15th Biennial Meeting of the

International College of Prosthodontists

September 18-21, 2013 Turin, Italy

Conference Program

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Department of Oral, Maxillofacial and Implant Rehabilitation, University of Torino
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ICP Welcomes our Colleagues and Guests to Torino, Italy

Special thanks to our Conference Organizing Committee:
Francesco Bassi, Mario Bresciano, Stefano Carossa & Paolo Pera

15th Meeting of the

International College of Prosthodontists

Torino, Italy
September 18-21, 2013

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International College of Prosthodontists

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Chinese Society of Prosthodontics of the Chinese Stomatological Association
http://www.cndent.com/

Dutch Society for Prosthetic Dentistry and Orofacial Pain
http://www.nvgpt.nl

Florida Prosthodontic Association
http://www.thefpa.org

Indian Prosthodontic Society
http://www.ipsonline.in/

International Society for Maxillofacial Rehabilitation
http://www.ismr-org.com/

Iranian Association of Prosthodontists

Israeli Society of Prosthodontics
http://www.dental.org.il

Italian Academy of Prosthetic Dentistry
http://www.aiop.com

Japan Prosthodontic Society
http://www.hotetsu.com/e.html

Korean Academy of Prosthodontics
http://www.kap.or.kr/

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Prosthodontic Society Singapore
http://prosthodontics.org.sg/

Sociedad de Protesis y Rehabilitación Oral de Chile
http://rehabilitacionoral.cl

Swedish Society for Prosthodontics
http://www.sfop.se/

The Academy of Prosthetic Dentistry, Chinese Taipei

The ICP wishes to thank our Organizations for their continued support and contributions to the art and science of prosthodontics around the world. We encourage our delegates to visit their respective web site for meeting announcements and news.

Welcome Letter from the ICP Presidents

On behalf of the International College of Prosthodontists (ICP), we would like to welcome all of our colleagues to Turin, Italy and the 15th Biennial Meeting of the ICP. We are delighted to be running this meeting with the cooperation of our Italian colleagues and associations. We are particularly happy to collaborate with AIOP the Italian prosthodontic association, and with our colleagues from the Italian universities. The ICP continues to flourish in its leading role as one of the largest international organizations dedicated to prosthodontics. Our organization is dedicated to patient care, education, research and outreach, and our ambitions are to promote the art and science of prosthodontics around the world.

We see the 2013 ICP Torino conference as providing an exciting and successful venue. We are particularly enthusiastic about the program which is offering the highest quality of speakers gathered together from the four corners of the globe together with a significant number of outstanding Italian speakers. This program promises to be yet another memorable ICP meeting with its special gathering of expertise, experience, scholarship, science and clinical art from our esteemed colleagues around the globe.

In the field of Prosthodontics we are seeing significant developments in areas of implantology , digital dentistry, dental materials and esthetics. In this meeting we are addressing these new developments with state of the art presentations. At the same time we are bringing the most learned and prominent names in the profession to address the important issues of treatment predictability in both new and traditional modalities. We have outstanding presentation scheduled to address current concepts and developments in the fields of implantology, basic science, temporomandibular disorders, esthetics, fixed prosthodontics, geriatric dentistry and outreach to underprivileged communities.

It is our hope that by working together, exchanging ideas and addressing the latest prosthodontic techniques and research, that new discovery will be achieved to benefit our specialty and ultimately our patients.

Yours Sincerely,

Co-Presidents

Dr. Martin Gross
Tel Aviv Dental School
Oral Rehabilitation
Tel Aviv, Israel

Dr. Yoshinobu Maeda
Osaka University, School of Dentistry
Dept of Prosthodontics and Oral Rehabilitation
Professor and Chairman
Osaka, Japan

16th Meeting of the

International College of Prosthodontists

Seoul, South Korea
September, 2015

Seoul, South Korea

Join the ICP 2015 conference in the business and cultural hub of South Korea…Seoul, where skyscrapers tower over Buddhist temples. Take it all in from the N Seoul Tower, built atop a peak in Namsan Park.

The teahouses and shops of Insadong give you a taste of Korean flavor, which you can further experience with a visit to the grounds and museums of Gyeongbokgung. UNESCO World Heritage Site Changdeokgung Palace is a fine example of authentic ancient architecture.

Seoul is a city steeped in the past yet anxious to embrace modernity, and this makes it one of Asia's most interesting and culturally vibrant destinations. From food, galleries, ancient palaces, museums, and shopping, this city has it all.

Save the date on your calendar and join us at this cultural destination!

Santiago, Chile

On a clear day, fresh after winter showers, Santiago basks in one of the most spectacular settings of any city in the world. A glance through the downtown blocks reveals a mighty circle of mountains - the snowcapped Andean peaks to the east, and a smaller coastal range to the west - that frames the Chilean capital.

Santiago is cultured, quirky and ambitious. The city rewards the patient traveler. Beyond the conservative conformity of Santiago Centro, and the soulless towers of the Las Condes financial district, there are thriving culinary and artistic enclaves that are a joy to uncover.

Gourmets feast on world-class cuisine in Bellavista and Providencia, bohemians gather in the charming old district of Barrio Brasil, while the city is dotted with fine museums and a flourishing arts scene. With a booming café culture and leafy, exotic suburban parks, Santiago has an infectious energy and a growing confidence.

Santiago is close in proximity to both the coast and the mountains. One hour east of Santiago into the Andes there are ski resorts for your entertainment, there should still be snow in September if you like to "Hit the Slopes"and one hour west are the beautiful cities of Valparaiso and Viña del Mar on the Chilean Pacific Coast.

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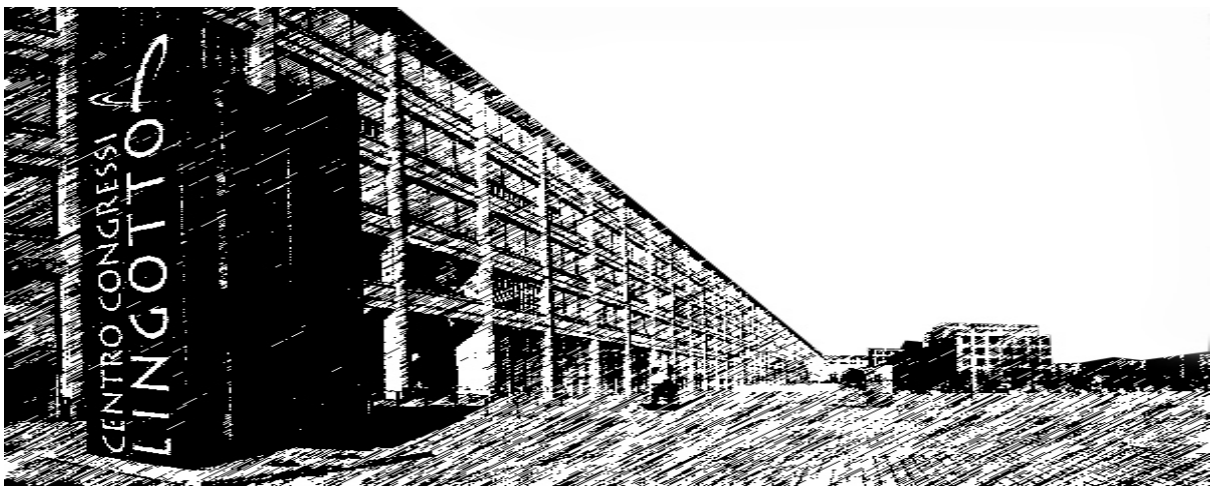

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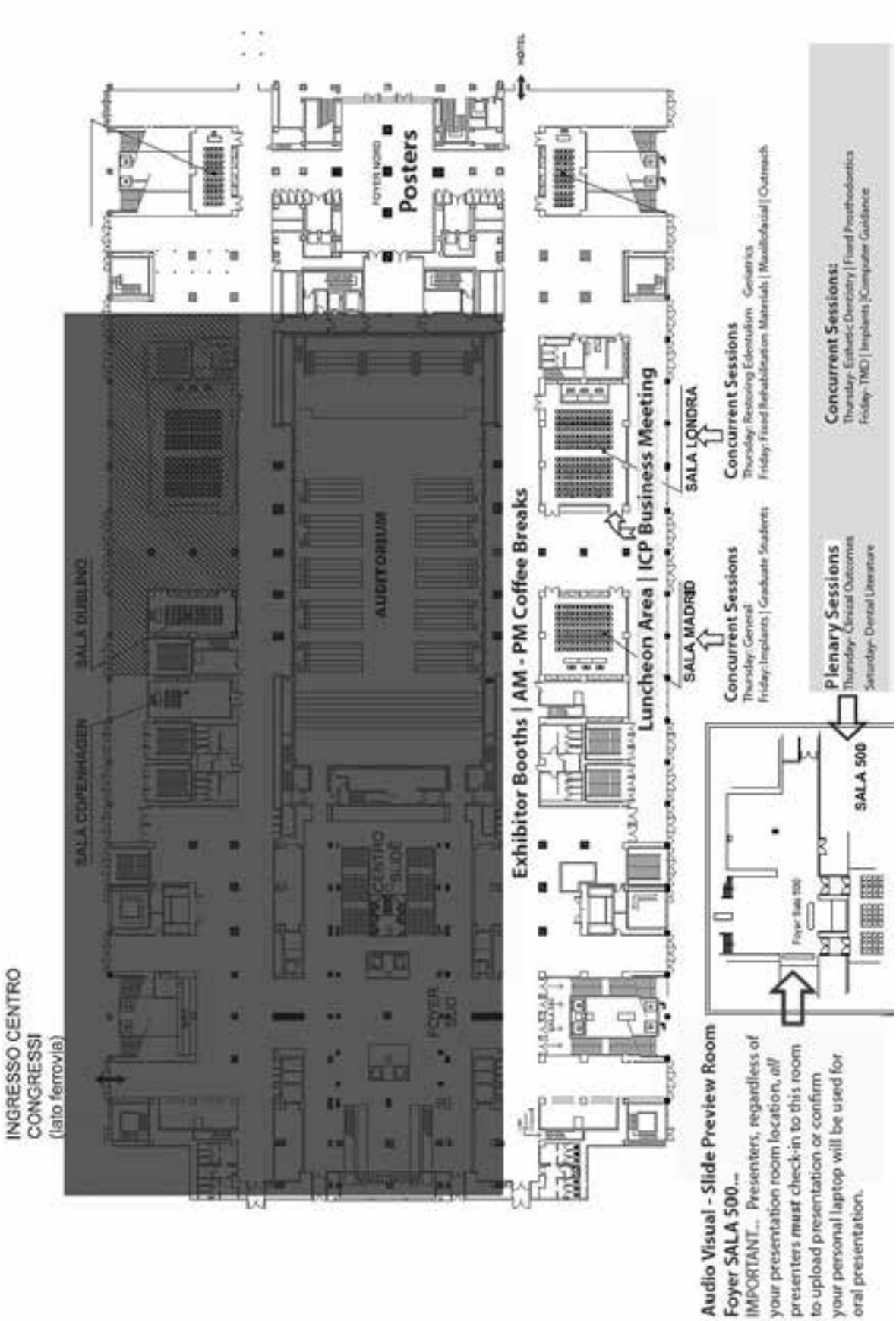
Congress Center Map



Conference Social Events

Wednesday, September 18th
17:00 - 19:00 Registration & Welcome Reception

We encourage all delegates to arrive early, pick-up your program book, conference credentials and review our industry partner booths.

No fee required for delegates
Accompanying Guest/s requires "Guest Fee"
Location: Exhibit Area
Dress: Casual

Wednesday, September 18th
18:30 - 20:00 YPE Reunion

Past delegates who have attended **Young Prosthodontic Educators**' (YPE) workshops are invited to meet for a "class reunion".

Invitation Only- Past YPE workshop delegates and guests
Location: Dental School / Third Floor / Main Hall
Dress: Casual

Thursday, September 19th
17:15 Poster Session & Exhibit Reception

Support your colleagues by reviewing their posters. Poster Session is scheduled from 2:00pm - 5:00pm. Posters will remain up through the Exhibit Reception for all to review.

The ICP encourage all delegates to visit our industry supporters. This is an excellent opportunity to network with your colleagues and review the latest in products and services.

No fee required for delegates
Accompanying Guest/s requires "Guest Fee"
Location: Exhibit Area
Dress: Business Casual

Friday, September 20th
18:15 ICP Reception & Banquet

Palazzina di Caccia di Stupinigi

The original castle was owned by the Acaja line of the House of Savoy. The new palace was designed by the architect Filippo Juvarra to be used as a *palazzina di caccia* ("hunting lodge") for Vittorio Amedeo II, King of Sardinia

Delegates and guests are invited to attend this gala event for the recognition of participating countries and their representatives, presentation of awards and installation of new officers. Entertainment, light appetizers, dinner and wine are included in this banquet event.

Reservations Required
Banquet Fee: $75 per person
Accompanying Guest/s requires "Guest Fee"
Location: Palazzina di Caccia di Stupinigi / Buses Depart from Lingotto Center
Dress: Black Tie Optional
Departure at 18:15

Conference Social Events

Saturday, September 21st
16:00 ICP Social Outing

Fontanafredda Winery
Langhe Valley, Piedmont, Italy

The story of Fontanafredda is a noble one. It began in 1858, when Vittorio Emanuele II, the first king of Italy, purchased the estate (a former hunting preserve) in order to produce fine Barolo for his personal use. Today, Fontanafredda is the single largest contiguous estate in Piedmont with over 305 acres of land, including 210 acres of vineyards in the Serralunga, Barolo and Diano d' Alba communes.

The Royal Villa Grill Garden is a liberty-style glass pavilion standing opposite swan lake. An ideal setting for our ICP social banquet.

Reservations Required
Social Outing Fee: $100 per person
Accompanying Guest/s requires "Guest Fee"
Location: Fontanafredda Winery/ Buses Depart from Lingotto Center
Dress: Business Casual
Departure at 16:00

Elective Events

Thursday, September 19th

Daily Spouse/ Guest Tour: DISCOVER TURIN

A tour of the city and its wonderful examples of baroque buildings and futuristic architectures. Art and history are very much at home in Turin, and this can be seen by the city's museums and palazzos, its piazzas, courtyards and churches, its historic relics and avant-garde pieces, its traditions and its progress.

You will enjoy the beauty of its historical centre discovering Piazza Castello with the Royal Palace, Palazzo Madama, the Cathedral and the splendid Baroque Palaces. Lunch in a typical restaurant.

Length: 5 hours, bus and walking tour
Time: 10:00am to 3:00pm

Price per person: $137 per person
Location: Departs from NH Lingotto 4, Tech and Marriott Hotel Lobby
Rate includes: private coach, English-speaking guide, lunch (4 Courses Menu, wine included)

Elective Events

Friday, September 20th

Daily Spouse/ Guest Tour:
EGYPTIAN MUSEUM AND PALAZZO MADAMA

Guided visit to the best leading attraction of Turin, the Egyptian Museum, the most important in the world after the one in Cairo. More than 30,000 items narrate 5000 years of history through art, religion and daily life in the time of the great pharaohs. Lunch in a typical restaurant. In the afternoon, guided visit to Palazzo Madama, once a Royal Residence, which now houses the collections of the Museo Civico d'Arte Antica, Turin's municipal museum of ancient art.

Length: 5 hours, bus and walking tour
Time: 10:00am to 3:00pm

Price per person: $210
Location: Departs from NH Lingotto 4, Tech and Marriott Hotel Lobby
Rate includes: private coach, English-speaking guide, lunch (4 Courses Menu, wine included), entrance fees.

Sunday, September 22nd

Post Conference Tour: Stresa and Maggiore Lake

A full day excursion to discover the beauty of Lake Maggiore, with the Borromean Islands and their spectacular gardens. Situated on the western side of Lake Maggiore, directly opposite Stresa, the three Borromean Islands lie in a wide gulf surrounded by mountains and were transformed by the aristocratic Borromean family into grand, luxurious residences with spectacular gardens. Only the island, named "dei Pescatori" after its age-old fishing community, was left to continue its traditional way of life. Sail on a private motorboat to Isola Bella and visit to its stunning Baroque Palace. Lunch in a typical restaurant. In the afternoon, guided visit to Stresa. A breathtaking view meets the first-time visitor to Stresa: Lake Maggiore, lined by rows of palm trees, flowering gardens, and the facades of elegant hotels, and in front the picturesque Borromean Islands, which seem to rise mysteriously out of the lake waters. Art and nature have found an extraordinary symbiosis here.

Time: 9:00am - 6:00pm

Price per person: $285
Location: Departs from NH Lingotto 4, Tech and Marriott Hotel Lobby
Rate includes: private coach, English-speaking guide, lunch (4 Courses Menu, wine included), private boat.

Monday, September 23rd

Post Conference Tour: Alba and the Langhe Area

A full-day-tour of the Langhe area, homeland of Barolo wine and truffles. An itinerary to discover the beauty of this land: La Morra, with its breathtaking view over the Barolo region, Barolo, splendid town with Medieval origins and Monforte, beautiful Medieval village. Lunch in a typical restaurant, in order to taste the delicacies of the area. In the afternoon, guided visit to Alba, the capital of Langhe, of wine and truffles, better knows as "the city with onehundred towers".

Time: 9:00am - 6:00pm

Price per person: $235
Location: Departs from NH Lingotto 4, Tech and Marriott Hotel Lobby
Rate includes: private coach, English-speaking guide, lunch (4 Courses Menu, wine included), wine tasting.

Tuesday, September 24th

Post Conference Tour: Discover the Royal Residences

A day to discover the beauty of the Royal Residences, UNESCO World Heritage Sites. Guided visit to the imposing Venaria Hunting Palace, one of the most significant examples of the magnificence of architecture and art in the 17th and 18th centuries thanks to its great architects like Amedeo di Castellamonte, Michelangelo Garove, Filippo Juvarra. A unique environmental and architectural experience of extraordinary interest, an immense, varied and imposing space full of ancient atmosphere is waiting to be discovered. Lunch in a typical restaurant. In the afternoon, guided visit to Racconigi Castle, location for Royal holidays, the last of the delightful residences built in the surroundings of Turin during the Baroque period. The castle site is distinguished by its majestic architecture and interiors, which contain splendid cabinets, frescoes, decorations, statues, stuccoes, chandeliers, flooring and a large collection of paintings – yet also for the wealth and beauty of its natural setting with the splendid park, the lake, the Margaria and greenhouse.

Time: 9:00am - 6:00pm

Price per person: $220
Location: Departs from NH Lingotto 4, Tech and Marriott Hotel Lobby
Rate includes: private coach, English-speaking guide, lunch (4 Courses Menu, wine included), entrance fees.

Welcome from the University of Turin

Being the Rector of the University of Turin, I am very pleased and honored to welcome you to Turin, a very ancient city. The name Torino derives from the Celtic word "tau", which means mountain. Turin was first established almost 2400 years ago by a Celtic tribe, the Taurini, who had conquered much of France and part of Spain before heading into what is known today as Italy. Through the years Turin was destroyed by Hannibal (first century A.D.), then rebuilt by Romans (Augustus Caesar) and later renamed Augusta Taurinorum (circa 28 A.D.). When the Roman Empire fell during the Dark Ages, Torino was conquered by various barbarian tribes including the Goths, Lombards and Franks and the city became an earldom in the 8th century A.D. The Savoy family dynasty conquered the city in the year 1280 and this historical landmark led to the city's rise to prominence. The history of Torino for the following 600 years is bound to that of the House of Savoy. In the year 1861 Vittorio Emanuele II was crowned king and Turin became the capital of Italy. In 1865, the capital moved to Florence. Rome became Italy's permanent capital in 1870.

In recent times, especially in the last decade, Turin has undergone various improvements, partly due to International events such as the 2006 Winter Olympic Games, which gave a huge input in restoring and renewing the city, thus making Turin internationally known.

The University of Turin was founded in 1404 by a Bull issued by Pope Benedict XIII. Medicine was one of the Schools. In 1506 Erasmus of Rotterdam obtained his degree here. Indeed, many scholars, especially French and English, considered Torino to be a first step in Italy before moving on to more ancient and better-known Universities such as Bologna (1088), Parma (1117) and others. In the 19th Century the University grew substantially to become one of the most prestigious Universities in Italy and a landmark for Italian Positivism.

Many of the leading figures in 20th century Italian political and social life, as well as three winners of the Nobel Prize for Medicine, Salvatore Luria, Rita Levi Montalcini, Renato Dulbecco, and Italian Republic Presidents, graduated from Turin University.

In Italy the School of Dentistry has been established recently. Dentistry before 1980 was a specialty of Medicine. In these few years, the Turin Dental School gained importance, and it is now Internationally appreciated. This occurred above all in the prosthodontic field thanks to Prof. Giulio Preti's efforts. I like the description that prof. Carlo Guastamacchia, once gave of him: He is "the flag and the wind for the Italian dental community. His enthusiasm, his competence, and his love for work are the best examples that a teacher can offer to a school of dentistry and to our profession." He was able to create a working group of collaborators who followed him in realizing his tasks in education and research. Some of these co-workers could continue their career in other Universities (Bari, Bologna, Ferrara, Genova) and others here in Turin, creating a school which is able to continue his conduct, even after his retirement. After seven years under prof. Stefano Carossa's leadership, I can say that it has been confirmed by the fact that the conference of ICP, the most important international academic association, is held in our city. This is a praise to Turin Prosthodontic School that gives pride to Turin University and consequently to Italian Dentistry.

Even though I am not a dentist, I can understand the topics of the program and I appreciate the interest in geriatrics and outreach, that usually are not very common in your field. In this global world, global health is more and more important. Teaching oral rehabilitation of disadvantaged people and in developing countries has to be considered as one of the main tasks that belong to a University.

The Rector wishes you a worthwhile work and I hope you will enjoy and appreciate Turin.

Yours sincerely,

Ezio Pelizzetti
Full Professor in Analytical Chemistry, Rector of Turin University

Welcome from the University of Genoa

Dear Colleagues and Friends,

The School of Dentistry of Genoa is delighted to welcome you to the 15th Biennial Meeting of the International College of Prosthodontists (ICP), 18-21 September 2013, in Turin, Italy.

We are willing to acknowledge you with some brief insight into Genoa University history.

As most of the Italian universities, University of Genova was born many centuries ago. It dates back the 13th century when Colleges were established as private institutions governed by their own internal rules and regulations. They were entitled to award degrees in Law, Medicine, Theology, the Arts and Philosophy.

Studies are underway to trace the official foundation of the University of Genoa, traditionally regarded as being marked by Papal Bull of Sixtus IV in 1417.

In 1554 the Company of Jesus of Genoa began taking an interest in higher education and founded its own college. When the Company of Jesus was suppressed in 1773, the responsibility for higher education was taken on by the Senate of the Republic of Genoa, which established rules and regulations for the four Faculties existing at that time (Philosophy, Law, Medicine and Theology).

When the Republic of Genoa became part of the French Empire, the University of Genoa was affiliated to the Imperial University in Paris. Later, at the Congress of Vienna in 1815, it was decided to entrust University of Genoa to the Kingdom of Sardinia, affiliated to Turin University and return to its original collegiate structure.

Genoa University has the merit of being the first University in Italy to have included the Course of Dentistry as an integral part of its program in 1890. Since then, the Dental Clinic has been developed in Genoa surviving to the two World Wars.

Some enlightened Professors from Genoa University (such as Professor Angelo Chiavaro and Professor Giovanni Briasco) struggled for decades to institute the Degree Course of Dentistry in Italy on the model of USA University.

The University of Genoa is proud to cooperate with the University of Turin in organizing such an exciting event. The scientific board has developed an engaging scientific program that will cater for the spectrum of interests of all the participants. The goal of the program is to provide a holistic vision of the prosthodontic rehabilitation and to give the opportunity to share scientific knowledge and clinical experience among different professionals from all over the world.

In addition, the uniquely beautiful Turin location will be an attraction for the social and cultural events. The program will also let you time available to enjoy gorgeous Turin, the amenities of Piedmont and to meet new and old friends joining at the Meeting.

On the behalf of the School of Dentistry of Genova we wish you all the best fruitful meeting.

Kind regards,

Giacomo Garlaschi
Dean of the Faculty of Dentistry, Genoa University

Paolo Pera
Director of The Dental Clinic, Genoa University

2012-2013 Scientific Program Chair Welcome Letter

Dear Colleagues,

It is with great pleasure that we welcome you to the 15th Biennial meeting of the International College of Prosthodontists.

This program promises to be yet another memorable ICP meeting with its special banquet of expertise, experience, scholarship, science and clinical art from our esteemed colleagues around the globe. We are particularly enthusiastic about the program which is offering the highest quality of speakers gathered together from the four corners of the globe together with a significant number of outstanding Italian speakers.

We are delighted to be running this meeting with the cooperation of our Italian colleagues and associations. We are particularly happy to collaborate with AIOP the Italian prosthodontic association, and with our colleagues from the Italian universities

It is ICP Board policy that invited speakers do not receive any reimbursement for travel, lodging and meals nor do they receive an honorarium. Our speakers represent all corners of the globe and bring enormous experience and wisdom to the podium to share with you. Truly, their participation represents a wonderful spirit of volunteerism and professional service and we wish to express our special gratitude to them for accepting our invitation to participate in the program.

In the field of Prosthodontics we are seeing significant developments in areas of implantology, digital dentistry, dental materials and esthetics. In this meeting we are addressing these new developments with state of the art presentations. At the same time we are bringing the most learned and prominent names in the profession to address the important issues of treatment predictability in both new and traditional modalities. We have outstanding presentation scheduled to address current concepts and developments in the fields of implantology, basic science, temporomandibular disorders, esthetics, geriatric dentistry and outreach to underprivileged communities. Now for the third time we are running the Graduate Students Treatment planning session. 5 Prosthodontic graduate students fromdifferent centers round the world will present single cases with stages and rationale for treatment planning and the treatment decided upon. This will be chaired by George Zarb, Peter Owen and Ami Schmidt and promises to be as successful as in the last meetings.

So we wish you all a very successful and highly enjoyable meeting.

With Best wishes,

Martin Gross

Francesco Bassi

Thursday, September 19th

Focus Session I: Clinical Outcomes-Evidence Based Dentistry *(Morning)* Sala 500
Dr. Martin Gross
Dr. Yoshinobo Maeda

Concurrent Session: Esthetic Dentistry Fixed Prosthodontics *(Afternoon)* Sala 500
Dr. Dale Howes
Dr. Mario Bresciano

Concurrent Session: General *(Afternoon)* Sala Madrid
Dr. Ann Wennerberg
Dr. Paola Ceruti

Concurrent Session: Restoring Edentulism Geriatrics Dentistry *(Afternoon)* Sala Londra
Dr. Keiichi Sasaki
Dr. Andrea Boracchini

Friday, September 20th

Concurrent Session: Occlusion & TMD Bruxism and it's Management *(Morning)* Sala 500
Dr. Iven Klineberg
Dr. Santo Catapano

Concurrent Session: Implants / Other *(Morning)* Sala Madrid
Dr. Brian Fitzpatrick
Dr. Federico Mussano

Concurrent Session: Fixed Rehabilitation Materials *(Morning)* Sala Londra
Dr. Aris-Petros Tripodakis
Dr. Vincenzo Notaro

Friday, September 20th *(continued)*

Concurrent Session: Implants, Inclined Implants, Computer Guidance *(Afternoon)* Sala 500
Dr. Steven Eckert
Dr. Lino Calvani

Concurrent Session: Graduate Student Treatment Planning Session *(Afternoon)* Sala Madrid
Dr. George Zarb
Dr. Peter Owen

Concurrent Session: Maxillofacial *(Afternoon)* Sala Londra
Dr. Tom Taylor
Dr. Giorgio Gastaldi

Concurrent Session: Implants, Inclined Implants, Computer Guidance *(Afternoon)* Sala 500
Dr. Steven Eckert
Dr. Lino Calvani

Concurrent Session: Graduate Student Treatment Planning Session *(Afternoon)* Sala Madrid
Dr. George Zarb
Dr. Ami Smidt

Concurrent Session: Outreach *(Afternoon)* Sala Londra
Dr. Sang-Wan Shin
Dr. Massimo Corsalini

Saturday, September 21st

Focus Session II: The Dental Literature, How Relevant is it to Clinical Practice? Sala 500
Dr. Rhonda Jacob
Dr. Peter Owen

Conference Program Schedule

Tuesday, September 17th

08:00 - 17:00 ICP Board Meeting *(Councilors only)* ***Location: Dental School***

Wednesday, September 18th

08:00 - 17:00 ICP Board Meeting *(Councilors only)* ***Location: Dental School***

15:00 - 17:00 **Industry Session**: **GC Sponsor Presentation**- ***Location: Dental School***
Title: *Glass-Fibre Reinforcement in Dentistry: Many Options at your Fingertips*
Instructors: Prof. Pekka Vallittu & Prof. Mutlu Ozcan

17:00-19:00 Registration Opens- Welcome Reception ***Location: Exhibit Area***

18:30-20:00 YPE Reunion- *Past YPE Delegates* (*Invitation Only*) ***Location: Dental School***

Thursday, September 19th

08:00	Opening Ceremony / Announcements
	Focus Session I: Clinical Outcomes- Evidence Based Dentistry ***Location: Sala 500***
	Moderators: Martin Gross & Yoshinobo Maeda
08:30	**#1: Torsten Jemt, Sweden*-** *What Can We Learn from Long-Term Follow-Up Studies on Dental Implants?*
09:15	**#2: Bjarni Pjetursson, Iceland*-** *Is Evidenced Based Treatment Planning in Prosthetic Dentistry Realistic, or Only an Illusion?*
10:00	**#3: Regina Mericske-Stern, Switzerland*-** *Implant Supported Overdentures*
10:30	AM Break / Exhibit Review
11:00	**#4: Giulio Preti, Italy*-** *Should the Edentulous Patient's Treatment Be Changed?*
11:40	**#5: Terry Walton, Australia*-** *Clinical Research in a Private-Practice Setting*

12:30 - 14:00 Conference Luncheon

14:00 17:00	**Concurrent Session:** Esthetic Dentistry Fixed Prosthodontics	**Concurrent Session:** General	**Concurrent Session:** Restoring Edentulism Geriatrics Dentistry
	Location: Sala 500	***Location: Sala Madrid***	***Location: Sala Londra***
	Moderators: Dale Howes & Mario Bresciano	**Moderators: Ann Wennerberg & Paola Ceruti**	**Moderators: Keiichi Sasaki & Andrea Boracchini**
14:00	**#6: Leonello Biscaro, Italy*-** *Meeting Patient's Esthetic Expectations: The Real Challenge in Today Restorative Dentistry*	**#14: Anneloes Gerritsen, Netherlands-** *Long-Term Sustainability of Shortened Dental Arches*	**#23: Joke Duyck, Belgium*-** *Age-Related Dental Challenges*
14:15		**#15: Qian Zhang, China-** *Occlusal Tooth Wear in Chinese Adults: Shortened Dental Arches*	**#24: Michael MacEntee, Canada*-** *Uncertainty in Restoring the Edentulous Patient*
14:30	**#7: Piero Simeone, Italy-** *Lithium-Disilicate Full Mouth Rehabilitation of Severe Bruxism: A Contemporary Minimally Invasive Prosthetic Approach*	**#16: Aris-Petros Tripodakis, Greece-** *Review and Current Rehabilitation Approach for the Aberrant Clinical Situation Described as: "Kelly's Combination Syndrome"*	**#25: Kazunori Ikebe, Japan*-** *Personalized and Predictive Prosthodontics for Elderly Patients*
14:45	**#8: Fausto Sommovigo, Italy-** *Smile Makeover Treatment with M.I.P.P. with Lithium Disilicate Monolithic Crowns & Laminates*	**#17: Clark Stanford, USA-** *Advanced Care Strategies for Patients with Congenital Oligodontia*	**#26: Norbert Enkling, Switzerland*-** *Mini-Implants (MDI): An Evidence Based Treatment Option for Edentulous Patients*
15:00	**#9: Domenico Baldi, Italy-** *A New Piezoelectric Insert For Anterior Teeth Preparation*	**#18: Ryota Takaoka, Japan-** *Genetic and Environmental Factors Involved in Sleep Bruxism in Twins*	**#27: Joanne Walton, Canada-** *The Vancouver Implant Prosthesis Trial 5-year RCT Results of Mandibular 1 and 2 Implant Overdentures*
15:15	**#10: Guido Schiroli, Italy-** *Immediate Tooth Esxtraction and Implant Provisionalization Using Computer Guided Surgery and Virtual Planned Milled CAD CAM Abutments: 3 Case Reports*	**#19: Leslie Lang, Canada-** *Effectiveness of a Novel Delivery System on Salivary Flow Rate, Quality of Life, and Inhibition of Caries-Associated Microbiota in Sjögren's Syndrome Patients*	**#28: Mats Kronstrom, USA-** *Patient Satisfaction and Clinical Outcomes Among Patients Treated with Immediately Loaded Mandibular Overdentures Supported by 1 or 2 Dental Implants*
15:30	PM Break / Exhibit Review		

	Location: Sala 500	*Location: Sala Madrid*	*Location: Sala Londra*
16:15	**#11: Duygu Karasan, Turkey-** *The Effect of Margin Ceramics on Pink Esthetics and Soft Tissue Health of Single Unit FDPs: A Split-Mouth Pilot Study*	**#20: Limor Avivi Arber, Canada-** *Principles of Brain Plasticity: Implications for Oral Rehabilitation*	**#29: Chisato Inomata, Japan-** *Effect of Removable Partial Dentures on Dietary Intakes in 70- and 80-Year-Old Elderly*
16:30	**#12: Raffaello Cimma, Italy-** *Minimally Invasive Surgery, Soft Tissue Management, Provisional & Definitive Crowns: Basic Steps to Enhance & Preserve Aesthetic Results*	**#21: Pranjal Radke, India-** *Ergonomics and Work Related Musculoskeletal Disorders (WMSD) Among Prosthodontists in a Health University in India: A Cross-Sectional Study*	**#30: Yuko Kurushima, Japan-** *Does Case Severity of Edentulous Patients Make Difference in the Clinical Improvements of Complete Dentures?*
16:45	**#13: Iordache Gallarato, Italy-** *The Use of Chu's Gauge in Crown Lengthening Procedures for Aesthetic Approach: A Case Series*	**#22: Hitoshi Oguchi, Japan-** *Psychosomatic Backgrounds, Treatments, and Outcomes in Occlusal Dysesthesia - Clinical Study of 61 Patients Who Required a Psychosomatic Approach*	**#31: Caroline Nguyen, Canada-** *Medication-Related Dry Mouth in the Elderly: Ubiquitous but Overlooked*
17:00	**Session Adjourns**		
17:00-19:00	**Poster Session & Exhibit Reception**		

Friday, September 20th

08:30 12:30	**Concurrent Session:** TMD Bruxism and Occlusion	**Concurrent Session:** Implants and Other	**Concurrent Session:** Fixed Rehabilitation Materials
	Location: Sala 500	*Location: Sala Madrid*	*Location: Sala Londra*
	Moderators: Iven Klineberg & Santo Catapano	**Moderators: Brian Fitzpatrick & Federico Mussano**	**Moderators: Aris-Petros Tripodakis & Vincenzo Notaro**
08:30	**#32: Iven Klineberg, Australia*-** *Bruxism and Bowel Symptoms – A New Look at an Old Problem*	**#47: Elisabetta Bellia, Italy-** *Functional Evaluation of RPD Retained by Short Implants Before & After Implant Anchorage: Case*	**#66: Matthias Kern, Germany*-** *Esthetic and Minimal Invasive Anterior Tooth Replacement Revisited*
08:45	**#33: Gunnar Carlsson, Sweden*-** *Occlusion and TMDs – Past and Present Opinions on Management*	**#48: Sun Jong Kim, Korea-** *Biomarkers of BRONJ (Bisphosphonate Related Osteonecrosis of the Jaw)*	
09:00		**#49: Francesco Pera, Italy-** *Periimplantitis: Perspectives for Prevention and Enhanced Clinical Management*	**#67: Fernando Zarone, Italy*-** *All-Ceramic Restorative Materials: Research Data and Clinical Considerations for a Rational Use*
09:15	**#34: Stefano Carossa, Italy* -** *Occlusion and Materials in Implant Prosthodontics*	**#50: Joseph Nissan, Israel*-** *Esthetic and Clinical Outcome of Implant Supported Restorations in Atrophic Alveolar Ridges, with the Use of Bone Block-Allografts - Up to 7 Years Follow-Up*	
09:30		**#51: Gianmario Schierano, Italy*-** *Dental Implant Site Preparation: Drill Technique Versus Piezosurgery Technique*	**#68: Roberto Scotti & Carlo Monaco, Italy*-** *Prosthetic Treatment and Teaching In the Digital Era*
09:45	**#35: Meiqang Wang, China*-** *Occlusion and TMD: From Clinic to Lab, and Back to Clinic*	**#52: Michael Korsch, Germany-** *Cement-Induced Periimplantitis: A Retrospective Clinical Observational Study of Fixed Implant-Supported Restorations Using a Methacrylate Cement*	
10:00		**#53: Nancy Clelland, USA-** *Split-Mouth Comparison of Splinted and Non-Splinted Implant Prostheses: 1 to 3 Year Results*	**#69: Petra Guess, Germany*-** *Minimal Invasive Dentistry: Science & Clinical Recommendations*

	Location: Sala 500	*Location: Sala Madrid*	*Location: Sala Londra*
10:15	**Discussion**	**#54: Marco Bevilacqua, Italy-** *Impact of Prosthetic Design on Screw-Retained Full Fixed Denture: A Three-Dimensional Finite Element Analysis*	**#70: Ge Chunling, China-** *Porcelain Veneer Failure Loads and Modes were Profoundly Influenced by the Supporting Substrate: Enamel, Dentin, or their combination*
10:30	AM Break / Exhibit Review		
11:00	**#36: Iven Klineberg, Australia*-** *Risk Factors Associated with Tooth Surface Loss*	**#55: Alon Preiskel, UK-** *Restore or Replace: The Prosthodontic Dilemma*	**#71: Eldad Sharon, Israel-** *Occlusal Veneers as an Alternative Treatment for the Conventional Crown*
11:10	**#37: Sandro Palla, Switzerland*** *A New Perspective of Occlusion: Neurocognitive Aspects*		
11:15		**#56: Sunyoung Ma, New Zealand-** *Maxillary 3-Implant Overdentures: Is This a Viable Treatment Option?*	
11:30		**#57: Sang-Wan Shin, Korea-** *Mandibular Implant Supported Overdentures: A Systematic Review*	**#72: Bulem Yuzugullu, Turkey-** *Effect of Microwave & Conventionally Sintered Zirconia Surface Treatments on the Bond Strength Between Zirconia and Veneering Ceramic*
11:40	**#38: Kiyoshi Koyano, Japan* -** *Occlusal Splints and Bruxism*		
11:45		**#58: Mingming Xu, China-** *Computer Guided Implant in Severe Bone Defect*	**#73: Lieve Van Zeghbroeck, Belgium-** *Evolution in Oral Scanners*
12:00		**#59: Adam Hamilton, Australia-** *Evaluation of the fit of CAD/CAM abutments*	**#74: Simel Ayyildiz, Turkey-** *Annealing of Co-Cr Dental Alloy: Effects on Nanostructure and Rockwell Hardness*
12:15	**Discussion**	**#60: Paola Ceruti, Italy-** *Evaluation of Masticatory Efficiency and Nutritional Status in Patients with Overdenture Retained by One Implant*	**#75: Ozlem Acar, Turkey-** *The Effect of Dentin Desensitizers and Nd:YAG :Laser Pre-Treatment on Microtensile Bond Strength of Self-Adhesive Resin Cement to Dentine*

12:30 - 14:00 **ICP Business Lunch** *(members only)*

14:00 17:00	**Concurrent Session:** Implants, Inclined, Computer Guidance	**Concurrent Session:** Graduate Student Treatment Planning	**Concurrent Session:** Maxillo-facial
	Location: Sala 500	*Location: Sala Madrid*	*Location: Sala Londra*
	Moderators: Steven Eckert & Lino Calvani	**Moderators: George Zarb & Peter Owen**	**Moderators: Tom Taylor & Giorgio Gastaldi**
14:00	**#39: Stephen Parel, USA*-** *The All on 4 Experience: Planning, Progress, Pitfalls*	**#61: Zoe Potres, Australia-** *Oral Rehabilitation of Amelogenesis Imperfecta*	**#76: Gianfranco Gassino, Italy*-** *The Maxillectomy Patient: A New Method to Relieve the Impression and the Vertical Dimension of Occlusion*
14:15		**Discussion**	**#77: Susan Tanner, UK-** *A Novel Patient–Specific Approach to Implant Reconstruction of Subtotal Resection of the Maxilla Following Maxillary Osteosarcoma*
14:30	**#40: Paolo Pera, Italy* -** *Concepts and Treatments Involving Inclined Implants*	**#62: Meriting Thokoane, South Africa-** *The Dynamic Nature of Treatment Planning*	**#78: Shlomo Calderon, Israel*-** *Do Posterior Teeth Supra-Erupt when Opposing Resected Segments?*
14:45		**Discussion**	**#79: Pooja Garg, Australia-** *Maxillary Microvascular Reconstruction Using Free Fibular Graft: Prosthodontically Driven Treatment Planning*
15:00	**#41: Graham Carmichael, Australia-** *Retrospective Analysis of Four Immediately Placed Implants and Immediately Loaded Mandibular Implant Supported Fixed Dental Prostheses*	**#63: Sayaka Tada, Japan-** *Treatment with the Overdenture for Partially Edentulous Patient; A Case Report*	**#80: Balendra Pratap Singh, India-** *Assessment of Swallowing and Masticatory Performance in Obturator Wearer- An In-Vivo Study*

	Location: Sala 500	*Location: Sala Madrid*	*Location: Sala Londra*
15:15	**#42: Martin Gross, Israel*-** *Prosthetically Driven Computer Assisted Guidance and Implant Supported Rehabilitation*	**Discussion**	**#81: Bella Panjwani, Canada-** *Keeping Pace with Changing Treatment Modalities in Head and Neck Cancer Patients: Prospectives from Oral Oncology and The Oral Supportive Team*
15:30	PM Break / Exhibit Review		
	Concurrent Session: Implants, Inclined, Computer Guidance	**Concurrent Session:** Graduate Student Treatment Planning	**Concurrent Session:** Outreach
	Location: Sala 500	*Location: Sala Madrid*	*Location: Sala Londra*
	Moderators: Steven Eckert & Lino Calvani	**Moderators: George Zarb & Ami Smidt**	**Moderator: Sang-Wan Shin & Massimo Corsalini**
16:00	**#43: Thomas Balshi, USA*-** *The Zygomatic and Pterygoid Implant, Guided and Unguided Strategies*	**#64: Shmuel Morgulis, Israel-** *The Treatment of a Severely Compromised Patient*	**#82: Francesco Bassi, Italy* -** *Outreach in Educational Programme at Dental Schools: Oral Health Global Health*
16:15	**#44: Yoshinobo Maeda, Japan*-** *Is "All-On 4 Concept with Inclined and Minimum Number of Implants" Really Biomechanically Valid? Better to have More or Less?*	**Discussion**	
16:20			**#83: Peter Owen, South Africa*-** *Therapeutic Options for Underprivileged Communities*
16:30	**#45: Tiziano Tealdo, Italy-** *6-Year Prospective Study on the Immediate Loading Rehabilitation of the Upper Jaw following the Columbus Bridge Protocol: Factors Affecting the Outcome*	**#65: Sagar Abichandani, India-** *Full Mouth Rehabilitation of a Patient using a Combination of Pankey Mann Schulyer & Hobo's Technique – A Clinical Report*	
16:45	**#46: Maria Menini, Italy-** *Immediate Versus Delayed Loading of Dental Implants in Edentulous Maxillae: A 6-year Study*	**Discussion**	**#84: Elham Emami, Canada-** *Knowledge Exchange in Rural Dentistry*
17:00	Session Adjourns		

18:15 **ICP Reception & Banquet** *(reservations required)*

Saturday, September 21st

08:30 13:00	**Focus Session II:** The Dental Literature- How Relevant is it to Clinical Practice? ***Location: Sala 500***
	Moderators: Rhonda Jacob & Peter Owen
08:30	**#85: Harold Preiskel, UK*-** *Dental Literature and Practice: Symbolic or Symbiotic Relationship?*
09:00	**#86: Stephen Eckert, USA*-** *What is the Relevance of the Dental Literature to Clinical Practice?*
09:30	**#87: Sreenivas Koka, USA*-** *Osseosufficiency, Osseoseparation, and Dental Implant Failure*
09:45	**#88: David Chvartszaid, Canada*-** *Distinguishing Normal and Abnormal Marginal Bone Behaviour around Osseointegrated Implants*
10:00	AM Break / Exhibit Review
10:30	**#89: Danielle Layton, Australia*-** *Statistical Certainty: An Oxymoron*
11:00	**#90: Tiziano Testori, Italy*-** *The Implant Literature: How Relevant is to Clinical Practice?*
11:30	**#91: George Zarb, Canada*-** *Summary of the Morning Session of the Relevance of the Dental Literature to Clinical Practice*
12:30	Conference Announcements- **2015 Meeting: Seoul, Korea**
13:00	Conference Adjourns

13:00 - 15:00 ICP Board Meeting *(Councilors only)* ***Location: Dental School***

16:00 - 20:00 **ICP Social Outing** *(reservations required)* **Fontanafredda Winery** Langhe Valley, Piedmont, Italy

**Denotes Invited Speaker*

The ICP reserves the right to cancel or modify its program as circumstances might dictate
Views expressed by the presenters at the ICP Meetings are solely their own and do not necessarily reflect the position or polices of the ICP

Poster Abstracts

(Listed first by Topic, then in Alphabetical order)

Thursday, September 19th 17:00-19:00 ***Location: Foyer Nord***

Topic: Dental Implants

Poster #	Name (Last, First)	Abstract Title
1	Akgurbuz, Alper	*Evaluation of the Stress Levels Created by Masticatory Forces on Tooth-Implant Supported Fixed Partial Dentures with Three Dimensional Finite Element Analysis Method*
2	Bae, Jiyoung	*A Quick Setting Calcium Phosphate Cement: Effects of Planetary Ball Milling*
3	Bergendal, Birgitta	*Current Experiences of Dental Implants in Rare Disorders - Review of the Literature*
4	Capirano, Medick	*Early Success of Short Implants from a Prospective Clinical Study*
5	Celebic, Asja	*Mini Dental Implant Supported Mandibular Overdentures: A Follow Up Over 5 Years Considering OHRQoL, Chewing Function and Bone Support and Comparison with Conventional Complete Dentures*
6	Chao, Yueh-Ling	*Application of an rhBMP-2 Based Artificial Bone Composite in Peri-Implant Bone Regeneration - A Radiographic Analysis*
7	Dellepiane, Elena	*Patient Satisfaction and Comfort After a Full-Arch Immediate Loading Rehabilitation: A Preliminary Study*
8	Franceschetti, Giulio	*Reliability of CAD-CAM Implant-Positioning Placement Software*
9	Fujino, Tomoko	*Cell Differentiation on Nanoscale Features of the Titanium Surface: Effects of Deposition Time in NaOH Solution*
10	Fukushima, Azusa	*Possible Involvement of Oxygen Concentration Cell in Microbiologically-Induced Titanium Corrosion*
11	Furuhashi, Akihiro	*Prosthodontictic Rehabilitation of a Patient with Partial Anodontia – a case report*
12	Han, Kyeong-Hwan	*Recruitment and Enrolling in a Randomized Clinical Trial of Mandibular Two-Implant Overdenture*
13	Hata, Masaki	*Comparision of Differential Capability and Mechanical Stress Response Between Dental Pulp Stem Cell and Bone-Marrow Derived Mesenchymal Stem Cells*
14	Hayashi, Kensuke	*Stress Analysis of Implant Keepers with Different Retaining Methods*
15	Hems, Edward	*Specialist Prosthodontists and Surgical Implant Placement*
16	Howashi, Miori	*Relationship Between Bone Density Values Evaluated Using Computerized Tomography or Cortical Bone Thickness, and Primary Implant Stability: Comparison of Different Types of Implants*
17	Ishiura, Yuichi	*Biomechanical Investigation into Effect of Length of Implants on Bone Stress under Simulated Loading Condition.*
18	Isorna Suarez, Cristina	*The Effect of a Novel Implant Surface on Gene Expression*
19	Jiang, Xinquan	*The Synergistic Effect of Hierarchical Micro/Nano-Topography and Bioactive ons for Enhanced Osseointegration*
20	Kahramanoğlu, Erkut	*Esthetic Outcome Evaluation of Maxillary Anterior Single Tooth Bone Level Implants with Metal and Ceramic Abutments*
21	Kamposiora, Phophi	*Final Outcomes of Immediate Restoration of Anterior Implants Following Stereolithographic Surgery*
22	Kim, Min-Jeong	*Finite Element Analysis of Maxillary Implant-retained Overdentures according to Bar Attachment Design and Palatal Coverage Type*

Poster #	Name (Last, First)	Abstract Title
23	Kuoppala, Ritva	*Treatment Outcome of Mandibular Implant-Supported Overdentures after Surgical Bone Graft using Tent Pole Technique*
24	Kwon, Kung-Rock	*Comparative Analysis on Screw Loosening of Prefabricated Abutments and CAD/CAM Abutments*
25	Law, Constance	*Fracture of Titanium Oral Implants: A Case Report with SEM Analysis*
26	Maestro, Dario	*High Technology for Patient Bearer of Grave Handicap: Resolution of a Complex Case Report*
27	Makihara, Yusuke	*Histological and Mechanical Evaluation of the Implants Placed in the Reconstructed Bone by Interconnected Porous Calucium Hydroxyapatite*
28	Malaguti, Giuliano	*Does Color Matter? Comparative Evaluation of Peri-Implant Tissue Esthetic with Colored Implants and Abutments Through Spectrophotometer and Image Software Analysis*
29	Marin, Mihaela	*The Influence of Interimplant Distance on Clinical Outcome of Two-Implant Mandibular Overdenture Treatment*
30	Melescanu-Imre, Marina	*Therapeutic Attitudes for Maxillary Full Edentulous Cases*
31	Michalakis, Konstantinos	*Marginal Adaptation of 4 Inlay Casting Waxes on Stone, Titanium and Zirconia Dies.*
32	Mito, Takehiko	*Stress Analysis in Mandibular Bone with Implants by FEA Adopting Inhomogeneity of the Bone*
33	Mussano, Federico	*A Pre-Clinical Study on Novel Oxidic Composites for Dental Implants*
34	Nakano, Yoko	*Effect of Nanostructure Modified Titanium Surface of Rat Vascular Endothelial Cells*
35	Nam, Sejin	*Stimulation of Healing Within a Rabbit Calvarial Defect by a PCL/PLGA Scaffold Blended with TCP using Solid Freeform Fabrication Technology*
36	Oikawa, Mayumi	*Surface Modification of Low Elastic Titanium by Electron Cyclotron Resonance Plasma Oxidation*
37	Oshima, Yoko	*Enhanced Osteoblast Function on Hydrofluoric-Acid Treated Ce-TZP/Al2O3 Nanocomposite*
38	Özçakır Tomruk, Ceyda	*Prevelance of Sinus Lifting (External or Internal) Procedures in the Posterior Maxilla: An Epidemiologic Study*
39	Ozkan, Yasar	*Early Loaded Implants in Various Augmentation Techniques: 5 – 10 Years Follow Up.*
40	Ozkan, Yasemin	*Ten Year Treatment Outcomes with Three Brands of Implants in Implant Supported Mandibular Overdentures*
41	Özkurt-Kayahan, Zeynep	*Prosthetic Restoration Types of Dental Implants: An Epidemiological Study in a Turkish Subpopulation*
42	Papavasiliou, George	*Rationale for the Use of Prostheses Combining Screw Retention and Cementation*
43	Persic, Sanja	*A Three Years Follow-Up Clinical Study of Fixed Partial Dentures Supported by Mini Dental Implants: Assessment of Oral Health-Related Quality of Life, Chewing Function and Orofacial Aesthetics*
44	Petricevic, Nikola	*Improvement of the Quality of Life in Patients with Implant-Supported Fixed Partial Dentures*
45	Pohlen, Boštjan	*Prosthetic RehabiIitation with Implants After Segmental Mandibuiectomy and Free Vascularized Fibula Flap Reconstruction*
46	Ponte, Alessandro	*The Insertion of Customized Zirconia Abutments During the Reentry in the Posterior Area: New Perspectives in Soft Tissue Management*

Poster #	Name (Last, First)	Abstract Title
47	Prado Correa, Francisca	*Torque Resistance of Orthodontic Mini-Implants of Different Diameter and Shape*
48	Preoteasa, Elena	*Mandibular Overdenture – Are 2 Mini Dental Implants Enough? Preliminary Results*
49	Radke, Pranjal	*Finite Element Analysis in Dental Implantology- A Literature Review*
50	Rubo, Jose H.	*Strain Caused by Prosthesis Fabrication Steps on Abutments and Simulated Bone Around Dental Implants*
51	Saccone, Concetta Laura	*Evaluation of Oral Sensitivity in Patients Wearing Maxillary Complete Denture and Mandibular Overdenture Before and After the Anchorage to a Single Implant*
52	Seol, Kuk Joo	*Strain Analysis of Mini-Implant Retained Mandibular Overdenture*
53	Shen, Yen-Wen	*Development of Peri-Implant Bone Loss Measuring Protocols by Feature Point Pair Technique*
54	Shin, Meeran	*Six Years After Fixed Implant Prosthesis on Patients with Epidermolysis Bullosa - A Clinical Case Report*
55	Soto, Macarena	*Effect of Using a Gold Washer Between Screw and Abutment on External Hex Implant-Abutment Resistance to Oblique Compressive Forces*
56	Stegaroiu, Roxana	*Accuracy of a 3D Finite Element Model of an Implant-Inserted Dried Human Mandible Created From Cone-Beam CT Data: Comparison with a Model Created from Micro-CT Data*
57	Takahashi, Kenta	*Biological Significance of Ti-Nb-Sn Alloy Implant with Low Young's Modulus*
58	Takebe, Hiroaki	*The Effect of Low Intensity Pulsed Ultrasound Stimulation on Sinus Augmentation in Animal Model*
59	Tsai, Ming-Hsun	*Practical Solution of a Severe Resorbed Ridge--A Case Report*
60	Tseng, Li-Ting	*The Effect of Different Implant Neck Designs Upon Strain at Surrounding Bone*
61	Tu, Ching-Yu	*Drilling Protocols and Insertion Torque for 2.1 mm Diameter MDI Implants in Simulated Bone of Different Qualities*
62	Vang, Mong-sook	*Bone Formation Effect of rhBMP-2 Coated Implant in Beagle Dog Model with Vertical Bone Defect*
63	Vanlıoğlu, Burçin	*Retrospective Analysis of Prosthetic Complications of Implant Supported Fixed Partial Dentures after an Observation Period of 5-10 Years*
64	Wang, Tong-Mei	*Insertion Torque and Resonance Frequency Analysis During Implants Insertion in Artificial Bone Blocks Simulating Poor or Poor-to-Medium Bone Quality*
65	Xing, Helin	*The Effects of Titanium Surfaces with Nano-Network Structures, Generated through Various Alkali Concentrations Treatment, on Osteoblastic Differentiation*
66	Yamada, Masahiro	*Strong Dermal Collagen Binding Capability of Alkali-Heat-Treated Titanium Surface with Substantial Nano-Tuft-Like Structure*
67	Yamaguchi, Kikue	*Use of the Hounsfield Units for 3-Dimensional Finite Element Analysis of Immediately Loaded Implants Treatment Planning*
68	Yang, Jun-Jip	*Effect of rhBMP-2 Immobilization to Heparinized Bio-Oss® on Bone Regeneration*
69	Yoon, Hyung-In	*Comparison in Early Bone Response through Continuous Removal Torque Analysis Between Fluoride-Modified and Anodically Oxidized Titanium Implants*
70	Yoshikazu, Ishikawa	*10 Years Evaluations of All-On-4 Implant Bridge Rehabilitation: A Prospective Study*
71	Yuichi, Ishida	*Prediction of Prosthetic Complications in the Superstructure by Assessing Changes in the Provisional Restoration*
72	Zenziper, Eran	*The Effect of Mucosal Cuff Shrinkage around Dental Implants*

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73	Zhang, Qin	*A Prospective Clinical Trial on Early Loading Protocol for Partial Edentulous Patients in Posterior Mandible site: A 1-Year Follow-up Study*
74	Zhou, Yongsheng	*Bi-Functionalization of Calcium-Phosphate-Coated Titanium Surface with Antibacterial Activity and Osteoinductivity using Slowly-Released Simvastatin and Metronidazole*
Topic: Esthetics and Ceramics		
75	Ajai, Gupta	*The Era of Digital Impresssion*
76	Al-Amleh, Basil	*Influence of Residual Stresses on Fractographic Pattern of Zirconia Bilayered Crowns*
77	Avrampou, Marianna	*Cad/Cam-Generated Provisional Restorations for the Treatment of Complex Cases: A Case Report*
78	Bagis, Bora	*How will Surface Treatments Affect the Translucency of Porcelain Laminate Veneers?*
79	Bennie, Karen	*Ceramic Materials for Posterior Restorations. An Evidence-Based Decision Tree*
80	Cal, Ebru	*Comparison of the Strength of Ceramic Denture Teeth Manufactured in 2-D and 3-D Tooth Color Systems*
81	Canay, Senay	*Effect of Engraving Speeds of CO2 Laser Irradiation on In- Ceram Alumina Roughness*
82	Cardenas Parra, Edurdo	*A Three-Year Clinical Evaluation of Three and Four-Unit Fixed Zirconia-Posterior Fixed Partial Dentures*
83	Chong, Bevan	*The Effect of Different Surface Finishing Procedures for Zirconia on Antagonistic Human Enamel Wear: An In Vitro Study*
84	Garg, Pooja	*Influence of Surface Treatment on the Aging Sensitivity of Dental 3Y-TZP: An In-Vitro Study*
85	Gómez Cogolludo, Pablo	*Randomized Clinical Evaluation of Zirconia and Metal-Ceramic Posterior Fixed Dental Prostheses: A 5-Year Prospective Study*
86	Gonzalo Inigo, Esther	*Influence of Porcelain Veneering on the Marginal Fit of Posterior Zirconia Three-Unit Bridges. In Vitro Study*
87	Hikita, Kazuhiro	*An Up to 3-year Clinical Evaluation of Zirconia-Based Restorations*
88	Hong, Sungok	*Esthetic Rehabilitation in Maxillary Anterior Tooth with Early Childhood Caries using ZIRKIZ® Crown : A Case Report*
89	Iizuka, Tomoaki	*The Effect of Psychological Status on Tooth Color Selection*
90	Kim, Hakcheon	*Pontic Site Development and Soft Tissue Transfer on Anterior Esthetic Area*
91	Komasa, Yutaka	*Fabrication of All-Ceramic Crowns using a New Method Improvement of Fit by Drying of Slips*
92	Michael, Michael	*A 3D Finite Element Analysis of the Stress Distribution in Different Restorative Materials used in Long Span Implant-Supported Maxillary Prostheses in Response to Loading*
93	Mobilio, Nicola	*Zirconia Resin-Bonded Prosthesis: A Case Report*
94	Mutluay, Mustafa Murat	*Fatigue Resistance of Various Metal-Free Cantilever Bridges Supported by Laminate Veneers*
95	Naidoo, Noland	*The Response of Maxillary Bone to Loading of Long Span Implant-Supported Prostheses of Different Restorative Materials using A 3D Finite Element Analysis*
96	Näpänkangas, Ritva	*Clinical 4-Year Follow-Up Study of Zirconia Single Crowns*
97	Pantea, Mihaela	*New Computerized Design Method for Complex Dental and Maxillofacial Rehabilitations*
98	Park, Eun Woo	*Perceived Color Shift of Ceramics According to the Change of Illuminating Light with Spectroradiometer*

Poster #	Name (Last, First)	Abstract Title
99	Patel, Mahul	*In-Vitro Comparison of Loads to Fracture Monolithic Zirconia Anatomical Contour Crown Restorations with Variations of Marginal Thickness*
100	Pelaez, Jesus	*Prospective Evaluation of Zirconia and Metal-Ceramic 3-Unit Posterior Fixed Dental Prostheses: A 7-Year Clinical Results*
101	Radke, Usha	*Esthetic Articulation Techniques: A Review*
102	Redha, Ola	*The Effect of Bleaching Agents on Dentine Collagen*
103	Sen, Deniz	*Influence of Air-Particle Abrasion and Low-Temperature Aging on Flexural Strength of Monolithic Zirconia*
104	Slabbert, Marc	*Finite Element Analysis of Preparation Geometries for CAD/CAM Restorations*
105	Thangavel, Arun	*The Effect of Different Surface Finishing Procedures of IPS E.Max (lithium disilicate) on Antagonist Enamel Wear: An in Vitro Study*
106	Watanabe, Mikiko	*A Colorimetric Study of Natural Teeth: Relationship Between the Color and the Thickness of Right and Left Upper Central Incisor Teeth*
107	Yıldız, Coskun	*In Vitro Evaluation of Retentive Properties of Different Luting Cements on Zirconia Copings*
108	Zhang, Xiuyin	*Fracture Load and Failure Modes of Different Machinable Ceramics Cemented with Self-Adhesive and Multi-Step Adhesive Bonding Systems*
109	Zhao, Ke	*Clinical Fracture and Chipping Rates of Zirconia-based Crowns*
Topic: Evidence Based Dentistry		
110	Al-Ahmar, Amira	*Accuracy of Linear Measurements Derived from Cone-Beam Computed Tomography Scans*
111	Chen, Su	*In-Vitro Study of Fracture Resistance in Anterior Post and Core Restoration between Zirconia and Fiber Post with Different Diameters*
112	Dong, Jin-Keun	*Application of PERT/CPM in Dental Clinic*
113	Kakudo, Masaki	*Examination of Tongue Movement During Mastication of Coronal Section using Ultrasonography*
114	Lee, Ahreum	*Wear Behaviour of Human Enamel Opposing Lithium Disilicate Glass Ceramic and Type III Gold*
115	Matsumoto, Hiroshi	*The Effect of Intermittent Use of Stabilisation Splint Devices on Sleep Bruxism*
116	Rodriguez, Jose	*Three-Dimensional Measurements of Tooth Wear Comparing Abrasive and Low-Abrasive Fluoride Preparations on Human Enamel*
117	Takaharu, Goto	*Assessments of "Quality of Mastication": Relationship Between Overall Eating Behavior and Mastication*
118	Wang, Han-wei	*Investigating Effects of Bisphosphonate on Osteoclasts During Bone Regeneration in Zebrafish – Model Simulation of BRONJ*
Topic: Fixed & Removable Prosthodontics		
119	Abichandani, Sagar	*Effect of Insertion and Removal of Tooth Supported Overdentures on Retention Strength and Fatigue Resistance of Two Commercially Available Attachment Systems - An In Vitro Study*
120	Ağan, Hatice	*Effect of Thermocycling on Color Stability of Polyamide and Polymethyl Metacrylate Denture Base Resins*
121	Alfadda, Sara	*The Relationship Between Clinical Quality of Complete Denture and Patient's Quality of Life: A Clinical Study*
122	Ando, Takanori	*Is Palate Helpful to Increase the Support for Maxillary Complete Denture?*
123	Aslan, Yılmaz Umut	*Contact Angle and Hydrophilicity of Newly Formulated Polyvinyl Siloxanether Impression Materials*

Poster #	Name (Last, First)	Abstract Title
124	Audenino, Guido	*Efficacy of Structured Office-Laboratory Comunication on Quality Outcome of Sigle Crowns*
125	Ben-Gal, Gilad	*The Teaching of New Materials and Techniques in the Field of Teeth Supported Fixed Partial Denture in the US and Canada Dental Schools – A Survey*
126	Braud, Adeline	*Short-Term Effect of Removable Partial Denture on Self-Reported Oral Health Status*
127	Dimiou, Anna Maria	*Influence of Thickness Increase of Intraoral Autopolymerizing Hard Denture Base Liners on the Temperature Rise During the Polymerization Process*
128	Esposito, Antonella	*Immediate Rehabilitation of Edentulous Arches using Intra-and Extra Oral Welding. Retrospective Study with 2 Years of Follow Up*
129	Falk, Anders	*Reliability of An Impression Replica Technique*
130	Fokkinga, Wietske	*Impression Procedures for Metal Frame Removable Dental Prostheses - A Pilot*
131	Fujii, Takamasa	*Influence of the Bite Impression Technique on Reproducibility of Occlusal Contacts of Working Casts for Implant*
132	Geerts, Greta	*Relating Physiologic and Anatomic Mandibular Dentures to Alveolar Ridge*
133	Gonda, Tomoya	*Tooth Survival in Patients with Partial Removable Dental Prosthesis*
134	Gul, Esma Basak	*Effect of Reinforcement with Different Fillers on the Mechanical Properties of PMMA*
135	Hanawa, Soshi	*Effectiveness of the Obturator Prostheses for Facial Morphology Restoration in Unilateral Maxillary Defect Patients*
136	Hase, Hideaki	*The Influence of Alveolar Bone Size on Maxillary Partial Denture; Full Arch Bone Support V.S. Aramany Class IV Defect.*
137	Ikawa, Tomoko	*Development of the Tooth Abutment Preparation Image-Guided System*
138	Ikeguchi, Nobuyuki	*Does a Dentist's Clinical Experience Affect Treatment Satisfaction of a Complete Denture Wearer?*
139	Ito, Nana	*Does Wearing Dentures Change Sensory Nerve Responses under the Denture Base?*
140	Kakuda, T.	*The Measurement Site was Decided in Newly Developed Chairside Measuring System for Denture Retention*
141	Kawano, Fumiaki	*Factors Affecting the Accuracy of Impression Materials*
142	Kawata, D.	*A Study on the Efficiency of Complete Denture Treatment*
143	Kim, Min-soo	*Prospective Comparative Clinical Trial of Ball Attachment Retained Implant Overdentures in Edentulous Patients*
144	Kim, Soyeun	*Comparison of the Accuracy of Digitally Fabricated Polyurethane Model and Conventional Gypsum Model*
145	Kim, Yungjin	*Full-Mouth Rehabilitation Through Multidisciplinary Approach of Young Patient with Multiple Missing Teeth and Collapsed Occlusal Plane*
146	Koroglu, Aslihan	*Evaluating Adhesion of Modified Polyurethane to Maxillofacial Silicone Elastomers*
147	Kreulen, Cees	*Incidence of Endodontic Treatment of Teeth with Crowns*
148	Kumano, Hirokazu	*Attractive Force Analysis of Magnetic Attachment using Three Dimensional Finite Element Method -Influence of the Keeper Thickness on Attractive Force-*
149	Kumar, Lakshya	*Comparative Evaluation of Pressure During Impression of Maxillary Edentuious Ridge on Stress and Non-Stress Bearing Areas – A Observational Study*
150	Kurihara, Mie	*The Influence of the Major Connector on Masticatory Performance of Free-End Removable Partial Dentures: A Comparison Between Lingual Bars and Lingual Aprons*
151	Kyung, Kyu-Young	*The Study of Anatomical Structures in Establishing Posterior Palatal Seal Area for Maxillary Complete Denture*

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152	Lee, Kyuho	*Prosthodontic Treatment of the Russel-Silver Syndrome : Case report*
153	Lim, Yeen	*Analysis of Saliva Proteins from Head and Neck Cancer Patients*
154	Masuda, Tatsuhiko	*Mechanical Analysis of Extracoronal Magnetic Attachment using Three-dimensional Finite Element Method*
155	Masumi, Shin-Ichi	*Clinical Application of Dental Magnetic Attachment using the Direct Bonding System*
156	Matsuda, Kenichi	*Crossover Trial Comparing the Clinical Results of the Biofunctional Prosthetic System and Conventional Complete Dentures*
157	Matsuda, Risa	*Influence of Vertical Dimension of Complete Denture on Electroencephalogram*
158	Mizuno, Yoko	*Stress Distribution in Abutment Tooth of Partial Removable Dental Prosthesis*
159	Mothopi, Matshediso	*The Impact of Guide Planes and Guiding Surfaces on Removable Partial Denture Retention*
160	Nakamura, Yoshinori	*Influence of the Measuring Methods on the Attractive Force of Magnetic Attachments*
161	Ogino, Takamichi	*Change of Blood Flow in Palatal Mucosa by Different Chewing Rate*
162	Oh, Sang-Chun	*Implant Retained Overdenture using Milled Titanium Bar with Locator® attachment on Fully Edentulous Maxillae : A Case Report*
163	Ohno, Yoshihiro	*Mechanical Strength Analysis of Extracoronal Magnetic Attachment by Three-Dimensional Finite Element Method*
164	Parra, Carlos	*Fingernails as Predictors of Toothshape*
165	Santos, Mariana	*Effect of Parylene Coating on the Surface Roughness of PMMA after Brushing*
166	Sato, Naoko	*Material Property of Cohesive Silicone for the Denture*
167	Shimpo, Hidemasa	*Relining or Repair Procedures of Polyamide Denture using New Adhesive System*
168	Shiraishi, Koichi	*Development of Retainer Fabrication Method using Laser Sintering*
169	Sommovigo, Fausto	*The Change in Preparation Paradigm: The Conservative Prosthetic Preparations for Anterior Teeth*
170	Sun, Jian	*Evaluation of Repeatability of Intraoral Digital Impression:An in-Vitro Study*
171	Takahashi, Kazuya	*Load Pressure during Upper Edentulous Impression Procedure*
172	Takahashi, Toshihito	*The Effect of Reinforcement Structure on the Share Strain of Palateless Denture*
173	Takeuchi, Yasuhisa	*The Bending Strength and Surface Property of a Soft Acrylic Resin for Denture Material in Comparison with Conventional Denture Materials*
174	Tanaka, Junko	*Relationship Between the Incidence of Lifestyle-related Diseases and Nutrient Intake and Occlusion*
175	Tanaka, Yoshinobu	*Full Mouth Prosthetic Case Applying Magnetic Attachments in Various Shapes*
176	Tancu, Ana Maria Cristina	*Prosthodontic Difficulties in Bimaxillary Overdentures Created by the Last Teeth. A Case Report*
177	Thokoane, Meriting	*The Dimensional Distortion of Acrylic Resin Denture Bases Subjected to Different Dual Cure Materials and Methods*
178	Wada, Takeshi	*Influence of Palatal Plate Composed of Ce-TZP/Al2O3 Nanocomposite on Patient Comfort*
179	Watanabe, Megumi	*Analysis of Small GTPases in Dendritic Cells and Keratinocytes in Nickel Allergy Mouse Model*

Poster #	Name (Last, First)	Abstract Title
180	Yamamoto, Masaaki	*Reconsrteuction of Mandibular and Lower Lip Defect by Dento-mandibular Prosthesis and Facial Prosthesis: A Case Report*
181	Yang, Hongso	*Fracture Resistance of Teeth with Different Ferrule Lengths, Restored with ParaPost® and Paracore®*
182	Yang, Tsung-Chieh	*The Influence of Particle Size of Poly (Ethyl Methacrylate) Regarding the Gelation Time of Tissue Conditioner*
183	Yoshida, Keiichi	*Hardness of Dual-cured Resin Cements and Core Build-up Resin Composites for Luting Fiber-reinforced Posts*
Topic: Geriatrics		
184	Berteretche, Marie Violaine	*How to Readapt an Old Denture : The 3 + 1 Steps*
185	Enoki, Kaori	*Influence of Xerostomia on Oral Health–Related Quality of Life of Older People in a 5-Year Longitudinal Study*
186	Kawahara, Ayaka	*The Influence of Denture Refusal on Unstimulated Salivary Flow Rates*
187	Ryu, Masahiro	*Sterilization Effect of Anti-bacterial Functional Water (Bioshot®) on Oral Bacteria Attached to Dentures*
188	Shibuya, Tomomi	*Lip-Closing Pressure While Swallowing*
189	Singh, Raghuwar Dayal	*Three-Dimensional Evaluation of Temporomandibular Joint of Completely Edentulous Subjects, Before and After Prosthetic Rehabilitation*
190	Tajima, Sayaka	*Time-Dependent Change in Microbial Count on the Tongue Surface after Tongue Cleaning*
191	Umezawa, Tomoko	*Adhesion of Streptococcus Sanguinis to Ce-TZP/Al2O3 Nanocomposite*
192	Wei, Yan	*3D Scanning Quantitative Evaluation of Facial Profile Variation of Edentulous Patients Pre- and Post Complete Dentures Restoration*
Topic: Occlusion		
193	Coraini, Cristian	*Instrumental and Functional Management of Vertical Dimension of a Teeth Grinding Patient in Upper and Lower Full-Arch Rehabilitation: Report of A Case Study*
194	Fuh, Lih-Jyh	*Reducing Occlusal Errors Introduced by Centric Record Taking*
195	Ishigami, Takayuki	*Effect of Change in Occlusal Supporting Zone on the Stabilization of Posture Stance Disturbed by Electrical Stimulation*
196	Jiang, Qingsong	*Effects of Molarless on Spatial Learning and Memory in KM Mouse*
197	Kihara, Takuya	*Reproduction of Occlusal Contacts on a 3-Dimensional Model of Dental Morphology*
198	Mukai, Norio	*A Three-Year Time Series of the Periodontal Mechanosensitive Thresholds of Patient Complained Occlusal Discomfort after Orthodontic Treatment*
199	Nobuaki, Higaki	*Efficiency of Oral Stimulations on Brain Function Activities: Evaluations using Wearable Near-Infrared Spectroscopy*
200	Ohta, Midori	*Effect of Changing Chewing Side on Autonomic Nervous Response*
201	Shigeta, Yuko	*Variation of Occlusal Plane Inclination – Cross Sectional Study –*
202	Strajnic, Ljiljana	*Computerised Cephalometric Application for the Level and Inclination of the Artificial Occlusal Plane*
203	Suzuki, Yoshitaka	*The Analysis of Jaw Movements at Peak Masseter Muscle Activities of Rhythmic Masticatory Muscle Activity events during Sleep*

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204	Tagari, Eyal	*An Occlusal model: A methodological and graphical representation of the Dynamic Occlusal Scheme*
205	Tamaki, Katsushi	*Regional Brain Activity Corresponding to the Experimental Occlusal Discomfort*
206	Tanaka, Masahiro	*Mechanosensitive Thresholds of Patients with Occlusal Discomfort Seen in Osaka Dental University Hospital*
207	Tanaka, Yuto	*A Physiological Method to Determine the Vertical Dimension of Occlusion*
208	Tatsuta, Mitsuhiro	*Mandibular Displacement and Stability of Occlusion during Intercuspation in Patients with Occlusal Disharmony*
209	Toyoshita, Yoshifumi	*The Effect of Food Forms on the Secretion of Glucagon-Like Peptide-1 in the Rat*
210	Vītols, Pauls	*Precision of Plaster Casts Made from Various Dental Impression Materials: A Preliminary In Vitro Study*
211	Wen, Ying	*Study on the Correlation Between Subjective and Objective of Vertical Distance Recovery after Occlusal Reconstruction*
212	Zeng, Jianyu	*Condylar Osteophyte Treated with Splints in the Edentulous Patient: A Case Report*
Topic: TMD		
213	Awf, Do'aa	*Clinical Evaluation of Two Occlusal Splints used in Myogenous Temporomandibular Disorder Therapy*
214	Evren, Buket	*Effect of Occlusal Splint Therapy on EMG and T-Scan Evaluation of Patients with Different Ypes of Disc Displacements*
215	Grossi, Marcio	*Temporomandibular Disorders and Orofacial Pain: An Epidemiological Survey in a Brazilian Population (The Maringa Study)*
216	Huang, Ching-Yi	*The Role of t-MAD in Treating Patient of Severe Obstructive Sleep Apnea*
217	Kranjcic, Josip	*Differences in Articular-Eminence Inclination Between Medieval and Contemporary Human Population*
218	Mizumori, Takahiro	*Development of an Experimental System for Suppressing Sleep Bruxism before its Onset without Electrodes*
219	Oho, Kohei	*The Effect of Stabilization Splints on Masticatory Muscle pain and Sleep Bruxism: A Randomized Controlled Trial*
220	Ono, Yasuhiro	*Effect of Newly Developed Cognitive and Behavioral Therapy for Tooth Contacting Habit*
221	Sakai, Takuro	*Association Between Clinical Features and Sleep Bruxism Assessed by Polysomnography*
222	Sato, Masayuki	*Effect of Daytime Biofeedback on Sleep Bruxism*
223	Shigemoto, Shuji	*Classification of Jaw Movement Patterns During Sleep Associated Bruxism*
224	Tsou, Ming-Hsun	*Treatment Efficacy on Obstructive Sleep Apnea (OSA) Patients with Tongue-Backing Mandibular Advancement device (t-MAD): Clinical trials*
225	Watanabe, Akira	*Continuous Effect of Masticatory Muscle Electromyogram Biofeedback on Awake Bruxism Regulation*

Invited Speakers

Invited Speakers

(Listed in Alphabetical Order by Last Name)

Thomas J. Balshi, DDS, PhD, FACP
Institute for Facial Esthetics
Fort Washington, PA USA

Dr. Thomas J. Balshi, Diplomate of the American Board of Prosthodontics, is the founder of Prosthodontics Intermedica, and the Director of the Institute For Facial Esthetics in Fort Washington, Pennsylvania. Both his graduate and post-graduate degrees were earned from Temple University School of Dentistry, and he received an Honorary Doctorate of Science degree from Cabrini College. His legacy working with Brånemark implants dates to 1984. He is Charter Member and Fellow of the Academy of Osseointegration, and a Fellow of both the American and International Colleges of Prosthodontists. Dr. Balshi lectures globally and his scientific research using Brånemark implants and immediate function is widely published. Dr. Balshi has co-authored a textbook entitled *A Patient's Guide to Dental Implants*, and was a contributing author to *Dental Implants: The Art and Science* – 2nd Edition (hardcover), Saunders. His most recent textbook contribution is in *Zygomatic Implants – The Anatomy-Guided Approach* (Quintessence).

Francesco Bassi, MD, DDS
University of Turin
Department of Surgical Science Dental School
Prosthodontic Section
Turin, Italy

Francesco Bassi graduated in Medicine in 1982 and specialized in Dentistry in 1988. He is now Full Professor at the University of Turin, Dept. of Surgical Science, Dental School, Prosthodontic Section. He is Dean of the School of Oral Hygiene, and Director of the Master "Development of oral health in developing countries and in disadvantaged populations" of the same University. He teaches "RPD", "Oral health global health" and "Oral care and dentistry for communities". He is reviewer for: the "Regional Programme for the industrial research, the innovation and the technological transfer" of Emilia-Romagna, Italy; the Italian Ministry for Education, University and Research; and international journals. He is associate editor of the International Journal of Prosthodontics. He is author of about 100 papers, 41 of which on international journals, on prosthodontics, oral implants, mandibular physiology. He is joint author of books in Spanish, English and Italian.

Leonello Biscaro
Rovigo, Italy

I graduated with honors in dentistry in 1985 at the University of Bologna: complex dental rehabilitation has always been my greatest passion, the treatment of which requires multi- disciplinary training. For this reason, after graduation, I attended multi-year postgraduate courses in orthodontics, implant and periodontal surgery and prosthodontics. I became more than 15 years ago active member of the Italian Society of Periodontology and the Italian Academy of Prosthetic Dentistry . Currently, I am the President of the Italian Academy of Prosthetic Dentistry (AIOP); I will hold this position for the next two years.

Prof. Shlomo Calderon
Oral and Maxillofacial Surgeon
Former head of Rabin Medical Center
Oral and Maxillofacial Surgery Department
Tel Aviv, Israel

Oral and maxillofacial surgeon. Former head of Rabin Medical Center Oral and Maxillofacial Surgery department Tel Aviv 1983-2011 . Former head of Oral Surgery department. Tel Aviv University school of dental medicine 2003-2011.

Gunnar E Carlsson, LDS, Odont Dr/PhD,
Dr Odont hc, Dr Dent hc^2, FDSRCS (Eng)
Institute of Odontology
University of Gothenburg
Gothenburg, Sweden

Dr. Carlsson was Professor and Chairman of the Department of Stomatognathic Physiology (with its clinic for TMD patients) at the Faculty of Odontology, University of Gothenburg, Sweden, 1969 to 1987, and Professor and Chairman of the Department of Prosthetic Dentistry at the same faculty 1987 to 1995. He is now Professor emeritus. He was Dean of the Faculty of Odontology 1974-1977 and 1987-1990.

Dr. Carlsson has published about 400 articles and several book chapters on prosthodontics, occlusion and temporomandibular disorders. He was editor-in-chief of the International Journal of Prosthodontics 1997 to 2004 and held the same position for the Acta Odontologica Scandinavica 1991 to 1997. He was Co-President of the International College of Prosthodontists 1998-1999. He has continued his scientific activity and international lecturing, and he has been author or co-author of 34 publications during the last 5 years (2008-2012).

Invited Speakers

Stefano Carossa, MD, DDS
University of Turin, Department of Surgical Science
Dental School, Prosthodontic Section
Turin, Italy

Stefano Carossa graduated in Medicine and earned the specialization in Odontostomatology. From 2001 he has been Full Professor at the University of Turin, Dept. of Surgical Science, Dental School, Prosthodontic Section, where he teaches fixed prosthodontics. From 2006 he has been dean of the Dental School at the University of Turin.

From 2007 he has been director of the Department of Oral Rehabilitation at the Dental School. From January 2013 he has been director of the CIR (Interdepartmental Research Center) Dental School in Turin.

He is member of the Academy of Medicine of Turin and a member of the European Academy of Temporo- Mandibular Disorders. He is author of more than 100 publications, among which many on international journals.

David Chvartszaid, DDS, MSc (Prostho), MSc (Perio), FRCD(C)
University of Toronto
Toronto, Ontario Canada

David Chvartszaid received the DDS degree from the University of Toronto in 2001. He completed hospital residencies in New York City and earned his specialty designations in Prosthodontics and Periodontics from the University of Toronto. He is an Assistant Professor at the University of Toronto. He is a reviewer for the International Journal of Prosthodontics and the International Journal of Maxillofacial Implants. His interests include treatment complications, implant failure, and clinical education.

Joke Duyck, PhD
Catholic University of Leuven
Leuven, Belgium

Joke Duyck is professor at the department of Oral Health Sciences (Division of Prosthodontics) of the Catholic University of Leuven, Belgium. She graduated as a dentist in 1995 and immediately continued her education with a postgraduate training in prosthodontics (2000). She combined her clinical training with a PhD in Medical Sciences on 'Biomechanical characterisation of oral implants' in collaboration with the University of Oslo, which she defended in January 2000. Since then, Dr. Duyck continued to combine basic research on implant biomechanics and peri-implant bone biology with clinical practice in prosthodontics.

Since 2009, her clinical focus shifted towards gerodontology and in 2011 she initiated the undergraduate course in gerodontology in her institution.

Steven Eckert, DDS, MS
Mayo Clinic College of Medicine
Rochester, MN USA

Dr. Eckert is a graduate of the Ohio State University College of Dentistry. He was certified in Prosthodontics and completed his Master of Science degree at the Mayo Graduate School of Medicine. Dr. Eckert is a Diplomate of the American Board of Prosthodontics and a Fellow in the American College of Prosthodontists, Academy of Prosthodontics, Academy of Osseointegration, American Academy of Maxillofacial Prosthetics and the International Team for Implantology. He is a director and an examiner for the American Board of Prosthodontics. He is Professor Emeritus at the Mayo Clinic College of Medicine and has served as President of the AO, AAMP, and AP and is currently the Vice President of the ABP and Treasurer of the ICP. He is Editor-in-Chief of the International Journal of Oral and Maxillofacial Implants. He has published extensively in the scientific literature and presents at numerous scientific meetings.

Norbert Enkling, Priv.-Doz. Dr. med. dent. Dr. med. dent., MAS
University of Bern, Switzerland

Current position: Associate professor and vice-chairman, Department of Prosthodontics, University of Bern, Switzerland (Chair: Prof. Dr. R. Mericske-Stern)
Visiting Assistant Professor, Department of Prosthodontics, Preclinical Education and Material Sciences, University of Bonn, Germany (Chair: Prof. Dr. H. Stark)
Undergraduate and postgraduate teaching: Department of Prosthodontics, University of Bern – Switzerland; Department of Oral Surgery, University of Witten / Herdecke – Germany; Department of Prosthodontics, University of Bonn - Germany
2003 – 2006: Postgraduate education in “Oral surgery” and vice-director Dental Clinic Bochum, Augusta-Kranken-Anstalt, Bochum, Germany
(Prof. Dr. Hans-Peter Jöhren)
2000–2003: Postgraduate education in “Prosthetic dentistry”, Department of Prosthodontics, University of Bonn, Germany (Prof. Dr. B. Koeck)
Undergraduate studies of dentistry at the University of Bonn, Final exams 2000
Doctoral thesis– Dr. med. dent.: 2001 University of Bonn; 2004 University of Bern
Habilitation: 2011 University of Bern2003: Certificate, implantology: Curriculum Implantologie DGI / APW“ German Association for Implantology
2005: Certificate, implantology:"Tätigkeitsschwerpunkt Implantologie" German Association for Implantology
2005: "Specialist for prosthetic dentistry– Spezialist für Prothetik" and active member of the German bord of prostodontists, German Association for Prosthetic Dentistry and Biomaterials
2006: "Specialist in reconstructive dentistry, aesthetics and oral function", European Dental Association
2006: "Specialist in oral surgery - Fachzahnarzt für Oralchirurgie"
2012 Master of advanced Studies (MAS), University of Bern: "MAS of Reconstructive- and Implant-Dentistry“
Since 2005: President of the Tucker Study Club # 59
Since 2006: Vice-president of the German Association for Psychology and Psychosomatic in Dentistry (AKPP – DGZMK)
Since 2002 national and international scientific presentations and publications

Invited Speakers

Prof. Gianfranco Gassino
Turin University, Italy

Professor Gianfranco Gassino graduated in Medicine and Surgery and specialized in Odontostomatology at the Turin University where he now works as an Associate Professor. He frequented, first as a student and then, from 1998, as an attending doctor the Prosthetic ward at the Turin University Odontostomatology Clinic, directed by Professor G. Preti.

Professor G. Gassino is, since a long time, a reference expert of the Azienda Ospedaliera S. Giovanni Battista Molinette in Turin, as regard prosthetic rehabilitations of maxillo-facial defects caused by cancer, traumas and congenital illnesses. Professor G. Gassino's experience in the prosthodontic rehabilitation field is due to numerous experiences abroad: Nijmegen University, training post graduate in Maxillo-Facial Prosthetic directed by Professor W. Kalk Los Angeles University, certificate in Maxillo-Facial Prosthetic directed by J. Beumer

Today Professor G. Gassino acquired such an experience to be considered an International reference figure: European Representative in the International Society for Maxillo-Facial Rehabilitation. He takes part in the Outreach International Teaching Program in the Developing Countries.

Martin Gross BDS, LDS, MSc.
Tel Aviv University Dental School
Tel Aviv, Israel

Graduated 1971, Guys Hospital Dental School, University of London. Masters in Prosthodontics Northwestern University Dental School, Chicago 1974 Specialist in Prosthodontics. Registrar Guys Hospital Dental School University of London 1974-1977. Faculty Tel Aviv Dental school departments of occlusion and prosthodontics 1978-2009. Associate Clinical Professor Department, of Oral Rehabilitation School of Dental Medicine, Tel Aviv University. Director of Postgraduate Specialty program Tel Aviv School of dental medicine 1997-2009. President International College of Prosthodontists. Currently in private practice. Author of 'The science and art of occlusion in oral rehabilitation' Quintessence, in preparation.

Petra C. Guess, DDS, Dr Med Dent, PhD
University Hospital Freiburg
Department of Prosthodontics
Freiburg, Germany

Dr. Guess, graduated and received her DDS from Albert-Ludwigs University, Freiburg, Germany in 2001. She was an Assistant Professor (2001-2006) at the Department of Prosthodontics (Chair Prof. Dr Dr. h.c. J.R. Strub), College of Dentistry, Albert-Ludwigs University, Freiburg, Germany and is a Board certified Prosthodontist (2005) of the German Society of Prosthodontics and Dental Materials (DGPro). From 2006-2009 she was a Visiting Scientist at the Department of Biomaterials & Biomimetics (Chair Prof. Dr. V.P. Thompson), NYU College of Dentistry, New York, USA. In 2009 Dr. Guess was appointed Associate Professor at the Department of Prosthodontics (Chair Prof. Dr. Dr. h.c. J.R. Strub) College of Dentistry, Albert-Ludwigs University, Freiburg, where she accomplished the Habilitation (Dr. med. dent. habil.) in 2011.

Dr Torsten Jemt, DDS, PhD/Odont Dr
Professor and Specialist in Prosthodontics
Brånemark Clinic
Gothenburg, Sweden

Dr Torsten Jemt graduated (DDS) 1975 in Gothenburg, Sweden, received his board certificate as specialist in Prosthodontics in 1982, and the degree of Odont Dr (PhD) in 1984. He became Associate professor in 1986 and the Professor in 2003 at the Department of Prosthetic dentistry and dental materials, The Sahlgrenska Academy at Göteborg University. Dr Jemt was a co-worker of P-I Brånemark during the late 1970s and 1980s. He was during this period responsible for development of the first single implant abutments. Dr Jemt was in 1986 co-founder of the Brånemark Clinic, the implant specialist clinic within the General Health Dental Service in Gothenburg, where he has served since then, as chairman between 2000 and 2009. At present time he holds a scientific position in the organisation, and is also Professor at the Institute of Odontology, University of Gothenburg. He is a member of the editorial board of several international journals, and he has published over 140 scientific publications. Dr Jemt has lectured on dental implants over the world for more than 30 years.

Invited Speakers

Kazunori Ikebe, DDS, PhD
Department of Prosthodontics
Gerodontology & Oral Rehabilitation
Osaka University, Graduate School of Dentistry
Osaka, Japan

Education: 1991, graduated Graduate School of Dentistry, Osaka University
Graduate School of Dentistry
Professional Employment: 1995-2007. Assistant Professor
2007-present. Associate Professor
Department of Prosthodontics, Gerodontology and Oral Rehabilitation, Osaka University Dental Hospital.
1999-2000. Assistant Visiting Professor, College of Dentistry, The University of Iowa.
Professional Societies: International Association for Dental Research, President of Geriatric Oral Research Group, April 2013-June 2014.

Selected publications

1) Ikebe K et al. (2006). Association of masticatory performance with age, posterior occlusal contacts, occlusal force and salivary flow in older adults. Int J Prosthodont 19: 475-481.
2) Ikebe K et al. (2007). Association between oral stereognostic ability and masticatory performance in aged complete denture wearers. Int J Prosthodont 20: 245-250.
3) Ikebe K et al. (2012). Masticatory performance in older subjects with varying degrees of tooth loss. J Dent 40: 71-76.

Matthias Kern, DMD, PhD, FADM
Chair, Department of Prosthodontics
Propaedeutics and Dental Materials
Christian-Albrechts University at Kiel
Kiel, Germany

Matthias Kern graduated 1985 in Dentistry from Albert-Ludwigs University at Freiburg, Germany. He was Assistant Professor in the Department of Prosthodontics in Freiburg, from 1985-1991 and from 1994-1997. From 1992-1993 he was Visiting Research Associate Professor at the University of Maryland at Baltimore. Since 1997 he is Professor and Chairman of the Department of Prosthodontics, Propaedeutics and Dental Materials at the Christian-Albrechts University at Kiel, Germany.
Matthias Kern is currently the President of the German Association for Prosthetic Dentistry and Biomaterials and serves in the Editorial Board of various peer-reviewed scientific journals.

Dr Iven Klineberg, AM, RFD, BSc, MDS, PhD, FDSRCS, FRACDS, FICD
Westmead Hospital, Center of Oral Health
Westmead, NSW Australia

Graduated at the University of Sydney in dentistry, science (BDS, BSc), and prosthodontics (MDS). Gained a PhD in the University of London and Fellowship in Dental Surgery of the Royal College of Surgeons, London(FDSRCS) and Hon. FDSRCS Royal College of Surgeons, Edinburgh. Visiting Associate Professor, Department of Occlusion, University of Michigan (1977-8), and Professor and Head of Prosthodontics, University of Sydney (1978-2006, 2013-), and Nobel Biocare Chair of Oral Rehabilitation (2007-2012) and Dean of Dentistry, University of Sydney 1991-8 and 2003-4. Awarded Membership in the Order of Australia (1996). Clinical and research interests in jaw function, TMD, oral rehabilitation with implants. Director of postgraduate prosthodontics (1981-) and Nobel Biocare Centre for oral rehabilitation.

Sreenivas Koka, DDS, MS
Mayo Clinic College of Medicine
Rochester, MN USA

Dr. Sreenivas Koka received the DDS and MS degrees from The University of Michigan. He joined the University of Nebraska faculty in 1992, became a Diplomate of the American Board of Prosthodontics in 1995, and received his PhD from Nebraska in 1999. He joined the Staff of Mayo Clinic in 2004 and currently is a Professor and fomer Chairman of the Department of Dental Specialties. He is a Fellow of the Academy of Prosthodontics, a Fellow of the American College of Prosthodontists, and a member of the International College of Prosthodontics. Dr. Koka serves on the Advisory Board of the International Journal of Prosthodontics. He has a hospital-based practice at Mayo Clinic and participates in research and educational activities.

Kiyoshi Koyano DDS, PhD
Kyushu University
Fukuoka, Japan

Dr. Koyano received his doctorate in dental surgery in 1983, and his PhD degree in 1987 from Kyushu University, Japan. He is currently a Professor and Chairman of the Section of Implant and Rehabilitative Dentistry, Faculty of Dental Science, Kyushu University. He spent two years in the section of Gnathology and Occlusion at UCLA back in 1990s. He had been a president of International College of Prosthodontists, Asian Academy of Prosthodontics as well as Japan Prosthodontic Society. He has been involved in the clinical practice and research on Prosthodontics, Dental Implants, Temporomandibular Disorders and Clinical Physiology of Masticatory System. He serves as an associate editor of International Journal of Prosthodontics, Journal of Oral Rehabilitation as well as Odontology.

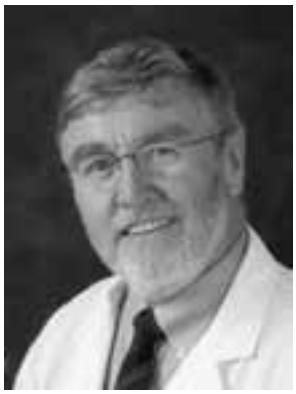
Invited Speakers

Danielle Layton, BDSc (Hons) (Qld), MSc Oxon, MDSc (Hons) (Syd)
University of Queensland, Australia

Danielle graduated with first class honours and the University Medal from the University of Queensland, Australia in 2000. She qualified with honours as a Prosthodontist at the University of Sydney, Australia in 2005, and completed a Master of Science in Evidence Based Health Care at the University of Oxford, United Kingdom in 2012.

Danielle has a private prosthodontic practice in Brisbane, Australia; teaches at the University of Queensland, Australia; and is completing a Doctor of Philosophy at Oxford University, United Kingdom. Research interests include patient-based outcomes, prosthesis survival, medical indexing, time to event methodology and the influence of withdrawn data. Danielle is also a statistical consultant for dental researchers.

Danielle is actively involved in committee and leadership roles in the Australian Prosthodontic Society, Academy of Australian and New Zealand Prosthodontics, the Academy of Prosthodontics and the Middle Common Room, Hertford, Oxford.



Michael I MacEntee, LDS(I), FRCD(C), Dip. Prosth. (MUSC), PhD
Univ. of British Columbia
Faculty of Dentistry
Vancouver, Canada

Dr. MacEntee's academic career has focused on the oral health needs of older people - as a prosthodontist, a teacher, and a researcher. He is Professor of Prosthodontics and Dental Geriatrics at the University of British Columbia, and was the Chair of Prosthodontics from 1981-2004 and Director of the Oral Implant Clinic from 1990-98. He is a past-president of the International College of Prosthodontists, and the Royal College of Dentists of Canada. Currently, he is Editor-in-Chief of *Gerodontology* and Senior Editor of "*Oral Healthcare and the Frail Elder: A Clinical Perspective*" which was published in 2011 by Wiley-Blackwell. In 2009, he received the Distinguished Scientist "Geriatric Oral Research Award" from the International Association for Dental Research.

Yoshinobu Maeda, DDS, PhD
Osaka University, Japan

Dr.Yoshinobu Maeda is currently the ICP co-president and the professor for the Department of Prosthodontics, Gerodontology and Oral Rehabilitation at Osaka University Graduate School of Dentistry, Osaka Japan. He has been publishing numerous articles on implant superstructures and overdentures from the view point of biomechanics. From those, he is suggesting "Strategic minimum number of implant placement". On the other hand, has also involved in revisiting conventional complete denture fabrication method based on BPS to establish scientific evidence for those who cannot have implants.

Regina Mericske -Stern, Dr.med.dent
University of Bern
Department of Prosthodontics
Bern, Switzerland

Prof. R. Mericske is Chair of the Department of Prosthodontics, University of Bern. Here she received her undergrduate training in dentistry including the doctoral (Dr.med.dent) and Habilitation degree. Today she runs a Master Program in Prosthodontics and Implant dentistry. The students elected her teacher of the year. She was a regular guest professor at the Dental School of Toronto and has lectured worldwide in over 30 countries. She is a member of various national and international societies: honorary member of the Japanese Association of Implantology, past-president of the international College of Prosthodontists and European Prosthodontic association (ICP and EPA) Currently she is the president of the Swiss Society of Reconstructive Dentistry (SSRD). Her activities, both in clinical practice and clinical research, cover the field of oral implantology, prosthodontics and geriatric dentistry. These are represented in many publications, abstracts and book chapters.

Carlo Monaco, DDS, MsC, PhD
University of Bologna
Bologna, Italy

Carlo Monaco is researcher and Assistant Professor at Alma Mater Studiorum University of Bologna and work in the Division of Prosthodontics and Maxillo-facial Rehabilitation directed by Prof. Roberto Scotti. He holds a Doctor of Dental Surgery degree from the Alma Mater Studiorum University of Bologna in the 1992. He obtained the master in Dental Materials and their clinical applications at University of Siena and in 2005 the Ph.D in Dental Materials. In 2003 he was invited as a visiting researcher in the Division of Cariology, school of Dental Medicine, University of Geneva. In the 2013 obtained a second Ph.D in materials engineering with a thesis on the zirconia restorations. He is a frequent presenter and lecturer at scientific meetings, received several national and international awards (AIOP, ConsEuro) and has held numerous continuing education courses. He is Active member of the IADR and is involved in research projects on the adhesive restorations and metal-free materials. He published over 50 papers and book chapters on national and international journals.

Invited Speakers

Prof. Joseph Nissan, DMD
President of "The Israel Society of Implant-Dentistry"
Prosthodontist, Associate Professor
Department of Oral-Rehabilitation
School of Dental Medicine, Tel Aviv University
Tel Aviv, Israel

Prof. Nissan received his DMD and Prosthodontics degrees , from Tel-Aviv University School of Dental Medicine. Prof. Nissan is Associate Professor in the Department of Prosthodontics , and former Director of the Implantology-Unit and the Prosthodontics postgraduate program . Prof. Nissan is President of the " Israel Society of Implant-Dentistry", and former President of the" Israel Prosthodontic Society". Prof. Nissan is Chairman of the "National board of Prosthodontics Professional Committee" . Prof. Nissan serves as International-reviewer of several International Dental Journals including: International Journal of Oral and Maxillofacial Implant, Journal of Clinical Implant Dentistry and Related Research, Journal of Oral Rehabilitation, Journal of Biomedical Materials Research. Prof. Nissan is the author of more than 70 international publications on fixed prosthodontics and implant dentistry.

Prof. Peter Owen, MScDent , MChD
University of the Witwatersrand
Faculty of Health Sciences
Johannesburg, South Africa

Peter Owen is a Vice-President of the ICP and is Professor and Head of the Department of Oral Rehabilitation at the University of the Witwatersrand, Johannesburg, South Africa. He has a particular interest in the interpretation and transformation of high technology to appropriate primary care technology – the use of “appropriatech” – and the development of Minimum Acceptable Protocols (MAPs) to serve as clinical guidelines. He is also involved the adaptation of computer-based technologies in dentistry, and has a keen interest in innovative teaching and learning methods, having developed a computer-based assessment system for clinical disciplines, as well as a software solution for multimedia e-learning.

Prof. (emeritus) Sandro Palla, Dr. med. dent.
University of Zurich
Zurich, Switzerland

Professor Sandro Palla has retired from his position at the University of Zurich, where he directed the Clinic of Masticatory Disorders, Removable Prosthodontics, and Special Care Dentistry between 1981 and 2009. 2007 - 2009 he served as Dean of the Center for Dental Medicine. He has authored numerous research papers on craniomandibular disorders, orofacial pain, temporomandibular joint biomechanics, TMJ imaging and removable prosthodontics and has lectured throughout the world on these topics. He is an active member of several international pain and dental associations in some of which he served as president. He is Associate Editor of the Journal of Orofacial Pain.

Prof. Dott. Roberto Scotti, MD, DDS
University of Bologna
Bologna, Italy

In 1975, Dr.Scotti received his MD graduation from the Faculty of Medicine, and in 1978, postgraduate certification in Oral Science at the Dental Institute, University of Turin. Until 1990 Dr Scotti remained as a lecturer at the Prof. Preti Department of Removable and fixed Prosthodontics. In 1983 he was, as a visiting professor at the Postgraduate program Prof. Kratochvil Department (UCLA). In 1990 to become Professor and Chairman, Division of Prosthodontics, School of Dentistry, University of Ferrara. In 1997 Prof Scotti accepted appointment as Head of Oral and Maxillo-Facial Prosthetic Rehabilitation Division, School of Dentistry, Alma Mater Studiorum Bologna University. Since 2003 he is Director of Postgraduate Courses in Dentistry at the same University. Prof Scotti is cited as an author on over 100 original papers and has been involved in, monographs, book chapters, and teaching manuals. His main research interests focus on metal free Prosthodontics, on CAD CAM in oral and maxillo facial prostheses, and on digital impression technology.

Stephen M. Parel, DDS
Dallas, Texas USA

Dr. Parel received his dental degree from The Medical College of Virginia in 1969. He spent one year as a general practice resident with the Veterans Administration Hospital in Richmond, which was followed by a two-year residency in Prosthodontics at the Wadsworth Veterans Administration Hospital in Los Angeles. He received his maxillofacial prosthetics training in Houston at the M.D. Anderson Hospital and Tumor Institute in 1973. He became a faculty member in the University of Texas System in 1975, rising to the rank of full professor in the San Antonio Medical and Dental Schools in 1978. He served as head of the Maxillofacial Prosthetics Division in the Department of Prosthodontics until 1991, which was followed by 7 years of private practice in prosthetic and implant dentistry.

Dr. Parel is a Diplomate of the American Board of Prosthodontics, the American and International College of Dentists, and is a member of many professional organizations, including the American Dental Association, the Academy of Prosthodontics, and the American College of Prosthodontics. He has been course director for osseointegration training at the University of Texas Health Science Center School of Dentistry in San Antonio, one of the four original Brånemark training centers in the United States. His literature contributions include over 45 scientific articles as principal author, and multiple textbook contributions. He was editor and co-author of *Esthetics and Osseointegration,* a landmark reference source for implant dentistry. He authored his second book, *The SmiLine System* in 1991, and recently completed a third book, *Esthetic Implant Restorations.* He was co-founder of Osseointegration Seminars, Incorporated, and has been president of The American Academy of Maxillofacial Prosthetics, The Academy of Osseointegration, and The Osseointegration Foundation. He has received the Andrew J. Ackerman Award for meritorius lifetime service in the field of Maxillofacial Prosthetics, the Distinguished Lecturer and Dan Gordon Awards from the American College of Prosthodontics, and presently serves as Immediate Past President of The American Board of Prosthodontists.

Dr. Parel has served as a professor at Baylor College of Dentistry—Texas A&M University System Health Science Center and director of the Center of Oral Maxillofacial Prosthodontics in the Department of Oral and Maxillofacial Surgery/Pharmacology from 1998 until 2008. He presently is the director of Prosthodontics at a private Implant Specialty Clinic in Dallas, Texas.

Invited Speakers

Paolo Pera, MD, DDS, PhD
University of Genova
Genova, Italy

- Paolo Pera performed his research and teaching activity as a lecturer at the Prosthodontic Department of the University of Torino.
- Fellow of Professor Giulio Preti.
- In 1997 he is nominated Full Professor of Dental Prosthesis at the University of Genova.
- Since 2003 he is the Dean of the School of Dental Hygiene.
- Since 2009 until December 2011 he is the Head of the Surgical and Integrated Diagnostic Sciences Department DISTBIMO.
- Since 2012 he is Coordinator of the Master in "Implant-prosthodontics".
- Professor Pera currently heads the Department of Implant and Prosthetic Dentistry of Genoa University.
- Past President of Italian Prosthodontic Society SIOPI.
- Author of several publications on national and international journals.
- Author of three books: "Removable partial prosthesis" Piccin ed., "Partial crowns in gold and ceramic" Masson ed., "Columbus Bridge Protocol" Quintessenza Ed. 2009 in Italian language, "Columbus Bridge Protocol" Quintessence Ed. 2012 in English language.
- Since 2004 is member, as reviewer, of Editorial Board of "The International Journal of Prosthodontics".

Bjarni E. Pjetursson, Prof. Dr. med. dent. DDS, MAS
University of Iceland
Faculty of Odontology Laeknagarour
Reykjavik, Iceland

Dr. Dr. Pjetursson, received his DDS from University of Iceland in 1990. Form 1990 to 2000 he worked as a general dentist in his private clinic in Iceland. In 2000 he started his postgraduate training in Periodontology and Implant Dentistry at the University of Berne, Switzerland. He received his specialist certificate (EFP & SSP) and Masters of Advanced Studies in Periodontology and Doctorate in Dentistry (Dr. med. dent) from the Faculty of Medicine, University of Berne, Switzerland. From 2003 to 2005 he did his postgraduate training in Prosthodontics at the University of Berne, Switzerland. From 2005 he was an Assistant Professor and Senior lecturer at the Department of Periodontology and Fixed Prosthodontics, University of Berne.

Presently he is a Professor and Chairman of the Department of Reconstructive Dentistry and Dean, Faculty of Odontology, University of Iceland. Dr. Pjetursson is an ITI Fellow and member of the editorial board of Clinical Oral Implants Research, European Journal for Oral Implantology. He has published extensively in resent years. He also given over 400 lectures in 40 countries around the world. His research interests are clinical studies in Implant Dentistry and evidenced based evaluation of different treatment modalities in Implant- and Prosthetic Dentistry.

Prof. Harold W. Preiskel, MDS, MSc, FDS, RCS
London, United Kingdom

Harold Preiskel is Emeritus Professor of Prosthodontics at King's College Dental Institute where he founded the dental implant program. He is also in speciality private practice.

Harold Preiskel was the first President of The International College of Prosthodontists, the first non-American President of the American Prosthodontic Society, founding co-editor of the International Journal of Prosthodontics, Chairman of its Board, Past President of the American Dental Society of London, the British Dental Association (Metropolitan Branch), the London Dental Study Club and Chaired the International Prosthodontic Symposium 1982. He was Alumnus of the Year 2007 Kings College London and Webb-Johnson Medallion awardee of the Royal College of Surgeons of England 2008. The Greater New York Academy of Prosthodontics appointed him 'Distinguished Lecturer of the Year 2008'. He is a Fellow of the Academy of Prosthodontics, Fellow of the Royal College of Surgeons of England and a Governor of Tel Aviv University.

He is author of numerous textbooks, some 100 scientific articles, the recipient of prestigious Prosthodontic awards and active in research, teaching and practice.

Prof. Giulio Preti
University of Torino
Torino, Italy

Giulio Preti is an Honoury Professor of the University of Torino. He had the Chair for Prosthodontics from 1986 to 2006. During his career he carried out extensive research and wrote several books along with his collaborators in Italian, English and French. The College of Professors awarded him recognition for his career. The President of the Italian Republic gave him the highest honour given by the Italian Republic of "*Cavaliere di Gran Croce Ordine al Merito della Repubblica Italiana*". The International Journal of Prosthodontics dedicated a profile to him.

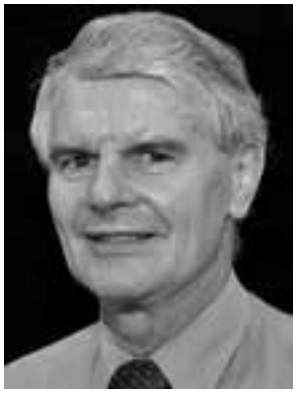
Invited Speakers

Gianmario Schierano, MD, DDS
University of Turin
Turin, Italy

- 1987 Degree in Medicin and Surgery, University of Turin, Italy,
- 1992 specialization in Dentistry, University of Turin,
- 1990 post-graduate in Maxillo-Facial Prosthesis in Nijmegen University (NL),
- 1994-march 2005 assistant professor in prosthodontics School of Dentistry University of Turin,
- 2005-today Associate Professor in prosthodontics University of Turin.
- *Teacher*: Dental Material and Advanced Implantoprosthesis.
- *Research activity fields*: Implant Dental Prosthesis and Dental Materials.
- He has produced 124 scientific articles (37 in extenso), prevalently in implant prosthesis, co-author of 17 chapters of books in Italian, English and Spanish and 2 Multimedia Cd-rom books.
- *Reviewer* of the Research Projects for "Ministero dell'Istruzione, dell'Università e della Ricerca. Direzione Generale per il coordinamento e lo sviluppo della Ricerca" Roma, Italy.
- *Reviewer activity* for: Implant-prosthesis and Periodontology Journals.
- Editor: Journal Case Reports in Dentistry
- *Promoting partner* of the Piezosurgery Academy and *President* of the Scientific committee of the Piezosurgery Academy

Tiziano Testori, MD, DDS, FICD
University of Milan
Como, Italy

- Doctor in Medicine (MD) and Doctor in Dental Science (DDS) from the University of Milan.
- Head of the Section of Implant Dentistry and Oral Rehabilitation Department of Biomedical, Surgical and Dental Science (Chairman: prof. R.L. Weinstein), IRCCS, Galeazzi Institute, University of Milan, Milan, Italy.
- Associate clinical professor School of Dentistry, University of Milan, Milan, Italy.
- Fellowship at the Division of Oral Maxillo-Facial Surgery, School of Medicine, University of Miami, Miami FL (Chairman: R.E. Marx).
- Visiting Professor New York University, College of Dentistry, New York, NY, USA.
- Past President (2007 – 2008) of the Italian Society of Oral Surgery and Implantology (SICOI).
- Member of the Editorial Board of:
    - The International Journal of Oral and Maxillofacial Implants (IJOMI), Quintessence Publishing Co, Inc, Illinois (USA).
    - European Journal of Oral Implantology (EJOI), Quintessence Publishing, London, UK.
- Editor: -with R.L. Weinstein and S. Wallace of the book "Maxillary Sinus Surgery and Alternative Therapies" published by Quintessence Publishing 2009.
  -with F. Galli e M. Del Fabbro of the book "Immediate loading: a new era in oral implantology" published by Quintessence Publishing 2011
- Author of over 200 scientific articles.



Terry Walton, BDS, MDSc, MSc
University of Sydney
Sydney, Australia

Dr Terry Walton graduated with the BDS degree in 1974 and MDSc (prosthodontics) degree in 1979 from the University of Sydney, Australia and MSc (fixed-prosthodontics) degree in 1981 from the University of Michigan. He has been in specialist prosthodontic practice in Sydney since 1983 and currently holds the position of Clinical Associate Professor in the Faculty of Dentistry at the University of Sydney. He is a member of many dental organizations including the International College of Prosthodontists, of which he was co-president in 2000-2001, the International College of dentists and the Pierre Fauchard Academy, and is on the Editorial Board of the International Journal of Prosthodontics. He has published many papers on the long-term outcomes of fixed tooth- and implant-supported prostheses.

Meiqing Wang, PhD
College of Stomatology
Fourth Military Medical University
Xi'an, China

Dr. Meiqing Wang is the professor and Chair of Dept. Oral Anatomy and Physiology and TMD in Dental School, Fourth Military Medical University. She is an occlusionist and specialist in TMD. She has published more than 200 papers, including over 30 English papers. She has also edited and published 4 books in Chinese on Oral Anatomy and Physiology and Occlusion. She has won the awards of Education Progress in Military (1997), the Science and Technology Progress in Military (Second Class, 2003) and in Shaaxi Province (First Class, 2005). She was honored as the Excellent Teacher of Chinese Military Schools (1998). She is now the vice president of the Society of TMD and Occlusion, and the president of Occlusion Branch, Chinese Stomatological Association (CSA).

Invited Speakers

George Zarb, DDS
University of Toronto
Toronto, Canada

George Zarb enjoyed a long career in clinical teaching, research and patient care at the University of Toronto where he served a Head of Prosthodontics. He has been honoured internationally and received numerous awards including six honorary doctorates and his country's highest civilian award, the Order of Canada. He continues to serve the profession as the current Editor-in-Chief of the International Journal of Prosthodontics and completed 2 new books in the past 5 years: "Osseointegration: Ongoing Synergies in Prosthodontics, Surgery and Biomaterials", for the Quintessence Publishing Company in 2009, and "Prosthodontic Treatment for Edentulous Patients", published by Elsevier in 2012.

Prof. Fernando Zarone
University "Federico II" of Naples
Naples, Italy

Fernando Zarone is a Professor and Chair in Fixed Prosthodontics at the School of Dentistry, Head of the Department of Fixed prosthodontics in the University of Naples "Federico II" (Italy). Invited as a speaker at many prestigeous international Meetings and Courses, he is the author of many scientific publications and reviewer in various international dental journals.

His research activity in the last years has been mainly focused on Esthetics, Implant prosthodontics, restorative Biomechanics, CAD CAM technologies.

Lecture Presentations

Thursday, September 19th

Focus Session I: Clinical Outcomes- Evidence Based Dentistry

1

What Can We Learn from Long-Term Follow-Up Studies on Dental Implants?

Jemt, Torsten, DDS, PhD/Odont Dr
Brånemark Clinic
Gothenburg, Sweden

It is almost 50 years ago since the first patient was treated with osseointegrated implants in the edentulous jaw by Dr Brånemark Besides the introduction of the principles of osseointegration, Dr Brånemark was also a pioneer in using clinical follow-up studies to report clinical function and long-term performance of rehabilitation in dentistry. Biological as well as mechanical problems and complications have been reported during the years, which have initiated modifications of techniques and components. Furthermore, new applications have been introduced, and modified implant treatment protocols have been tested.

This presentation will cover long-term observations with regard to mechanical and biological results. The presentation will focus on the biological response in terms of inflammation and bone loss at the implant, but will also cover other aspects on biological and mechanical problems with low incidence.

2

Is Evidenced Based Treatment Planning in Prosthetic Dentistry Realistic or Only an Illusion

Pjetursson, Bjarni E., DDS, MAS
University of Iceland
Faculty of Odontology Laeknagarour
Reykjavik, Iceland

In daily practice, dentists routinely face the challenge of making fast and difficult decisions. These are mostly influenced by paradigms dictated by basic dental education and many years of clinical practice.

Scientific evidence provided by well-controlled studies is rarely available to influence and/or determine the treatment plan.

When planning a fixed reconstruction, the options are tooth-supported or implant-supported fixed dental prostheses (FDPs) or single crowns (SCs). These treatment options have various documented longevities and biological as well as technical risks that should be considered during treatment planning.

As there are no randomized controlled clinical trials (RCTs) in the dental prosthetic literature comparing tooth-supported FDPs to implant-supported FDPs, it is an open question whether or not the practice of evidence-based treatment planning is at all possible in prosthetic dentistry.

Ideally, treatment decisions should be based on well-performed systematic reviews of the available evidence and, if possible, on formal quantitative evidence synthesis and meta-analysis. If there are no studies on the highest level of evidence, the systematic review has to be based on the highest level of evidence available.

During this lecture, several common clinical situations will by discussed and attempts will by made to perform evidence based treatment planning. Special considerations will be given to the vitality of the teeth, periodontal conditions, the remaining tooth structure, esthetic priority, the presence or absence of reconstructions on adjacent teeth and the morphology of the alveolar bone in edentulous areas.

3

Implant Supported Overdentures

Mericske -Stern, Regina, Dr. med. dent.
University of Bern
Department of Prosthodontics
Bern, Switzerland

Mandibular implant overdentures (OD) in completely edentulous patients are well documented in the dental literature with a broad variety of topics. These comprise survival of implants, number of implants and type of anchorage devices, immediate loading and biomechanics, technical aspects and survival of prostheses, costs, age and systemic health. Good long-term results were frequently reported and many clinicians agree on the effectiveness and positive impact on quality of life through implant OD. Less information and less uniform consensus is available on maxillary OD whilst fixed prostheses are often preferred or suggested. It appears that more problems are encountered, originating from a more complex anatomy, reduced bone quality/quantity and patients having still natural teeth in the opposing mandible. Functional dynamics, tissue health and bone stability need to be viewed differently from mandibular OD. The lecture will outline these aspects and include some perspectives of new technologies.

4

Should the Edentulous Patient's Treatment Be Changed?

Preti, Giulio
University of Torino
Torino, Italy

The protocol for the treatment of the edentulous patient has remained unchanged for many years: made up of six clinical sittings and complex technical support. This support is distributed over the various sittings. In the last few decades, people who need dentures have become progressively older. They bring with them all the disadvantages of old age. That is to say they often have problems in getting around by themselves and is common for them to have economical difficulties.

That is why a protocol that needs fewer sittings and is less expensive is needed. Other roles are played by the difficulty in incorporating the teaching of the making of a complete denture into an undergraduate programme, which is already crammed with the other recent progress that has taken place.

Therefore, we propose an innovative protocol that we have called SET (Simplified Edentulous Treatment) that I will illustrate in my lecture.

5

Clinical Research in a Private-Practice Setting

Walton, Terry, BDS, MDSc, MSc
University of Sydney
Sydney, Australia

Clinical research in a private practice setting – why bother? In this era of evidence-based dentistry, the evidence for effective and appropriate treatment is provided through systematic reviews and associated meta-analyses of a myriad of studies. Or is it? The clinical applicability of these reviews is questionable and often leaves a void – a void likely to be filled by trade-sponsored articles in non-peer reviewed "infotainment" free journals or by charismatic evangelical roaming lecturers. The dis-connect between clinician and academic seems to be getting greater.

Alternatively, there is a case for practice-based research. It can allow assessment of the longevity of restorations and patient satisfaction of treatment; help dispel some accepted dogmas; provide a balance against poor research and aggressive marketing; assist in future treatment planning; and provide a personal assessment that we clinicians are doing what we should be doing for our patients. Practice-based research can also pose a moral dilemma. Each patient is an ethics committee. The clinician enters into a contract to provide the best evidence-based treatment in return for a fee. If the evidence is compelling, how can the clinician ethically experiment with unproven materials and techniques on uninformed paying patients. Would these patients knowingly take the risk on the unproven given the relatively high capital outlay involved?

To be broadly applicable practice-based research should combine data from many practices. A research model is proposed that would provide a re-connect between the academic and clinician. The academics would identify several practices in their locality and devise protocols for collecting and collating data that are not too restrictive of usual clinical practice. The data would be scientifically analysed and published using academic expertise. An enormous amount of clinically relevant data could be collected in a relatively short time.

Concurrent Session- Esthetic Dentistry & Fixed Prosthodontics

6

Meeting the Aesthetic Expectations of the Patient Should Be the Real Objective of Restorative Dentistry

Biscaro, Leonello, DMD
Rovigo, Italy

In reality, it seems that the primary aesthetic goal of dentists is to restore ideal aesthetics. In our meetings, cases can be presented only if they fulfill ideal aesthetic parameters, but these are certainly not representative of the patients that we have to deal with every day in our practice. The reason is that the presentation standards appear to be set only for idealized situations. Literature and clinical practice demonstrate that very seldom ideal aesthetic goals coincide with the aesthetic goals of the patient. The extension of the aesthetic area, defined as portion of the mouth visible during maximum smile, should be the real basis in clinical practice for defining the aesthetic goals of treatment. It's true that sometimes low lip line becomes a cover for poor dentistry, but too often using ideal as the ultimate objective of treatment leads to "overtreatment" not justified by the real needs of the patient.

7

Lithium-Disilicate Full Mouth Rehabilitation of Severe Bruxism: A Contemporary Minimally Invasive Prosthetic Approach

Simeone, Piero*
University of Rome La Sapienza, Italy & Private Practice
Periodontics
Rome, Lazio, Italy

Purpose: Background: Restorative treatment of severely worn dentition is typically indicated to replace deficient tooth structure, limit the advancement of tooth destruction, improve oral function and enhance the appearance of the teeth. Minimizing removal of additional tooth structure while also fulfilling the desire of patients to have higly esthetic restorations can present a prosthetic challenge when the existing tooth structure is already diminished, especially in the bruxers patients. In this particolar cases the restorations provide for a new masticatory pattern, according to the articular path and the muscolar activity.

Methods & Materials: Objective: The presentation will be focused on the clinical and laboratory phases by using condylography, cephalometry and electromyography as diagnostic tools support. A comprehensive minimally invasive prosthetic treatment approach will be proposed, using a lithium disilicate all-ceramic material for the esthetic full mouth rehabilition of a severly worn dentition in patients diagnosed with bruxism habits.

Conclusion: References: 1.Touati B. Innovative dental ceramics: Expanding the material alternatives. Pract. Proced. & Aesthetic Dent. 2005;17:357-358. 2. Fradeani M, Redemagni M. An 11-years clinical evaluation of leucite-reinforced glass-ceramic crowns: A retrospective study. Quintessence Int. 2002;33:503-510. 3. Della Bona A, Kelly JR. The clinical success of all-ceramic restorations. J. Am. Dent. Assoc. 2008;139(suppl):8S-13S. 4. Beier US, Kapferer I. Dumfahrt H. Clinical Long-Term evaluation and failure characteristics of 1.335 all-ceramic restorations. Int. J. Prosthodont. 2012;25:70-78. 5.Valenti M, Valenti A. Retrospective survival analysis of 261 lithium disilicate crowns in a private general practice. Quintessence Int. 2009;40:573-579. 6. Sato S. Slavicek R. The masticatory organ and stress management. J. Stomat. Occ. Med. 2008;1:51-57. 7. Conrad H, Seong WJ, Pesun IJ.: Current ceramic materials and systems with clinical recommendations: A systematic review. J Prosthet. Dent. 2007;98:389-404 8. Fradeani M, et Al.: Esthetic Rehabilitation of a severely worn dentition with minimally invasive prostetic procedures. Int. J. Period. & Rest. Dent; 2012;32:135-147. 9. Simeone P. Slavicek R: Kinematic Comparison of Different Incisal Tables Used for Anterior Guidance Reconstruction. I J Stom. & Occ. Med. 04/2012:155-163. 10. Ferrario VF et al.: The influence of occlusion on jaw and neck muscle activity: a surface EMG study in healthy young adults. J Oral Rehab. 2006:33;341-48. 11. Manfredini D.: Relationship between bruxism & TMD: a systematic review of literature from 1998 to 2008. Int Oral S. Oral M. oral P. Oral Radiol. 2010; 109:26-50.

8

The Smile Makeover Treatment with M.I.P.P. with Lithium Disilicate Monolithic Crowns and Laminates

Sommovigo, Fausto*
Viareggio, Lucca, Italy

Purpose: One of the most common requests made by our patients is to improve their smile. After collecting the anamnesis, the radiographic and photographic status and pouring the diagnostic casts, the clinician must be able to give an aesthetic diagnosis and propose a treatment plan which takes into consideration all of the aesthetic weak points and how to solve them. This often involves a multidisciplinary approach that can be performed by one or more specialists. In recent years there have been remarkable changes in prosthetic preparation. The advancement of ceramic materials and the chance to make ceramic crowns and bridges without a metal framework enables clinicians to use more conservative preparation techniques. Above all, the use of monolithic lithium disilicate to reduce the thickness of the crown, while maintaining adequate strength, limits the involvement in prosthetic preparation to the enamel, thus improving the prognosis for the restorations of the teeth as well as obtaining better cohesion when the restorations are bonded to the teeth.

Methods & Materials: A particular clinical case is illustrated. A 47-year-old woman wants to improve her smile. She has an agenesis of the two lateral incisors and two twenty-year-old Maryland bridges. The two pontics do not look natural and the two central incisors look grey because of the metal wings on the palatal side. Because of the narrow space between the roots of the cuspids and central incisors it was impossible to place fixtures. A mock-up involving incisors and cuspids was made just to understand what the patient wanted. After that, the Maryland bridges were removed and an enhancement of the pontic sites was made bilaterally using the previous Maryland bridges as temporary restorations. After the healing period another mock-up was made involving the bicuspids according to the patient's request. The central incisors were prepared for two laminates and the bicuspids as well, although the preparation of these two teeth was extended interproximally to englobe the pre-existing fillings. The two cuspids were prepared for crowns with an MIPP technique and the lateral incisors were carried as cantilevers.

9

A New Piezoelectric Insert for Anterior Teeth Preparation

Baldi, Domenico*; Menini, Maria; Pera, Paolo
Genoa University
Fixed and Implant Prosthodontics
Genoa, Liguria, Italy

Purpose: The aim of this article is to describe a new kind of piezoelectric tools (Tipholder DB basic insert and the Mectron Crown prep tips terminal insert) able to perform an elliptical-like movement thus enabling its functioning independently of the position of the tip with respect to the tooth, which represents the main disadvantage during tooth preparation, and also to evaluate the smoothness of prothetic teeth preparation using these new piezoelectric instruments.

Methods & Materials: Sonic and ultrasonic instruments allow greater control by the operator, without any lesion of gingival tissue. Nevertheless both methods present respective advantages and some handicaps. In fact in sonic instruments (air action) the insert makes an elliptic movement and all the surfaces are active. This rotatory movement and the action of the insert that is indipendent from the work operator position are important advantages compared to the ultrasonic instruments. In fact piezoelectric instruments make a linear movement and thus only two surfaces of the insert are active and strictly dependent from the operator position. According to these characteristics Mectron has produced a new component for piezoelectric instruments (Tipholder DB). This new component induces a similar-elliptic movement on the insert comparable to the sonic ones. All the above maintain the favourable characteristics of ultrasonic instruments (patient comfort and action capability). Furthermore, the typical conformation of Tipholder permits excellent visibility during tooth preparation and the possibility to easily arrive to all tooth surfaces (all the surfaces of the insert are in action).

Results: The efficacy of work is supported by the data from technical tests which show, first of all optimal frequency and top quality tuning when the instrument is in use. The first parametre in question stays perfectly in the frequency range set for Mectron® instruments. The absence of abnormal peaks in sintony shows smoother vibration and this provides excellent working balance. The results relative to the measurement of the trend impedance of the system were aimed to test the absence of further impedance peaks and therefore of resonances which might give rise to unespected and potentially harmful movement. This highlights that the insert resonance which corresponds to the impedance peaks is unique (there are no furthre impedance peaks). Four extracted teeth were prepared and then analized after ultarsonic final touches with a surface

analysis with roughness tester (Mitutoyo Surf Test SJ-301). The outcomes are in agreement with the data found in scientific literature which show that the optimal smoothness of prothetic teeth preparation results between 5 e i 10 micron for a good finishing preparation in order to have an optimal cement attachment.

Conclusion: Conclusions This is a preliminary study on working of a new kind of piezoelectric tools (Tipholder DB basic insert and the Mectron Crown prep tips terminal insert) for tooth preparation. Technical tests supported the efficacy of this new piezoelectric instrument and also the surface analysis with roughness tester show the optimal smoothness of prothetic teeth preparation. This new technology finds an interesting application also for what concerns the preparation of dental elements for rehabilitations with metal-ceramic or metal free crowns, till the use in the creation of ceramic veneer.

10

Immediate Tooth Esxtraction and Implant Provisionalization Using Computer Guided Surgery and Virtual Planned Milled Cad Cam Abutments: Three Case Reports

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Restorative Dentistry
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Purpose: The aim of this contribution is to describe two clinical case of single tooth replacemnt with implant supported restorations .The case #1 two lateral upper incisor were extracted due to the advanced periodontal desease and the case #2 the congenital missing tooth (first bicuspid left lower jaw) was replaced .Both case have been treated in conjunction between computer driven implant placement and immediate positioning of computer derived milled cad cam abutments . Both surgical and prosthetical components have been planned using the same software platform before the surgery . All components , abutments and provisional restorations , have been placed immediately after the surgery to perform a non functional immediate load .

Methods & Materials: two case of immediate post extraction implant placement have been selected for this specific protocol .In the case #1 two upper lateral incisors have been extracted due to the advanced periodontal disease . A congenital missing first bicuspid lower tooth has been enrolled as a case #2 . A cone beam was requested for both patient to plan the correct implant position using a dedicate software platform (Simplant - Leuven Belgium). A specific tool for a virtual wax up is now available in the software . The implant axis was aligned according the best compromise between bone availability and prosthetical position . Finally also the virtual abutment design (Atlantis Dentsply) has been created virtually using a dedicate software recently available as innovative tool in the same Simplant platform . A master cast must be taken by using conventional polyether impression material (impregum - 3M ESPE) to send to the company for the optical scanning . A software aided matching between radiological data and virtual models derived from the scanning is key to produce a stereolytographic surgiguide with passive dental apposition . We received with the surgical template also the abutment and a provisional crowns to place immediately after the surgery . After conventional anaesthesia we removed carefully the teeth without any flap reflection. After a cleaning of the remaining sockets we placed the guide and we were then able to place the implants through the guide following the conventional procedures of the Facilitate Astra-tech (Dentsply) guided surgery protocol. A custom notch visible on the top of the sleeve was a referral point to stop the implant insertion . On the top of the implant holder the same indicator was aligned to rich a correct position of internal connection of the implant platform . We then removed the surgiguide and we placed the Atlantis abutments derived from cad cam procedures according to the virtual planning . The provisional crowns have been relined to place in a non functional occlusion . Three months later we taken a new conventional impression and we delivered to the patients the final zirconia Atlantis abutment and the definitive metal-free crowns.

Results: In both case (three single units replacement) we were able to place the abutments Atlantis in a proper manner as planned by using the software before the surgery . The conditioning of the soft tissues around the implant collars have been maintained by the titanium contour of the abutments . A minimal collapse of the soft tissue have been reported due to the mini invasive procedures . After three months a final impression was taken and we delivered a new Atlantis Zirconia abutments and the metal-free definitive crowns . The aesthetic and functional results has been emphasized from the original virtual planning . The implant position derived from the software planning and the contour of the abutment collar previously determined on the same software platform , achieved an excellent results of final restoration both aesthetically and functionally .

Conclusion: Several scientific contributions described the accuracy of the stereolitographic guided surgery. Many different advantages have been reported both for the patient and the clinician . We can today plan in advance, using dedicate software , the proper implant position according to the final restoration visible on the screen . The surgery can be performed avoiding risks or damages of vital anatomical structures . Prosthetical driven implant placement has been a challenge for the last decade . The immediate load is also a demanding procedure due to rich a provisional restoration with a correct pattern and occlusion within 48 hours after the surgery . The opportunity to plan virtually the surgical position of the implant and also

the prosthetic components using an advanced dedicated software platform gives to the clinician all data to be able to place easily and predictability all components at the time of surgery . The Atlantis technology , introduced from many years in the market as a prosthetic option with high technological quality and optimal prosthetical performance , can be now placed immediately after the surgery as a perfect tools for the soft tissue conditioning . Mini invasive surgery can be performed in conjunction with an optimal prosthetic solution to simplify the immediate load protocol . All procedures can be managed easily emphasizing surgical and prosthetic results . More predictable aesthetic has been obtained in terms of shape and translucency of the final restorations . Functional prosthetic position of final restoration showed a plannable protocol . Abutment 3D virtual design in conjunction with software aided implant position , available in the same software platform , can become the routinary approach for the excellent management in several implant clinical applications . The described protocol seems to encourage to perform other case to demonstrate the reliability for a standard approach in the implant dentistry .

11

The Effect of Margin Ceramics on Pink Esthetics and Soft Tissue Health of Single Unit Fdps: A Split-Mouth Pilot Study

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Purpose: Metal-ceramic fixed-dental prosthesis (FDPs) has a long history in dentistry and is considered as an established restoration material of choice in fixed prosthodontics. In spite of their several advantageous properties, their inability to provide a satisfactory esthetic result is their main disadvantage. In this study, it was hypothesized that the major esthetic problem of the metal ceramic restorations related to the metal reflection through gingiva can be solved by the application of margin ceramics which has also positive effects on the health of soft tissues around the restorations.

Methods & Materials: Ten subjects with a need of two single unit fixed prosthesis preferably in the anterior/premolar segments of the contralateral sides of the dental arch were included in this study. Every patient was treated with a margin ceramic applied restoration (margin ceramic group) in the one side of the jaw and conventional metal-ceramic restoration (control group) for the contralateral side. Spectrophotometric soft tissue color measurements were accomplished by Spectroshade Micro device after the cementation and during the 1 year follow-up appointment. The measurements are done from the gingival area of the restorations to compare the change in E values between the margin ceramic group and control group. Periodontal parameters like Plaque index, gingival index, probing depth were evaluated after the cementation and during the 1-year follow-up.

Results: The mean change in E values between the margin ceramic group and control group has been found 7,52±3,41. The difference between these groups was not statistically significant. Also there was no significant difference between periodontal parameters.

Conclusion: This pilot clinical study has shown that margin ceramics have no significant effect on esthetics and periodontal health.

12

Minimally Invasive Surgery, Soft Tissue Management, Provisional and Definitive Crowns: Basic Steps to Enhance and Preserve Aesthetic Results

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Purpose: The purpose of this clinical work is to compare prosthetic and surgical techniques between natural teeth and dental implants to obtain, with a simplified treatment plan, guided soft tissue healing through minimal invasive surgery and periodontal maturation with proper abutments and crown design. A few planned and minimally invasive steps, make the achievement of stable aesthetic results possible, maintaining for a long time healthy periodontal tissues.

Methods & Materials: The gingival flaps are performed with a surgical technique similar to coronally repositioned flap. Flap designs, selected microsurgical instruments and sutures allow a very gentle and conservative tissue approach. To achieve a three-dimensional gingival healthy aspect and soft tissue stabilization, very few surgical procedures are made to

minimize surgical impact.The conditioning of soft tissues on natural teeth with provisional crowns was made on a feather edge finish line abutments. Convexity of provisional crowns stabilize blood clot under the gingival margin, to increase soft tissue thickness. Dental implants were positioned with minimally invasive surgical procedures for immediate loading, delayed loading and post-extraction implants with immediate loading. The same techniques used on natural teeth were used to guide peri-implant soft tissue healing, both for provisional and for definitive abutments.

Results: Minimal surgical trauma, shoulderless type preparation of the abutments, proper convex outline of provisional and definitive crowns allow to modify and improve periodontal soft tissues. Even though the present examination is a short-term study the follow up displays soft tissue with an excellent esthetic aspect, stable and healthy.

Conclusion: Functional and aesthetic success can be achieved with a few minimal invasive steps, linked to each other and aimed to improve and maintain soft tissue trophism.

13

The Use of Chu's Gauge in Crown Lengthening Procedures for Aesthetic Approach: A Case Series

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Purpose: In recent years the clinician attention has drawn towards new technique for improving aesthetic outcome using different strategies for achieving a better aesthetic result before any prosthetic rehabilitation. In any case of excessive gingival display whenever a new prosthetic rehabilitation needs to be done, a periodontal surgical therapy needs to be done.

Methods & Materials: Thanks to CHU`s aesthetic gauges is possible to determine both the incisal edge position at the time of final restoration and the clinical crown length without violation of the biologic width. The degree of tooth display should guide our restoration . The Incisal edge position can be determined with a preview based on a diagnostic wax up. Taking consideration of the biologic width (Gargiulo 1961) (Vacek 1994) with a sulcus depth of 1,5mm after restoration and a new biologic width of 3 mm. The final restoration after a crown lengthening procedure or a simple gingivectomy should be done at least six months after without any rebound of the tissue.

Results: The promising outcome obtained in the present case report shows that the Chu's aesthetic gauge can be an useful device for improving tooth proportion and correct the gingival margin. Patients referred no pain after the surgical procedure and were satisfied from the periodontal and prosthetic result.

Conclusion: Avoiding the biological width violation permits to create a perfect correlation between the pink and the white aesthetic with the final restoration in place.

Concurrent Session- General

14

Long-Term Sustainability of Shortened Dental Arches

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Purpose: Objectives: to analyze the sustainability of shortened dental arches (SDAs) by considering two clinical endpoints: (1) time to the first restorative intervention of teeth, as a proxy for caries development, and (2) time to tooth loss. Shortened dental arch subjects (SDA group) were compared with subjects with complete dental arches (CDA group). Additionally, the subjects with shortened dental arch were compared with shortened dental arch subjects wearing (distal extension) removable dental prostheses (SDA plus RDP group). We hypothesized that in SDA subjects hazard probabilities for 'first restorative intervention' and 'tooth loss' are higher compared to CDA subjects and lower compared to SDA plus RDP subjects.

Methods & Materials: Data (up to 45.8 years follow up) from patient records of 59 subjects (23 SDA, 23 CDA, and 13 SDA plus RDP subjects) participating in a prospective cohort study on shortened dental arches were analyzed. Statistical package R, version 2.13.1, was used for statistical analysis. Group effects on survival were analyzed using Cox regression models with SDA group as reference group; where appropriate Kaplan-Meier analyses were done.

Results: Compared to SDA subjects, CDA subjects had a significantly lower risk to receive a first restorative intervention in anterior teeth (Hazard Ratio (HR) = 0.377; 95% CI [0.205…0.695]; p = 0.002) and premolars (HR = 0.470; 95% CI [0.226…0.977]; p = 0.043). CDA subjects had a lower risk to lose premolars compared to SDA subjects (HR = 0.130; 95% CI [0.053…0.319]; p = <0.001). Risk for 'first restorative intervention' and for 'tooth loss' did not significantly differ between SDA with and without RDP.

Conclusion: SDA subjects had an increased risk to lose premolars and to receive a first time restoration in anterior teeth and premolars compared to CDA subjects. SDA subjects with RDP had no increased risk to receive a first restorative intervention or for tooth loss compared to SDA without RDP. Clinical relevance: Subjects with shortened dental arches with or without removable denture prostheses can be discerned as enduring at-risk patients. It is therefore recommended that shortened dental arch subjects receive intensive and continuous care to prevent further tooth loss.

15
Occlusal Tooth Wear in Chinese Adults with Shortened Dental Arches

Zhang, Qian*; Witter, Dick J.; Bronkhorst, Ewald M.; Bartlett, David W.; Creugers, Nico H.J.
Guangzhou Medical University
Department of Prosthetic Dentistry
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Purpose: To assess associations between occlusal tooth wear and shortened dental arches in Chinese 40 years-and-older subjects.

Methods & Materials: Occlusal wear was assessed using a modified Smith and Knight index. From a sample of 1462 urban and rural adults, those presenting with shortened dental arches (SDA; n=150) were compared to a control group of 65 randomly selected subjects with complete dentitions (CDA). Occlusal tooth wear index (OTWI) scores were analysed using multivariate (logistic) regression.

Results: There was no significant effect from SDA for those with severe occlusal wear (OTWI scores 3 or 4). Higher age was associated with OTWI score 3 or 4 (p values = 0.007); urban had less OTWI scores 3 or 4 than rural residents (OR = 0.519; p = 0.008). Within the SDA group premolars had higher mean OTWI score compared to the CDA group (effect = +0.213; p = 0.006). For all tooth types higher mean OTWI scores were associated with older age groups. Females had lower mean OTWI score for anterior teeth (effect = -0.153; p = 0.030). Higher mean OTWI scores were associated with rural residents, except for anterior teeth. In the SDA group more POPs were associated with lower mean OTWI sores for anterior teeth (effect: -0.158; p = 0.008) and higher scores for molars (effect: +0.249, p = 0.003). Conclusions: Subjects with SDA or CDA presented comparable occlusal tooth wear. OTWI scores were not associated with number of teeth, but fewer numbers of POPs was associated with more wear in anterior teeth.

Conclusion: Teeth in shortened dental arches seem to have similar risk for occlusal tooth wear as teeth in complete dentitions.

16

Review and Current Rehabilitation Approach for the Aberrant Clinical Situation Described As: "Kelly's Combination Syndrome"

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Purpose: In patients bearing a complete maxillary denture and a Class I mandibular removable partial denture, the pattern of resorption of the bone and the fibrous hyperplasic reaction of the soft tissues in the edentulous areas has been noted to express a specific pattern. E.Kelly was the first to describe this pattern in 1972 named "Kelly's combination syndrome". Although not recognized medically as a true "syndrome", it very well describes empirically a set of changes in the alveolar

ridges that is caused by the above described edentulism thus restored, resulting in five specific changes: 1) loss of bone from the anterior part of the maxillary ridge, 2) overgrowth of the tuberosities, 3) papillary hyperplasia in the hard palate 4) extrusion of the lower anterior teeth and 5) the loss of bone under the partial denture bases. The purpose of the presentation is to overview the "syndrome" and its variations and seek new solutions in combination with dental implants.

Methods & Materials: A variety of clinical cases are presented involving the already described classic situation, as well as its variations in the form of the "maxillo-mandibular unilateral combination syndrome". The treatment solutions are based on reorganizing the occlusion by providing the missing necessary posterior support. The proper extension of the denture bases, the reorientation of the occlusal plane and the elimination of the occlusal contacts between the natural teeth and the removable prosthesis in the anterior area are the essential treatment components in managing the destructive effects of the syndrome. Moreover, the contemporary approach aims to attain the proper occlusal support by the use of dental implants, bilaterally or unilaterally. As the location of required implant support is often related the areas that present extensive bone resorption, the implant placement is accomplished either by utilizing the limited amount of the remaining bone and/or follows its vertical augmentation by bone grafting.

Results: Long-term follow-up that in all patients exceeded a 5-year period shows that restoring the cases by full and partial removable prostheses is inevitably followed by relapse and reoccurrence of the tissue changes. On the other hand, cases in which the necessary occlusal support is attained by dental implants present the desired stability over time.

Conclusion: Reorganizing the occlusion by fixed support with dental implants presents the most effective solution for the predictable and full elimination the destructive effects of the combination syndrome.

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Advanced Care Strategies for Patients with Congenital Oligodontia

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Purpose: Many patients affected with congenital anomalies have affected oral and craniofacial structures related to both the mutation(s) but also the global impact of the malformation on associated bone and soft tissue development. Objective: To understand the impact of staging of tooth replacement therapies which often necessitates a range of strategies from dentures though complex fixed prosthodontic rehabilitation in patients affected with various forms of genetic oligodontia. Multispecialty care is often critical including the appropriate timing of orthodontic care to guide craniofacial development.

Methods & Materials: A case series retrospective clinical trial design was used to evaluate all affected subjects rehabilitated with oral implants at one site since 1987 using a minimum of three year post-prosthesis insertion follow-up.

Results: Results: In a case series at one institute's craniofacial team, 46 subjects were rehabilitated (5-53 years of age), using 231 oral implants, with a minimum recall of 3year recall (3-26yrs), implant survival was 99.5% CISR with the primary complication being prosthetic wear and facial gingival discoloration associated with ongoing osseous remodeling. All implants were performed with a conventional two-stage procedure with 32 of the 46 patients having cortiocancellous hip grafting for site development. Prosthetic restorative options included 67 arches with 53 restored with fixed oral implant prosthesis and 14 with removable prosthesis. Bone loss at the patient level was 0.3mm or less. Patient level QOL as measured by 14-OHIP was considered similar to age-matched cohort sampling.

Conclusion: This paper will therefore review diagnostic and management strategies for prosthetics options for rehabilitation of an age continuum from children though complex orthodontic and implant rehabilitation of the young adult patient reflecting the outcomes from this dataset in this serial case study. Supported by: (NIH), through Grant 2 UL1 TR000442-06

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Genetic and Environmental Factors Involved in Sleep Bruxism in Twins

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Purpose: Sleep bruxism is a stereotyped movement disorder characterized by grinding or clenching of teeth during sleep, usually associated with sleep arousals (ICSD-2 2005). Sleep bruxism has been attracting attention because of its complications; tooth wear, breakage of teeth and/or dental prosthesis, and disorders of the orofacial function. At present, several studies support the multi-factorial hypothesis of genesis and pathogenesis of sleep bruxism. Previous twin studies have tried to clarify the contributions of genetic and environmental factors. However, the presence of sleep bruxism in those studies was determined only by self-reported questionnaires. The objective of this study was to assess sleep bruxism events with electromyography during sleep and to reveal the relative importance of genetic and environmental factors involved in sleep bruxism in twins.

Methods & Materials: The subjects consisted of 108 twins whose mother belongs to the Twin Mothers Club, Japan (mean age: 22.2 ± 6.4 years). Sixty twins (30 pairs) are monozygotic and 48 twins (24 pairs) are dizygotic. Zygosity was determined by the genetic test and for twins who had never received the genetic test, questionnaire method (Hayakawa et al., 1986) was applied. Electromyographic activity of temporalis muscles during sleep was evaluated using a portable automatic sleep bruxism analyzer (Grindcare 3.0, Medotech A/S). The recordings of the electromyographic activity were carried out for at least three consecutive nights in their home. The quantitative genetic statistics based on the structural equation modeling was utilized to estimate variance components with the statistical program "R" and "OpenMx". Since previous research indicated that prevalence of sleep bruxism were different among age groups, regression technique was carried out in order to adjust the effect of age.

Results: The proportion of total phenotypic variance in liability of sleep bruxism to attribute to genetic influences was 48% (95% CI: 17-95%) and to non-shared environmental influences was 52% (95% CI: 28-82%).

Conclusion: This is the first study that revealed the presence of genetic factor while utilizing the electromyographic measurement that can be considered as a moderate screening method for sleep bruxism. It was suggested that genetics are suspected to be the contributing factor to the occurrence of sleep bruxism.

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Effectiveness of a Novel Delivery System on Salivary Flow Rate, Quality of Life, and Inhibition of Caries-Associated Microbiota in Sjögren's Syndrome Patients

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Purpose: Sjögren's Syndrome (SS) is a systemic autoimmune disorder characterized orally by dry mouth (xerostomia) symptoms due to salivary gland destruction by lymphocyte infiltration and subsequent rampant decay. Licorice root (Glycyrrhiza uralensis) extract (LRE) has been shown to inhibit bacterial glycosyl-transferase activity and plaque formation by S. mutans (He et al, 2006). While most sweeteners commonly increase salivary flow, xylitol, a natural sugar alcohol, has also demonstrated anti-cariogenic properties by reducing bacterial acid production and promoting tooth remineralization (Ly et al, 2006). A unique delivery system of LRE and xylitol, in the form of lollipops, has shown capability of clinical reduction of S. mutans (Peters et al, 2010). Objectives: To determine whether a 10-day regime of consumption of 2 such lollipops per day could: 1) increase resting and stimulated salivary flow rates (R-SFR and S-SFR, respectively), 2) reduce growth of S. mutans and Lactobacilli spp., and 3) improve the overall quality of life (QoL) in patients with SS.

Methods & Materials: SS patients were recruited and randomly assigned to one of 3 types of lollipops: sweetened by LRE, xylitol, or an artificial sweetener. The investigators were blinded to the assignment. Saliva samples were collected pre- and post-treatment to determine R-SFR and S-SFR in ml/min and to measure amounts of S. mutans and Lactobacilli spp. Self-administered questionnaires were used to evaluate subjective experiences.

Results: 1) Levels of Lactobacilli spp. were reduced in all treatment groups, while only one type reduced S. mutans levels. 2) Two lollipop treatments effectively increased both R-SFR and S-SFR. 3) One treatment allowed SS patients to feel a statistically significant improvement in their QoL after 10 days. 4) Sixty percent of SS patients reported that the lollipops showed effectiveness in dry mouth relief and that their mouths felt more pleasant after use.

Conclusion: A unique delivery system consumed by SS patients twice daily for 10 days was shown to increase saliva production, decrease oral bacterial load (especially Lactobacilli spp.), and provide a positive experience in xerostomia relief.

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Principles of Brain Plasticity: Implications for Oral Rehabilitation

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Purpose: Oral rehabilitation aims to restore sensory and motor functions and improve patients' quality of life. However, patients vary in their ability to adapt to their prostheses and a considerable number of patients cannot adapt at all and may remain with functional oral motor deficits or may develop somatosensory disturbances including phantom sensations and chronic pain. While the central neural mechanisms underlying oral rehabilitation are unclear, they may involve the sensorimotor cortex, a brain region that plays a crucial role in the integration and control of oral sensory and motor functions. Vast research focussing on limb sensorimotor functions have shown that subjects' ability to adapt (or maladapt) to peripheral alterations and their ability to recover (or not) following peripheral injury (that affects sensory inputs to the brain and motor function) depends on the remarkable capacity of the cerebral cortex to change its structure and functions throughout life (i.e., neuroplasticity). Neuroplasticity has also been associated with somatosensory or motor experiences and learning of novel limb motor skills. Recently, principles of neuroplasticity have been translated into rehabilitation of limbs, speech and swallow motor functions following central or peripheral injuries. Neuroplasticity may also play a role in oral rehabilitation and this is important since every time we engage a patient in an intraoral manipulation or oral rehabilitation state, we alter sensory inputs and motor functions that can induce sensorimotor cortex neuroplasticity. These neuroplastic changes may be crucial in determining how patients model their sensory and motor behaviours and adapt (or not) to loss of teeth and subsequent rehabilitation with dental prostheses. Therefore, uunderstanding these neuroplastic mechanisms may assist in translating principles of brain plasticity into improved diagnostic tools and improved evidence-based oral rehabilitation practice for early diagnosis of at-risk patients to prevent the development of maladaptive behaviours and to facilitate behavioural compensation and restoration of sensory and motor functions.

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Ergonomics and Work Related Musculoskeletal Disorders (WMSD) Among Prosthodontists in a Health University in India: A Cross-Sectional Study

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Purpose: To study the prevalence of musculoskeletal disorders and identify the ergonomic factors among Prosthodontists in a Health university in India.

Methods & Materials: A self-reporting questionnaire was distributed to 182 Prosthodontists working in various dental schools of the Maharashtra University of Health Sciences, India between August 2012 and January 2013, from which a response rate of approximately 74% was achieved. The questionnaire included data on sociodemographic information, ergonomic features, physical and psychosocial workload, need for recovery, the occurrence of musculoskeletal pain in the past 12 months, chronicity of pain for at least 1 month, absenteeism from work and health care use.

Results: 72% respondents reported some kind of musculoskeletal pain in the last 12 months. 28.88% had chronic complaints, 6.66% had spells of absence and, 12.5% sought medical care. Out of the various locations of musculoskeletal pain (cervical, shoulder, lumbar, dorsal, wrist) that were compared, the most commonly reported site was the neck (62.22%) followed by lower back (51.11%) and shoulder region (47.4%). 19.25% of the respondents took some preventive measures (Exercise and Yoga flexes) against musculoskeletal disorders. The treatments utilized to alleviate the pain were medication

(24.44%), physical therapy (7.4%), acupuncture (2.7%) and alternative medicine (6.66%) Health care use and absenteeism were strongest influenced by chronicity of musculoskeletal complaints and comorbidity with other musculoskeletal complaints and, to a lesser extent, by work-related factors.

Conclusion: Overall, this study suggests musculoskeletal pain in neck is commonest followed by pain in lower back and shoulders. Hence the epidemiological patterns of musculoskeletal disorders must be established and careful preventive strategies be considered to help minimize its impact on the next generation of Prosthodontists.

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Psychosomatic Backgrounds, Treatments, and Outcomes in Occlusal Dysesthesia - Clinical Study of 61 Patients Who Required a Psychosomatic Approach

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Purpose: In patients who present at the hospital because of occlusal dysesthesia characterized by complaints such as " I have an uncomfortable feeling when biting," "I have no idea where to bite," and "I have no feeling of biting," despite no objective findings, treatment is often challenging. Treatments vary depending on the hospital, and a standard therapy has yet to be established. Between 1996, when our department was established, and 2012, we clinically analyzed the psychosomatic backgrounds, treatments, and outcomes of patients who presented with occlusal dysesthesia or who were referred to our hospital because of occlusal complaints or the suspected involvement of psychic factors during the course of treatment.

Methods & Materials: Subjects: The study group comprised 61 patients (17 men and 44 women) who were referred to or presented at the Department of Geriatric Dentistry, Tsurumi University School of Dental Medicine because of occlusal dysesthesia as the main complaint.

Results: The minimum age was 21 years, and the maximum age was 86 years. As for age composition, 13 patients each were in their 40's or 60's, accounting for the largest subgroup, followed by 8 patients each in their 30's of 70's. As for mental and psychological factors, 19 patients had somatoform disorder with anxiety, followed by 11 patients with schizophrenia, 8 with obsessive tendency, and 7 with depressive state and depression. Other conditions were personality disorders such as immodithymia in 7 patients, phantom bite syndrome in 2, and mental conflict, panic disorder, differing body image, no desire for treatment, and unknown causes. Among 28 patients who were presenting at specialties such as psychiatry and internal medicine, 7 patients each had schizophrenia and depression, followed by somatoform disorder in 3, dysautonomia in 2, personality disorder in 1, and bipolar disorder in 1. As for therapy, all patients received general psychotherapy. The most common treatment was general diagnosis and treatment alone in 26 patients, followed by general psychotherapy combined with tranquilizers and antidepressants such as selective serotonin reuptake inhibitors and sulpiride in 17 patients, general psychotherapy and dental treatment in 10 patients, and general psychotherapy and antidepressants in 4 patients. As for outcomes, occlusal dysesthesia disappeared in 25 patients (41%). Twenty patients (33%) discontinued treatment, 13 (21%) were referred or transferred to other specialties such as psychiatry, and 3 continued to receive treatment. The treatments received by the 25 patients in whom occlusal dysesthesia resolved were general psychotherapy plus antidepressants and tranquilizers in 8 patients, general psychotherapy alone in 7, general psychotherapy and dental treatment in 6, and others in 2. Among the 20 patients who discontinued treatment, 10 just complained and did not comply with treatment, 1 had immodithymia characterized by adherence to symptoms, 3 had depressive state, 2 were suspected to have schizophrenia, and 2 were suspected to have phantom bite syndrome. Among the 7 patients who received dental treatment with disregard to their metal state or did not give fully informed consent, 4 could be treated, and 3 were very unsatisfied and angry with their previous physicians and could not be treated at all. Among the 13 patients for whom treatment at departments of psychiatry or other specialties was requested, 10 are receiving treatment at clinics, 2 were introduced to psychiatrists after building rapport, and 1 received treatment at a dental clinic that made the patient's prosthesis.

Conclusion: Of the 61 patients who presented at our department, 38 patients (62%) could be treated, and 20 (33%) could not be treated at all. Occlusal dysesthesia should be treated taking into account the underlying psychiatric disorder that is manifesting itself as physical complaints.

Concurrent- Restoring Edentulism Geriatrics Dentistry

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Age-Related Dental Challenges

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Elderly people challenge oral health care workers in many different ways. We face challenges related to age-related oral pathologies, specific treatment needs, patient's complexity and comorbidiy as well as the challenge for our profession to cover the excessive treatment needs in the elderly population. Finally, there is also the challenge to educate and motivate oral health care workers to actually take responsibility in taking care of this particular patient group.

Although the most prevalent oral pathologies in the elderly, (root)caries and periodontitis, are common ones, they present in a way that requires careful diagnosis and treatment planning. Besides pathology, many elderly people lost teeth, which in turn requires prosthetic or restorative treatment. This treatment planning is particularly challenging due to the complexity of this group of patients. The patient's physical and mental condition, social context, and frailty need to be taken into consideration. As treatment should focus on improvement of the patient's quality of life and function, the proposed treatment plan needs to comply with the patient's complaints and expectations towards the treatment. In addition, the proposed treatment should restore function, prevent predictable damage, and be feasible for a particular patient.

Abundant literature is available indicating the excessive treatment needs in the older population, although the frequency of dentist visits is lower compared to younger persons. The reasons for these barriers for dental follow-up and treatment are related to the older persons themselves, as well as to the health care system and the dentists. Dentists' negative attitude towards elderly and lack of confidence due to insufficient knowledge and skills have an adverse effect on oral health care for the elderly. Appropriate education in geriatric dentistry is therefore mandatory in order to improve the latter. Besides courses, sufficient clinical exposure and training is crucial to improve dental students' skills and attitude towards oral health care for the elderly.

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Uncertainty in Restoring the Edentulous Patient

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This presentation will address the extent and consequences of uncertainty in the prosthodontic treatments offered to edentulous patients who are frail. It will explain how clinicians manage uncertainty when treating this population, and what clinical procedures need more robust evidence to enhance the quality of life of frail patients who are coping with complete tooth-loss and dentures.

The complete denture (CD) over the past century has been pleasantly overshadowed by the decline in tooth-loss and the growth in implants. Yet the need for this prosthesis remains high in numbers, especially among people who are frail and cannot access more invasive and expensive treatments. The success of CDs rests more on the judgment and skill of clinicians and technicians than on scientific-based evidence. Indeed, most of the change in CDs over the last century has emerged from improvements in biomaterials rather than clinical procedures, and uncertainty continues to pervade the clinical principles upon which CDs are made.

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Personalized and Predictive Prosthodontics for Elderly Patients

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In 20th century, prosthodontics emphasized material and technique. It was believed that so-called "good" denture was sure to make any patient chew well. For the patients in sixties, standardized treatments would be successful.

However, in these days, oldest-old, those are persons aged 85 years and over dramatically increase. Longer life means to live longer frequently with chronic disease, disability or handicap. In oral cavity, number of teeth is decreasing, oral motor or sensory function is declining and salivary flow is reducing. And their individual difference in such physical function is becoming wider as getting older. In the super-aging society, personalized treatment considering individual difference and aging will be required.

In the 20th century, the extraction of teeth and their replacement with a denture was the most effective form of dental treatment. However, patients' attitudes to oral health or dental treatment have been changing. Patients are eager to keep their own teeth in general, regardless whether they are sound or not. Therefore, patients become edentulous in later in life than before. The individual's first complete denture is inserted at older age where there are severer alveolar bone loss, poor salivary flow and more deteriorated sensory and motor function. Due to these factors, problems of adaptation and dealing with complete denture are expected and prognosis may be poor.

A series of controlled studies has shown a relatively limited influence of denture factors, such as retention, stability, and occlusal relation, on oral function. Similarly, clinically excellent dentures have failed to show any significant relationship with the function and satisfaction of denture wearers. Therefore, it may be useful to identify other significant factors in the elderly.

Medicine is now undergoing a major revolution that will transform the nature of healthcare from reactive to preventive. The changes will be catalyzed by a new systems approach to disease that will trigger the emergence of personalized medicine - a medicine that focuses on the integrated diagnosis, treatment and prevention of disease in individual patients.

In this paper, Personalized and Predictive Prosthodontics for Elderly Patients will be proposed and discussed.

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Mini-Implants (MDI): An Evidence Based Treatment Option for Edentulous Patients

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The Mc Gill consensus in 2002 and again the York consensus meetings in 2009 stated the treatment of edentulous patients with an implant-supported overdenture in the mandible as standard of care. However, an extreme resorption of the alveolar ridge can occur that inhibits the insertion of standard diameter implants without applying extensive bone augmentation procedures. A possible alternative is the use of small diameter implants (SDI) or mini-implants (MDI). The smallest implant available is a one-piece implant including a ball-attachment with a diameter of 1.8mm (MDI, 3M Espe, Seefeld, GER).

The aim of the presentation is to discuss the current scientific evidence of small and mini dental implants and provide data of a prospective clinical study with 1.8mm implants at the University of Bern: in 20 patients, being edentulous for more than 20 years, four interforaminal implants were installed with an open flap procedure and immediately loaded if a primary implant stability of 35 Ncm could be achieved. In 17 patients, the implants were immediately loaded and in three patients after a healing period of three months by transforming the existing dentures in overdentures. One year after loading, implant survival and success rates were 100%, i.e. periimplant bone loss was always less than 2mm. No biological complications occurred. In six patients the denture fractured in the region of the matrices. However, after an integration of a simple metal band in the lingual aspect of these dentures, no further fracture occurred. Due to increased denture retention and stability, patient satisfaction and oral health related quality of life (OHIP G53) were statistically significantly improved.
These results are in accordance with published implant survival rates of 90-100% for MDIs. Thus, with the indication 'mandibular implant overdenture', the use of implants with a diameter of 1.8mm can be an adequate alternative for standard diameter implants in order to avoid bone augmentation procedures.

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The Vancouver Implant Prosthesis Trial 5-Year RCT Results of Mandibular 1 and 2 Implant Overdentures

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Purpose: For maladaptive denture patients, a mandibular overdenture retained by one implant is initially more economical and equally satisfying compared to treatment with two or more implants. We tested the hypothesis that there are no differences in patient satisfaction or implant survival comparing mandibular overdentures retained by 1 or 2 implants after 5 years.

Methods & Materials: 86 edentulous subjects (43 men, 43 women; mean age 67), enrolled in the Vancouver Implant Prosthesis (VIP) clinical trial, were randomly assigned to receive 1 or 2 Straumann implants in the anterior mandible to retain their existing lower dentures using a ball and gold matrix attachment. Subjects reported lower denture satisfaction at baseline, 1 year and 5 years using a Visual Analog Scale (VAS), 0 to 100mm. VAS scores were compared using the Wilcoxon/Mann-Whitney test. Implant survival was determined by a lack of mobility, pain and suppuration.

Results: 62 of 86 subjects were available after 5 years (29 1-implant subjects; 33 2-implantsubjects). At 5 years, the 1-implant group had no significant difference ($p>0.05$) in overall VAS satisfaction (median 88.0) compared with 2-implant subjects (median 89.0). Median satisfaction was slightly lower than 1-year results (median 93.0 and 94.0 respectively for the 1- and 2-implant groups), but still significantly ($p<0.05$) improved over baseline scores (median 29 and 51 respectively for the 1- and 2-implant groups). Prior to loading, 5 implants failed in 4 subjects in the 2-implant group and no implants failed in the 1-implant group. Four of the failed implants were replaced and all were subsequently loaded and followed for 5-years. One subject chose not to replace his failed implant, but had his denture attached using the remaining implant; he was also available for 5-year follow-up. No implants failed following loading, yielding a raw 5-year implant survival of 100% (29 of 29 original implants) for the 1-implant group and 92% (61 of 66 original implants) for the 2-implant group.

Conclusion: We found similar patient satisfaction and implant survival with 1- and 2-implant overdentures after 5 years. 1-implant overdentures should be considered a successful alternative to 2-implant overdentures in the medium-term. This study was supported by the ITI Foundation, Grant #635-2009.

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Patient Satisfaction and Clinical Outcomes Among Patients Treated with Immediately Loaded Mandibular Overdentures Supported by 1 or 2 Dental Implants

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Purpose: To evaluate clinical outcomes and patient satisfaction among edentulous subjects who had received treatment with implant supported mandibular overdentures. This paper presents the 5 year follow-up results.

Methods & Materials: Thirty-six edentulous subjects, 16 men and 20 women were provided with mandibular overdentures supported by 1 or 2 Branemark TiUnite surface implants. All subjects received new dentures prior to implant surgery. Using a random procedure, each subject received one or two implants placed in the interforamina area. All dentures were provided with retentive female attachments and delivered the day of surgery. Subjects were followed for 5 years with annual recall exams. The clinical examinations included evaluation of denture stability/retention, occlusion and wear, implant stability quotient (ISQ) using RFA analysis, soft tissue condition and peri-implant bone loss. Need for maintenance and technical/biological complications were also registered. Before each clinical examination, subjects were asked to complete the OHIP-EDENT questionnaire.

Results: Of the original 36 subjects, 17 (7 male and 10 women) with a mean age of 59.4 years were available for the 5 year follow-up. Eleven subjects (6 men and 5 women) belonged to Group 1 (single implant) and the remaining 6 (1 man and 5

women) belonged to Group 2 (two implants). No failing implants were found between the 12-month and 5-year follow up. The number of technical complications was low and the most common need for maintenance was replacement of retentive o-rings. The ISQ values remained at a high level and the OHIP-EDENT questionnaire responses indicated most subjects in both groups were still very satisfied with their dentures.

Conclusion: The results from this study indicate a single implant may provide high patient satisfaction and sufficient retention and could serve as an alternative to the customary two-implant overdenture therapy. The need for maintenance was low and no failing implants were found after the first year. However, the early failures seen in this study should be considered and more research is needed to further evaluate factors associated with the immediately loading of implants supporting removable prostheses.

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Effect of Removable Partial Dentures on Dietary Intakes in 70 and 80 Year-Old Elderly

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Purpose: It is well known that tooth loss causes decline of oral function. However, benefits of removable partial dentures (RPDs) on dietary intake have been controversial. Especially, for patients who lost some posterior occlusal supports, past studies did not always indicate a significant difference in dietary intakes between patients with and without RPDs. The aim of this study was to investigate the effect of RPDs on dietary intakes after adjusting for other factors.

Methods & Materials: The study population was 274 community-dwelling people aged 70 and 80 years old. They were partially edentulous with 20 teeth and more and their posterior occlusal support was Eichner B1 or B2. The subjects were divided into 2 groups whether using RPDs or not. Dietary habits during the preceding month were assessed using a brief-type self-administered diet history questionnaire (BDHQ). The BDHQ is a structured questionnaire that consists of consumption frequencies of selected food and beverage commonly consumed in Japan and calculates energy-adjusted nutrient intakes. Number of occlusal units (OU: a pair of antagonistic premolars was counted as 1 OU, and that of molars as 2 OU), occlusal force (OF), and stimulated salivary flow rate (SSFR) were measured as objective oral functions. The mean of probing pocket depth (PPD) was used as an individual periodontal status. We conducted analysis of covariance (ANCOVA) to compare food and nutrient intakes with using RPDs or not after adjusting for OU, OF, SSFR, the mean of PPD and socioeconomic status (SES: age, gender, education, economic status and resident area).

Results: Forty-three percent of subjects did not use RPDs. There was no significant difference in OU, OF, and SSFR between the two groups. In the group using RPDs, intakes of green and yellow vegetables and meats were significantly higher than the other group after adjusting for objective oral functions, mean PPD and SES. Similarly in nutrient, intakes of n-3 polyunsaturated fatty acids, some vitamins, minerals and dietary fiber were significantly higher in the group using RPDs.

Conclusion: Our results suggested that prosthetic treatment with removable partial denture was effective in dietary intakes after adjusting for oral functions.

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Does Case Severity of Edentulous Patients Make Difference in the Clinical Improvements of Complete Dentures?

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Purpose: Generally, the edentulous cases with extreme alveolar bone resorption, distorted jaw relationship or hyposalivation had been considering difficult in fabricating successful complete dentures. However there is not enough evidence to confirm the relationships between case severities and clinical outcomes of prosthetic treatment by complete dentures. The purpose of this study is to investigate the effect of case severity on clinical outcomes of complete dentures by professional treatment.

Methods & Materials: Twenty-two edentulous outpatient of the Department of Removable Prosthodontics at the Osaka University Dental Clinic (12men /10women, mean age: 74.0±5.6 years) participated in this study. The study protocol was approved by the Institutional Review Board of Osaka University Graduate School of Dentistry. The inclusion criteria were: (1) independently-living without serious chronic condition; (2) requiring a new set of complete dentures; and (3) wearing complete dentures for at least 3 years previously. One prosthodontist (clinical experience: 10 years) fabricated a new set of complete dentures for all the patients. Evaluations were carried out before and after treatment. As subjective evaluations, oral health related-quality of life (OHIP-14), satisfaction by visual analogue scale, and food acceptance were examined. As an objective evaluation, masticatory performance by chewing a piece of gummy jelly was measured. Subjects were divided into severe group (n=13) and moderate group (n=9) according to the classification for edentulous cases by Japan Prosthodontic Society, which includes examination of residual ridge height, mucosal condition, jaw relationship and so on. Mann-Whitney U test and Wilcoxon test were used for statistical analyses. $p<0.05$ was considered significant.

Results: Before treatment, severe group showed significantly lower masticatory performance and food acceptance than moderate group. However, severe group made significant improvement after treatment in all objective and subjective variables. In contrast, moderate group had no significant difference in them. Consequently, after treatment, we could not find any significant difference in all variables between both groups.

Conclusion: Severe cases were liable to lower in both subjective and objective evaluations than moderate cases. However, after professional treatment with new complete dentures, severe cases indicated higher improvement than moderate cases.

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Medication-Related Dry Mouth in the Elderly: Ubiquitous but Overlooked

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Purpose: Over three-quarters of the elderly population take medications that potentially cause a dry mouth and lessen the buffering capacity of saliva. It is not clear how much information physicians or pharmacists routinely provide patients about medications that can cause dry mouth, or whether consideration of this adverse effect influences treatment decision. A key question is information availability. The objectives of this study were to: 1) identify which of the most frequently prescribed medications in Canada had written warnings about dry mouth; and 2) explain how clinicians might access this information.

Methods & Materials: Monographs on the 100 most frequently prescribed medications in Canada during 2010 were retrieved from the Compendium of Pharmaceuticals and Specialties (CPS), the National Library of Medicine's "DailyMed" database, and directly from manufacturers.

Results: Medications from different manufacturers but with similar formulation were grouped together for comparison bringing our total to 71 different medications. We found written warnings about dry mouth for 43 of these 71 medications most commonly prescribed in Canada: 19 in the CPS; an additional 19 in monographs obtained directly from the manufacturer; 2 in the DailyMed database; and another 3 in the major databases of biomedical journals that were also searched for citations containing warnings about dry mouth associated with these medications. Notably, the CPS provided monographs on only 43 of the 100 most commonly prescribed medications, and offered at most information only about prescriptive dosages for the remaining medications.

Conclusion: Over half of the most commonly prescribed medications in Canada cause dry mouth, but less than half of the warnings about dry mouth appeared in the CPS which is the available reference of choice in most Canadians hospitals.

Friday, September 20th

Concurrent Session- Occlusion and TMD Bruxism and it's Management

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Bruxism and Bowel Symptoms – A New Look at an Old Problem

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Introduction: Bruxism is of concern because of the consequences of tooth wear, fracture of restorations, tooth hypersensitivity or jaw muscle pain.[1] In the past, tooth and occlusal discrepancies were considered important causative factors although there was no validated evidence. The focus has shifted from local environmental to pathophysiological factors[2] such as stress and personality disorders which have been reported to be more prevalent in subjects with self-reported bruxism.[3, 4] Bruxism during sleep has been classified as a sleep-related movement disorder with rhythmic tooth clenching and grinding, secondary to sleep-related micro-arousals. Awake bruxism, on the other hand, is dominated by clenching and is primarily associated with a nervous tic (involuntary, compulsive, rapid, repetitive movement) or a reaction to stress.[1] The prevalence of sleep bruxism in the general population is about 8%, whereas awake bruxism is about 20%.[5] Given the importance of stress as a possible driver of bruxism, this is to be considered as an associated feature and a possible etiological factor.

Aims: To consider the medical associations associations between self-reported bruxism, muscle tenderness, and bowel symptoms, and their relation to the 9 dimensions of the Symptom Checklist-90-Revised (SCL-90-R).

Methods: Data from 3 surveys – Bowel Symptom Questionnaire (BSQ), Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) and SCL-90-R were collected between 2005 and 2011 at the Orofacial Pain Clinic at Westmead Centre for Oral Health. BSQ was analyzed using the Rome II criteria to classify the bowel status: no symptoms, functional symptoms and irritable bowel syndrome (IBS). Outcomes of muscle palpation and self-reported bruxism were extracted from the RDC/TMD. SCL-90-R was scored to yield the 9 dimensions: somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation and psychoticism. Chi-squared tests were used to test for pairwise associations between bruxism, muscle pain; and bowel status. Multiple logistic regression analysis was used to identify the independent predictors of bruxism and of IBS.

Results: Data from 246 surveys were collected for bruxism, muscle tenderness and bowel status. There is significant association between bruxism and muscle pain ($p=0.004$), IBS and bruxism ($p=0.020$), and constipation and bruxism ($p=0.007$). Multiple logistic regression analysis identified “muscle pain” and “constipation” as independent predictors of bruxism; and “somatization” as the sole independent predictor of IBS.

Conclusion: These data establish a relationship between bruxism and bowel symptoms. Approximately 36% of the Australian population has a functional gastrointestinal disorder, and 13% have a diagnosis of IBS. If bruxism is related to bowel symptoms, education regarding higher risk of tooth surface loss and restoration loss is needed for this patient group.

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Occlusion and TMDs – Past and Present Opinions on Management

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Temporomandibular disorders (TMDs) have been considered one of the most controversial issues in clinical dentistry, and many controversies remain unresolved. TMDs encompass a group of musculoskeletal conditions, with overlapping signs and symptoms. The general dental practitioner can expect to find many patients who need treatment for TMDs due to its high prevalence in the population. Screening for TMDs should be performed on all dental patients.

Occlusal disturbances were for long believed to be the dominant cause of TMDs. Patients with TMDs were in many countries managed in prosthodontic clinics with various types of occlusal therapy. After publications of Monson and Costen in the first part of the 20th century, bite raising and replacement of all lost teeth remained for long a recommended treatment for TMD patients. Even if occlusion continued to be considered important, less extensive treatments began to be used, such as occlusal adjustment and intraoral appliances, especially so-called stabilization splints. Research has however demonstrated that other than occlusal features are the dominant etiologic factors in TMDs. Even though an intraoral appliance provides an efficient treatment in the management of many TMD patients, they may not be necessary; proper explanation of the probable diagnosis and low-cost self-care treatment including jaw exercises should be the first option in management of TMD patients. The great majority of primary TMD patients will be helped by this treatment approach.

A critical assessment of the clinical management of TMDs indicates that there is a great variation of suggested treatment methods, as well as of types of patients, signs and symptoms. However, most TMD patients can be managed successfully according to some simple principles using conservative, reversible and evidence-based therapeutic modalities, which leaves occlusal therapy outside the currently accepted standard of care.

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Occlusion and Materials in Implant Prosthodontics

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In implant- prosthodontic rehabilitation the transmission of occlusal loads to the bone structures occurs in different ways, depending on the different connection between implants and supporting structures.

The capacity of propioperception recovery, following tooth extraction, was evaluated by means of nervous fibres regeneration.

An analysis of scientific literature was made to identify the suggested occlusal schemes in the various types of edentulism and in the different conditions of load, immediate or delayed, and in fixed or removable prosthodontics .

Biomechanical evaluations were made to detect the most suitable prosthetic materials and the implant framework characteristics to be used, especially in the immediate loading rehabilitations, both during the provisional and definitive phase. Special attention should be given to the control of micromovements during implant osseointegration.

Particular attention was given to the rehabilitation of the edentulous arches. The factors referred to the occlusal scheme and the materials used were also considered in the situations of evident parafunctional activity.

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Occlusion and TMD-- From Clinic to Lab, and Back to Clinic

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The role of occlusion in temporomandibular disorders is still in conflict. An epidemic survey should be based on a strictly definition of the diagnosing of TMD and the classification of occlusion. However, either TMD definition or occlusion criteria are difficult to define for a survey on a large population. In present work, firstly, we used the method of case-control investigation to analyze the association of posterior tooth missing and the symptoms of TMD. It was concluded that patients with missing posterior teeth in one more quadrant would have over 7-times higher risk of having TMD than patients with missing posterior teeth in one quadrant. The forming of the gradually appeared disordered occlusion caused by missing of a posterior tooth without restoration for a long time, which we named as the tightly locked occlusion, was assumed the explaining. We then created 4 separate spaces in different dental quadrants to establish the gradually disordered occlusion in rats with orthodontic methods. Significant degenerations were found in TMJ cartilage of the experimental rats, characterized as cell death and extra-cellular matrix degradation. Thirdly, we used surface electromyography, T-Scanning occlusion checker, to collect the data from TMD patients and asymptomatic controls. It was disclosed that a stabilized occlusion was benefit for an effective jaw muscle function. Forceful balancing side interferences, i.e., the one with a level of strength, evoked an extra-SEMG activity in masseter muscle. It might be this kind of forceful occlusal interference that takes a role in TMD. We then concluded that a better understanding of occlusion with more information or characters, such as occlusal force direction, contact strength and distribution, will be helpful in clarify the role of occlusion in TMD.

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Risk Factors Associated with Tooth Surface Loss

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Introduction: Correlations between medical and diet history, stress and saliva on the incidence of tooth surface loss (TSL) were investigated.

Methods: 80 subjects (40 cases and 40 controls) aged 25-75 years were recruited. Cases were subjects with severe TSL and controls had mild or minimal TSL. Cases and controls were age and gender matched. Data on medical history, diet, daily stress levels and saliva pH and flow was obtained and was assessed for correlations between variables and severity of TSL.

Results: Conditional linear regression and chi square analysis were used to analyse the data as follows: 45% of cases and 7.5% of the controls reported gastrointestinal problems; 35% of the cases and 7.5% of controls reported musculoskeletal problems; and 77.5% of the cases consumed medications. Most aspects of the daily hassles scores were elevated in the cases. Stress due to finance, health and self image in particular was higher with cases. No significant differences were evident in diet, saliva quantity or quality.

Discussion: Medical status, medications as well as elevated stress levels correlated with increased TSL.

Conclusion: Significant correlation was observed between severe tooth surface loss and medical status and/or medications and elevated stress levels

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A New Perspective of Occlusion: Neurocognitive Aspects

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Dentists are constantly changing the occlusion, mostly without causing problems. However, in a minority of cases also very minute occlusal alterations may trigger several symptoms arising the question "why this happens". It is the belief of many practitioners that this may occur because the occlusal alteration triggers or enhanced a bruxism behavior. In order to

comprehend whether this in effect happens, it is necessary to understand some of the neurophysiological principles of occlusion. Normally the neurophysiological processes taking place when teeth occlude are narrowed down to segmental reflexes, i.e. those that inhibits or facilitate muscle activity. However, it must be kept in mind that the adaptation or the lack of adaptation of a subject to occlusal alterations, or alterations within the oral cavity in general, largely depends on perception. In this framework, occlusion does not purely relate to the contact situation between the teeth or the maxilla-mandibular position but to the neurophysiological and neurocognitive processes occurring when teeth occlude. Occlusal perception is continuously modulated by descending inputs from the central structures, in particular by attention, which is one of the mechanisms by which sensitivity to a stimulus is increased. In this framework it is likely that the attention state is more relevant than the precision of occlusion for the patient's adaptation to the variations in the occlusion, that always occur when making a filling or performing more complex dental reconstructions.

The lecture will outline these neurocognitive aspects and discuss how different subjects respond differently on experimentally introduced occlusal alterations, and end up with some practical advises for the daily practice.

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Occlusal Splints and Bruxism

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Bruxism is considered as one of the major risk factors that cause dental problems such as tooth wear, progression of periodontal disease, damage or failure of dental restorations or implants, and therefore, is thought to be important in prosthodontic treatments. Although there are many studies on bruxism, the controversy exist with regard to the definition, causes, pathophysiology, consequences, and management of bruxism. Major reason of this problem is lacking of consensus regarding a definition and a diagnostic grading system for bruxism and the currently used definitions such as the eighth edition of The Glossary of Prosthodontic Terms, the second edition of the International Classification of Sleep Disorders, and the fourth edition of the Orofacial Pain Guidelines have some drawbacks. Therefore, a group of bruxism experts including the speaker proposed a new definition of bruxism described below in the paper published in the Journal of Oral Rehabilitation. "*Bruxism is a repetitive jaw-muscle activity characterized by clenching or grinding of the teeth and/or by bracing or thrusting of the mandible. Bruxism has two distinct circadian manifestations: it can occur during sleep (indicated as sleep bruxism) or during wakefulness (indicated as awake bruxism).*" Major drawbacks of the currently used definitions and the background of this definition will be discussed in the first half of this lecture.

Although the etiology and neurological mechanisms that generate sleep bruxism (SB) are not well understood, occlusal splints is the most commonly accepted modality among the managements for SB. Stabilisation splints have been reported to decrease masseter muscle activity in more than 50% of SB patients. Specifically, the short-term use of stabilisation splints reduced SB-related events in a recent randomised controlled study. However, there are clinical reports that splints did not diminish SB activity with long-term observation. Moreover, some studies pointed out that there is no difference in the effect on SB by the occlusal splints with or without covering the occlusal surface of the dentition. The latter half of this presentation will discuss the above mentioned controversies regarding the effects of occlusal splints on SB.

Concurrent Session- Implants, Inclined Implants, Computer Guidance

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The All On 4 Experience: Planning, Progress, Pitfalls

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The concept of tilting implants to create an improved spread and enhance base stability for full arch implant restorations has allowed treatment opportunities for a broader segment of patients than previously thought possible. Enhanced capabilities for planning implant placement using CBCT technology along with implants now designed with greater initial stability make this approach in immediate load situations even more viable.

This presentation will review the present state of the "All on 4" approach, along with a complication based protocol for minimizing implant pitfalls at the treatment planning stage.

Objectives: Upon completion of this presentation, participants should be able to:

1) Employ the most effective available treatment planning options for full arch implant restorations.
2) Identify an emerging class of patient presentations that might have previously not been considered full arch implant candidates.

Utilize a failure avoidance protocol at the time of treatment planning to help minimize implant complications.

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Concepts and Treatments Involving Inclined Implants

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In recent years, numerous articles have focused on the treatment of edentulous maxillae with immediately loaded implant-supported prostheses. Tilting of the implants parallel to the anterior maxillary sinus wall may represent a feasible treatment option.

The use of long tilted implants placed in residual bone has been advocated to obtain high levels of initial primary stability, avoiding bone-grafting procedures. Improved implant anchorage can be achieved by benefiting from the cortical bone of the anterior wall of the sinus and the nasal fossa. Additionally, tilting implants can optimize the anterior- posterior spread of the implants to provide satisfactory molar support for a full fixed prosthesis. This design also eliminates or reduces the number of cantilever extensions generally seen with vertical implants to obtain the same number of masticatory units.

The purpose of the lecture is to evaluate the prognosis of immediately loaded full-arch prostheses supported by both upright and tilted implants. Implant cumulative survival rate (CSR) and peri-implant bone resorption are investigated.

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Retrospective Analysis of Four Immediately Placed Implants and Immediately Loaded Mandibular Implant Supported Fixed Dental Prostheses

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Purpose: This study investigated the predictability and success of immediate placement and loading of four implants (Nobel Biocare(TM) Replace(TM) Select Tapered TiUnite(TM)) to support a fixed dental prosthesis (FDP) in the edentulous mandible. The study also investigated rates and types of complications, and patient satisfaction.

Methods & Materials: 78 patients treated at The Brånemark Center in Perth between 2004 and 2011 by one clinician after a minimum of 12 months. Inclusion criteria: following mandibular tooth extraction; four Replace(TM) Select Tapered TiUnite(TM) dental implants were immediately placed interforaminally and immediately loaded with an implant supported FDP. Exclusion criteria: patients edentulous prior to treatment, received more or less than four implants in the edentulous mandible, implants other than Replace(TM) Select. Of the 78 patients, 4 were uncontactable, 3 had moved interstate or overseas and were unavailable, 2 declined, 2 were medically unfit. The resulting 67 patients completed a patient satisfaction questionnaire, and were examined clinically and radiographically by an independent clinician. Patients were interviewed and treatment history obtained from the records.

Results: 268 implants were placed in 67 patients. There was one implant failure. 31patients (46.3%) reported 65 complications with provisional FDP's in function for up to 7.5 years, and 15 patients (22.4%) reported more than 1 complication. The most common complications were chipping of acrylic teeth, fracture of distal cantilever extensions in non-reinforced FDP's, and cohesive failure of teeth. Patient satisfaction was high for aesthetics, function and speech; patients rated the treatment cost as high, but considered this justified. Treatment fulfilled patients' expectations and they would recommend the treatment to others.

Conclusion: Immediate placement and loading of an implant supported FDP on 4 implants in the edentulous mandible is a predictable and successful treatment. Patient satisfaction was high, with the treatment fulfilling patients' expectations. A number of complications were observed, with acrylic tooth chipping having the highest incidence. The incidence of distal cantilever fracture varied with different bridge reinforcement designs.

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Prosthetically Driven Computer Assisted Guidance and Implant Supported Rehabilitation

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Planning and restoring implant supported restorations present significant challenges to the restorative dentist, surgeon and dental technician. It is desirable that the planned restoration be simulated in advance to serve as a template for the planning of implant location , orientation and bone augmentation if necessary. The simulated restoration needs to take into account all of the occlusal functional , esthetic and prosthetic determinant as well as any other of the individual determinants that are specific to each case.Advances in technology now allow computer assisted 3D planning and accurate guided implant placement from virtual and stereolothographic computer generated jaw models and surgical guides. Several methods may be used to create customized templates that incorporate these individual case determinants and prosthetic requirements into the virtual modelling of the jaws . These include the use of single or dual scan cone beam CTs with 1, Modeling set ups or wax ups of the prostheses; 2, Pre-existing dentures or prostheses; 3, Standing teeth and restorations with merged virtual teeth; 4, Optically scanned plaster casts merged into virtual CBCT models of the jaws and 5, Set up of virtual teeth. Fully edentulous and partially edentulous cases illustrating each of these methods will be presented .

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The Zygomatic and Pterygoid Implant, Guided and Unguided Strategies

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The use of zygomatic and pterygoid implants provides patients with extreme maxillary atrophy a biomechanically sound, fixed, screw retained prosthesis using the Teeth In A Day® protocol in conjunction with computer guided surgery. Remote anchorage with tilted implants can offer rapid treatment for individuals who otherwise would require time consuming extensive bone grafting with sinus elevations or inlay and onlay grafts.

CT scan and virtual surgery is used to generate prosthetic templates to guide precise implant placement. Evidence based data for these procedures has been reported in the literature and is summarized at
http://dentalimplants-usa.com/treatment/implants/tiltledimplants/zygomatic-ptergomaxillaryfixtures.html

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Is the "All-On 4 Concept with Inclined and Minimum Number of Implants" Really Biomechanically Valid? Better to Have More or Less is Better?

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Osseointegrated implants have given us valuable possibilities to re-establish the stable occlusal support and better oral functions in edentulous situations which conventional prostheses could not usually achieve.

Recent improvements of CT 3 dimensional data based computer guided implant treatment and surgery also has made it possible to place inclined implants precisely at the correct position in the limited amount bone. With these backgrounds, the "All-on4 concept" has been widely utilized to accommodate patients need for immediate function with the minimum number of implants and limited amount of surgical intervention. However, there are still some questions to be answered.

In this presentation following questions will be discussed from the biomechanical point of view based on currently available literatures and results from our 3 dimensional finite element analysis.

(1) How many implants do we really need for re-establishing stable occusal support for edentulous patients? Where should we place them?
(2) When should we choose a fixed implant superstructure or removable one?

(3) In which clinical situation we should apply the "All-on 4 concept" and should not apply? What are limitations of "All-on 4 concept"?
(4) What should we consider for the "All-on 4 concept" superstructure? What kind of material or frame design should we use?
(5) What would be long-term clinical problems and possible solutions for "All-on 4 concept" or inclined implants?

Key words: minimum number of implants, inclined implant placement, All-on-4 concepts, biomechanics

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6-Year Prospective Study on the Immediate Loading Rehabilitation of the Upper Jaw Following the Columbus Bridge Protocol: Factors Affecting the Outcome

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Purpose: This prospective study reports the 6-year outcomes for patients rehabilitated with an immediate loading protocol of the upper maxilla (Columbus Bridge Protocol).

Methods & Materials: 169 implants were inserted in 37 patients and loaded within 24-36 hours.

Results: 4 implants failed during the first 6 months. At the 6-year follow-up, a mean bone loss of 1.52mm was found. Significantly ($p<.0083$) less bone loss was found next to tapered implants compared to cylindrical implants, and next to Osseotite implants compared to FOSS implants ($p<.0083$).

Conclusion: No significant differences in bone loss were found for tilted vs. upright implants nor for mesial vs. distal implant sides.

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Immediate Versus Delayed Loading of Dental Implants In Edentulous Maxillae: A 6-Year Prospective Study

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Purpose: The aim of this study was to compare survival rates and peri-implant bone resorption of immediate and delayed implant loading rehabilitations in edentulous maxillae for a minimum of 5 years of function.

Methods & Materials: Forty-nine patients in need of maxillary full-arch treatment were split into two groups. The test group (34 patients) was treated following the Columbus Bridge Protocol providing the insertion of 4-6 implants loaded within 24 hours with distal tilted implants. While the control group (15 patients) was treated following the ad modum Brånemark protocol with 6-9 straight implants loaded a mean 8.75 months after surgery. In the control group implants were placed in healed sites, while in the test group implants were placed in both healed and fresh extraction sites. Two hundred sixty implants (test: n=163, control: n=97) were placed, and subjects were treated with screw-retained full-arch prostheses.

Results: At the 6-year follow-up 2 patients dropped-out (one in the test group, and one in the control group). The other patients were followed-up on average for 71.5 months (range: 68-77 months). At the 6-year follow-up, no differences in implant cumulative survival rate were found between groups. Significantly ($P=0.001$) less bone loss was found in the test group (mean: 1.62 mm) compared to the control group (mean: 2.44 mm).

Conclusion: In the edentulous maxilla, the Columbus Bridge Protocol involving immediate loading of implants exhibited equivalent implant survival and less marginal bone loss at 6 years compared to the conventional two-stage delayed loading protocol.

Concurrent Session- Implants/Other

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Functional Evaluation of RPD Retained by Short Implants Before and After Implant Anchorage: A Case Series

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Purpose: In partial edentulism with distal edentulous ridges the quantity of residual alveolar bone in the posterior sides is very often reduced. In these cases, the use of conventional length implants is not possible, while it could be possible the use of short implants whose lengths are inferior to 8mm.
The purpose of the study is to evaluate:
-The so-treated patients from a functional point of view before and after the support of implant anchorage.
- The behavior of peri-implant tissues
-The survival rate and the success of short implants used for support and anchorage in RPP.

Methods & Materials: Patients with I and II Kennedy class rehabilitated in our department from 2004 to 2011 were recruited. Specific questionaries are used to evaluate the level of satisfaction of the patient . Masticatory efficacy and occlusal force are checked by means of food tests and kinesiograph. Chewing cycle has been assessed by K7 Myotronics kinesiograph using specific jellies (Gunne's modified protocol). Short implants (6/5 mm length, supershort 3i)are inserted in strategic position according to the traditional protocol of delayed load. After three months for mandibular implants and six for maxillary ones, second surgical time is performed, and the prosthetic anchorage is performed using locator attachments. After a clinical and radiological evaluation the same tests performed before are repeated again after the anchorage.

Results: Implant survival will be evaluated from the insertion time (3,6,12 months, once a year). As regards the prosthetic aspect, the change will be evaluated from the implant activation on (3,6,12 months, once a year).

Conclusion: In the light of the preliminary data, the use of short implants can be useful for RPD anchorage.

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Biomarkers of BRONJ (Bisphosphonate Related Osteonecrosis of the Jaw)

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Purpose: BRONJ has been reported in patients undergoing treatment with bisphosphonates for osteoporosis, and because of the 10-year half-life of bisphosphonates, there is a need for further studies of this extensive population.

Bone biomarkers have been suggested for the risk assessment for osteonecrosis of the jaw, a serious complication associated with bisphosphonate (BP) use; however, no consensus has been reached. This study investigated the possible associations between bone biomarkers and the development of bisphosphonates-related osteonecrosis of the jaw (BRONJ).

Methods & Materials: This is a case-control study of 37 patients with BRONJ (age, 73.6 ± 11.2 years) who had at least 1 sample available at diagnosis and 37 age- and gender-matched controls who had been exposed to BPs for >24 months but had no evidence of BRONJ after dentoalveolar surgery. The association between biomarkers (osteocalcin [OC], deoxypyridinoline [DPD], C-terminal telopeptide of collagen I [CTX], N-terminal telopeptides [NTX], bone-specific alkaline phosphatase [BAP], and parathyroid hormone [PTH]) and BRONJ development, the effects of BP discontinuation on biomarkers, and the performance of biomarkers for risk assessment were investigated.

Results: The PTH levels were significantly different between the 2 groups ($P < 0.05$), but not the OC, DPD, CTX, NTX, and BAP levels ($P > 0.05$). The CTX level in reference to a 150 pg/mL cutoff was also not significant for BRONJ development ($P > 0.05$). Among BRONJ patients who discontinued BP, in a linear mixed model, only CTX showed a significant increase over time ($ß = 0.002$, $P = 0.007$). The cutoff PTH level was >41.52 pg/mL (AUC = 0.719, $P = 0.009$), and that of CTX was =0.094 ng/mL (AUC = 0.619, $P = 0.069$).

Conclusion: There is insufficient evidence for the risk prediction for BRONJ of bone biomarkers; additional research is necessary. Low biomarker values confirmed by continuous checkups may signal risks; however, BRONJ risk should not be determined on the basis of a single result before dentoalveolar surgery without considering least significant changes.

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Periimplantitis: Perspectives for Prevention and Enhanced Clinical Management

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Purpose: This presentation is aimed at discussing the results of recent researches performed by the authors in this field and addressing different issues related to the prevention and clinical management of periimplantitis

Methods & Materials: The different issues related to the prevention and clinical management of periimplantitis include: i) influence of implant design and surface characteristics on susceptibility to biofilm formation and bacterial penetration and their impact on optimized selection of dental implants for different clinical applications; ii) key features of bacterial biofilms with a focus to recent advances in the management of biofilm infections; iii) actual golden standards in the treatment of periimplantitis and their outcomes; iv) development and clinical validation of specific and innovative preventive protocols for early onset bacterial sustained implant failures; v) development and clinical, microbiologic and biologic validation of an innovative combined mechanical pharmacologic protocol for the treatment of periimplantitis; vi) future perspectives offered by biotechnologies in the clinical management of periimplantitis, from diagnosis to prevention and treatment

Results: Periimplantitis is among the most frequent causes of failure in implant dentistry. Although generally regarded mainly as a form of periodontitis affecting implants, periimplantitis may begin as a consequence of different pathogenetic mechanisms and is generally sustained by a less complex though more aggressive microbial flora. The importance of bacterial biofilms and the high prevalence of uncommon bacterial species have been extensively investigated as the major causes of higher resistance of periimplantitis to treatment as compared to periodontitis.

Conclusion: Preventive and therapeutic options have been extensively investigated in order to reduce the impact of periimplantitis on the life expectancy of dental implants.

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Esthetic and Clinical Outcome of Implant Supported Restorations in Atrophic Alveolar Ridges, with the Use of Bone Block-Allografts - Up to 7 Years Follow-Up

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Loss of alveolar bone follows periodontal disease and tooth removal resulting in buccal plate compromise and a reduction in alveolar width until knife-edge ridges form in severely atrophic cases. Moreover, a deficiency of alveolar height may preclude implant placement. The primary goal of implant dentistry is to create a biomechanically stable bone-implant foundation for an esthetic fixed implant-supported prosthesis.

The purpose of this presentation is to demonstrate the survival rate of dental implants placed following cancellous freeze-dried bone block allograft augmentation in cases with atrophic alveolar ridges.

Long –term Clinical and histological studies will demonstrate the possibilities of increasing alveolar ridge width and height, For achieving soft and hard tissue implant supported esthetic restorations . Advantages, disadvantages and potential complications and solutions will be emphasized.

It can be concluded that cancellous block allografts may provide an alternative treatment that meets the clinical and esthetic requirements of restoration guided implant-supported prosthesis in the atrophic alveolar ridges.

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Dental Implant Site Preparation: Drill Technique versus Piezosurgery Technique

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Most dental implants are positioned using a drilling surgery technique. A new piezoelectric technique has been recently introduced in bone surgery. The technique was introduced to overcome some of the limitations involving rotating instruments in bone surgery.

This presentation compares, in a animal study, the osseointegration process of porous dental implants using traditional drills versus the piezoelectric surgery technique, for the implant bone site preparation.

Furthermore , in a human study, was evaluated the cumulative implant survival rate and the peri-implant bone loss after four years of function, using piezosurgery technique for the implant site preparation. The histological, biomolecular, and clinical results are exposed.

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Cement-Induced Periimplantitis: A Retrospective Clinical Observational Study of Fixed Implant-Supported Restorations Using a Methacrylate Cement

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Purpose: Cement-retained fixed implant-supported restorations involve the risk of excess cement which can induce periimplantitis. In connection with routine therapy using a methacrylate cement to retain fixed implant-supported restorations, complications, i.e. inflammations, were developed in some cases. After removing the suprastructure and the abutment, residual excessive cement was found. For this reason all implant-supported restorations that had been fixed with this type of methacrylate cement were re-evaluated and retreated.

The aim was to study the peri-implant tissue response after cementation.

Methods & Materials: In a retrospective clinical observational study including 71 patients with 126 implants, the findings made during retreatment were documented. In all cases the suprastructure and the abutment were removed. For recementation a zinc oxide cement was used. If an inflammation had developed, a follow-up appointment was scheduled 3 to 4 weeks later. These cases were re-evaluated.

Results: In 59.5% of the implants cement residues were identified. Bleeding on probing was diagnosed at 80% of the implants with excess cement, and suppuration at 21.3% of the implants. After removal of the excess cement and recementation with Temp Bond, a 76.9% reduction of bleeding on probing was found at follow-up. Suppuration was not found around any of the implants at follow-up.

Conclusion: Excess cement left in the implant-mucosal interface caused bleeding on probing in most cases and suppuration in some. The removal of excess cement after cementation should be given high priority. In this retrospective observational study an unusually high number of implants with excess cement after cementation was found with the methacrylate cement applied in the study.

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Split-Mouth Comparison of Splinted and Non-Splinted Implant Prostheses: 1 to 3 Year Results

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Purpose: Providing patients with screw-retained prostheses for multiple implants involves the decision whether to use splinted or individual restorations. Considerations include fixture length, occlusion, hygiene, abutment connection design and difficulty achieving a passively fitting framework. This prospective study aimed to compare splinted and individual restorations supported by short implants featuring an internal connection in the same patient population.

Methods & Materials: Eighteen patients received at least four Astra Tech implants in symmetrical posterior locations following a two-stage surgical approach over a 2 1/2 year period. Implants (n= 82) ranged in length from 6 to 11 mm with 70 implants = 9 mm and 38 implants = 6 mm. After 3 to 5 months, patients were randomly restored with splinted prostheses on their left or right side. Non-splinted restorations were made for contralateral sides. Radiographs were taken at prostheses seating and 6, 12, 24 and 36 month recalls. Radiographic bone levels were analyzed and compared using JMP (SAS, Inc, Cary, NC) to determine differences between splinted and non-splinted implants. Complications such as screw-loosening, screw breakage, or porcelain fracture were assessed at recalls.

Results: At the time of this report, 1 to 3 years of recalls were completed on 18 patients. Screw-loosening occurred in 5 patients on their non-splinted side. Implants for these patients were all 6 mm in length except for one patient who also experienced broken prosthetic screws. Porcelain chipping occurred for 3 patients on their splinted side. Two 4x6 mm implants were lost after loading on non-splinted sides for 2 patients. These implants were subsequently replaced with no further problems. There was no significant difference ($p > .05$) at 6 months or 1 year for average bone change around splinted and non-splinted implants.

Conclusion: For this study, the majority of complications involved non-splinted prostheses supported by 4 x 6 mm implants. According to these results, there may be a benefit to splinting 6 mm length implants; however, changes in peri-implant bone levels around splinted and non-splinted implants were not statistically different regardless of implant length. There was no apparent advantage to splinting the other implant lengths used in this study.

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Impact of Prosthetic Design on Screw-Retained Full Fixed Denture: a Three Dimensional Finite Element Analysis

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Purpose: The aim of this work was to analyze the loading transmission with conventional all-acrylic Full Fixed Dentures (FFDs) respect to FFDs endowed with a metal framework using finite element analysis.

Methods & Materials: A human skull was scanned and a mathematic maxillary model was developed. Within the computer model, screw-retained FFDs were screwed into four implants. Two types of fixed prosthesis design were considered: one simulating a conventional all-acrylic FFD, the second simulating a FFD endowed with a metal framework. The value of elasticity given to each of the simulated elements was extrapolated using data available in the literature. A vertical load of 150 N was applied to the most distal portion of the FFDs. Tests were performed simulating the insertion of the implants in both compact bone and trabecular bone. Stress values were recorded at the prosthesis level, at the implant level, and at the peri-implant bone level.

Results: Recorded data revealed a different behaviour in loading transmission between the two prosthetic designs. The maximum values of Von Mises stress recorded at the prosthetic level, the implant level and the peri-implant bone were respectively 12.63, 91.46, and 25.92 for the conventional all-acrylic FFD and respectively 10.14, 67.52, and 16.53 for the FFD endowed with the metal framework in compact bone. In cancellous bone, data were 12.64, 89.48, and 11.62 for the all-

acrylic FFD and 10.13, 66.47, and 9.55 for the metal reinforced FFD. Generally, a better distribution of the applied load was present in the FFD endowed with a metal framework resulting in low implant and bone stimulation.

Conclusion: Finite element analysis data regarding treatment of edentulous maxillae revealed that FFDs endowed with a metal framework decrease stresses on implants and on the peri-implant bone. This treatment modality seems to be a valid therapeutic alternative to conventional all-acrylic FFDs to reduce implant overloading.

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Restore or Replace: The Prosthodontic Dilemma

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Purpose: The wide range of today's effective treatment modalities complicate clinician's decision making. A systematic approach was made to treatment planning with literature appraisal. This presentation demonstrates a schematic approach to risk factor analysis to solve the dilemma of when to replace or to restore. It will aid the practitioner improve the chances of success rather than clutch at potentially misleading arithmetic means.

Methods & Materials: The advent of osseointegration has produced a quantum leap in prosthodontic treatment capabilities so much so that the implant is in danger of becoming the default option not only for replacement but superseding repair as well. Success rates of 95% are frequently reported, but it is difficult to ascertain how this figure represents reality due to differences in definitions of success.

Results: Survival figures are not numbers in a game of chance, but a culmination of all the factors affecting a course of treatment. Each patient must be assessed with the main factors discussed being restorative prognosis, implant prognosis, aesthetics, operator experience, psychology and costs: all tailored to the individual patient.

Conclusion: This presentation, practical in nature, is aimed at today's practitioner with an interest in modern prosthodontics. Predictable successful treatment outcomes result from careful analysis rather than making your best bet.

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Maxillary Three-Implant Overdentures: Is This a Viable Treatment Option?

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Purpose: To evaluate 10-year clinical outcomes of maxillary overdentures (splinted and unsplinted designs) using on three narrow diameter implants.

Methods & Materials: Forty edentulous participants (mean age 64 years; range 55-76 years), previously rehabilitated with complete maxillary dentures and mandibular two-implant overdentures, were treated with maxillary three-implant overdentures. Initial random allocation was to two similar implant systems (Branemark or Southern Implants). Further allocation was into two different prosthodontic treatment groups for each system (unsplinted with ball attachments or splinted with bar units). One-stage surgery, early loading at 12 weeks with maxillary overdentures and complete palatal coverage reduced after one year were sequenced. Standardized intra-oral radiographs were taken at baseline (loading), 1, 2, 5, 7, and 10-year recalls. Marginal bone levels, implant stability, peri-implant mucosal parameters, and prosthodontic maintenance were recorded. Significant associations between independent variables such as attachment systems were analysed against the marginal bone level changes.

Results: A total of 117 implants were originally placed in 39 participants and 23 participants attended the 10-year recall. Remaining participants were lost due to deaths, drop-outs and emigration. Stringently applied implant success rates were affected by participant deaths. Marginal bone loss and implant stability showed no significant differences between systems or prosthodontic designs. Peri-implant mucosal "nuisance factors" developed, particularly in the splinted designs. The burden of prosthodontic maintenance focused on the respective matrices coupled with repairs/ reline/remakes of overdentures.

Conclusion: Three implants can be used to support maxillary overdentures for patients struggling with conventional complete dentures opposing mandibular 2-implant overdentures. However, considering the implant success rates, caution must be taken with a strict patient selection.

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Mandibular Implant Supported Overdentures: A Systematic Review

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Purpose: The aim of this presentation is to address treatment outcomes according to the number of implants and type of attachments for Mandibular implant overdentures in terms of implant survival rate, prosthetic maintenance and complications, and patient satisfaction.

Methods & Materials: Literature search was conducted using PubMed and hand searching of relevant journals considering inclusion and exclusion criteria. RCT, quasi-randomized and compared clinical trial studies on mandibular implant supported overdenturees until December, 2012 were selected. The data on implant survival rate, maintenance and complications, and patient satisfaction were analyzed.

Results: The studies for mandibular implant supported overdentures compared between 2 vs 4 implant group and 1 vs 2 implant group on the nember of implants and among bar vs ball vs magnet attachment group on the type of attachments. The implant survival rate was high regardless of the number of implants and type of attachments. Common prosthetic maintenance and complications were activation, reattachment, and replacement of attachment, and reline or repair of denture base. Conflicting findings were found on the rate of prosthetic maintenance and complications among attachment groups. Most studies showed no significant differences in patient satisfaction depending upon the number of implants and type of attachments and the patient satisfaction was substantially high.

Conclusion: The implant survival rate of mandibular implant overdentures seemed high regardless of the number of implants and type of attachments. The prosthetic maintenance and complications may not be influenced substantially by the number of implants, but may be influenced by the type of attachments. The patient satisfaction may be substantially high regardless of the number of implants and type of attachments.

Keywords: Mandibular, Implant, Attachment, Overdenture, Treatment oucomes
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Computer Guided Implant in Severe Bone Defect

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Purpose: Severe bone morphological defects and masticatory function loss induced by the tumor, trauma and infection can serious impact on the life quality of patients. The aim of our team work is to reduce the time of surgeries and improve the quality of occlusal function reconstruction after bone grafting treatment.

Methods & Materials: The ideal of well restoration on the precise jaw reconstruction are the challenge to maxillofacial surgeons and prosthodontists. Any form of jaw bone defect repair would be faced with how to realize the ideal of both maxillary and mandibular contour continuity and the occlusal function. Based on the concept of occlusal functional reconstruction, the team work between maxillofacial surgeon and prosthodontists try to bring the functional reconstruction to the design of each severe bone defect patient.

Results: A precise guide according to the digital design was made to fix the position of the transplanted tissue.

Conclusion: Team work of maxillofacial surgeons and prosthodontists based on digital disign and guidance can help severe bone defect patients better treatment.

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Evaluation of the Fit of CAD/CAM Abutments

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Purpose: This study aimed to compare the fit of CAD/CAM abutments provided by a single system to proprietary prefabricated abutments on various implant systems.

Methods & Materials: Titanium CAD/CAM abutments were compared to prefabricated abutments on five different implant types. The samples were embedded in epoxy resin, sectioned longitudinally and polished. Scanning electron microscopy was used to measure the gap between the implant and abutments at the connecting flanges and internal features. Independent t-tests were used to compare data.

Results: Connecting Flanges: An average difference of 1.86µm between the Gold synOcta® and CAD/CAM abutments on the Straumann Standard Plus implant was observed to be statistically significant (P=0.002). Less than 0.4µm difference was found between the CAD/CAM and prefabricated abutments for the remaining implant types, and statistical significance was not observed. Internal features: Average differences of 34.4µm (Gold) and 44.7µm (Titanium) were observed between the CAD/CAM and prefabricated abutments on the Straumann Standard Plus implants which were statistically significant (P<0.001). An average difference of 15.0µm was also observed between the CAD/CAM and prefabricated abutment on the NobelReplaceTM implant, which was statistically significant (P=0.026). All other groups had less that 4µm difference and statistical significance was not observed.

Conclusion: The CAD/CAM abutments assessed appeared to have a comparable fit to prefabricated abutments for most of the systems evaluated. Design differences between the CAD/CAM and prefabricated abutment connections for both of the Straumann implant types were observed which affected the fit of internal components of the implant-abutment connections.

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Evaluation of Masticatory Efficiency and Nutritional Status In Patients with Overdenture Retained by One Implant

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Purpose: A 2-implant-mandibular-overdenture (2-implants-MIR-OVD) can improve the nutritional state of edentulous patients by increasing masticatory efficiency. There is evidence that one implant can support an overdenture as well as two implants. This study tested the hypothesis that a 1-implant-mandibular-overdenture (1 implant MIR-OVD) will have a similar beneficial effect on masticatory efficiency (primary outcome) and nutritional status (secondary outcome).

Methods & Materials: A preliminary study has been conducted on 15 patients for obtaining the reference point and defining the hypothesis and the number of patients for the main study. Patients were given a mucosa supported complete denture (MSCDs)and planned for introducing 2 implants for a 2 implants-MIR-OVD. The masticatory efficiency was tested (Kazunori et al. 2005) with the complete denture incorporated and after the connection of the implants. An improvement of 80 points was found after the prosthetic connection. Fifteen patients have been recruited for the main study. A mucosa-supported complete denture was made for each of the participants. Then they received one implant in the mandibular midline, and 3 months later implants were connected to the denture by Locator®(Zest Anchors). The masticatory efficiency was tested with the complete denture incorporated and 4 months after the implant prosthetic connection. The nutritional scenario was evaluated making a nutritional counseling during the three months after the delivery of the complete denture for eliminating biases. Then Body Mass Index,alimentary 7-days recall anamnesis, body composition by means of bioimpedenziometric measurements, and dynamometric hand grip were recorded before the insertion of the implant and after the prosthetic connection. Data were analyzed statistically to test the hypothesis that the variation of masticatory efficiency of participants with the 1-implant-MIR-OVD would not differ from the 80-points found in the preliminary study.

Results: There was a statistically significant improvement in mean masticatory efficiency with 1 implant MIR-OVD (123.4 mg/dl (95%CI 105.7 - 141.6), more than the reference of 80 points (p-value= 0.0001). Then, participants with 1-implant-MIR-OVD ate more food, but this result was not statistically significant, than with MSCDs, but significantly more of some micro nutrients.

Conclusion: Participants chewed more efficiently and consumed more vitamins with 1-implant MIR-OVD than with MSCDs, with the same results obtained with 2-implants-MIR-OVD.

Concurrent Session- Graduate Student Treatment Planning Session

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Oral Rehabilitation of Amelogenesis Imperfecta

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Purpose: Amelogenesis imperfecta (AI) comprises a clinically and genetically heterogeneous group of conditions that affect the dental enamel. The treatment of AI with an open bite is challenging and ideally requires a multidisciplinary specialist team approach. Most often, this condition carries an additional burden to the patient of dentinal hypersensitivity, psychosocial impact and financial pressures. This clinical report describes the oral reabilitation of a 39-year-old female affected by hypoplastic form of AI with an anterior open bite and unilateral posterior open bite.

Methods & Materials: The treatment plan for AI involves consideration of the patient's: economic status, severity of the disorder, and the specific intraoral status at the time the treatment is planned. In this case, rehabilitation included maxillofacial surgery with Le Forte I osteotomy and hemimaxillary impaction, followed by a provisional restorative phase of adhesive composite resin restorations, crown lengthening, then definitive restorations with a combination of specific all ceramic crowns, gold crowns and composite resin restorations.

Results: These progressive steps were designed to sequentially eliminate tooth sensitivity, improve aesthetics and restore occlusion, to allow improved function.

Conclusion: The patient outcome was positive.

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The Dynamic Nature of Treatment Planning

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Purpose: Zelda Ngxiki, a 30 year old female presented with pain and a complaint that "my tooth is broken and I have an abscess, I lack confidence because of this". Her first extraction was at the age of twelve, but the bulk of her teeth she lost twelve years later due to rampant caries. The patient reported that the family had the habit of eating refined sugar as a snack. Ms Ngxiki lost her mother at the age of fourteen; she was then sent to boarding school and reported that she would have to be really ill to receive medical attention. She now lives with her grandmother and her aunts and reported that everyone in their house wears dentures (complete or partial). Her main complaint and the history of the main complaint highlighted various aspects which needed to be considered during treatment planning, and which guided our decision making processes. Heydecke and Kerschbaun (2004) described 4 parameters which affect the outcome of prosthodontic therapy, and these included: biological & physiological factors; longevity & survival of the prostheses; psychosocial; and economic factors. Ms Ngxiki's main complaint spoke to all of these parameters.

Methods & Materials: The initial treatment plan included dealing with infection control and pain relief, as well as the

construction of a tooth supported removable partial denture. For the definitive treatment plan we considered various treatment options including no treatment; the use of amalgam restorations and metal framework dentures; conventional crown and bridge restorations and a milled denture; and/or implant supported prostheses. The patient underwent periodontal assessment and salivary tests, oral hygiene education as well as dietary advice. She was compliant, and showed a decrease in plaque retention and gingival inflammation and bleeding. An improved oral health IQ gave us reason to move from the very conservative approach of restorations and an RPD. This has a reduced longevity and survival time when compared with the other two options. The next option was conventional fixed prosthodontics with a milled denture, based on the quality and number of the remaining dentition. This would meet the patient's need for an improved smile and confidence. However, during the clinical planning of this treatment option the patient fractured the 21, a tooth we deemed strategic and necessary for our plan.

Results: This necessitated another change in the treatment plan, and the fact that the oral environment had now improved meant that we could explore the implant supported prosthesis treatment option. Although this is a more complex approach, demanding of time and commitment, it has more predictability and control especially as she had a thin biotype and a high smile line.

Conclusion: This case therefore illustrated the need to not only develop a variety of viable options early in the treatment planning, but the fact that changing circumstances and modifying factors require a dynamic approach to reach the optimum plan for a patient.

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Treatment with the Overdenture for Partially Edentulous Patient: A Case Report

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Purpose: A 62-year old male with the chewing difficulty due to the increased mobility of the residual teeth and unadapted denture. The patient wished for a new prosthetic rehabilitation that could restore the masticatory function for a long time.

Methods & Materials: 1. Medical background: There was nothing particular. 2. Dental background: * The clinical and radiographic examination indicated a severe periodontitis. * He used the bilateral removable partial dentures (RPDs) which were unadapted and lost proper occlusal contacts. He had already lost premolar and molar occlusal support. The diagnosis was the masticatory dysfunction caused by severe periodontitis and unadapted dentures. The concept for the treatment planning was "to maintain the residual teeth and alveolar ridge, and the proper oral function for long periods with minimum modification". For the quick recovery of masticatory function and periodontal tissue, the initial treatment was carried out, including the extraction of hopeless teeth, the provision of immediate dentures and the basic periodontal treatment. From a general evaluation of the pretreatment outcome, the patient demonstrated a good oral hygiene but some of the residual teeth were reduced the periodontal support tissue. The final prosthetic treatment options available for this case were considered RPDs, overdentures and dental implants. In planning the prosthetic treatment of this case, there were some consideration points. 1. With the objective of crown-to-root ratio of the residual teeth, the good prognostic implications of some were not evaluated. 2. Strong occlusal force was suspected by well-developed torus mandibularis and masseter muscle. 3. The patient refused surgical stress. Due to these aspects, we finally selected the overdenture with magnetic attachments.

Results: About 3 years have passed since the overdenture was provided. The patient keeps the good oral hygiene without any change of oral status. The masticatory efficiency was improved.

Conclusion: In this case, making a positive choice of treating with the overdenture has achieved a successful outcome. Some of the benefits of overdentures include the distribution of occlusal force against both the abutment teeth and the prevention of bone loss.

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The Treatment of a Severely Compromised Patient

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Purpose: A 66 year old female suffering from Schizophrenic Disorder, Diabetes Mellitus type 11, Xerostomia (drug related), and Tardive Dyskinesia presented with failed recently completed prostheses. Her main complaints included impaired masticatory function and poor appearance. Intraoral findings included fractured implants, lack of posterior occlusal support, deranged occlusion, caries and hyposalivation. Risk factor assessment showed her to be a high risk due to her medical history, severe hyposalivation, limited manual dexterity and parafunctional habits. Additional complications were involuntary sudden movements, nausea, and appointments limited to one hour.

Methods & Materials: Treatment objectives were to provide a functional reconstruction that could be maintained and retrieved when necessary, yet was tolerable to the patient.

Results: The selected treatment plan included the construction of upper and lower complete overdentures supported by implants and teeth. The patient accommodated to a 5 mm VDO increase and was able to demonstrate effective plaque control. Satisfactory function and appearance was assured by establishing a new occlusal plane together with appropriate compensating curves.

Conclusion: The selected treatment plan will be presented in detail together with other treatment options including the relative merits of fixed and removable prostheses.

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Full Mouth Rehabilitation of a Patient Using a Combination of Pankey Mann Schulyer & Hobo's Technique – A Clinical Report

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Purpose: Loss of vertical dimension can result in compounding issues like chewing inefficiency, cheek biting, temporo-mandibular joint pain and alternations in the appearance. An optimally created occlusion will be better able to deal with the forces generated in function and parafunction.

Methods & Materials: a patient with a loss of vertical dimension and missing posteriors came to the dental clinic for rehabilitation. a combination of Pankey Mann Schulyer technique with Hobo's technique was incorporated for the fabrication of fixed- removable restorations that only provided the desired esthetics but also took the function and the occlusal considerations into account. pankey mann schulyer technique and hobo's twin table technique are the two classic techniques for full mouth rehabilitation. this case report has taken the best of both these widely practiced techniques and rehabilitated the patient with combined advantages of both techniques.

Results: a satisfied patient with the desired combination of esthetics and function was rehabilitated

Conclusion: a new concept of incorporating the best of both - pankey mann schulyer and hobo's technique for the rehabilitation of a patient with loss of vertical dimension can be aptly demonstated.

Concurrent Session- Fixed Rehabilitation Materials

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Esthetic and Minimal Invasive Anterior Tooth Replacement Revisited

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Resin-bonded fixed dental prostheses (RBFDPs, so-called Maryland bridges) with two metal retainer wings have been introduced over 30 years ago for a minimal invasive replacement of missing teeth, when the abutment teeth were caries-free. However unfortunately due to various reasons metal-ceramic RBFDPs were not considered a comparable treatment modality to implants by most of the dentists.

Cantilevered RBFDPs with a single ceramic retainer wing were introduced more than 15 years ago. They provide better esthetics and are less invasive than two-retainer RBFDPs. In the meantime long-term data of this minimal invasive treatment option are available and it is well-known how to bond these restorations clinically successfully. However, it is a prerequisite that the dentist has a good understanding about indications, materials properties and the clinical procedures including specific bonding techniques. A lack of this knowledge of many clinicians might be the responsible that cantilevered RBFDPs with a single ceramic retainer wing have not found their way into the general dental practice yet.

This lecture summarizes the essential knowledge on the successful clinical application of all-ceramic single retainer RBFDPs which in many cases present an excellent and less costly treatment alternative to single implants or conventional FDPs. In addition, limitations and future developments in the field of all-ceramic single retainer RBFDPs will be presented and discussed.

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All-Ceramic Restorative Materials: Research Data and Clinical Considerations for a Rational Use

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The interest of the dental world in metal-free restorations has been rising in the last 20 years, following the introduction of innovative all-ceramic materials in the daily practice. From an esthetic point of view, the traditional glass-ceramics, like the feldspathic ones, are characterized by excellent optical properties and long term clinical performances when adhesively bonded to the dental tissues. Recently, the dental research has increasingly been focusing its interest on lithium disilicate, high strength ceramics like alumina and zirconia and related CAD/CAM techniques, that have undoubtfully widened the clinical indications of all-ceramic prostheses, thanks to the more favourable mechanical characteristics compared to the early ceramic materials. In particular, zirconia is one of the most promising restorative materials, yielding very favourable mechanical properties and reasonable esthetic. Both in vitro and in vivo scientific studies have shown good technical characteristics and a medium term excellent clinical serviceability as a framework material for both single crowns and short-span fixed partial dentures; nevertheless, data is not available yet for the validation in large implant-supported restorations.

This presentation aims at providing a brief review on the rational use of all-ceramic dental materials, evaluating pros and cons of their utilization in the different clinical conditions, in the light of the most significant and recent scientific results and of the author's clinical experience.

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Prosthetic Treatment and Teaching in the Digital Era

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Continuous development of new composite and ceramic materials, the recent advances in bonding at the tooth structure, and the implant therapy in combination with implants and maxilla-facial guided surgery allowed the introduction of the alternative approach in respect to the traditional prosthetic rehabilitations. By means of newly developed CAD/CAM-Software systems with improvements in grinding, laser sintering and stereolithography 3d printer technology, cores and full contour fixed partial denture (FPD) frameworks and implant-supported abutments were manufactured with a new methods. The presentation will focus on the use of the new technologies during the teaching and prosthetic treatments. The presentation will focus the use of the new technologies in the teaching and prosthetic treatments.

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Minimal Invasive Dentistry: Science & Clinical Recommendations

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Aesthetic demands but also restorative needs in anterior and posterior dentition have changed dramatically within the last decades. All-ceramic materials and CAD/CAM technologies are increasingly used in prosthetic dentistry. The paradigm shift in fixed prosthodontics from traditional to minimal invasive treatment approaches is evidenced by the clinical long-term success of bonded glass-ceramic restorations. Modern all-ceramic materials deliver superior aesthetics and reliability, as shown by contemporary material science. Advancements in all-ceramic systems and adhesive technologies enable the development of innovative defect-oriented treatment concepts for restoring compromised dentition. Modified onlay and full veneer preparation geometries evolved and form a reliable alternative for conventional full-coverage crowns. Nowadays non-retentive preparation designs in combination with reduced ceramic thicknesses allow for a minimal invasive treatment approach. A perspective on future developments in minimal invasive adhesive dentistry will be addressed.

The lecture objectives will be

1.) To provide guidelines for minimal invasive preparation designs and recommended ceramic thicknesses
2.) To give rationale of case based selection of modern ceramic materials
3.) To present scientific evidence pertaining to the clinical success of all-ceramic materials and minimal invasive restorative technologies.

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Porcelain Veneer Failure Loads and Modes Were Profoundly Influenced by the Supporting Substrate: Enamel, Dentin, or their Combination

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Purpose: To investigate the influences of three different substrates: enamel alone, enamel and dentin, or dentin alone; and veneer thickness on failure load.

Methods & Materials: Facial enamel surfaces of 30 extracted human maxillary incisors were flattened by polishing. Feldspathic model discoid porcelain veneer specimens, 0.2 to 1.42mm in thickness and 5.4mm in diameter were randomly assigned and bonded to the incisors using a light-cured resin-composite veneer cement. Specimens were thermal-cycled

1,000 times between 5 and 55 °C, with dwell and transfer times of 120 and 15 seconds. Specimens were loaded, using a central sphere, in a universal testing machine at a crosshead speed of 0.01 mm/min to catastrophic failure. Individual initial, intermediate and catastrophic fracture events were identified and analyzed fractographically and statistically. The same teeth were then sequentially re-prepared to include equal amounts of enamel and dentin, and then dentin alone, with model veneers applied as above. Fracture load was plotted against porcelain thickness for each substrate group. Regression analysis was used to identify the simple linear equations relating fracture load to thickness and correlation coefficients, R2, calculated.

Results: Porcelain thickness increased catastrophic failure loads in all groups, but most markedly with the enamel substrate. The maximum failure loads (y) for porcelain veneer thickness (x) were: enamel $y = 723x + 517$ ($R2=0.5$); enamel and dentin $y = 292x + 167$ ($R^2=0.3$); dentin $y = 241x + 186$ ($R^2=0.1$). Fractographic and numerical data demonstrated that the final catastrophic failure followed radial cracking, likely propagating from the internal surface. Cohesive porcelain failure dominated in completely enamel-bonded specimens; whereas, adhesive failure also occurred in the other groups.

Conclusion: Partial or complete bonding to dentin, instead of completely to enamel, dramatically decreased catastrophic failure loads and altered failure modes. Increased porcelain veneer thickness markedly increased catastrophic failure loads in enamel.

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Occlusal Veneers as an Alternative Treatment for the Conventional Crown

Sharon, Eldad
Mevasseret Tziyon, Israel

The traditional tooth preparation for a full crown, can be a radical procedure. In order to create adequate tooth preparation, up to 70% of tooth structure might be removed. The use of new techniques and new concepts of adhesion can help tooth structure preservation. The lecture will discuss the concept of occlusal veneers as an alternative treatment for crown restoration. Indications for the procedure, advantages and preparation design will be discussed.

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Effect of Microwave and Conventionally Sintered Zirconia Surface Treatments on the Bond Strength Between Zirconia and Veneering Ceramic

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Purpose: The aim was to evaluate the effects of various surface treatments and sinterization methods on the shear bond strength between microwave and conventionally sintered zirconia substructure and veneering ceramics.

Methods & Materials: Noritake Alliance Y-TZP presintered blocks were used to prepare zirconia substructures. 96 disc shaped specimens were fabricated using YenaDent CAM unit and were divided in 2 groups according to the sinterization methods (n=48). 48 specimens were microwave sintered and the other 48 specimens were conventionally sintered. The specimens were then divided into 4 groups according to the surface treatments applied (n=12). The groups for microwave sintered substructure specimens were as; MK: untreated (control group), M1: Al2O3 sandblasted, M2: liner applied, M3: Al2O3 sandblasting followed by liner application; and the groups for conventionally sintered substructure specimens were as; KK: untreated (control group), K1: Al2O3 sandblasted, K2: liner applied, K3: Al2O3 sandblasting followed by liner application. Surface roughness (Ra) of MK and Kk groups were measured using a profilometer. Following firing of Cerabien CZR veneering ceramic on zirconia substructures, specimens were thermocycled (5°-55°C, 6000 cycles). All specimens were then subjected to shear bond strength test using a universal testing machine at 0,5 mm/min. Fracture patterns of all specimens were evaluated under an optical microscope and classified as adhesive, cohesive or combination of adhesive and cohesive fracture patterns. A specimen of each fracture pattern was further evaluated under a scanning electron microscope. Data were statistically analyzed ($p<0.05$).

Results: Conventionally sintered zirconia substructures showed higher surface roughness values compared to microwave sintered zirconia ($p=0.046$). Within comparisons of shear bond strength values among microwave sintered substructure groups were statistically insignificant ($p=0.113$). Shear bond strengths of K3 group specimens compared to that of K1 group

(p=0.015), Kk group specimens compared to the Mk group (p=0.004) and K3 group specimens compared to the M3 group were statistically higher (p=0.005). While adhesive fracture pattern was not demonstrated in any of the groups, cohesive and combined patterns was seen in all groups.

Conclusion: In conclusion, Al2O3 sandblasting followed by liner application on conventionally sintered Noritake Alliance zirconia substructures may be preferred.

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Evolution in Oral Scanners

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Purpose: With his thesis "The Optical Impression" in 1973, François Duret can be named the inventor of the optical impression. Nowadays there are different optical systems available and new systems are introduced. The purpose of this study was to test the accuracy, user friendliness and handling possibilities of a new optical scanner, allowing free data use.

Methods & Materials: A new optical scanner, invented by François Duret and based on active stereophotogrammetry technology, was tested and compared with the Lava C.O.S scanner and the Cerec Blue Cam.

Results: The new generation of oral scanners are scanners which are easy to handle, have unlimited possibilities, are accurate, can be used with any CAD and CAM system (open system) and do not ask a big investment.

Conclusion: There is no doubt that the application of CAD/CAM technology in dentistry provides innovative, state-of-the-art dental service, and contributes to the health and QOL of people in aging societies.

They are the future for the dental practice and has unlimited possibilities.

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Annealing of Co-Cr Dental Alloy: Effects on Nanostructure and Rockwell Hardness

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Purpose: The aim of this study was to evaluate the effect of annealing on the nanostructure and hardness of Co-Cr metal ceramic samples that were fabricated with a direct metal laser sintering (DMLS) technique.

Methods & Materials: Samples fabricated by a conventional casting technique (Group I) and prefabricated milling blanks (Group II) were examined as controls. The DMLS samples were randomly divided into three groups of samples that were not annealed (Group III), annealed in argon atmosphere (Group IV), or annealed in oxygen atmosphere (Group V). The nanostructure was examined with the small-angle X-ray scattering (SAXS) method. The Rockwell hardness test was used to measure the hardness changes in each group, and the means and standard deviations were analyzed statistically.

Results: The general nanostructure of the samples was composed of small spherical entities stacked atop one another in a dendritic form. All groups also displayed different hardness values depending on the manufacturing technique. The annealing procedure and environment directly affected both the nanostructure and hardness of the Co-Cr alloy. Group III exhibited a non-homogeneous structure and increased hardness because the annealing process was incomplete and the inner stress was not relieved. Annealing in oxygen atmosphere relieved the inner stress, but the hardness increased. However, annealing in argon atmosphere not only relieved the inner stresses but also decreased the hardness, and a homogeneous product was obtained.

Conclusion: After the manufacturing with DMLS technique, annealing in argon atmosphere is an essential process for Co-Cr metal ceramic substructures.

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The Effect of Dentin Desensitizers and Nd:YAG Laser Pre-Treatment on Microtensile Bond Strength of Self-Adhesive Resin Cement to Dentine

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Purpose: The aim of this study was to evaluate if pre-treatment with desensitizers have a negative effect on microtensile bond strength before cementing a restoration using a recently introduced self-adhesive resin cement to dentine.

Methods & Materials: Thirty five freshly extracted human third molars were embedded in acrylic resin. The occlusal surfaces grinded until dentine was exposed and they were randomly divided into 7 groups (n=5). The groups were as follows; 1) Gluma (Glutaraldehyde) 2) Aqua-Prep F (Fluoride), 3) Bisblock (Oxalate), 4) Cervitec Plus (Clorhexidine), 5) Smart protect (Triclosan), 6) Nd:YAG laser, 7) Control: No treatment applied with any of the desensitizers. After applying the selected agent or none, Rely X U200 self-adhesive resin cement was used to adhere composite resin rectangular blocs to the dentine surfaces. All of the groups were subjected to thermocycling procedure for 1000 cycles at 5° C and 55° C with a dwelling time of 20 seconds in each bath. Each bonded specimen was sectioned to microbars (6mm×1mm×1mm) (n=20). Specimens were submitted to microtensile bond strenght test at a crosshead speed of 0.5 mm/min using a universal testing machine and load at failure was recorded. Kolmogorov-Smirnov, Levene's test, Kruskal–Wallis one-way analysis of variance, and Conover's nonparametric statistical analyses were used for statistical analysis of the data ($p<.05$).

Results: Gluma, Smart Protect and Nd:YAG laser treatments showed comparable microtensile bond strengths compared with the control group ($p>.05$). The microtensile bond strengths of Aqua-Prep F, and Cervitec Plus were similar to each other but significantly lower than the control group ($p<.05$). Bisblock showed the lowest microtensile bond strength among all groups tested ($p<.001$).

Conclusion: Within the limitations of this in-vitro study, it is not recommended to use Aqua-prep F, Cervitec Plus and Bisblock on dentine when used with a self-adhesive resin cement due to the decrease they cause in microtensile bond strength. On the other hand, pre-treatment of sensitized dentine with Gluma, Smart protect, and Nd:YAG laser do not have a negative effect on the bonding performance if a self adhesive resin cement is used to cement a restoration to dentine tissue.

Concurrent Session: Maxillo-Facial

76

The Maxillectomy Patient: A New Method to Relieve the Impression and the Vertical Dimension of Occlusion

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Patients who undergo surgical interventions for cancer of the hard palate with extended tissue losses will have, if not surgically or prosthetically rehabilitated, functional (speech, swallowing, eating) and aesthetical limitations, causing often psychosocial difficulties. In the case surgical reconstructions are not possible, the provisional and definitive prosthetic rehabilitation after surgery must therefore be realized as soon as possible to lead the patient to a normal life in short times.

In the realization of obturators in edentulous maxillae there are some technical difficulties in recording all area of the defect and in recording maxillo-mandibular relationships because of the instability of the bases during recording.

Many methods have been proposed that partially solve these complications. An innovative, simple, user friendly, time saving technique, used originally just for the treatment of the edentulous patient, may allows for stable and precise record bases and an early delivery of the prosthesis.

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A Novel Patient–Specific Approach to Implant Reconstruction of Subtotal Resection of the Maxilla Following Maxillary Osteosarcoma

Tanner, Susan*; Dawood, Andrew J.S.; Kalavrezos, Nicholas
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Purpose: This presentation will describe the treatment of a 42 year old man, who suffered from a maxillary osteosarcoma, which led to the subtotal resection of his maxilla. A novel approach to planning and treatment with custom-designed, patient specific implants was used to provide an unusual implant supported prosthesis.

Methods & Materials: Osteosarcomas of the jaws are relatively rare tumours, more commonly afflicting a younger patient group. Treatment is usually surgical resection, sometimes preceded by chemotherapy. In the maxilla, resection followed by reconstruction with a vascularised free-flap, may be followed with the provision of an implant-supported prosthesis. This report describes an alternative approach to reconstruction using patient-specific implants and implant components, and a rigidly supported removable partial denture/obturator supported by a CAD CAM titanium bar.

Results: Case report
The patient presented having had a resection of the maxilla extending from the right second premolar to the left first molar. He was provided with a simple acrylic obturator and was coping well, although he complained of lack of stability and oro-nasal leakage.

One year post operatively he sought to improve his situation and was offered a surgical maxillary reconstruction with a vascularised free-flap to close the defect. The patient, who was a perceptive and engaged individual, did not want to cover the defect, wishing to have the site available for inspection. Furthermore, he did not wish to involve a second surgical site.

A second alternative was offered using a combination of conventional and bespoke implants. Two patient-specific zygomatic implants were designed and placed into the zygoma/infraorbital rim with precisely tailored threaded parts, and non-threaded, surface-treated shafts, in addition to two conventional fixtures.

Impressions were made and a digitally designed titanium bar milled to provide support for a cast cobalt-chrome substructure within a removable obturator.

The patient experiences no problems whatsoever with stability, oro-nasal leakage, appearance, or quality of life as measured by the Washington quality of life survey.

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Do Posterior Teeth Supra-erupt when Opposing Resected Segments?

In memory of our dear colleague Dr. Arie Shifman -
Life member of ICP, scholar, clinician, gentleman and friend.

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Oral and Maxillofacial Surgeon
Former head of Rabin Medical Center
Oral and Maxillofacial Surgery Department
Tel Aviv, Israel

Purpose: The aim of this study was to assess the rate and timing of possible supra-eruption of non-occluding posterior teeth in a selected group of post-surgical patients.

Patients and Methods. Twenty patients were selected of which 16 had undergone segmental mandibular resections and iliac bone graft reconstructions. The remaining 4 patients had partial maxillary resections with primary closure of the defect. No patient received any prosthetic restoration. Clinical photographs and radiographs of the last follow up examination were compared to those obtained initially (mean 6.9 years).

Results The results of this longitudinal retrospective study. Showed that supra-eruption even slight had not occurred in any patient.

Conclusion These findings are discussed with regard to their possible cause and prosthodontic implications.

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Maxillary Microvascular Reconstruction Using a Free Fibular Graft: Prosthodontically Driven Treatment Planning

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Purpose: Reconstruction of complex maxillary or mandibular defects often requires grafting with hard and soft tissues. In the conventional approach, a flap is transferred to provide vital tissue. Subsequent shaping and debulking has been required in a number of cases to achieve optimal result. The aim of this case report is to present the clinical efficacy of maxillary reconstruction with preoperative model planning while focusing on esthetics and occlusion.

Methods & Materials: The patient underwent maxillary reconstruction with a free fibular graft following hemimaxillectomy due to squamous cell carcinoma of right maxilla. A partial removable dental prosthesis was fabricated as part of the provisional phase to assess aesthetics, phonetics, space and psychological impact. CT scans of the maxillofacial region and the fibula were performed. Biomodels of the skull and fibula were fabricated and pre-operative treatment planning was completed on these biomodels. The technique involved two surgical steps (prefabrication and flap transfer). First surgery for implant placement in the fibula was followed by six weeks of healing. Second stage surgery involved harvesting of the fibular graft, microvascular reconstruction of the maxilla and insertion of implant supported provisional fixed dental prosthesis. Both surgeries were performed following templates developed during the planning phase. Correct positioning of the prefabricated flap was accomplished using the occlusion as a guide.

Results: The objective assessments were made with the help of follow up clinical examination and radiographic examination. The subjective feedback on chewing, speech and appearance was very positive.

Conclusion: Preoperative model planning can help define the spatial relationship of the maxilla and the fibular graft individually. This is essential to achieve optimum clinical outcome.

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Assessment of Swallowing and Masticatory Performance in Obturator Wearer- An In-Vivo Study

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Purpose: To assess function of an obturator wearer following maxillectomy by identifying changes in swallowing and evaluating the masticatory performance.

Methods & Materials: Sixty subjects were recruited for the study, of which 20 (case group) were obturator wearers, and 20 complete dentate subjects (control-1) and 20 removable partial/complete denture subjects (control-2). Swallowing ability (prospective case study) was evaluated with "Water Drinking Test" in case group without and with obturator wheras; Masticatory performance (case control study)was obtained by sieve test adn maximum occlusal force with digital bite sensor in the case and control group. The data was analyzed using SPSS version 15.0. The confidence level of the study was kept at 95%, hence a "p" value of less than 0.05 indicated a statistically significant difference.

Results: Level of disability, behaviour of drinking and time taken to drink were significantly improved ($p<0.001$) after wearing obturator. Masticatory performance, was not significantly different ($p=0.252$) with control groups, but significantly high inter group difference ($p<0.001$)in maximum occlusal force. No statistically significant ($p=0.124$) correlation was found between masticatory performance and maximum occlusal force.

Conclusion: The results supported that obturator imporved the function of a maxillectomy patient.

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Keeping Pace with Changing Treatment Modalities in Head and Neck Cancer Patients: Prospectives from Oral Oncology and the Oral Supportive Team

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Purpose: Radiotherapy and chemo-radiation are widely used therapies for Head & Neck Cancers, and Prosthodontists are important members of the multidisciplinary management team. This paper highlights the changing scenario of head and neck cancer management and it's implication for dentists and prosthodontists.

Methods & Materials: Recent advances in radiation physics allow highly conformal sculpting of the high dose region to match the three dimensional shape of the target to be irradiated. There has been a rapid evolution from conventional techniques to 3-D conformal to intensity modulated radiotherapy (IMRT) to Volumetric Modulated Arc Therapy (VMAT). The doses received by the various tissues can now be graphically assessed by computer generated metrics like the Dose Volume Histograms (DVH). The tongue and mandible are not static structures, and to account for this, the oncologist has to add an additional margin to the clinical target volume (CTV) to obtain the internal target volume (ITV). Currently imperfect neck immobilization leads to random daily set-up errors, and hence an additional margin is added to obtain the planning target volume (PTV). These increases in volume needing to be treated leads to increase in toxicity. Immobilization of structures is even more important in IMRT/VMAT than in conventional RT, making it imperative to maintain exact field geometry, or else IMRT?VMAT will not be reliable.

Results: While specific critical organs like the parotid glands can be elegantly spared by IMRT/VMAT, the volume of mucosa receiving low to moderate doses may paradoxically be increased. Thus, while the incidence of xerostomia and its complications is markedly diminished, mucositis can pose a challenging problem.A dose greater than 39 Gy is associated with a long duration of mucositis. Drugs used to prevent and treat mucositis currently target the associated infection, but recently, interest has been shown in the use of agents such as the growth hormone. Considerable progress needs to be made in immobilization with the aid of technology familiar to prosthodontists, and better stents and more frequent protection of backscatter damage to soft tissue surrounding restorations is required. Higher doses of radiation used currently necessitates intense and early intervention by the oral support team.

Conclusion: The altered toxicity profile with modern radiotherapy, newer agents for preventing and treating mucositis, newer tools to measure doses received by tissues, and heightenned needs for reproducible immobilization have implications for multidisciplinary patient management and research.

Concurrent Session: Outreach

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Outreach in Educational Programme at Dental Schools: Oral Health Global Health

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The Global Health approach is based on a vision of health as a state of biopsychosocial wellbeing and a fundamental human right in its widest sense and implementation.

In Italy, the "Italian Observatory on Global Health (OISG) moved the proposal to realize university courses on subjects regarding the Global Health.

The need to fill the lack in the university formation, above all in medicine, brought to elaborate an European Project titled: "*Equal opportunities for health: action for development*". Only a few Dental Schools took part to this project. Oral health unfortunately is not yet considered part of the general heath of human beings. Even university formation mainly concerns the part of the population which is able to have access to expensive treatments such as implants, high tech prosthodontic solutions, thus forgetting the disadvantaged communities. The lack is even higher in the developing countries.

The course “oral health global health” started in 2008 with the educational aim to promote a complete training coordinated on global health, to update the actual dental school programme so that it can face challenges and give the opportunities of a global world. In particular this training course intends to give students knowledge and tools to analyse set of problems and possible answers about oral health and global health: in summary, a global approach to oral health.

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Therapeutic Options for Underprivileged Communities

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The term ‘outreach’ may not be the best one to describe activities that take place in and around communities whose access to oral health care is limited. It can so often mean an activity within a limited time period, often carried out to appease consciences and in the name of social responsibility. That’s the cynical view, but there is another, which is the development of community-based activities on a sustainable basis, and in Prosthodontics this should be an absolute requirement, because of the oft-forgotten need for on-going maintenance and replacement. It is not the role of the ICP as an organisation to conduct such activities, but it *is* our role to support, encourage, and help develop them and to give appropriate direction to those carrying out these activities. And that means developing and if necessary teaching the use of therapies that are cost-effective but result in quality outcomes. These “appropriatech” treatment modalities have proven to be as effective as other more costly therapeutic options, and some examples of these will be given, with the purpose of generating discussion on how – or whether – the College membership could develop sustainable community-based activities.

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Knowledge Exchange In Rural Dentistry

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Purpose: The shortage of oral care health professionals in rural and remote areas will enlarge inequalities in the accessibility of dental care services, and will impede the provision of quality care. The changes toward an effective health system necessitate identifying barriers and facilitators, sharing knowledge, delivering information and creating strategies to improve dental workforce attraction and retention in rural and remote communities. Therefore, it is our responsibility as the oral health research community and the educators of future dentists to raise awareness on this issue and to develop community-centred perspectives on oral health. We should stimulate interest and enthusiasm of dental students, dentists and policy makers about the importance of meeting the needs of this underprivileged population.

This presentation will focus on a set of knowledge synthesis, knowledge translation and exchange activities that were designed to:
1. Understand how and to what extent workforce issues influence equitable access to oral health care in rural and remote areas.
2. Develop and implement a knowledge transfer instrument to promote rural dentistry.
3. Sensitize academic decision makers to the delivery of community-based dental education.

Saturday, September 21st

Focus Session II:
The Dental Literature, How Relevant is it to Clinical Practice?

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Dental Literature and Practice: Symbolic or Symbiotic Relationship?

Preiskel, Harold W., Prof. (emeritus), MDS, MSc, FDS, RCS
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'Unbiased opinion is always absolutely valueless' (Oscar Wilde 1890): our earlier literature, and some of relatively recent vintage, is replete with authors who have taken this warning to heart. This presentation will examine discoveries based upon deductive logic derived from established scientific protocols together with those that owe little to the literature and prevailing current opinions. Today we pride ourselves upon rigid scientific vigour, but has the baby been lost with the bathwater? Is clinical observation totally without value? Perhaps Bertrand Russell (1929) was correct when he stated "The fact that an opinion has been widely held is no evidence whatsoever that it is not absolutely absurd." These are among numerous issues to be addressed.

The quantum leaps in prosthodontic therapeutic possibilities have been marked by paradigm shifts made with reference to the literature. Rather like the Bible there is back up in our extensive archives to support virtually any point of view. The answer rests with discrimination by the reader. From the period of the Articulator Wars to developments with osseointegration there are examples galore.

We build our future on the foundations of those who preceded us and the dental literature bears eloquent testimony to generations of devoted research. We ignore it at our peril. If the services we provide are to benefit from the exciting possibilities of a digital future a thorough understanding of prosthodontic foundations is essential.

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What is the Relevance of the Dental Literature to Clinical Practice?

Eckert, Steven, DDS, MS
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The volume of scientific literature has increased dramatically over the last few decades. The number of publications is so great that no individual can possibly remain current with all the literature in the fields of prosthodontics and implant dentistry. A prudent clinician must consider the need for all this information while simultaneously establishing a strategy that allows the clinician to remain well informed.

Clinicians must recognize that much of the published research, although quite interesting and intellectually stimulating, may have no particular relevance to the current day to day clinical practice of dentistry. This recognition does not suggest that the scientific literature may be ignored but it does recognize that much of the reading that takes place does so without a plan to change practices.

When considering the assessment of literature specifically to influence clinical practices, clinicians must understand the factors that could influence decisions to change those practices. To do this the clinician must understand their own successes and failures otherwise published studies have no basis for comparison. When a practitioner maintains a comprehensive database of clinical experiences that data may be compared with published material from clinical trials to allow comparison between personal experience and published experiences of others.

This presentation will discuss the factors that should be considered in an effort to ensure the relevance of literature to the clinical practice.

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Osseosufficiency, Osseoseparation, and Dental Implant Failure

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An early popular emphasis on measurable bone levels around successfully osseointegrated implants suggested long-term stability of marginal bone. In fact, specific bone height values continue to be regarded as an important criterion of successful individual implant outcomes. This somewhat uni-dimensional and perhaps even naïve approach, has now led to considerable debate since recent published reports have now also identified adverse and specific bone changes around asymptomatic dental implants. These changes are referred to as a specific disease pattern that is not unlike periodontal disease.

Other reports contest these convictions and underscore the urgent need to determine whether these changes are an integral part of time-dependent patient and site-specific bone response behavior as opposed to a new disease entity. This session seeks to provide prudence and clarity in the interpretation of the significance of alterations in marginal bone integrity around osseointegrated implants.

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Distinguishing Normal and Abnormal Marginal Bone Behavior Around Osseointegrated Implants

Chvartszaid, David, DDS, MSc (Prostho), MSc (Perio), FRCD(C)
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Toronto, Ontario, Canada

Maintenance of osseointegration requires the existence of a biologic equilibrium between the implant-prosthesis unit and the surrounding hard and soft tissues. Understanding the aetiologies of marginal bone loss should validate monitoring programs as well as the clinical measures in monitoring or predicting changes in osseointegration. This presentation will highlight that efforts to clarify the overlap between physiologic and pathophysiologic clinical events around osseointegrated implants are confounded by the existence of multiple proposed aetiologies, shortcomings in currently used clinical parameters, the use of imperfect terminology, and the deficiencies in existing knowledge.

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Statistical Certainty: An Oxymoron

Layton, Danielle, BDSc (Hons) (Qld), MSc Oxon, MDSc (Hons) (Syd)
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This paper will be on the manipulation of statistics, and how small changes can dramatically impact our interpretation of long-term outcome data in prosthodontics. So many patients want to know "how long will it last Doc?"... and as they are investing, often substantially investing financially as well as in time and effort, in their teeth it behooves us to be able to answer this question. Essentially, it is a statistical question. At times statistics baffles us all, and a paper on statistics may sound less than appealing.... but it's surprisingly interesting and the ease with which our percentage survival can be manipulated is certainly sobering.

Prosthodontic research commonly explores longitudinal outcomes of prostheses as they age. This research may involve individual studies that may be experimental, such as RCTs, or observational such as a cohort. Or, this research it may take the form of a systematic review, where multiple studies are sought to contribute to our understanding.

In prosthodontics, we seek time-to-event data, such as the time to “failure” or “percentage survival”. Time-to-event statistics, such as Kaplan Meier, are often used to calculate this estimated cumulative survival (ECS) from individual studies. In such analyses, common end-points (events) are “survival” and “failure”.

Systematic reviews seek all studies that have researched a certain outcome, such as the survival of crowns, reviewing the impact of heterogeneity on outcomes. Under certain circumstances, the results, the estimated cumulative survivals of individual studies can be combined with meta analysis statistics, to provide an overall best estimate.

The ECS of prosthodontic prostheses forms the keystone of treatment planning. Clinicians rely on these survival outcomes to compare competing treatment options. Unfortunately, the statistic can be poorly reported and remains poorly understood.

This paper aims to explore the mathematics of survival statistics and meta analysis statistics, explain how this is relevant for prosthodontic treatment planning, and provide advice for future presentation of such data.

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The Implant Literature: How Relevant is to Clinical Practice?

Testori, Tiziano, MD, DDS, FICD
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Como, Italy

The lecture will present the numerous systematic review published by the scientific/clinical team of the Galeazzi Institute.

Systematic reviews of literature and meta-analyses are used more and more frequently in the medical-scientific field. Meta-analysis is a statistical technique that combines and summarizes the results of similar multiple studies published on a given subject as part of a systematic review, and describes the real clinical effects of specific treatments, pharmacological therapies, and surgical techniques in a much . a more accurate manner than single clinical studies can do. It is therefore a powerful decision-making tool for validating or not validating procedures, treatment, materials, drugs etc.

However, very often in systematic reviews (also in those that consider RCTs only), the heterogeneity between the various articles (often due to various primary objectives of the different studies) is such that it does not permit a formal quantitative statistical analysis (or a meta-analysis). Therefore a qualitative analysis is carried out, reporting the data concerning each single article that was selected by means of precise inclusion criteria. The overall weighted averages for each variable examined can be calculated, but no attempt should be made to evaluate the statistical significance of any differences observed.

In this way, useful indications are provided for the surgeon who, depending on the summary data obtained, can himself judge the weight of certain variables on the performance of a treatment.

With regards to this analysis, the main limit is represented by the lack of homogeneity between the various studies.

The performance of high-quality RCTs, with long-term follow-up and large sample size, carried out thoroughly, abiding by the set protocols and defined according to current guidelines, may certainly in the future provide more precise answers to clinical queries.

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Summary of the Morning Session of the Relevance of the Dental Literature to Clinical Practice

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Poster Presentations

Thursday, September 19th 17:00-19:00

Dental Implants

Poster 1

Evaluation of the Stress Levels Created by Masticatory Forces on Tooth-Implant Supported Fixed Partial Dentures with Three Dimensional Finite Element Analysis Method

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Department of Prosthodontics
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Purpose: The aim of the study was, to evaluate the stress levels occurring on the jaw and the fixed prosthetic restoration which was created by masticatory forces either placing an implant as a pier abutment where the span length of the fixed partial denture(FPD) planned to be fabricated between the residual teeth is longer than ideal conditions, or there is an available natural tooth to connect between two implant abutments which can be taken as an additional support.

Methods & Materials: Right posterior region of the mandible was randomly selected for the study and either implant or natural tooth supports were designed to insert in canine, second premolar and second molar tooth area. Five unit porcelain FPDs with Co-Cr substructures were fabricated over these various abutments and the stress values occurring at the reference points taken on the restorations, implant fixtures, and the cortical and trabecular bone around the tooth or implant fixture were calculated and evaluated with static linear finite element analysis. The abutment sequence designed in the study was either tooth-implant-tooth or implant-tooth-implant in the working group; and in the control group, five unit FPDs had all-implant or all-natural teeth support. The working models were scanned using Activity880 scanner and then Algor Fempro computer analysis programme was used for the finite element analysis of the study.

Results: According to the results of this study, none of the models has exceeded the bearing limitations against the stresses occured in cortical bone, but almost edged in implant fixtures in the working models.

Conclusion: It was concluded that tooth-implant supported restorations can be an alternative choice to only-implant-supported restorations, but long term in-vivo studies are necessary in order to support the results that have been obtained from the computer simulation program.

Poster 2

A Quick Setting Calcium Phosphate Cement: Effects of Planetary Ball Milling

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Purpose: Calcium phosphate cement (CPC) is widely utilized today for various clinical applications. CPC shows many advantages as a bone-substitution material. However, it shows some disadvantages: long setting time, and low strength in the early stages of implantation. An approach to reduce the setting time is using a chemically unstable amorphous calcium phosphate (ACP) as a starting material. In the present study, the properties of CPC produced from a calcium phosphate powder including ACP powder were investigated.

Methods & Materials: ACP powder was produced from a crystalline ß-tricalcium phosphate (ß-TCP) powder by the planetary ball milling. The milled powder was mixed with 2.5 mass% CaCl2 solution, and then 2.5 mass% NaH2PO4 solution at a total powder/liquid ratio of 2:1:1. The mixtures were kept in an incubator for 1 d and 2 w. The phase constitutions of clcium phosphate were investigated using X-ray diffractometry (XRD). Mechanical properties evaluated were the compressive strength (CS) and diametral tensile strength (DTS). Microstructures of CPC were investigated using scanning electron microscopy (SEM).

Results: XRD pattern of milled powder showed broad halos with peaks of ß-TCP, which indicated that the milled powder in the present study is a mixture of ACP and ß-TCP (mixed CP). The CS and DTS of aCPC after 1 d and 2 w were 40.2 ± 4.4

MPa and 49.6 ± 8.6 MPa, and 4.6 ± 1.5 MPa and 7.9 ± 1.8 MPa, respectively. Those of control were 1.2 ± 0.3 MPa and 2.6 ± 0.5 MPa, and 0.1 ± 0.0 MPa and 0.5 ± 0.1 MPa, respectively. All the CS data and DTS data of aCPC were significantly higher than those of control of the same cement reaction time ($t < 0.01$). The aCPC specimens after 1 d reaction time showed a plastic deformation during CS and DTS tests, on the contrary, those after 2 w reaction time showed no deformation before the final fracture.

Conclusion: These data suggested that the unstable ACP dissolved rapidly and accelerated hydroxyapatite precipitation, which successfully shortened the cement hardening time.

Poster 3

Current Experiences of Dental Implants in Rare Disorders - Review of the Literature

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Purpose: Congenital tooth agenesis or acquired early loss of teeth are common in many rare disorders where oral rehabilitation with dental implants are strongly indicated. The aim was to compile current knowledge on the use of dental implants in individuals with rare disorders, with special emphasis on risks and complications.

Methods & Materials: A search of PubMed using dental/oral implants and rare diseases/disorders as well as specific diagnoses as search terms was used. In addition, abstracts from conferences and workshops, as well as personal communication with colleagues and patients were used to find reports and publications.

Results: Reports on around 200 individuals in 80 publications and conference abstracts were found (February,2013), a majority of which were case reports. The results probably reflect an underestimation of reported patients since the search was manual and directed to well-known diagnoses known to be associated with missing teeth. More than half of the publications referred to treatment in patients with ectodermal dysplasia, which was the diagnosis in more than 70% of reported patients.In many diagnoses oral rehabilitation with dental implants had worked well. However, osseointegration seem to be compromised in hypohidrotic ectodermal dysplasia, x-linked hypophosphataemic rickets, and Papillon Lefevre syndrome. In osteogenesis imperfecta longer healing time has been advocated. In some rare disorders the surgical technique need to be adapted to the status of the oral tissues as in dystrophic epidermolysis bullosa where due respect has to be paid to the frail oral mucosa.

In order to improve the quality of care for individuals with rare disorders the establishing of quality registers would provide more reliable information about risks and side-effects. Due to the small numbers of patients this calls for multi-center co-operation in the efforts to provide the best possible treatment for individuals with rare disorders.

Conclusion: The knowledge of outcomes of treatment with dental implants in rare disorders from publications and reports is still limited. A report bias in that a majority of case reports show favourable outcomes of treatment cannot be excluded. Multi-center co-operation and quality registers could open up possibilities to prospectively monitor outcomes of treatment as well as risks and side-effects.

Poster 4

Early Success of Short Implants From a Prospective Clinical Study

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Purpose: Short implants are an alternative to bone augmentation procedures for patients with limited bone height. This study evaluated the success of short implants placed in the posterior maxilla or mandible prior to loading.

Methods & Materials: Eighteen patients received at least 4 Astra Tech/ Dentsply implants in symmetrical posterior locations. Implants (n= 82) ranged from 6 to 11 mm with 70 implants = 9 mm and 38 implants = 6mm. Placement was

planned virtually using software and CBCT scans. Computer generated guides were ordered for all patients, however; lack of inter-arch distance precluded their use for 5 patients. In these situations, guides were used to communicate pilot drill position only. Osteotomies were prepared using the guides and accompanying drill sequence following a two-stage surgical approach. Degree of bone mineralization (DBM) parameters for implant osteotomy sites were measured using 3D cone beam computed tomography (CBCT) images taken before and after implant placement. A paired t-test was used to compare the DBM parameters between failed and successful implantation sites.

Results: Early failure occurred for 7/82 implants or 8.5%. All of the failed implants were 6 mm in length and placed using CAD/CAM surgical guides. Three failures occurred in one patient. Bone grafting was done for failed implant sites. After healing, new implants were placed using conventional surgical guides and no further failures occurred. According to a paired t-test (P=0.043), peak DBM values were significantly higher for failed implant sites than for successful ones. Low DBM values were moderately higher (P=.082) for failed sites.

Conclusion: Current failures suggest that CAD/CAM guides used with external irrigation may pose a greater risk for the success of 6-mm implants placed in posterior areas with advanced bone loss. This may be due to the bone density in these highly resorbed areas combined with limited irrigation reaching the osteotomy sites.

Poster 5

Mini Dental Implant Supported Mandibular Overdentures: A Follow Up Over 5 Years Considering Ohrqol, Chewing Function and Bone Support and Comparison with Conventional Complete Dentures

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Purpose: Mini dental implants (MDI)s have opened new simple options in oral rehabilitation by complete overdentures (MDI-CD) for patients with narrow alveolar ridges, low income, and for very old and/or health-compromised patients, due to minimally invasive flapless surgical methods. We aimed to examine oral health related quality of life (OHRQoL) and chewing function (CF) in patients whose mandibular denture was supported by four mini dental implants (MDI-CDWs) at baseline, one year and five year check-ups and to compare them with conventional complete denture wearers (C-CDWs).

Methods & Materials: Ninety patients (MDI-CDWs) (40 males and 50 females, 52-84 years old) with 4 MDIs supporting mandibular complete denture (ball attachments) participated. All MDIs were placed by flapless surgical method in intraforaminal region. The MDIs were from 1.8 mm to 2,5 mm wide and from 10 to 15 mm long. Two types of MDI were used (Imtec, 3M Company and Renew Biocare, Switzerland). The control group consisted of 56 conventional complete denture wearers (C-CDWs) (32 females, 20 males, 51-86 years old). Clinical and x-ray examination were made at the baseline, one year and five year check ups. Participants filled-in the Oral Health Impact Questionnaire (OHIP49) and the Chewing Function Questionnaire (CFQ). The summary scores were calculated. Plaque and gingival indices were also obtained. Statistical analysis was made by the SPSS software. The probability level was set st 0.05.

Results: Only 19 implants from a total of 360 implants were lost in the MDI-CDW group at the insertion (3 were fractured), or soon after loading, but mandibular dentures remained successfully supported by the remaining 3 MDIs. One more MDI was lost in one patient after one year and 5 month. A total of 95% MDIs remained over the 5-year period. At the 5-year follow up the bone level was reduced for 0.97 ± 1.02 mm. The PI and GI were 1 in the majority of patients and were significantly higher at the 5-year follow-up. The OHRQoL was extremely improved after the treatment, at the 1-year, as well as at the 5-year appointment ($p<0.001$) in MDI-CDWs. The effect size was very high in MDI-CDWs (4.12. In the MDI-CDWs the chewing ability and the QHRQoL were significantly better than in the C-CDWs at all observation stages. In the C-CDWs the OHIP Summary Scores, as well as the CFQ summary scores significantly increased at the 1-year and 5-year follow ups, contrary from the MDI-CDW group ($p<0.01$).

Conclusion: The results of this study report significantly increased OHRQoL and chewing function throughout the 5-year period in the MDI-CDWs in comparison to the CCDWs. The MDIs offered reduced cost with minimized pain and trauma. The clinical results of this study at the 1 and at the 5 year appointment are promising.

Poster 6

Application of an Rhbmp-2 Based Artificial Bone Composite in Peri-Implant Bone Regeneration - A Radiographic Analysis

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Purpose: To evaluate the potential and efficacy of an artificial bone composite as a carrier of rhBMP-2 in repairing peri-implant critical size defect.

Methods & Materials: Nine healthy male adult beagle dogs were used. Fifty titanium porous-oxide surface-modified implants (TiUnite, 4.0 x 8.5 mm; Nobel Biocare, Sweden) were inserted into 50 critical size mandibular alveolar defects (10 mm in width, 4 mm in height). Four millimeters of the implants were placed within the surgically reduced alveolar ridge, creating 4.5 mm, supra-alveolar, peri-implant defects. The 50 defects with dental implants were randomly assigned into 5 groups (empty, artificial bone composite only, bone composite with 5, 20 and 50 μg rhBMP-2) and 2 healing times (4 and 8 weeks). The animals were administered fluorescent bone labels (tetracycline at first day of operation, calcein at 3 weeks, and alizarin red at 6 weeks) for a qualitative evaluation of bone formation. Periapical x-ray were taken immediately post-surgery (baseline), and at weeks 4 and 8. Micro-CT data were obtained after euthanasia and analyzed using CTan software.

Results: Healing processes of all defect areas were uneventful except three sites ended up with cover screw exposure without other signs of inflammation. Both x-ray and micro-CT data showed significantly improved vertical bone regeneration around dental implants at week 8 in groups containing rhBMP-2. Bone composites containing 50 μg rhBMP-2 revealed the best bone regeneration at week 4. However, the performance of composites with 20 μg rhBMP-2 exceeded any other groups at week 8.

Conclusion: An animal model was established to evaluate vertical bone regeneration around dental implants. The artificial bone composite used in our study may act as an osteoconductive scaffold and a carrier of rhBMP-2 which effectively contributed to bone regeneration. The dosage of rhBMP-2 exerted a great influence on the timing and extent of bone regeneration.

Poster 7

Patient Satisfaction and Comfort After a Full-Arch Immediate Loading Rehabilitation: A Preliminary Study

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Purpose: To evaluate the changes in quality of life and the satisfaction of patients rehabilitated with an immediate loading full-arch prosthesis (Columbus Bridge Protocol, CBP).

Methods & Materials: The study included 11 patients rehabilitated with CBP between September 2012 and May 2013 of one or both dental arches. Each patient answered an anonymous 26-questions questionnaire at a pre-surgical appointment (T0), 1 week after surgery (T1) and 2 months (T2) after surgery. The questionnaires were inspired by statement of Oral Health Impact Profile (OHIP). The questions were related to: pain, chewing ability, phonetics, aesthetics, home dental hygiene procedures, patient satisfaction. Only questions common to all questionnaires were considered for statistical analysis. For categorical variables differences in the scores at the 3 time points were assessed by Cochran's test. If a statistically significant difference was found, post-hoc pair wise comparisons were performed by McNemar test. Multinomial data differences in the scores were evaluated with Marginal Homogeneity test, comparing each pair individually. A $p=0.05$ was considered statistically significant.

Results: No statistically significant differences between the 3 time points were noticed for variables regarding smoking, tense, avoiding smiling, difficulty in relating to others, instruments used for oral hygiene and difficulties to use them. A

statistically significant improvement between t0 and t1 (p=0,028) and t0 and t2 was observed for the variables regarding satisfaction as regards ability to chew; t0 and t1 (p=0.05) and t0 and t2 (p=0,021) about satisfaction with the aesthetic results; t0 and t2 (p=0,046) about pain during chewing; t0 and t2 (p=0,046) and t0 and t1 (p=0,046) about breaks during chewing; a significant increase in phonetic difficulty was found between t0 and t2 (p=0,025). All the patients were pleased with support received by the clinicians and they felt that CBP was an effective therapy for their oral problems.

Conclusion: On the base of this preliminary evaluation, patients treated with CBP reported a better chewing ability and a greater satisfaction with their aesthetic appearance compared to pre-treatment assessments. However further investigation on a larger number of patients is needed to confirm these results. Key words: implant supported prosthesis, edentulous jaw, oral health, patient satisfaction, treatment outcome.

Poster 8

Reliability of CAD-CAM Implant-Positioning Placement Software

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Purpose: To evaluate clinical CAD-CAM computed implant-positioning placement software accuracy and reliability.

Methods & Materials: Three-dimensional digital scanning by optical scanner (model Gom Atos III) optical technology-topometric was obtained. 4 pairs of plaster casts were analysed, respectively referred to as "A" model (virtual implant position planned - cast) and "B" (real surgical implant position - cast). A total of 19 casts pairs were compared to verify effective implant position. 19 pairs were so identified: • Model 12 A and 12 B of the maxillary arch with 5 dental residual teeth (1.1, 1.2,1.3, 2.1, 2.7) and with 5 implants planned for rehabilitation (region # 1.4, # 1.5, # 2.2, # 2.3, # 2.5). • Model 13 A and 13 B of the mandibular arch with 7 dental residual teeth (3.1, 3.2, 3.3, 3.4, 4.1, 4.4, 4.7) and with 3 implants planned for rehabilitation (region # 3.5, # 4.3, # 4.5). Model 20A and 20B of the edentulous maxillary arch with 5 implants planned for rehabilitation (region # 1.2, # 1.3, # 1.5, # 2.2, # 2.3, # 2.5). Model 38A and 38B of the edentulous mandibular arch with 5 implants planned for rehabilitation (region # 4.1, # 4.2, # 4.4, # 3.1, # 3.4).

Results: • 4.06% of cases occurred with exact transferring of virtually planned implant position to the real implant position. the maximum positive value observed for implant discrepancy was 460 microns. The maximum negative value observed for implant discrepancy was - 520 microns • similar discrepancy frequency was observed for positive?(51.7%) and negative (48.3%) values. • considering both negative and positive values, results in measurement greater than 150 microns were recognised in 25.2% of cases. While the average value was greater of 165 microns. • considering the overall average for the model, the average value found was less of 50.83 microns. While the average value greater than 146.5 microns. • standard SD detected on all 4 scanned casts pairs was 97.45 microns.

Conclusion: That there is a considerable spatial discrepancy between scanned designed virtually implant position and the real surgical implant position. Further studies should be conducted to verify accuracy of CAD-CAM system.

Poster 9

Cell Differentiation on Nanoscale Features of the Titanium Surface: Effects of Deposition Time in Naoh Solution

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Purpose: It is currently unclear how the nanoscale features of implants differentially affect the osteogenic differentiation of mesenchymal stem cells. There is a current need for improving titanium implants for reconstructive surgeries in orthopedic

and dental fields. Herein, this study found that modification of titanium surfaces with NaOH could be an effective method of improving their biological properties. Further developments in nanotechnology may help improve osseointegration of titanium implants. The present study aimed to investigate cellular behavior on nanoscale features of a titanium surface by controlling the deposition time in NaOH. These effects were then evaluated on osteogenic differentiation of rat bone marrow cells to potentially increase the success rate of titanium implants.

Methods & Materials: Titanium disks were left untreated or soaked in 10 M NaOH for 5 min, and 1, 3, 9, and 24 h. Scanning electron and probe microscopy were used to evaluate the nanoscale features. Rat bone marrow cells were seeded on the specimens in osteogenic differentiation medium. Alkaline phosphatase activity, osteocalcin production, and mineralization were then analyzed. Statistical significance was analyzed using one-way ANOVA followed by the Tukey test.

Results: Nanofeatures were detected at 1 h after NaOH treatment and were well established at 9 h. Alkaline phosphatase activities of specimens soaked for 1 h or 3 h were significantly different from specimens soaked for 9 h or 24 h after 14 days of differentiation. Osteocalcin production and calcium deposition between untreated specimens and specimens soaked for 5 min, as well as between specimens soaked for 9 h and 24 h were significantly different after 21 days.

Conclusion: It was suggested that the immersion to sodium hydroxide solution of unalloyed titanium metal affects osteoblastic differentiation of bone marrow cells and enhances mineralization from 24 hours in 9 hours of a short time.

Poster 10

Possible Involvement of Oxygen Concentration Cell in Microbiologically-Induced Titanium Corrosion

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Purpose: Corrosion and discoloration of titanium are the major concern when applied for the dental implants and prostheses. This study aimed to investigate the mechanism of microbiologically-induced corrosion of titanium under artificial biofilm by measuring corrosion current of titanium surface, titanium eluted into biofilm and oxygen concentration under biofilm.

Methods & Materials: Streptococcus mutans NCTC10449 were grown in the 0.5%-glucose-containing complex medium (viable cells [VC]). A part of the cells was treated with autoclaving (killed cells [KC]). Samples of commercially-pure titanium (CPTi) ASTM Grade II (1×10×10 mm) were ground up to the one side mirror polishing. An experimental apparatus with a well (4.0 mm in diameter and 2.0 mm deep) was made of polymethyl methacrylate with a CPTi at the bottom. VC or KC were packed into the well as artificial biofilm and kept at 37°C for 90 min. Before and after biofilm formation for 90 min, corrosion current on the surface of CPTi was measured using computer-controlled potentiostat. The oxygen concentration under biofilm was monitored using oxygen-sensitive fluorescent film placed at the bottom of the well and fluorescence image detector. The amount of titanium eluted from CPTi surface into VC and KC was measured by inductively coupled plasma mass spectrometry (ICP-MS).

Results: Corrosion current of CPTi surface under VC biofilm increased to 41.2±20.6 nA during 90 min, while that under KC biofilm was stable (0.3±0.2 nA) (VC vs KC, $p<0.01$). Oxygen concentration under VC biofilm decreased by 61.3±2.0% during 90 min, while that under KC biofilm was stable (slight increase by 3.9±5.1%) (VC vs KC, $p<0.01$). No significant elution of titanium was detected in VC or KC biofilm after 90 min.

Conclusion: VC biofilm induced titanium corrosion along with oxygen consumption. It is suggested that VC create unevenness of oxygen concentration on titanium surface by bacterial metabolism-coupled oxygen consumption and subsequently form ‘oxygen concentration cells (OCC)’. OCC can induce electrochemical corrosion of titanium surface, possibly by modification of titanium-oxide layer, although it seems to be not enough to elute titanium from the surface. Oral biofilm could form OCC on metal surfaces and cause electrochemical corrosion in vivo. Supported by MEXT, Japan.

Poster 11

Prosthodontictic Rehabilitation of a Patient with Partial Anodontia: A Case Report

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Purpose: Partial anodontia is a disease with congenital missing teeth. As a consequence, malformation of alveolar bone is often reported. We have experienced a partial anodontia patient treated with dental implants after bone graft procedure. The purpose of this presentation is to report this case.

Methods & Materials: A 33 years old female partial anodontia patient visited our clinic. At first visit, her chief complaint was abnormal shape of her frontal teeth. Malformation of her anterior teeth was observed. And also, many of her permanent teeth were missing. She has received removable partial denture treatment for her right partially edentulous maxilla and mandible when she was a high school student, but didn't use them for the discomfort. To solve her aesthetic demand, laminate veneers were fabricated for the upper anterior teeth. After the treatment, to restore the missing right posterior region, she wanted to receive dental implant treatment. Computed tomography (CT) X-ray examination was done with diagnostic stent. From the CT image, the distance from the bone crest to the sinus floor was not enough for implant placement. Lateral approach to the right sinus floor was done for bone augmentation. One implant was placed simultaneously and one implant was placed after the bone healing into the right posterior maxilla. Two implants were placed in the right posterior mandible. During the use of provisional restoration, pus discharge was observed on her left lower second deciduous molar. From the dental X-ray image, root resorption was evident. As it seemed to be difficult to restore it, the tooth was extracted. After waiting for the bone healing, dental implant was placed into the left second premolar position in the mandible.

Results: After adjusting the provisional restorations to the oral function, cross mount procedure was performed to transfer the occlusion to the final prosthesis. Screw-retained final prosthesis were fabricated using UCLA-abutments veneered with hybrid resin composite.

Conclusion: High patient's satisfaction was achieved with good aesthetics and functional rehabilitation.

Poster 12

Recruitment and Enrolling in a Randomized Clinical Trial of Mandibular Two-Implant Overdenture

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Purpose: The purpose of this study was to evaluate the effectiveness of promotion campaign. In addition, the reasons of withdrawal for a prospective clinical trial of mandibular two-implant supported overdenture were examined

Methods & Materials: Subjects of this study were the participants of a randomized controlled clinical trial for investigating prognosis of mandibular implant supported overdentures. Forty-eight subjects were selected from assuming a confidence level of 95% and a power of test of 80%. Recruitment methods such as advertising and patient referral were used. Recruited subjects were classified by gender, age, and participation motives. Withdrawal rate of the participants before and after enrolment were evaluated. Additionally, withdrawal rate based on the reasons of withdrawal were calculated and compared.

Results: A total of 177 patients were recruited but 51 patients enrolled for the trial. In this study, 40 subjects took part finally in the trial. One hundred sixteen subjects (65.5%) were recruited by advertisement campaign and 61 subjects (34.5%) were referred from our hospital or local clinics. With regard to promotion efficiency, newspaper promotion was the most successful to recruit the largest number of subjects. Printed advertisement such as posters recruited the least number of subjects. With respect to referred patients, the proportion of our hospital patients was the highest (37/61). Regarding ages of the subjects, subjects in their 70s occupied the largest proportion (22/51). Concerning gender distribution, the number of male and female patients was similar (25:26). Final withdrawal rate of all subjects were 74.0%. Withdrawal rate of patients who were recruited by advertisement (87.9%) was higher than those of referred patients (57.4%). The most common reasons for withdrawal were presence of remaining teeth and lack of motivation.

Conclusion: To facilitate the recruitment of clinical trial subjects and improve the participation rate, it seems important to obtain sufficient number of researchers, to perform promotion activity with diverse strategies, to cooperate with local dentists, to increase research fund, and to alleviate subjects' fear against clinical trials by thorough consultation Keywords : Mandibular, Implant, Overdenture, Recruitment, Clinical trial Supported by Korea Health Industry Development Institute (project No A110669)

Poster 13

Comparision of Differential Capability and Mechanical Stress Response Between Dental Pulp Stem Cell and Bone-Marrow Derived Mesenchymal Stem Cells

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Purpose: Dental pulp stem cells (DPSCs) are located in dental pulp and can differentiate into severals type of cells including odontoblasts and osteoblasts. Bone marrow-derived mesenchymal stem cells (BM-MSCs) also have multilineage potential. Jaw movement and occlusal forces imposes mechanical stress on DPSCs, which may play an important role in oral tissue engineering. In this study, we examined differential capability and mechanical stress response on DPSCs and BM-MSCs.

Methods & Materials: DPSCs and BM-MSCs were isolated and cultured from 6-week-old male Sprague-Dawley rats as previously described. The identification of DPSCs and BM-MSCs were analyzed by a fluorescence activated cell sorter (FACS) analysis. These cells were differentiated into adipocytes or osteoblasts using each differentiation medium. To examine the response of mechanical stress, these cells were uni-axially stretched by 10 % (10 round/minutes) and the growth rate was analyzed.

Results: The rate of adipocyte differentiation significantly higher in BM-MSCs than DPSCs (BM-MSCs; 33.3%, DPSCs; 9.5%). Whereas, osteogenic differentiation of DPSCs were significantly higher than BM-MSCs (BM-MSCs; 2.3%, DPSCs; 21.3%). One hour stretch stimulation significantly increased the growth of DPSCs by 1.3 times compared with static DPSCs. The growth rate of BM-MSCs was not affected by the stretch.

Conclusion: DPSCs may be an effective tool of bone regeneration and stretch stimulus are thought to save cellular quantity for tissue regeneration.

Poster 14

Stress Analysis of Implant Keepers with Different Retaining Methods

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Purpose: Restorative implant materials and technique have continued to evolve and improve. Implant overdentures with magnetic attachment are drawing attention due to their excellent retentive mechanism. A keeper corresponding a magnetic assembly is secured to the implant to exert the function of an attachment. In the screw-retaining method, a keeper is mechanically secured to an implant using a retaining screw. The benefit of this method is that a keeper can be removed by operators, and, therefore, suitable for the maintenance. However, since a keeper is mechanically fixed using a screw, safety should be considered in the long-term intraoral performance of this implant. There have been several reports on clinical problems such as a fracture of an abutment screw. It is extremely important to understand mechanical influence of keeper fixture methods on implants to investigate the optimal retaining method. The purpose of the present study was to investigate mechanical influence of keeper retaining method with screws using the three-dimensional finite element method.

Methods & Materials: 1. Analysis model The keeper retaining methods include "fixation structure A" in which a fixture and an abutment are fixed with abutment screw and keeper unit, and "fixation structure B" in which a fixture and an abutment are fixed with abutment screw, and a keeper is separately fixed with an abutment on top. Finite element models of "fixation structure A" and "fixation structure B" were constructed using a general purpose finite element pre-post

processor(Patran 2010, MSC software). 2. Analysis condition An elastic stress analysis was performed using a general purpose finite element program (Marc 2010, MSC software).

Results: The main purpose of the present study was to investigate the mechanical influence of the difference in the fixation method of a magnetic implant keeper on a load.

Conclusion: The mechanical evaluation was performed regarding the keeper fixation using the screw retaining method. Mechanical evaluation was conducted using three-dimensional finite element method, and the following conclusions were drawn. 1. A significant stress relaxation was observed regarding compression and tensile stress during load application in 45°direction by separating an abutment and keeper. 2. For abutment screw materials, a higher mechanical safety was suggested in Ti-6Al-4V compared with soft magnetic stainless steel (SUSXM27).

Poster 15

Specialist Prosthodontists and Surgical Implant Placement

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Purpose: A new curriculum was introduced in 2010 by the governing body of dental specialists in the United Kingdom (UK) the General Dental Council (GDC) which removed the need for surgical placement of dental implants to have been carried out by training specialists. It was therefore decided to investigate the number of Specialist Prosthodontists placing implants in general dental practice and hospital setting.

Methods & Materials: The full GDC Prosthodontics specialist list was obtained there were 408 registered specialists in Prosthodontics with the GDC in 2011, 188 were excluded as also on other lists eg Restorative/ Periodontics/ Oral surgery a further 7 were excluded as residing outside the UK, giving a total of 213 registered specialists in Prosthodontics. A simple one page questionnaire was constructed asking the date of graduation of their primary dental degree, what postgraduate education they had undertaken and whether they carried out implant placement. The questionnaire also asked as to where they undertook the majority of their work - in a private practice or NHS (state)) funded institution. Of the 213 Prosthodontists, 25% were randomly selected in 2011 and sent a questionnaire pack with a return stamped addressed envelope. The questionnaire was repeated in 2012 with a different set of 25% giving a total of 50%.

Results: The response rate to the questionnaire was 64%. The majority graduated between 1981- 1990. 56% responded that they did undertake all implant placement and a further 12 % some selected placement and 32% no placement. Of the 32% there was an even split between Oral surgeons and Periodontists as to whom Prosthodontists referred to. All respondents who graduated after 1997 undertook implant placement. Very few Prosthodontists who graduated prior to 1981 undertook surgical implant placement. 10% of respondents were working at least partially in state funded institutions either teaching or placing implants as part of there week.

Conclusion: 68% of those responding to the questionnaire were placing some or all of the dental implants in their practices. The results suggest younger Prosthodontists were placing there own implants. Training in implant placement to achieve optimal results should be part of the Prosthodontics curriculum.

Poster 16

Relationship Between Bone Density Values Evaluated Using Computerized Tomography or Cortical Bone Thickness, and Primary Implant Stability: Comparison of Different Types of Implants

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Purpose: The aim of this study was to investigate the relationship between bone quality expressed in Hounsfield units (HUs), measured using helical CT or cortical bone thickness, and primary implant stability for different types of implant designs and drilling protocols.

Methods & Materials: A total of 44 fresh swine femoral heads were included in this study. Measurement of the average quality of the bone surrounding the planned implant sockets in HUs was based on the helical CT image. Two different types of implants (NobelReplace® Straight Groovy 4.3×10 mm; NobelReplace® Tapered Groovy 4.3×10 mm) were inserted into each specimen according to the manufacturers' instructions. The maximum insertion torque value (ITV) and removal torque value (RTV) of each implant were recorded using the digital torque driver. The implant stability quotient (ISQ) was measured using an Osstell Mentor® and the cortical bone thickness of implant recipient sites was measured using a vernier caliper. Spearman's correlation coefficients were calculated to evaluate the correlations between the HUs of the surrounding bone or cortical bone thickness and ITV, ISQ or RTV.

Results: In both types of implant, high correlations were found between the HUs of the surrounding bone and primary stability (ITV, ISQ or RTV; $P<0.01$). In straight implants, there were also high correlations between the HUs of the surrounding cancellous bone and primary stability (ITV, ISQ or RTV; $P<0.01$). In tapered implants, significant correlations were observed between the HUs of the surrounding cancellous bone and ITV ($P<0.01$) or RTV ($P<0.01$), and between the cortical bone thickness and ITV ($P=0.02$) or ISQ ($P<0.01$).

Conclusion: The quality of the bone surrounding the implant evaluated by helical CT had a strong correlation with the primary stability of implants, indicating that preoperative evaluation of the HUs for implant recipient sites would allow clinicians to predict primary stability before placement. In addition, the region of the surrounding bone, namely the cortical or cancellous bone, which has greater effect on primary stability may differ depending on the implant design and drilling protocols. Supported by Grants-in-Aid for Scientific Research from the Japan Society for the Promotion of Science 24792094

Poster 17

Biomechanical Investigation into Effect of Length of Implants on Bone Stress Under Simulated Loading Condition.

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Purpose: Length of the implants is considered to be one of the most important factors that have a significant impact on implant stability. Especially for patients, who exert strong occlusal forces during functional or non-functional activity such as sleep bruxism, longer implants are generally favorable, which is, however, not always feasible due to insufficient bone height or other patient's factors. The aim of this pilot study was to evaluate the effect of the implant length on bone stress using a three-dimensional finite element analysis method (3D-FEA), which was created from a single patient's data.

Methods & Materials: A #46 missing male patient, who had taken computerized tomography (CT) and received a dental implants treatment, was selected and 3D-FEA models were created using his CT-Digital Imaging and Communication in Medicine (DICOM) data (MECHANICAL FINDER, Research Center of Computational Mechanics, Inc). Hounsfield Units of the DICOM data was reflected in the Young's modulus of the jawbone of these analyzing models. On this simulation model, we placed a dental implant at the #46 region in 3 different designs, which included 1) 5.0mm(diameter) x 8.5mm(length), 2) 5.0mm x 11.5mm, and 3) 5mm x 15mm. As a superstructure of the implant, a crown made of platinum-gold alloy was applied. Over all, the model consisted of between approximately 310,000 and 340,000 nodes and between approximately 1,700,000 to 1,900,000 elements. Total load of 1178.4 N was applied on occlusal surfaces of #44, 45, 46, 47 in order to simulate parafunctional tooth grinding toward the right side. The magnitudes of von Mises stress on the bone were analyzed under the simulated loading condition.

Results: The von Mises stress concentration was observed at the surrounding bone of the implants. Maximum equivalent stress around implant was 463 MPa (8.5mm), 340 MPa (11.5mm) and 425 MPa (15mm).

Conclusion: Within the limitation of this simulation study, the magnitude of the bone stresses was not dependent upon the length of the implants placed in a predictable manner, suggesting other patient's factors, such as bone density distribution or occlusal force levels, should also be taken into consideration.

Poster 18

The Effect of a Novel Implant Surface on Gene Expression

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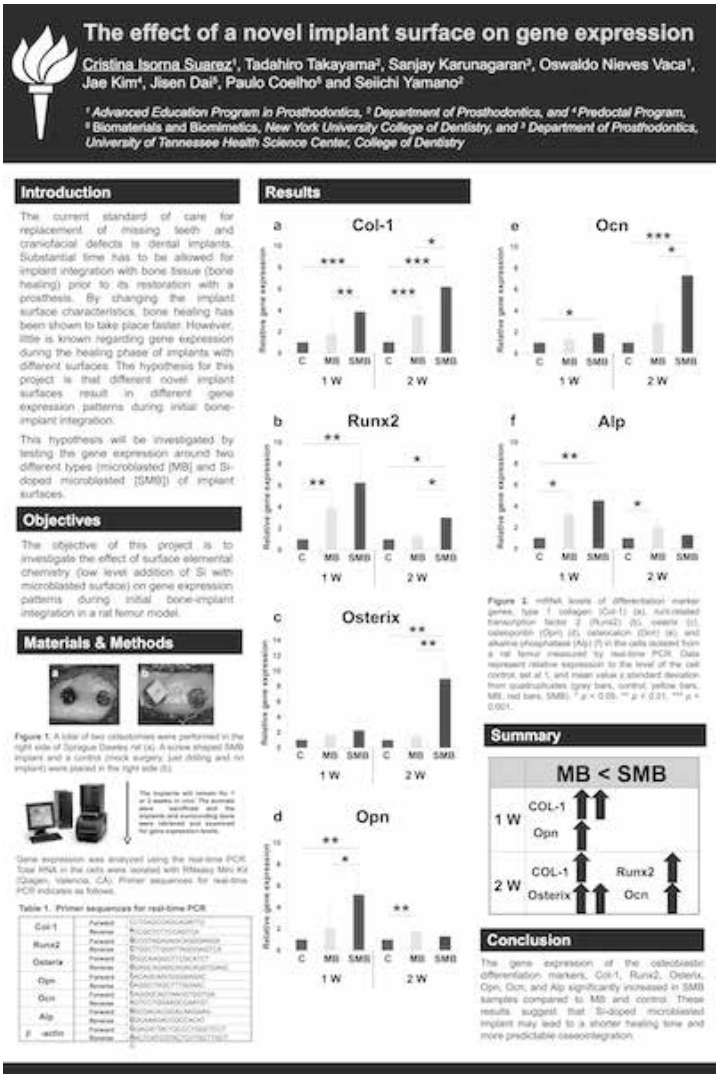
Purpose: The objective of this project is to determine the gene expression pattern that results in the faster integration of endosseous implants.

Methods & Materials: We investigated by testing the gene expression in the bone using real-time PCR at 1 or 2 weeks after two different types (acid etched [AE] and Si-doped microblasted [SMB]) of implants were placed in a rat femur model.

Results: Gene expression of Col-1, Runx2, Osterix, Opn, Ocn, and Alp in SMB samples significantly increased compared to AE and control.

Conclusion: These results suggest that SMB implant may lead to a shorter healing time and more predictable treatment for edentulous patients.



Poster 19

The Synergistic Effect of Hierarchical Micro/Nano-Topography and Bioactive Ions for Enhanced Osseointegration

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Purpose: Both surface chemistry and topography have significant influence on good and fast osseointegration of biomedical implants; the main goals in orthopeadic, dental and maxillofacial surgeries. A surface modification strategy encompassing the use of bioactive trace elements together with surface micron/nano-topographical modifications was employed in this study in an attempt to enhance the osseointegration of Ti alloy, a commonly used implant.

Methods & Materials: Briefly, we developed strontium-substituted hardystonite (Sr-HT) ceramic coating with a hierarchical topography where the nanosized grains were superimposed in the micron-rough coating structure. Its ability to induce new bone formation was evaluated by an in vivo animal model (beagle dogs). Micro-CT evaluation, histological observations, biomechanical test and sequential fluorescent labeling were used to evaluate the quantity and quality of new bone. In addition, we investigated the effects of surface topography and the dissolution products from the coatings on the in vitro bioactivity using canine bone marrow mesenchymal stem cells (BMMSCs) cultured on the implant surface as well as using extracts of the coated implants.

Results: Both Micro-CT evaluation and histological observations consistently demonstrated that our developed Sr-HT-coated Ti-alloy implants have the highest osseointegration (BIC=51.20±9.08%), while the uncoated implants had the lowest (BIC=5.27±1.45%). According to the biomechanical test results, Sr-HT group showed the highest failure load (388.84±100.51N). Results of sequential fluorescent labeling indicated that Sr-HT coated implant promoted new bone formation from the initial stage. We also demonstrated that the dissolution products, particularly strontium (Sr) from the Sr-HT-coated implants, enhanced the ALP activity and in vitro mineralization ability, while the micro/nano-topography was more related to the promotion of cell adhesion.

Conclusion: Those results suggest that our developed Sr-HT coatings have the potential for future use as coatings for orthopedic/dental and maxillofacial devices.

Poster 20

Esthetic Outcome Evaluation of Maxillary Anterior Single Tooth Bone Level Implants with Metal and Ceramic Abutments

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Purpose: The aim of this study was to evaluate the treatment outcome of implants in the esthetically demanding regions

Methods & Materials: In this study, patients were treated with implant (Camlog Biotechnologies, Basel, Switzerland) supported all ceramic single crowns and followed for 1 year. Esthetic parameters were recorded to assess treatment outcomes. Pink esthetic score and white esthetic score (PES/WES) was applied for the objective esthetic outcome assessment of anterior single-tooth implants. The patients' own appreciation was also evaluated by means of questionnaire.

Results: Thirty implants were placed in 25 patients. At the recall examinations, all implants were successfully integrated, demonstrating healthy peri-implant soft tissues as documented by standard clinical parameters. Esthetic outcomes confirmed pleasing results overall. WES values were slightly superior to PES values. None of these implants had mucosal recession.

Conclusion: In conclusion, objective as well as subjective evaluation of maxillary implants in the esthetic zone yielded satisfactory results. The follow up revealed pleasing esthetic outcomes and stable facial soft tissues.

Poster 21

Final Outcomes of Immediate Restoration of Anterior Implants Following Stereolithographic Surgery

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Purpose: For implant patients achieving predictable esthetics is very important. Flapless surgery reduces surgical trauma. Placement of the final prosthetic abutment at the time of implant placement stabilizes soft tissue adhesion and position to the implant. Both results require careful presurgical planning.

The purpose of this study was to test the accuracy on clinical level of transferring information from CT scans to stereolithographic models for the immediate restoration of implants in the esthetic zone. A secondary objective was to study whether the methodology affects implant's survival rate.

Methods & Materials: This was a 20 patient clinical trial. The inclusion criteria were that patients were missing a single tooth in the esthetic zone. Dicom files transferred from CT scans were used by Facilitate™ software for implant position planning. Stereolithographic models and surgical guides were fabricated from the digital information. Implant replicas were placed in stereolithographic models preoperatively as simulated surgery. Subsequently a ceramic abutment was adapted on the model, and a provisional crown was fabricated. At time of real implant surgery, the same procedure was used with a flapless approach. The ceramic abutment was permanently placed into the implant and the provisional crown was cemented. A ranking system from A to D was used in order to assess the accuracy of the procedure. Following an appropriate osseointegration period, a final ceramic crown was made.

Results: According to the scale defined for the present study one procedure was considered as a failure, five procedures were given a rating of A and fourteen procedures were given a rating of B. All implants were considered successfully osseointegrated and were restored with ceramic crowns.

Conclusion: Immediate restoration of implants in the esthetic region using stereolithographic model surgery, prior to actual surgery is a clinically feasible and safe procedure. Use of the technique minimizes the effect of a significant number of events that traditionally compromise final implant esthetics. Patients must be carefully selected for this option. There is decreased accuracy in the z-direction for 3D software reconstruction of CT images which leads to the need for occlusal adjustments of temporaries at the end.

Poster 22

Finite Element Analysis of Maxillary Implant-Retained Overdentures According to Bar Attachment Design and Palatal Coverage Type

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Purpose: The purpose of this study is to investigate the effects of bar attachment system (Hader bar using clips, Milled bar using Locator) and palatal coverage of denture base on load transfer when maxillary implant-retained overdenture is planned to be made by using 4 implants installed on upper edentulous area.

Methods & Materials: Comparative analysis of stress distribution on Bar attachment system, implant fixture, implant supporting bone and mucosa when load was applied on unilateral 1st molar was done by using finite element analysis method.

Results: 1. In all models, the highest stress occurred on distobuccal area of the connecting part of the most posterior implant fixture and the bar on the loaded side.
2. In supporting structure around implants, the highest stress occurred on distobuccal cortical bone of the most posterior implant on the loaded side.

3. MBL(Milled bar using Locator®) model showed higher stress on bar, implant fixture and cortical bone than those of HBC(Hader bar using clips) model, but lower stress occurred on mucosa and trabecular bone.
4. In all bar attachment systems, higher stress occurred on implant fixture when palate was not covered by denture base, and the size discrepancy of the stress that occurred on implant fixtures by whether palate was covered or uncovered was larger in MBL model than in HBC model.

Conclusion: Through this investigation, it could be found that when making maxillary implant-retained overdenture, using Hader bar instead of Milled bar and full palatal coverage rather than partial palatal coverage are more beneficial in distributing the stress that is applied on implant supporting bone.

Poster 23

Treatment Outcome of Mandibular Implant-Supported Overdentures After Surgical Bone Graft Using Tent Pole Technique

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Purpose: Purpose of this follow-up study was to evaluate the outcome of prosthetic treatment in implant-supported overdenture patients with severely resorbed mandibles treated surgically with a modified tent pole procedure. The aim was also to evaluate prosthetic maintenance, survival of the implants, patient satisfaction and quality of life.

Methods & Materials: Altogether, 22 patients treated between 2003 and 2009 with autogenous bone grafts using modified tent pole technique and implant-supported overdentures at the Department of Oral and Maxillofacial Surgery, Oulu University Hospital, were invited to the follow-up. All the patients were referred for the surgical implant procedure because of extreme mandibular bone resorption being too difficult or impossible cases for normal implantation. A bar was used to splint the implants and the final prostheses with implant connection were completed approximately 7 months after surgery. Seventeen patients (14 female, 3 men; mean age 68 years; range 54- 77 years) attended the clinical examination. The mean follow-up time was 5 years (1.5 to 7.4 years). Panoramic radiographs were taken before clinical examination and an OHIP-14 -questionnaire concerning the patients' oral health-related quality of life was filled in beforehand.

Results: The stability of the overdenture was good in 58.8% of cases and the retention in 64.7%. The most usual prosthetic complication was loosening of the attachment component noted in 7 cases (41.2%). The amount of plaque and bleeding was more remarkable on the lingual implant surfaces and less remarkable on the buccal surfaces. Pocket depth around the implants seemed to correspond to cases implanted intraorally. The radiographs revealed excellent grafted bone survival. The patients' oral health-related quality of life was found to be good after the treatment.

Conclusion: Implant placement with bone graft using a modified tent pole technique enables to achieve good prosthetic rehabilitation of occlusion improving the function and also the quality of life.

Poster 24

Comparative Analysis on Screw Loosening of Prefabricated Abutments and CAD/CAM Abutments

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Purpose: A significant percentage of implant-retained restorations presents screw loosening on functional loading. This study evaluated the loss of tightening torque values and vertical discrepancy between implant-abutment interface (I-A interface) of a prefabricated and customized CAD/CAM abutments.

Methods & Materials: There were three groups in this study with different implant companies. Each group had three stock

abutments and three custom abutments. CAD/CAM custom abutments were fabricated identically to stock abutments in each group. Then, prefabricated abutments and customized CAD/CAM abutments were connected to implant fixtures. The abutments were tightened on the implant analogues with 30Ncm torque using a manual torque wrench and were retightened after 10 minutes to compensate the loss of initial preload. Using universal testing machine (Instron, USA), cyclic loading tests were performed at 10 to 250N, for 5000 cycles, at 14 Hz, by subjecting sinusoidal wave at 30°. 1) measurement of initial and post-loading removal torque value with digital torque wrench (iSD900, NSK, Tochigi-ken, Japan) was performed, and 2) vertical discrepancy between the implant-abutment interface was evaluated by scanning electron microscope.

Results: Loosening percentage of the initial torque and vertical discrepancy of the implant-abutment interface was not significantly different between the CAD/CAM customized abutments and prefabricated abutments. Among groups, however, there was significant difference.

Conclusion: Thus, with precise control of CAD/CAM customized abutments, good screw joint stability may be achieved.

Poster 25

Fracture of Titanium Oral Implants: A Case Report with SEM Analysis

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Purpose: The aim of this study was to analyse a fractured titanium oral implant using a scanning electron microscopy and evaluate its fracture mechanisms.

Methods & Materials: A titanium oral implant restored with a cement-retained porcelain fused-to metal crown with previous episodes of prosthetic screw loosening was removed due to the fractured implant. The fractured implants were retrieved as two pieces and examined under the optical microscopy as well as scanning electron microscopy to analyze the fracture pattern at the site.

Results: Observations at low magnification showed that surface of the fracture appeared to be brittle and cleavage-like, except in the vicinity of the step-like feature which showed more ductile-like fracture. Closer examination of the fracture surface showed fatigue-like striations as well as areas where plastic contact deformation between the faces of where the crack occurred.

Conclusion: This case report illustrates various features of fractured areas that can be analyzed to theorize the origin and direction of the fracture.

Poster 26

High Technology for Patient Bearer of Grave Handicap: Resolution of a Complex Case Report

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Purpose: The use of modern technologies - such as computer assisted surgery, the encondeR system - has contributed to the resolution of a difficult implant-supported rehabilitation in a patient with mental retardation and uncooperative. The patient not only gained chewing function, phonetics and aesthetics, but also a semblance of normality who has never had.

Methods & Materials: surgery was performed under general anaesthesia taking advantage of computer-assisted technology. 15 implants (8 implants maxilla and jaw 7 implants) were inserted using a flapless technique by means of 2 surgical mucosa-supported masks, thus shortening the operating time. 8 months after, the patient underwent another operating session and 15

healing-abutments encodeR were bolted. 1 month after this second surgical time, biphasic bicomponent Polyvinylsiloxano impressions of the encodeR screws were taken; in order to establish the spatial orientation of the fixture and to skip the longer and more complex use of transferts. During the following sessions performed without general anaesthesia the patient accidentally ingested a prosthetic component (a screwdriver with security thread, and an implant abutment) promptly removed by means of endoscopy. The assembly of the upper and lower full-arch components was performed in the operating room.

Results: No. 3 sessions were performed in the operating room for the fixture insertion, for the bolt of the encode healing screws and for the mounting the upper and lower components of the full-arch. No.5 sessions were performed without anaesthesia for the impressions of healing screws, to detect the VDO, to test the prosthetic abutments, to install the prosthetic metal frame, to evaluate aesthetic and for testing of the weld.

Conclusion: As expected, given the limited cooperation of the patient, despite the latest innovations in technology, some problems occurred. First the accidental ingestion of prosthetic components and secondly the lack of collaboration in performing the impressions implied a suboptimal accuracy of virtual realizations given by the encode system (the upper girder was cut and welded in 2 points). The timing of some sessions (implant placement, taking of the impressions) was considerably reduced, but the number of the session was not inferior than the traditional method.

Poster 27

Histological and Mechanical Evaluation of the Implants Placed in the Reconstructed Bone by Interconnected Porous Calucium Hydroxyapatite

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Purpose: This study evaluated histological and mechanical of the aspects of osseointegration of the implants placed in the reconsulted bone by interconnected porous calcium hydroxyapatite(IP-CHA).

Methods & Materials: This study design was approved by the Research Facilities Committee for laboratory Animal science at Hiroshima university School of medicine.
Test 1; Cylinder-type IP-CHAs(F: 4.3 mm, h: 10.0 mm, NEOBONE®,Covalent Materials) as a bone substrate were placed into four bone sockets at right side of the femur of four male HBD Dogs. After 12 weeks of IP-CHA placement, titanium implant(F: 3.3 mm, L: 10.0 mm, Brånemark System? Mk? Tiunite, Nobel Biocare) was placed into half side of the IP-CHA. (A half portion of the implant was contacted to the reconsulted IP-CHA and a half of the femur itself). After 12 weeks of implant placement, dogs were sacrificed and the bone tissues involved the implant. The block was prepared as undecalcified polishing specimens and stained with toluidine blue. These samples were examined historogically with a light microscope. Bone-implant contact (BIC) ratio was measured histomorphometrically at samples (n=4).
Test 2; Cylinder-type IP-CHAs(F: 6.0 mm, h: 12.0 mm) as a bone substrate were placed into three bone sockets at right side of the femur of three male HBD Dogs different from test 1. After 12 weeks of IP-CHA placement, titanium implant(F: 3.3 mm, L: 10.0 mm, Test group) was placed center of the IP-CHA, in addition, implant(Control group) was placed into left femur. After placed implants, ISQ value was measured. After 12 weeks, ISQ value and removal torque were measured.

Results: Test 1; New bone formation was observed in both of the host bone and IP-CHA sides. BIC ratio was no significant difference between both sides.
Test 2; ISQ value of after 12 weeks from implant placement was no significant difference between test and control. However, removal torque of test group was significantly lower compared to the control group.

Conclusion: Based on the limited results of this study, IP-CHA cylinder might be expected to be a possible bone substrate to reconstruct bone quality for implant placement.

Poster 28

Does Color Matter? Comparative Evaluation of Peri-Implant Tissue Esthetic with Colored Implants and Abutments Through Spectrophotometer and Image Software Analysis

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Purpose: The aim of this study was to evaluate color influence of implant neck and abutment through the marginal peri-implant mucosa. Abutments evaluated were grey (titanium), white (zirconia), pink (titanium with anatase treatment) and gold (titanium with nitride treatment).

Methods & Materials: 13 patient with 31 implant-supported single crown were recruited; 9 implants with pink neck (Genesis Implant System, Keystone Dental, Burlingon, MA USA) and 26 with grey neck (Prima Implant System, Keystone Dental, Burlingon, MA USA) were evaluated. Different colors of implant abutment (grey, white, pink, gold) were connect covering the over-gingival part to standardize the measurement. Color analysis with spectrophotometer and photos of peri-implant mucosa of each single implant was performed. Spectrophotometric and photographic ?E, l*, a*, b* values were compared with the same values in the control site (gingival adjacent natural teeth).

Results: There was no significant difference between the ?E and a* values of different abutment colors with spectrophotometric analysis. A significant difference existed (p=0,001) between b* values of test sites and control sites and between grey abutments and control sites (p=0,021). No significant difference between b* values with white, pink, gold abutment and control sites. L* values were significant different (p=0,031) between pink and white abutments (p=0,014) and between white and grey abutments (p=0,031). Image software analysis showed no significant difference between ?E of Genesis and Prima implants and between the different abutments. Some significant difference were noticed between a*, b*, L*, ?E value with best performance for white and gold abutments.

Conclusion: Implants evaluated had no difference in esthetic performances. Abutments evaluated had significant discoloration of peri-implant mucosa. Abutment with best esthetic performance was white, followed by gold abutment, pink abutment and grey abutment.

Poster 29

The Influence of Interimplant Distance on Clinical Outcome of Two-Implant Mandibular Overdenture Treatment

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Purpose: Establishing the influence of the interimplant distance on clinical complications associated with mandibular overdenture treatment on two-implants using ball attachments.

Methods & Materials: The study group (n =32) consisted of complete edentulous patients having ages between 57 and 80 years old, of which 24 were females and 8 were males, complete edentulous, treated with overdenture on two implants in the mandible jaw and conventional denture in the upper jaw. Patients were divided into two groups according to the implant position: anterior (group 1 = 16) and distal to the canine region (group 2 = 16). All clinical complication related to the implants, prosthetic components, and oral structures were recorded at six months and one year after the treatment.

Results: After six months, a total of 51 complications were recorded. In group 1 were recorded the following complications: decubitus lesions (50%), loss of matrices, screw loosening, and prosthesis fracture (12.50%), need for occlusal rebalancing, and periimplant hyperplasia(25%). In group 2 were recorded the following complications: decubitus lesions (62.50%), decrease of matrices retention and the need for occlusal rebalancing (37.50%). After one year, a number of 75 complications were recorded, of which 44 belonged to patients from group 2. Patients from group 1 recorded 43.75% occlusal complications and 37.50% decrease of matrices retention. Patients from group 2 registered as the most frequent complication

the loose of matrices (62.50%), followed by the need to rebalance the occlusal (56.25%) and denture relining (43.75%). After the two-implant mandibular overdenture treatment, the number of complications increased after six months, and the highest number of complications belonged to group 2. The complication manifested mostly as mucosal lesions followed by loosening of matrices retention and the need for occlusal rebalancing.

Conclusion: The two-implant overdenture with ball attachments treatment can be associated with complications related to prosthetic components, implants, and oral structures. The number of complications was higher in prosthetic components and oral structures for the case of implants position distal to the canine region and showed a tendency to increase over time.

Poster 30

Therapeutic Attitudes for Maxillary Full Edentulous Cases

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Purpose: The morpho-functional rehabilitation of the full edentulous maxilla is a complex therapeutic act for any practioner.Mobile or fixed solutions,review of local and general aspects in order to develop an appropriate prosthetic protocol.

Methods & Materials: By several selected clinical cases of full maxillary edentulous patients solved with fixed or removable prosthesis,we reviewed the objectives and subjectives factors that concurre to the best functional therapy solution-mobile or fixed.Facial analysis,vertical dimension and prosthetic solutions are showed.

Results: The functional criterions specific to edentulous pathology must be critically evaluated.The esthetic problems of these cases and the expectations of the geriatric patients must be well analysed .The prosthetic treatment plan must be driven by specific aspects of the edentulous maxilla with a prosthetic evaluation protocol

Conclusion: The increasing number of edentulous patients,their age and expectations from this complex treatment are important elements to be analysed.The complexity of this treatment,the choice between fixed or removable prosthesis needs a strict facial and prosthetic evaluation in order to respond both to functionnal and esthetic criterions.

Poster 31

Marginal Adaptation of 4 Inlay Casting Waxes on Stone, Titanium and Zirconia Dies

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Purpose: The purpose of this study was to evaluate the marginal accuracy of four inlay casting waxes on stone dies, and titanium and zirconium abutments, as well as to correlate the findings with the degree of wetting between the die specimens and the inlay casting waxes.

Methods & Materials: The inlay casting waxes tested in this study were Starwax (Dentaurum), Unterziehwachs (Bredent), SU Esthetic wax (Schuler), and Sculpturing wax (Renfert). The marginal opening of the waxes was measured with a stereomicroscope on high strength stone dies, as well as on titanium and zirconium abutments. Photographic images were obtained and the mean marginal opening for each specimen was calculated after measuring the gaps with a specialized imaging and measurement software, on 3 predetermined points on each of the 4 surfaces of each die. A total of 1440 measurements was performed. Wetting between die materials and waxes was performed after fabricating stone, titanium and zirconium rectangular specimens. A calibrated pipette was used to place a drop of molten wax onto each specimen. The contact angle was calculated with appropriate software after an image of each specimen was taken using a digital camera. Collected data were subjected to a 2-way analysis of variance (ANOVA) (a=.05). Any association between marginal accuracy and wetting of different materials was found by using the Pearson correlation.

Results: The "wax" factor had a statistically significant effect both on the marginal discrepancy (F=158.31, P<0.001) and contact angle values (F=68.09, P<0.001). A statistically significant effect of the "die material" factor both on the marginal adaptation (F=503.47, P <0.001) and contact angle values (F=585.02, P <0.001) was also detected. The interaction of the "wax" and "die material" factors also had a statistically significant effect both on the marginal adaptation (F=24.22, P <0.001) and contact angle values (F=8.25, P <0.001). A significant correlation between the marginal accuracy and the contact angle values (Pearson=0.881, P=0.01) exists.

Conclusion: Not all wax-die material combinations provide copings with a satisfactory marginal accuracy. Stone dies provided wax copings with the best marginal integrity, followed by titanium and zirconia abutments. Unterziehwachs (Bredent), could probably be the wax of choice for fabrication of wax copings on different die materials. There is a significant correlation between the marginal accuracy and the contact angle values. As the contact angle value becomes smaller the marginal accuracy becomes better. All combinations among the waxes included in this study and stone and titanium dies present a high wettability. The wettability between zirconium and inlay casting waxes is low.

Poster 32

Stress Analysis in Mandibular Bone with Implants by FEA Adopting Inhomogeneity of the Bone

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Purpose: It is well known that mechanical stress of the bone around the dental implant causes biological response resulting in mineralized bone formation or bone resorption adjacent to the implant. Therefore, many studies have done to evaluate the mechanical stress in the peri-implant bone using the finite element analysis (FEA). Reliability of the FEA results depends on accuracy of the model including structures. Most of the previous FEA models employed the binary bone structure consisting of cortical and cancellous bone with discrete material properties, although cortical and cancellous bone have inhomogeous material properties in their structure. This study aimed to elucidate the difference of mechanical stress analyzed with two FEA employing homogeneous and inhomogeneous bone models, constructed with the X-ray computer tomographic (CT) images from a subject.

Methods & Materials: A 62-year-old edentulous female, who had four implants between bilateral canine region of the mandible and has worn an implant supported overdenture participated as a subject. A series of CT images was used for constructing the two FEA models: one with a binary bone structure (homogenous model) and the other reproducing the inhomogeneity of material properties of the bone and their spatial variability, based on multi-value processing of CT images (inhomogeneous model). Input data of the loads exerted on implants during function for both FEAs were obtained from the subject in vivo with 3-D piezoelectric transducers (Kistler). Stress analysis was conducted with dedicated FEA program. The von Mises stress and the principal stresses were used to observe stress distribution.

Results: The stress distribution was different between the homogenous and inhomogeneous models, although the higher principal and von Mises stress were observed in the peri-implant bone in both models. In homogeneous model, higher principal and von Mises stress concentrated at interface of cortical and cancellous bone. In inhomogeneous model, the stresses were distributed with spatial difference in both cortical and cancellous bone area according to their spatial variability.

Conclusion: The resulted stress distribution of the peri-implant bone by FEA was affected significantly by the bone modeling. Inhomogeneity and spatial variability of bone should be considered.

Poster 33

A Pre-Clinical Study on Novel Oxidic Composites for Dental Implants

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Purpose: Composite materials made of alumina and zirconia have been widely studied and successfully proposed for orthopedic application, due to their volumetric stability, the increased material toughness and a bioactivity allowing the osseointegration, when proper surface treatments are performed. Also, oxidic composites are very suitable to aesthetic oral rehabilitations. This study aimed to compare the Bone to Implant Contact (BIC) of clinical use titanium dental implants (Nobel Active) to that of implants made of Alumina Toughened Zirconia (ATZ).

Methods & Materials: ATZ dental implants were made by CAD/CAM techniques and treated with a patented hydro-thermal cycle to activate their surface for the osseointegration process. ATZ and titanium (Nobel Active) dental implants were placed in the tibiae of 16 mini-pigs. Animals were euthanized at 28 and 56 days and the peri-implant bone was harvested for histomorphometric analysis. The vascularization and the histological structure of the peri-implant bone were assessed by traditional histologic stainings (E&E). Specimens were examined and images acquired with an Olympus BX51 equipped with a DotSlide 2.1 software. Two indipendent pathologists determined the BIC, by working in single blind, following an established protocol.

Results: The BIC values differed in a statistically significant way between the ATZ and the titanium samples at day 56 (ATZ= 53.3% ± 6.5, Ti=35.3% ± 1.9). At 28 days no significant difference could be found (ATZ= 35.4% ± 3.5, Ti=32.1% ± 6.4).

Conclusion: ATZ based composite materials may be a promising candidate for dental implant fabrication. However, further mechanical studies are urged to assess their suitability for clinical purposes.

Poster 34

Effect of Nanostructure Modified Titanium Surface of Rat Vascular Endothelial Cells

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Purpose: In a prior study, we used sodium hydroxide to generate titanium nanosheet (TNS) surfaces at room temperature and atmospheric pressure. The aim of this study was to evaluate the ability of this surface to influence early angiogenesis.

Methods & Materials: Titanium discs were immersed in 10 M NaOH to obtain TNS surfaces. Titanium discs with and without TNS surfaces were used for the test and control groups. Sprague-Dawley rat vascular endothelial cells were seeded into microplate wells and cultured in media designed to induce early angiogenesis. We used fluorescence microscopy to observe cells morphology and evaluated cell adhesion with the CellTiter-BlueTM Cell Viability Assay Kit. After 2 and 5 days, we analyzed ICAM-1 expression by real-time PCR.

Results: Cell adhesion to the TNS surfaces was greater and increased more quickly in comparison to the non-TNS surfaces. Adherence in the first 15, 30, 45 min, 1 hour and 2 hours significantly higher in the TNS group; however, there was no difference in cell adhesion at 3 h. ICAM-1 expression was significantly greater in the TNS group than in the controls ($p < 0.05$).

Conclusion: The TNS surface improved the adhesion of vascular endothelial cells and lead to an increase in adhesion factor expression.

Poster 35

Stimulation of Healing Within a Rabbit Calvarial Defect by a PCL/PLGA Scaffold Blended with TCP Using Solid Freeform Fabrication Technology

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Purpose: The purpose of this study was to investigate the ability of healing within a rabbit calvarial defect by polycaprolactone (PCL)/poly lactic-co-glycolic acid (PLGA) scaffold blended with tri-calcium phosphate (TCP). The new bone formation on the PCL/PLGA/TCP scaffold was analyzed by means of micro computed tomography (μCT) and histometric analysis.

Methods & Materials: The scaffolds were fabricated using the multi-head deposition system (MHDS) which is one type of solid free-form fabrication (SFF) technologies. The circular scaffold whose diameter was 8 mm and height 2mm were fabricated to insert the 8mm size of rabbit calvaria defect. Eighteen NewZealand white rabbit (3.3-3.5kg) were used. Bone defects (8mm diameter) in calvaria were randomly implanted with PCL/PLGF or PCL/PLGA/TCP scaffold or left empty. Animals were allowed to recover for 4 and 8 weeks of post surgery. The new bone formation on the scaffold was analyzed by means of μCT and histometric analysis. To detect interactions between the healing interval and treatment condition, ANOVA and post hoc t-tests were used to analyze the differences between treatment groups at each healing interval.

Results: The PCL/PLGA and PCL/PLGA/TCP groups had significantly greater new bone area than the control groups at 4, 8 weeks ($p<0.01$). The PCL/PLGA/TCP group had significantly greater new bone area than the PCL/PLGA group at 4 weeks ($p<0.01$). The tissue area in the PCL/PLGA and PCL/PLGA/TCP groups were also significantly greater than in the control group at 4 and 8 weeks ($p<0.01$).

Conclusion: The results of this study suggest that the PCL/PLGA/TCP scaffold fabricated using MHDS is useful to recovery and enhance new bone formation on bony defect in rabbit.

Poster 36

Surface Modification of Low Elastic Titanium by Electron Cyclotron Resonance Plasma Oxidation

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Purpose: Commercially pure titanium and Ti alloys are used as biomaterials for dental and orthopedic implants because of their excellent biocompatibilities and mechanical properties. However, difference in Young's moduli of the implant metal and human cortical bone is believed to cause bone atrophy. Although we previously reported the mechanical properties of Ti-Nb-Sn alloy which has Young's modulus and intensity approximated to human cortical bone, surface modification techniques to improve osseointegration of the alloy have not been investigated. The purpose of this study was to investigate the characteristics and the biocalcification ability of the oxidation films created by electron cyclotron resonance (ECR) plasma oxidation apparatus on the Ti-Nb-Sn alloy.

Methods & Materials: Disk samples of Ti-Nb-Sn alloy (8mm diameter and 1mm thickness) were oxidized by an ECR plasma apparatus. The substrate temperature changed in the range from room temperature to 300, 400, 500, and 600?, and the oxidation time altered 30 and 60 minutes. Calcification experiment was conducted by immersing the oxidized samples in a phosphate-buffered solution, at around neutral pH and room temperature. Increasing rate of weight before and after the calcification was measured to evaluate the biocalcification ability. The roughness of oxidation films were measured using a three-dimensional non-contact form-measuring instrument. The structure and morphology of the precipitations and the crystals were characterized by X-ray diffraction analysis (XRD) and scanning electron microscopy (SEM), respectively.

Results: SEM images showed that the oxidized surface of Ti-Nb-Sn alloy didn't change at 300?, however a crater-like

surface structure about 3µm in diameter became discernible on the substrate surface at 600?. The roughness and the thickness of oxidation films increased with increase of substrate temperature and XRD peaks of rutile phase were intensified with increasing the temperature. On the other hand, calcium phosphate compounds precipitated on the all specimen and the crystalline phase of the precipitations were identified as dicalcium phosphate dehydrate (DCPD) and octacalcium phosphate (OCP) by XRD. The amount of the precipitations increased with the temperature.

Conclusion: These results suggested that altered surface of Ti-Nb-Sn alloy by ECR plasma oxidation can improve the biocalcification ability.

Poster 37

Enhanced Osteoblast Function on Hydrofluoric-Acid Treated Ce-TZP/Al2o3 Nanocomposite

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Purpose: Ce-TZP/Al2O3 nanocomposite (P-nanoZR), which is composed of nano-sized grains and particles dispersed in each crystal and has therefore higher strength and fracture toughness than conventional Y-TZP, has been widely used for crowns and bridges. Since P-nanoZR has low susceptibility to hydrothermal degradation, this material has potential to be applied to dental implant fixtures. This study aimed to investigate effects of hydrofluoric treatment of P-nanoZR on nanostructure surface modification and initial response of osteoblast cultured on the modified P-nanoZR surface.

Methods & Materials: P-nanoZR disks (20mm in diameter, 1mm thickness) with two different surface modifications (4% hydrofluoric acid: HF etching, and 55% HF etching) were prepared. Surface morphology of the substrates, before and after HF etching, was examined by scanning electron microscopy (SEM) and atomic force microscopy (AFM). MC3T3E-1 cells were cultured on these disks and on acid-etched titanium as a control. The culture on each disk was examined by the WST-1 test for cell attachment and the ALP activity test for cell differentiation. Cell spread and cytoskeletal development were evaluated by confocal microscopic image-based cytomorphometry with actin filament staining.

Results: SEM showed unique nanoscale rounded structures created by HF treatment of P-nanoZR. Rounded structures were rougher in size and uniformity on the 55%HF treatment than on the 4%HF. AFM quantitative measurements indicated that there were significant differences with or without HF etching in the average roughness, peak-to-valley roughness or peak-to-peak distance. Cell attachment and differentiation were consistently enhanced by 30%–35% on the 55%HF-etched disks compared with on the acid-etched titanium disks. Fluorescent imaging with actin filament and vinculin staining revealed that focal adhesion, cell processes and cytoskeletons developed more extensively on the HF-etched P-nanoZR surface, with increased nanostructure formation in these disks, than on the acid-etched titanium surface.

Conclusion: A newly created nanostructure surface on alumina/zirconium composites enhances initial attachment, cytoskeletal organization and initial differentiation in osteoblast. We expect that this HF treated “top-down” approach of P-nanoZR will be tested for extensive application in the fields of dental implants.

Poster 38

Prevelance of Sinus Lifting (External or Internal) Procedures in the Posterior Maxilla: An Epidemiologic Study

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Purpose: The aim of the study was to estimate the prevalence of sinus lifting (external or internal) for the rehabilitation of posterior maxilla.

Methods & Materials: This retrospective chart review examined consecutive patients with tooth/teeth loss in the posterior maxilla between 2008 and 2012 via sinus lift (internal or external), when needed, and implant insertion. The retrospective evaluation was conducted in the assistant professor clinic by examining the digital record system of the faculty in combined with the manual labarotary record system of the department. Age, gender, implant sites, implant numbers and augmentation types (if needed) were recorded.

Results: The study population consisted of 222 patients treated in the posterior maxilla via insertion of 445 dental implants. The mean age of the patients at time of the follow-up examination was 54.4 years in the overall group. 47 patients were scheduled to have a unilateral procedure, 20 patients a bilateral procedure and 10 patients with internal lifting. 265 implants were positioned in native areas beneath the sinus floor, 163 implants in external sinus-lifted areas and 11 implants in internal lifted areas. 82 implants were placed in the region of tooth 15, 118 implants in the region of tooth 16, 27 implants in the region of tooth 17, 82 implants in the region of tooth 25, 100 implants in the region of tooth 26, 36 implants in the region of tooth 27. All surgical procedures were uneventful. The implant cumulative survival rate was 100% in native areas, 98.8% in external sinus lifted (2 implant failure/163 implant), and 100% internal lifted area.

Conclusion: The sinus lift with lateral wall approach and crestal approach were reliable methods for implant insertion in the posterior maxilla. Survival rates of the internal sinus lifting were slightly higher than external sinus lifting group. However the number of internal sinus lifting was less than external sinus lifting.

Poster 39

Early Loaded Implants in Various Augmentation Techniques: 5 – 10 Years Follow Up

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Purpose: The reconstruction of dentoalveolar defects has been a challenge for surgeons. Extensive loss of bone and teeth presents a complex problem for reconstruction. The aim of this study was to evaluate the treatment outcome of early loaded implants in various augmentation techniques.

Methods & Materials: A total of 170 implants in 74 patients were installed and the success rates of implants placed in the reconstructed or distracted areas were evaluated. The implants were divided in 4 groups: (1) 44 implants placed in 25 patients after major vertical or horizontal bone augmentation (or both); (2) 28 patients were treated using the "sinus lift" technique and 84 implants (3)distraction osteogenesis was performed in 9 patients and 22 implants were installed (4) 20 implants placed in extraction sockets with the application of membranes and grafts at 12 patients. After osseointegration, patients were treated with implant supported fixed partial dentures. The patients were recalled from six months to 10 years period.

Results: The implants were in function and clinically stable when tested individually; the periimplant soft tissues were clinically healthy. Periimplant marginal bone loss was in clinically acceptable levels and the patients were satisfied with the prosthetic outcome. The clinical results reported here has shown several procedures may be necessary for the rehabilitation of the patients with extensive bone loss. Autogenous bone grafts used in one stage sinus augmentation yields sufficient quality and volume of bone for predictable simultaneous implant placement. Also augmentation of the alveolar bone with an onlay bone graft and distraction often provides the desired gain of bone, allows for the ideal placement of dental implants, and improves any discrepancy between the upper and lower arches.

Conclusion: As a result early loaded implants in variously augmented bone reveals satisfactory results.

Poster 40

Ten Year Treatment Outcomes with Three Brands of Implants in Implant Supported Mandibular Overdentures

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Purpose: The purpose of this study was to evaluate the clinical outcome, post-treatment care and patient satisfaction with overdenture treatment in severely resorbed mandible.

Methods & Materials: According to anatomical conditions two implants were inserted to intraforaminal region of 36 edentulous patients. A total of 72 implants: 24 ITI (ITI group), 24 Swiss Plus (SwissPlus group), 24 Astra (Astra group),were placed. Implants were not loaded until osseointegration was complete. Following osseointegration and insertion of the prosthesis the implants were evaluated by clinical and radiographic parameters. Clinical parameters like plaque index (PI), sulcus bleeding index (BI), peri-implant probing depth (PD), and marginal bone loss (MBL) were recorded along with any biological and mechanical complications at baseline and recall evaluations. The patients' own appreciation on oral functions, mastication, phonetic, oral hygiene, chewing comfort and esthetic were also evaluated by means of questionnaire.Repeated-measurement ANOVA, Kruskal-Wallis test, Wilcoxon signed rank test and paired samples test were used for istatistical analysis (p=.05).

Results: The cumulative implant survival rate after 10 years of loading was 100%. There were significant differences in mean PD values between 3 implant groups at baseline and recall evaluations in ($p<0.05$). Although mean MBL was in the clinically acceptable levels for all groups, there were significant differences among the three groups for MBL scores between baseline and 5 years ($P<0.05$). Mean MBL of ITI group was significantly lower then Astra and SwisPlus group ($p<0.05$). Relining procedures were conducted in all of the patients. The prosthesis were refabricated in 12 patients. In 120 months of evaluation period most common prosthetic complication was the dislodgement of the female attachment part and fracture of the acrylic portion above the attachment

Conclusion: Mandibular implant overdenture treatment is a successful treatment modality in severely resorbed mandible.

Poster 41

Prosthetic Restoration Types of Dental Implants: An Epidemiological Study in a Turkish Subpopulation

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Purpose: The aim of this study was to evalute the prevalance of different prosthetic restoration types (single unit fixed partial denture, multi unit bridge or overdenture) of dental implants in a Turkish subpopulation.

Methods & Materials: The retrospective evaluation was conducted in an epidemiological sample of patients attending to Department of Prosthodontics, Faculty of Dentistry, Yeditepe University, Istanbul, Turkey from January 2010 to December 2012 (3 years), by examining the digital record system of the faculty in combined with the labarotary record system of the department. Age, gender, edentulousim (full/partial), implant sites (maxilla/mandible, anterior/posterior), tooth numbers and prosthetic restoration types were recorded. Descriptive statistical methods and Chi-square test were used to analyze data. An alpha level of 0.05 was used for all statistical analyses.

Results: There were 368 patients (135 were males and 233 were females) who had 1143 implants. Patients ranged in age from 20 to 89 years, with mean age of 51.77 ± 14.36 years. Three hundred and twelve patients (84.8%) were partially edentulous and 56 patients (15.2%) were fully edentulous. The implants were placed to maxilla in 116 patients (31.5%), mandible in 179 patients (48.6%), and maxilla and mandible in 73 patients (19.8%). The implants were in anterior region in 58 patients (15.8%), posterior region in 245 patients (66.6%), and anterior and posterior region in 65 patients (17.7%). Two hundred and nine patients (56.8%) had single unit fixed partial dentures, 83 patients (22.6%) had multi unit bridges, 44

patients (12%) had both single unit fixed partial dentures and multi unit bridges, and 32 patients (8.7%) had overdentures. One hundred and twenty two (33.2%) patients had an implant on lower right first molar (highest percentage) and there were 11 patients (3%) who had an implant on lower left central incisor teeth (lowest percentage). There was no significant effect of gender factor on restoration types ($p>0.05$), however, 40% of patients who had overdentures were in age group of 70 and over ($p<0.05$).

Conclusion: The great majority of patients treated with dental implants had single unit fixed partial dentures. Only 8% of patients had overdentures. The most implant treated sites were mandible and posterior regions.

Poster 42

Rationale for the Use of Prostheses Combining Screw Retention and Cementation

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Purpose: Cemented and screw-retained implant prostheses offer distinct advantages and limitations. Prosthesis retrieval is challenging with cemented restorations. A method is described in order to fabricate multiple unit cement retained and screw retained telescopic restorations supported by implants and teeth. It is intended for cases in which prosthesis retrieval, optimal esthetics and passive fit are all very important for success. Management of a patient over 5 years is described that involves a situation requiring use of the retrieval design mentioned above.

Methods & Materials: The patient's periodontal condition required that most teeth had to be extracted. Nevertheless, there was always a risk of losing some or all of the remaining teeth if the oral hygiene status did not remain optimal. For that reason, implants were placed in "strategic" locations, allowing survival of the prosthesis in the event that one or all of the abutment teeth were lost over time. For the same reason the prosthesis had to be retrievable, allowing modifications or repairs. Retrievability was a main goal in the planned design for these prostheses because of the concern of creating abutments on periodontally involved teeth in combination with osseointegrated implants. Telescopic copings have been used previously for these situations with good results.

Prefabricated abutments were planned for all implants. For abutment teeth a combination of retention modalities was used. Primary copings were permanently cemented. Definitive prostheses were luted with temporary cement. For the mandibular prosthesis dual retention (cement as well as screw) was used. The teeth and most of the implants were used as telescopic abutments. One posterior implant was used as a screw retained abutment.

Results: The restorations were placed in 2005 and so this is an 8-year report. The mandibular restoration had to be removed once after 3 years for the left natural canine to be endodontically treated . It was replaced on the abutments without further modification, proving the main concept of this fabrication design, which was the potential for retrieval.

Conclusion: There were no problems associated with the prosthesis such as debonding, prosthesis or abutment screw loosening, speech or esthetic problems or history of pain.

Poster 43

A Three Years Follow-Up Clinical Study of Fixed Partial Dentures Supported by Mini Dental Implants: Assessment of Oral Health-Related Quality of Life, Chewing Function and Orofacial Aesthetics

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Purpose: Mini dental implants (MDIs) have opened new options in oral-implant rehabilitation for patients with narrow alveolar ridges. However, studies with fixed partial dentures (FPDs) supported by MDIs are rare. We aimed to evaluate patients treated with FPDs supported only by MDIs and/or by MDIs splinted with natural teeth (NT), regarding their oral

health related quality of life (OHRQoL), oral aesthetics and chewing function (CF) over a 3-year period.

Methods & Materials: A total of 28 patients were included and 73 MDIs were inserted, 49 in the anterior or/and premolar region of the mandible and 24 in the maxilla. In 12 patients FPDs were constructed on MDIs and in 16 patients on both, MDIs and prepared NT. The three questionnaires: the OHIP14, the orofacial esthetic scale (OES) and the Chewing function questionnaire (CFQ) have been administrated three times: prior the MDIs insertion, three months and three years after the treatment. Marginal bone loss was measured on digital images. Each implant site was also clinically evaluated at the three month and at the three year follow-up control appointment using the peri-implant plaque index (PI) and the gingival index (GI.

Results: A statistically significant increase of the OES, the CFQ and the OHIP14 summary scores were obtained after the FPD treatment for all questionnaires ($p<0.001$). There was no statistically significant differences for the OHIP14 summary scores between the three month and the three year follow-up ($p>0.05$). The OES summary scores slightly, but significantly decreased, while the CFQ summary scores slightly, but significantly increased at the three year follow-up appointment ($p<0.05$) revealing only slightly decreased aesthetics, but increased chewing ability compared to the 3-month appointment. There was no significant difference between patients with FPDs on MDIs and patients with FPDs on both, MDIs and NT ($P>0.05$). The PI and GI showed relatively satisfactory oral hygiene, although significantly higher values considering mucosa inflammation and placque accumulation after a period of three years compared to a 3-month period ($p<0.005$).

Conclusion: The FPDs supported by MDIs showed satisfactory results considering marginal bone loss, increased OHRQoL, chewing function and oral aesthetics over a period of three years.

Poster 44

Improvement of the Quality of Life in Patients with Implant-Supported Fixed Partial Dentures

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Purpose: To date, clinical studies have mainly been focused on measuring the bone changes around implants. Recently, there has also been considerable interest in improvement of the oral health related quality of life (OHRQoL) after the implant therapy. The aim of this study was to evaluate OHRQoL after the implant therapy and prosthodontic rehabilitation with fixed partial dentures (FPDs).

Methods & Materials: Fifty patients (mean age=45.56) filled in OHIP49-CRO questionnaire before receiving implants (122 implants) and 1-year after FPDs. Another group of 47 healthy subjects (CHS) (age mean=22.31) was randomly collected as a control group.

Results: None of the implant was lost during. No soft-tissue or prosthetic appliance failures were recorded. There were no significant differences for the OHIP scores between males and females and different age groups (<40, 40-59, >59). Furthermore, there was no significant difference of the scores dependent on the presence of the natural teeth or FPD in the antagonistic jaw ($P>0.05$). The CHS had the lowest scores, as expected. The IFD follow-up scores were significantly lower in comparison to baseline scores, but still remained significantly higher than the CHS scores ($P<0.05$).

Conclusion: The implant-supported FPD therapy significantly increased the OHRQoL, but it didn't reach the CHS group. Sex and age had no influence on the OHRQoL.

Poster 45

Prosthetic Rehabilitation with Implants After Segmental Mandibuiectomy and Free Vascularized Fibula Flap Reconstruction

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Purpose: The mandible determines the size and shape of the lower third of the face, allows mastication, swallowing, speech and airway protection. Tumors in the lower jaw ought be excised with large resection of the mandible. Marginal/rim resection leaves the base of mandible, whereas segmental resection impairs the continuity of the mandible. The degree to which dysfunction and disfigurement occur depend both on the location of the mandibular segment and surrounding soft tissue removed. Reconstruction of the lower jaw is possible with alloplastic material, autologous tissues or a combination thereof. The success of the prosthetic rehabilitation depends on the location of the mandibular segment and the amount of soft tissue removed. The purpose of this presentation is to show a prosthetic rehabilitation with implants of a 33-year old man after segmental resection of the mandible and reconstruction with free vascularized fibula flap.

Methods & Materials: Mixofibroma odontogenes was excised 5 years ago and free fibula flap was used for reconstruction. Teeth of the upper jaw are not visible at rest. Interocclusal distance between the left first molars is 6 mm. The mucosa of the lower jaw is hypermobile. A partial denture made of only acrylic was done in the lower jaw for checking the OVD, visualizing the final esthetic outcome, radiographic examination and surgical template for positioning the implants. We used a two stage surgical protocol. The remaining teeth in the mandible were prepared and verticaly increased provisionals were temporarily cemented. While we were waiting for osseointegration, teeth in the maxilla were prepared for all-ceramic crowns and bridge in the anterior region and metal-ceramic crowns in the posterior region. After 3 months an acrylic plate for fixation the palatal mucosa around gingiva formers was constructed.

Results: Prosthetic rehabilitation in the lower jaw was done with cement-retained metal-ceramic bridge on implants and splinted metal-ceramic crowns on teeth.

Conclusion: The optimal treatment should be to prostheticaly rehabilitate the mandible at the time of having the correct provisional restorations on maxillary teeth. But because the patient was left without treatment for 5 years after surgery, he asked to be rehabilitated in less time possible.

Poster 46

The Insertion of Customized Zirconia Abutments During the Reentry in the Posterior Area: New Perspectives in Soft Tissue Management

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Purpose: Recently, in implant surgery the esthetic demands of patients concern not only the frontal region but even the posterior area. The purpose of the presented technique is to insert CAD/CAM customized zirconia abutments during the reentry surgery. The pre-programmed emergence profile and the biolgical and optical characteristics of the material allow for improved and stable esthetic results.

Methods & Materials: Between 2009 and 2012 13 patients were provided with 18 Dentsply Xive S® implants. Two implants were inserted in the premolar and 16 implants in the molar region. An intrasurgical transfer of implant position was performed by connecting the impression copings with the surgical stent. A new cast was fabricated in order to evaluate the three dimensional position of the implants. After the healing period customized full zirconia Dentsply Cercon® abutments were placed together with temporary crowns during the reentry surgery. Definitive full ceramic crowns were cemented after a period of 5 months to allow periimplant soft tissue for maturation. Casts and acrylic stents were fabricated in order to measure the vertical position of the soft tissue each 6 months. Radiographs were taken during the reentry and each 6 months.

Results: 2 weeks after the reentry surgery a favorable soft tissue contour was achieved: no inflammatory processes were detected. After the insertion of the definitive crowns a pleasant esthetic result was obtained. No change of the vertical position of the soft tissue was detected after 1 year in function. The radiological analysis showed a mean bone loss of 0.32 mm and a mean distance from the implant shoulder to the first bone-implant contact of 0.12 mm .

Conclusion: The technique of performing an intrasurgical transfer of the implant position to the master cast and to install a customized ceramic abutment during the reentry surgery gives the opportunity to guide the soft tissue healing without compromising the peri-implant physiology. The frequent insertion and removal of healing abutments, impression caps and temporary abutments causes "microtraumata" for the hard and soft tissue. A pre-programmed customized abutment with favorable mechanical and optical characteristics seems to be an alternative to the common restorative protocol.

Poster 47

Torque Resistance of Orthodontic Mini-Implants of Different Diameter and Shape

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Purpose: Compare the fracture torque of orthodontic mini-implants according to their diameter and shape.

Methods & Materials: 32 mini implants were torque tested till fracture, 9 cylindrical orthodontic mini implants 1.5x9mm; 9 of 2x9mm; 4 tapered orthodontic mini implants of 1.5x8mm, and 10 of 2x8mm were used. A steel fixation bracket with a bedding for each implant was manufactured. Acrylic was prepared for filling the space between the orthodontic implants and the bedding walls. After the polymer-based coating application, each fixing bracket with the orthodontic implants was placed in the torque meter, connected to the equipment and submitted to torsional forces until fracture. Data was analyzed with ANOVA and Tukey test.

Results: Orthodontic mini implants of 2mm diameter (cylindrical and tapered), fractured at a significantly higher torque than mini implants of 1.5mm. The tapered orthodontic mini implants fractured at a higher torque than cylindrical.

Conclusion: Orthodontic mini-implants of a larger diameter, have a high tensile strength compare to a smaller diameter. Tapered orthodontic mini implants are more resistant to fracture than cylindrical. The feature of of fracture was located in the cervical area and first threads of the orthodontic mini implants.

TORQUE RESISTANCE OF ORTHODONTIC MINI-IMPLANTS OF DIFFERENT DIAMETER AND SHAPE
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Summary of minimum, maximum, average and SD torsion resistance of each group

	N	Minimum Resistance (Ncm)	Maximum Resistance (Ncm)	Average resistance to torsion (Ncm)	SD
Group 1 Cylindrical orthodontic mini-implants of 1.5mm diameter	9	21.59	36.65	27.38	4.61
Group 2 Cylindrical orthodontic mini-implants of 2mm diameter	9	57.92	66.12	61.66	2.83
Group 3 Conical orthodontic mini-implants of 1.5mm diameter	10	18.51	44.96	36.09	8.56
Group 4 Conical orthodontic mini-implants of 2mm diameter	4	76.53	120.16	99.37	18.46

Poster 48

Mandibular Overdenture – Are 2 Mini Dental Implants Enough? Preliminary Results

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Purpose: This study aimed to assess 2 mini dental implant (MDI) overdenture as treatment alternative for the mandibular complete edentulism.

Methods & Materials: An observational clinical study on mandibular completely edentulous patients treated conventionally, with complete dentures, but dissatisfied with this treatment alternative, was implemented in the Department of Prosthodontics (Faculty of Dental Medicine, Bucharest). There were inserted 2-4 MDI to each patient. The MDI were supplied by Medical Bredent (Germany). The mini Sky MDI have a 2.8mm diameter, are available in 3 lengths (10mm, 12mm and 14mm) and have collared ball as retention system. The follow-up period was 18 months.

Results: Study sample included 23 completely edentulous patients, aged between 41 and 86 years, from which 5 were men. 19 patients received 2 MDI and 4 patients 3-4 MDI, a total of 53 MDI being applied. One MDI was lost in the 1st month after implant placement, most probably due to incorrect overdenture relation (which exercised excessive pressure on the implant). We mention that this patient didn't attend the follow-up medical appointments, leading to the impossibility to evaluate and correct the deficiencies. This MDI was removed and replaced by another one in the same appointment, after that being noticed a positive evolution. The rest of the patients presented a positive evolution regarding the MDI, the overdenture and patient's perception and satisfaction. In 3 of the 19 patients with 2 MDI overdenture were encountered some complications – namely moderate alveolar bone resorption and occasional pain under the denture. These may be related to a sensitive thin mucosa corresponding to the support area and presence of fixed prosthetic restorations in the maxilla.

Conclusion: Our preliminary results indicate that MDI overdenture seems like an appropriate treatment alternative for the mandibular complete edentulism, requiring less invasive surgical interventions and being accompanied by a high degree of patient satisfaction. Using only 2 MDI for increasing overdenture retention may be accompanied by moderate alveolar bone resorption, especially when fixed prosthetic restorations are encountered in the maxilla.

Poster 49

Finite Element Analysis in Dental Implantology- A Literature Review

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Purpose: The aim of this study was to review the literature on various applications of finite element analysis (FEA) in dental implantology.

Methods & Materials: Database searches were conducted using the search terms 'Finite element analysis, implant dentistry, finite element model, dental implantology, biomechanics of implants' using PubMed. Resultant titles were screened, and full text was obtained where relevant. The authors selected the most appropriate articles, giving preference to systematic reviews.

Results: Thirty one articles were selected and critiqued by the authors.

Conclusion: Finite Element Analysis (FEA) is a computerized investigative method that is capable of determining the mechanical stress arising in various objects and their environment as a result of forces affecting the system by using a mathematical model. It is widely used to evaluate the biomechanical behavior of Osseointegrated implants. Stress distribution in the implant– prosthesis connection can be examined by FEA studies and the necessary design changes to avoid prosthetic failures can be made by improving the stress distribution of implant components. The researcher should have adequate knowledge in model fabrication (experimental delineation) and analysis of result. The model should be

precisely fabricated using advanced digital technology so that detailed assumptions can be made about the model geometry, material properties, boundary conditions and implant- bone interface. The composite, anisotropic, nonhomogeneous structure of bone needs to be taken into consideration. Various design feature optimizations can be predicted with FEA which can be applied to evolve new implants systems in the future.

Poster 50

Strain Caused by Prosthesis Fabrication Steps on Abutments and Simulated Bone Around Dental Implants

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Purpose: The many steps of prosthesis fabrication are known to generate distortions of the framework that tend to build up. When the prosthesis is connected to the implants by means of screwing the resultant strains are transmitted to the abutments, implants and underlying bone tissue. Measuring these strains is important to verify their magnitude and possible damages they can inflict to the bone. Therefore, the aim of this study was to verify the strains occurring on abutments and bone during prosthesis screw retention, analyzing seven fabrication steps of a 3-unit implant-supported fixed partial denture.

Methods & Materials: An experimental polyurethane model was used to simulate bone where 2 external hexagon implants were placed parallel to each other, provided with 5 mm height multi-unit abutments. Three strain gauges were bonded to the sides of each abutment and 4 strain gauges were positioned on the simulated bone at the mesial, distal, buccal and lingual aspects of the implants. The tests were performed screwing the specimens onto the abutments at 10Ncm torque.

Results: The readings were made (at the simulated bone and abutments respectively) in seven moments, according to prosthesis fabrication: 1) control group: isolated cobalt chromium prefabricated machined cylinders before any laboratorial modification (36,4 με and 87,5 με), 2) one-piece cast frameworks fabricated in nickel-cobalt-chromium alloy (340,3με and 131,4με), 3) sectioned frameworks before soldering (43,2με and 66,6με), 4) sectioned frameworks reassembled with autopolimerizing acrylic resin before soldering (74με and 86,8με), 5) frameworks after soldering (280με and 146,2με), 6) ceramic veneered frameworks before glazing (288,7με and 151,1με), and 7) ceramic veneered frameworks after glazing (359,9με and 197,8με).

Conclusion: The results showed that strain increases when a one-piece cast framework is compared to the original isolated cylinders. Strain decreases when the framework is sectioned for soldering and increases again as the next steps of prosthesis fabrication supervene. The soldering procedure decreased strain levels in simulated bone tissue around the implants compared to the one-piece cast specimens. By analyzing the results, it was also possible to verify that strain was caused by a center driven type of distortion acting on the prosthesis as laboratory steps evolved.

Poster 51

Evaluation of Oral Sensitivity in Patients Wearing Maxillary Complete Denture and Mandibular Overdenture Before and After the Anchorage to a Single Implant

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Purpose: Edentulism and rehabilitation with complete denture imply a reduction of oral sensitivity because of the loss of periodontal ligament receptors, the reduction of mucosal trophism, (thus leading to a further receptor decrease) and the instability of the removable denture. Several studies demonstrate how a mandibular 2-implants retained-overdenture (MIR-OVD) increases the stability of the denture and determines a partial re-innervation of the mucosa, thus improving oral sensitivity. OVD anchored to a single implant could improve oral functionality, reducing economical costs. The aim of this study was to evaluate if there is an improvement in oral tactile perception after the anchorage of the mandibular denture to a single implant inserted into the mandibular midline.

Methods & Materials: The study included 15 edentulous patients, wearing conventional complete dentures. The prostheses were made at the Department of Oral and maxillofacial Rehabilitation and Dental Implants of Turin, within the two years before the beginning of this study. Sensitivity was evaluated testing the ability of discrimination of little interocclusal thicknesses, by means of calibrated stripes 8 microns thick , interposed between opposing premolars. The stripes are repeatedly folded so as to reach the thickness perceived by the patient. Evaluations were made at baseline with complete denture in compensatory incorporation (t0), the same day of the implant anchorage, that is three months after surgery (t1), one month (t2) and three months after the anchorage (t3).

Results: The mean thicknesses (?m) perceived by patients were 80,27 (±58,74) at t0, 59,20 (±33,88) at t1 ,48,80 (±26,76) at t2, and 43,20 (±19,90) at t3. Statistical analysis was made by means of SAS software, using one-tailed T test for paired samples and excluding outliers. It shows a significant difference between thicknesses perceived at t0 and t2 (p-value= 0,04) and between t0 and t3 (p-value =0,02).

Conclusion: The results of this study suggest that there is an improvement in oral sensitivity since 1 month after the anchorage of the mandibular complete denture to the implant.

Poster 52

Strain Analysis of Mini-Implant Retained Mandibular Overdenture

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Purpose: This study is designed to investigate the strains of mini dental implants in mandibular overdenture. The prognosis of four mini dental implant retained overdenture in totally edentulous mandible in possible clinical situations including failures of mini dental implants is to be discussed.

Methods & Materials: Materials and methods: Mandibular complete denture was fabricated and converted to mini dental implant retained overdenture with O-ring attachments after placing four mini dental implants (3M ESPE, St. Paul, MN, USA) on the cast. Four strain gauges (KFG-1-120-C1-11L1M2R, Kyowa, Japan) were then attached to buccal surfaces of mini dental implants. Strain gauges were connected to strain amplifier (PCD-300, Kyowa Electronic Instrument, Kyowa, Japan) and strains were measured with electric resistance strain gauges when the load from 0-100N (EZ-Test, Shimadzu, Kyoto, Japan) was applied to posterior part of overdenture. Combinations of possible clinical failures of mini dental implants were presented under same loading protocol.

Results: Strain gauge analysis and elastic stress analysis concurred and showed similar results. When all four mini dental implants were present in overdenture, more load distribution was observed on posterior implants than anterior implants. With loss of anterior implant, there was no significant change in strains of other implants. With loss of posterior implant, however, there was significant increase in strains of other implants.

Conclusion: Posterior mini dental implants were being loaded significantly more than anterior mini dental implants. An additional placement of mini dental implant is required when posterior implant failed in mini dental implant retained overdenture in clinical situations.

Poster 53

Development of Peri-Implant Bone Loss Measuring Protocols by Feature Point Pair Technique

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Purpose: The development of implants in 1965 confirmed that can unify stably in the alveolar bone. Dental implants can restore patient's normal linking function and esthetic. The patient's edentulous ridge reconstructed by the application of implants can improve patient's life quality. Good osseointegration between an implant and bone is the successful first step!! The interface of osseointegration is already the quite mature technology. However, the clinical behavior will present the each different form destruction along with the time. For all that researchers in view of dangerous factor and the tracing result all do not have around the quantification of data to be possible to provide clinicians.

Methods & Materials: The methods to evaluate the height of alveolar bone change included the distances measured in periapical films, panoramic films or CBCT. Each research way has the limit which it carries out and the errors create between the findings and the clinical actual state. However, using gauges in periapical films is the common and benefit of low dose irradiation at present. A periapical film in our study was optimization by feature point pair technique and Image J, a bio-image processing and analysis software.

Results: We correct the amount of deformity, brightness and the contrast gradient carry on the manual synchronizing and gauges the distance again for the difference of angle and the equal quality.

Conclusion: Our aim in this study is to build up customized, standardized and simple protocols for long term tracing the alveolar bone change.

Poster 54

Six Years After Fixed Implant Prosthesis on Patients with Epidermolysis Bullosa - A Clinical Case Report

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Purpose: Objective Epidermolysis Bullosa (EB) is an inherited connective tissue disease causing blisters in the skin and mucosal membranes. So, EB patients result in extremely fragile skin—even only minor mechanical friction such as brushing, oral suction can lead to trauma. The aim of this case report was to help oral functional restoration of patients diagnosed with Epidermolysis Bullosa(EB) and to report progress after six years.

Methods & Materials: Patient & Method EB patient (43,F, first exam) has not only general problem but mastication problem. Dental Examination presented an edentulous Maxilla and seven teeth remained Mandible. Maxillary alveolar bone's resorption was severe and made Mandibular prognathism. And she has microstomia, ankyloglossia and perioral stricture. These factors made it difficult to plan a conventional removable denture. So, we made a another treat plan-Implant restoration-and processed it 7 implants placed maxilla by Le Fort I osteotomy under G/A and 5 implants placed mandible under L/A. Maxilla restorated by fixed implants supported prosthesis. Mandible restorated by two types of restoration abutment.

Results: Result Patient's oral function was improved-mastication, pronunciation, aesthetic- and satisfied treatment. But poor oral hygiene made some problem, so we needed regular T.B.I & O.H.I.

Conclusion: Conclusion Epidermolysis Bullosa patients makes a difficult to conventional prosthodontic treatment; especially denture. So we more study about EB patient's oral restoration in many aspects, and Implant fixture is one of excellent plan.

Poster 55

Effect of Using a Gold Washer Between Screw and Abutment on External Hex Implant-Abutment Resistance to Oblique Compressive Forces

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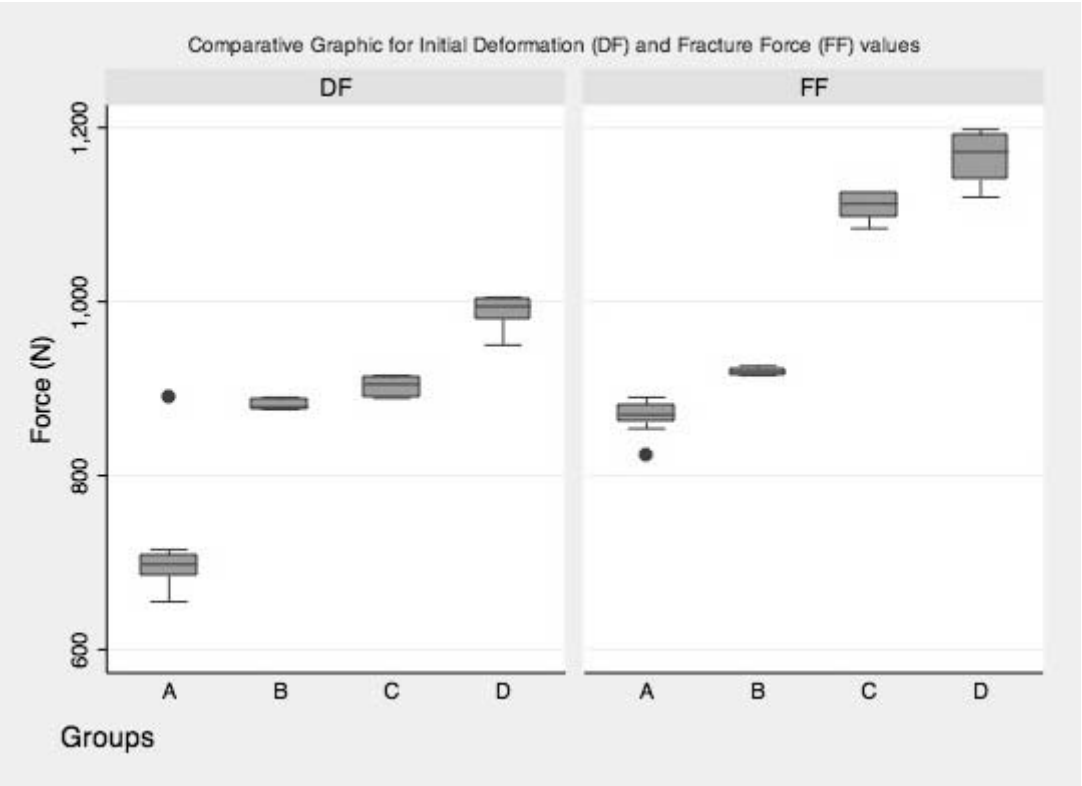
Purpose: Compare the effects produced by using a gold washer between screw and abutment on resistance to oblique compressive forces.

Methods & Materials: 32 Implant-abutment assemblies composed by regular external hexagonal implants, and machined titanium abutment, were divided in 4 groups of 8 samples each: Implant-abutment system fixed by Titanium-retaining screw (Group A), Implant-abutment system fixed by Ti screw with a gold washer (Group B), Implant-abutment system fixed by gold coated Titanium screw (Group C), Implant-abutment system fixed by gold coated Ti screw and a gold washer (Group D). Each implant was placed in a brass block, and the abutments were tightened twice with a torque of 32 Ncm for the groups A and B, and 20 Ncm for C and D. Samples were placed in a steel mounting bracket with an inclination of 30 degrees, and static loaded, with an universal testing machine, until failure. Mean values of Initial Deformation force (DF), and Fracture force (FF), were analysed with ANOVA and Tukey´s test.

Results: Mean DF values were (A) 698±19,198N (B) 882,75±5,898N (C) 902,428± 10,722N (D) 987,667± 20,791N. Samples with gold washer demonstrated significantly greater values than without washer ($p<0,05$). No significant differences were found between groups B and C showing similar behavior of implant-abutment interface with gold washer and Titanium screw, and the interface with gold coated Titanium screw. Mean FF values were (A) 867,5±21,044N (B) 919,675 ±4,373N (C) 1109,5 N±16,084N (D) 1165,5±34,152N. Group D showed de highest FF, and groups B and D with washer demonstrated greater FF values compared with groups A and C ($p<0,05$).

Conclusion: Gold washer increases the implant-abutment system mechanical strength, for values of initial yield strength and fracture with titanium and gold coated Titanium screws. Samples with gold coated Ti screw presents higher values of DF and FF than control group (A). Gold washer with Ti screw, generate similar behavior of the interface for DF than gold coated Ti screw. The combination washer and gold coated Ti screw, generate the highest values for DF and FF compared to the other groups. For all systems screw was the weakest link of the interface.



Poster 56

Accuracy of a 3D Finite Element Model of an Implant-Inserted Dried Human Mandible Created From Cone-Beam CT Data: Comparison with a Model Created from Micro-CT Data

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Purpose: The authors have previously used microfocused computed tomography (micro-CT) data to create a 3D finite element (FE) model of an implant-inserted human dried mandible and reported that its accurate simulation of the trabecular bone structure allowed a better prediction of the peri-implant bone stresses than the traditional models, which simplified the cancellous bone to a homogenous block. However, because of their limited size, micro-CT scans can not be used for scanning patients. Therefore, as a first step towards developing a model with clinical applicability, the present study aims to create a 3D FE model of an implant-inserted human dried mandible from cone-beam CT (CBCT) data and compare its accuracy with that of a micro-CT based 3D FE model.

Methods & Materials: A human dried mandible with a solid-screw implant and abutment inserted in the posterior region were successively scanned by a micro-CT scan (ELESCAN, Nittetsu Elex) and 2 CBCT scans (CB MercuRay, Hitachi Medico and AUGE SOLIO, Asahi Roentgen) providing resolutions of 0.083 mm, 0.2 mm, and 0.1 mm, respectively. Each data set obtained was used to create 3D FE models (named in scanning order "micro-CT", "CBCT-old", and "CBCT-new") by using a computer program for bone structure analysis (TRI/3D-BON, RATOC) and a 3D- FE analysis soft (TRI/3D-FEM, RATOC). The reproducibility of the bone structure was compared between the 3 models with "micro-CT" as reference.

Results: The bone structure reproducibility was highest in "micro-CT", followed in order by "CBCT-new" and "CBCT-old". In "CBCT-new", bone reproducibility was satisfactory, although the trabecular bone was slightly overestimated as compared with "micro-CT", but in "CBCT-old", the trabecular bone was partially not reproduced or was falsely identified as cortical bone in some regions.

Conclusion: Since the 3D FE model "CBCT-new" created from DICOM data obtained by a new CBCT scan was more accurate than "CBCT-old" based on data from an old scan, the new scan will be used in further basic and clinical studies of bone stress around implants and potential implant sites.

Poster 57

Biological Significance of Ti-Nb-Sn Alloy Implant with Low Young's Modulus

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Purpose: This study was to evaluate the biomechanical behavior, biocompatibility and bioactivity of implants fabricated from a novel ß-type titanium (Ti) alloy that demonstrates a low Young's modulus (around 40 GPa).

Methods & Materials: Disks (8.0 mm in diameter) and cylindrical implants (1.0 mm in diameter, 2.0 mm in hight) were prepared from commercially pure grade 2 Ti (cpTi) and from a novel ß-type titanium alloy consisting of titanium, niobium and tin (Ti-Nb-Sn). Mouse bone marrow stromal ST-2 cells were seeded onto the disks and incubated for 7, 14 and 21 days. Cell proliferation was quantified by WST-8 colorimetry, and alkaline phosphatase (ALP) activity was measured by a colorimetry-based assay using p-nitrophenylphosphate as a substrate. To assess the degree of osseointegration, ten-week-old male Sprague-Dawley rats were used. Two implants were placed in femur at 7 mm and 11 mm from the distal edge of the femur. The rats were sacrificed at weeks 2, 4 and 8 after implant placement, and the bones containing implants were harvested for evaluation on a universal testing machine.

Results: In vitro tests showed that the propagated cells grew equally well on Ti-Nb-Sn alloy and cpTi throughout the experimental periods. Furthermore, there was no significant difference in ALP activity in cells grown on these surfaces. In vivo tests, the push-in test demonstrated that the Ti-Nb-Sn alloy implants were more effectively osseointegrated than the cpTi implants at week 2 ($n = 5$; Mann-Whitney U test, $p < 0.05$), but not at weeks 4 and 8.

Conclusion: The results suggest that implants fabricated from Ti-Nb-Sn alloy has the sufficient biological potential and are capability of excellent osseointegration, especially in the early stages of healing.

Poster 58

The Effect of Low Intensity Pulsed Ultrasound Stimulation on Sinus Augmentation in Animal Model

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Purpose: Low Intensity Pulsed Ultrasound Stimulation (LIPUS) has been used in orthopedics as a supplementary therapy to promote healing of pathological and traumatic fractures. It is also used in dental implant surgery. Little research exists on the effects of ultrasound on sinus augmentation, and the mechanism involved is not clear. Our previous report suggested that LIPUS plays a role in promoting newly formed bone following sinus augmentation.The objective of the present study was to determine the optimal frequency for enhancing bone regeneration in sinus augmentation by measuring cell proliferation using bromodeoxyuridine (BrdU) analyses in a rabbit model.

Methods & Materials: Thirty male rabbits underwent sinus augmentation bilaterally in the nasal bone. LIPUS was applied at two different frequencies (1 and 3 MHz) on experimental sites daily for 2, 4 and 8 weeks. Each histological area of the experimental and control sites was divided into upper and lower parts from the parietal region to a depth of 5 mm. Immunoreactive nucleated cells were counted by BrdU in the each three measured area of the experimental and the control sites (all 1.0 × 1.0 mm squares). The labeling index was defined as the number of BrdU-labeled nuclei divided by the total number of nuclei and was expressed as a percentage.

Results: At 2 weeks, the experimental sites in the 1 MHz group exhibited a significantly higher labeling index than the control sites in both the upper and lower parts. At 2, 4 and 8 weeks in the 3 MHz group, there was no difference between the experimental sites and the control sites in the upper and lower parts.

Conclusion: The results suggest that LIPUS enhances cell proliferation related to newly formed bone in the 2 weeks following sinus augmentation, and that this effect is greater at a frequency of 1 MHz than at 3 MHz.

Poster 59

Practical Solution of a Severe Resorbed Ridge: A Case Report

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Purpose: This is a case of an unilateral free end missing dentition with severe resorption of alveolar ridge. With the aid of CT image planning software and positioning device, dental implants were placed buccally to the mandibular canal.

Methods & Materials: The patient is a 66 year-old male who has been wearing an implant-supported maxillary complete overdenture for almost 10 years. In the mandibular arch, there is a Kennedy class II removable partial denture to restore the missing #44,#45,#46 and #47 teeth which were extracted 20 years ago . The patient complained of sinking of the lower partial denture and could not chew efficiently over the time. Also, he suffered from denture sore off and on over the palate. Patient declined to have sinus elevation with his own reasons. The treatment plan was to place three dental implants at the

mandibular missing teeth area to gain the support. However, the cone beam CT examination revealed the vertical bone height is insufficient in order to avoid the inferior alveolar canal.

Results: In the poster, we would show how we placed the dental implants without involvement of the mandibular canal in this severe ridge resorption case. With the help of implant planning software (ImplantMax v5.0, Saturn Imaging Inc., Taiwan) imaging and positioning device (ProbeMax, Saturn Imaging Inc., Taiwan), the implants were placed as planned. The definitive prosthesis is an overdenture retained with Bredent VKS ball attachments on a milling bar.

Conclusion: Under the guidance of the CT image planning software and positioning device, we are able to provide a quite satisfactory treatment for this compromised case.

Poster 60

The Effect of Different Implant Neck Designs Upon Strain at Surrounding Bone

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Purpose: The idea of "functional surface area" was brought up to explain more about stress transfering at bone-implant interface. Unfortunately, we did not really understand the details of this area. The aim of the present study was to identify this area and how it influence the stress distribution.

Methods & Materials: Two different designs of dental implants were included in this study. The sizes of Brånemark (Mk III, Sweden) implants were 3.75 or 5.0 mm in diameter and 8.5 or 10 mm in length. The sizes of Astra Tech (OsseoSpeed, Sweden) implants were 4.0S, 5.0S or 5.0 mm in diameter and 9 or 11 mm in length. There were two implants of each size. Each implant was embedded in a polymethyl methacrylate resin block (85 X 20 X 30 mm), simulating a low-density bone. Four miniature strain gauges (KFG-02-120-C1, Kyowa, Japan) was attached to each implant where the measuring points were at 1, 2, 4 and 5 mm below the platform on the external surface of the implant. A 30-degree oblique static load of 50N was applied 6 times on a Ti block (8 X 8 X 8 mm) screwed on the implant of each model.

Results: All implants showed the largest mean strain value (MSV) at 1-mm site below the platform which was statistically higher ($p<0.05$) than the other 3 measuring sites. For Brånemark implants, the largest MSV was observed in 3.75*8.5 mm implant. For Astra Tech implants, the largest MSV was observed in 4.0S*9 mm implant. MSV dereased when the implant length increased and when the implant diameter increased. However, difference existed between two implant designs in the effect of implant length and implant diameter on MSV. The outspreaded or microthreaded design also affected the MSV.

Conclusion: Within the limitation of this in-vitro study, we concluded that MSV concentrated mostly at 2mm below platform of implants in different diameters, lengths or designs. Well design in this area would give more benefits in stress distribution.

Poster 61

Drilling Protocols and Insertion Torque for 2.1 Mm Diameter MDI Implants in Simulated Bone of Different Qualities

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Purpose: To investigate the insertion torque of 2.1 mm diameter MDI implants placed with different drilling protocols in artificial bone blocks of different qualities.

Methods & Materials: Low to high density cancellous bone without cortical coverage were simulated using 10 pounds per cubic foot (pcf) (density: 0.16 g/cc), 20 pcf (0.32 g/cc), and 30 pcf (0.48 g/cc) polyurethane foam test blocks. Cancellous bone with a layer of cortical bone were simulated with laminated blocks using a combination of 1 or 2 mm 50 pcf (density: 0.80 g/cc) polyurethane layer . After site preparation, mini implants (IMTECT MDITM , diameter 2.1mm and 13mm in length) were inserted into the blocks and insertion torque was recorded with every 0.5 mm implant advancement. In each type of blocks, we explored the optimal drilling protocol by drilling with 1.1 mm drill in 4 mm depth first and testing the insertion torque, and sequenced drilling protocols of a deeper drilling depth or a larger diameter (1.5 mm) drilling were only tested if the insertion torque was greater than 50 Ncm. Each drilling protocol was repeated for 5 times. Sequenced drilling protocols tested were: (1) 1.1 mm drill, 4 mm depth; (2) 1.1 mm drill(7mm); (3) 1.1 mm drill, (13 mm) ; (4) 1.1 mm drill (13 mm), then 1.5 mm drill (4mm); (5) 1.1 mm drill (13 mm), 1.5 mm drill (7 mm); (6) 1.1 mm drill (13 mm), 1.5 mm drill (13 mm)

Results: The block with density of 10 and 20 pcf and 0~2mm lamination, the final insertion torque would not exceed 45 Ncm with the most conservative site preparation of 1.1 mm drilling in 4 mm depth. In the block with density of 30 pcf and 0~2mm, the insertion torque was beyond 50 Ncm before the implant fully seated and a deeper, wider site preparation was needed. And it was observed that deeper drilling usually could not reduce the insertion torque efficiently and a larger diameter preparation was needed.

Conclusion: Drilling protocols can be and should be developed according to different bone quality for MDI implants to avoid implant fracture and achieve ideal insertion torque.

Poster 62

Bone Formation Effect of Rhbmp-2 Coated Implant in Beagle Dog Model with Vertical Bone Defect

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Purpose: For stable retention of implants, sufficient bone volume is necessary. As possessing high osteoinductive potential, BMP-2 is considered to be an interesting candidate growth factor for coating of titanium implants. The aim of this study is to evaluate the bone formation effect of rhBMP-2 coated implant in beagle dog model with vertical bone defect.

Methods & Materials: A total of 16 RBM (Resorbable blast media surface) titanium implants (Exfeel®, Megagen, Daegu, Korea), 3.75 mm in diameter and 7 mm in length, were used. For control group(R), RBM implant itself was used and for test group(BA), 40 μg of the rhBMP-2 solution (1.5mg/ml) was loaded onto the implants with micro-nanotubular surface treatment by anodic oxidation. Two beagles were used in this study. Alveolar bone was removed to a level of approximately 3mm apical circumferentially, creating bilateral, critical-size, supra-alveolar and peri-implant defects remaining the center part of the mandible. Each beagle had 4 implants placed in each mandible, making total of 16 implants inserted using a randomized design. Radiographic, taken at the day of surgery, 4 weeks later, 8 weeks later and at the end of the treatment period, and micro-computed tomographic analysis were used to evaluate the bone formation effect. The region of interest (ROI) of the specimen to calculate bone volume, percent bone volume, bone height and bone mineral density was designated as 0.5 mm, 1.0 mm, 1.5 mm, 2.0 mm away from the implant thread.

Results: Micro-computed tomographic analysis showed that there were significant differences between the BA and R group in bone volume only in the top part at the ROI 0.5 mm away from the implant thread. There were significant differences between two groups in bone height at 0.5 mm and 1.0 mm away from the implant thread. Implants coated with rhBMP-2 exhibited significant bone formation compared with the control group in aspect of bone volume and height.

Conclusion: The results suggest that rhBMP-2 coated implants with micro-nanotubular surface induced vertical augmentation of the alveolar ridge.

Poster 63

Retrospective Analysis of Prosthetic Complications of Implant Supported Fixed Partial Dentures after an Observation Period of 5-10 Years

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Purpose: The purpose of this study was to evaluate the incidence of the most common technical problems, in implant-supported fixed partial dentures (FPDs), and assess the survival and success rate (event-free survival) after 5-10 years of function.

Methods & Materials: All of the implants evaluated in this study were from a single manufacturer (Institut Straumann AG, Waldenburg, Switzerland). Follow-up examinations were scheduled 1week after suprastructure placement, after 6 months, and annually. Prosthesis-based data on survival/failure rate and technical complications were analyzed.

Results: In 95 partially edentulous patients, a total of 231 Straumann implants were placed and restored with 177 implant-supported FPDs (125 single crowns, 18 splinted crowns, 34 FPD bridges). A total of 131 solid abutments and 100 SynOcta abutments were used. The survival rate of FPDs supported by implants was 97.4% after an observation period of 5 years. The success rate (event-free survival) of the FPDs was 96.05%. After an observation period of 5 years the cumulative incidence of screw loosening was 0 %. Fracture of the veneering porcelain occurred in 3.95 % of all FPDs. Fracturing of the suprastructure framework was not observed. The overall complication incidence after 5 years was highest in the group of splinted crowns, which showed the lowest success rate 94.4 % , followed by three unit fixed partial dentures (96 %); and single crowns (98.4 %).

Conclusion: Fixed partial dentures supported by both SynOcta and Solid abutments on Straumann implants showed low technical complications rates, the most common being fracture of the veneering porcelain.

Poster 64

Insertion Torque and Resonance Frequency Analysis During Implants Insertion in Artificial Bone Blocks Simulating Poor or Poor-To-Medium Bone Quality

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Purpose: This study's aim was to investigate the continuous changes of insertion torque (IT) and resonance frequency (ISQ) of four different implants which were placed in the artificial bone blocks with density simulating poor or poor-to-medium bone quality.

Methods & Materials: Polyurethane foam blocks (Sawbones®) of 0.16g/cm3 and 0.32g/cm3 were used to simulate low density and low-to-medium density cancellous bone, respectively. In addition, laminated test blocks by attaching a 1mm-thick polyurethane layer of 0.80 g/cm3 density to the cancellous blocks were used to simulate cancellous bone with a thin layer of cortical bone. Four different implants (Nobel Biocare MKIII-3.75, MKIII-4.0, MKIV-4.0 and NobelActive-4.3) were placed into the different test blocks (n=5 per implant design per block) according to the manufacturer's instructions. The IT and ISQ were recorded and observed every 0.5-mm inserted length during implant insertion. The values of peak IT (PIT), final IT (FIT) and final ISQ were recorded and statistically analyzed.

Results: All implants showed increasing ISQ values accompanied with increasing implant inserted length, and a linear relation existed between ISQ and implant inserted length. All implants showed an increase in the PIT when the density of test blocks increased or when the 1-mm laminated layer was present. However, in contrast to ISQ, different implants showed different IT patterns during the implant insertion especially when the 1-mm laminated (cortical) layer existed. Three

NobelActive-4.3 could not be inserted completely with an IT of 90 Ncm in the laminated test blocks of 0.32g/cm3 cancellous density.

Conclusion: While implant designs affected the dynamic IT patterns during implant insertion vigorously, they did not affect the ISQ values with a similar extent. Some implant designs may be more suitable than the others to achieve high insertion torque in bone with poor quality. How IT and ISQ represent the implant primary stability should be further investigated.

Poster 65

The Effects of Titanium Surfaces with Nano-Network Structures, Generated Through Various Alkali Concentrations Treatment, on Osteoblastic Differentiation

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Purpose: Titanium surface modification is a promising approach to direct stem cell osteoblastic differentiation for promoting osteointegration. In our previous study, we found that at room temperature and atmospheric pressure, titanium oxide spontaneously generates a titanium nanosheet (TNS) structure via TiO2 sputtering. The TNS structure of titanium promotes osteoblastic differentiation. However, the most suitable TNS structure for promotion of osteoblastic differentiation remains to be determined. In this study, we used different concentrations of sodium hydroxide solution to obtain surfaces with different TNS structures and compared the extent of osteoblastic differentiation induced by these surfaces.

Methods & Materials: We used titanium discs immersed in 2.5, 5, 7.5, and 10 M NaOH as test groups and discs without NaOH modification as the control group. The surface morphology of these samples was examined using a scanning electron microscope (SEM). MSCs from Sprague-Dawley rat bone marrow were seeded into 24-well plates and cultured in media designed to induce osteoblastic differentiation. To assess the extent of differentiation, we evaluated alkaline phosphatase (ALP) activity, osteocalcin (OCN) production, and calcium deposition.

Results: SEM images showed that fine, nanometer-scale network structures were formed on the surfaces after NaOH treatment. Further, the size of the network structures decreased as the concentration of NaOH used for treatment of the surfaces increased from 2.5 M to 10 M. In all samples, ALP expression in the MSCs was first observed at 7 days post-incubation and increased with the incubation time. ALP production differed significantly among the test and control groups. At 21 days post-incubation, both OCN production and calcium deposition were higher in the test groups than in the control group.

Conclusion: Our data suggest that titanium discs modified using 10 M NaOH are best for promoting osteoblastic differentiation.

Poster 66

Strong Dermal Collagen Binding Capability of Alkali-Heat-Treated Titanium Surface with Substantial Nano-Tuft-Like Structure

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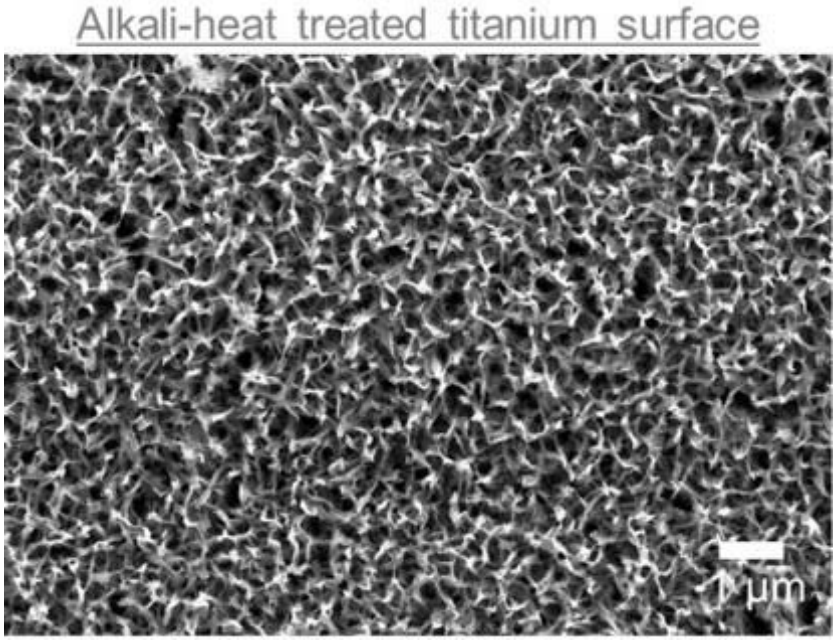
Purpose: Reinforcement of soft tissue sealing at percutaneous part influences prognosis of cranio-maxillofacial implants. Alkali-heat treatment provides titanium surface with nano-tuft-like structure possibly to enhance fibroblastic function and collagenous binding strength with accompanying substantial mechanical property. The purpose of this study was to evaluate the influence of alkali-heat treated titanium surface (AH) on collagen production of human dermal fibroblasts and binding strength of deposited collagen to titanium surface with assessment of mechanical property of the surface.

Methods & Materials: AH were prepared by alkali-heat treatment for grade II pure titanium turned disks (TU). Human dermal fibroblasts were purchased and cultured in D-MEM/F12 on TU and AH. The day 28 cultures underwent Sirius red-based collagen colorimetry and scanning electric microscopic observation (SEM). For evaluation of strength of collagen deposition on the surfaces, remnant collagen on surface was quantified with Sirius red staining after exposure to detachment stress with ultrasonication, collagenase or hydrogen peroxide. Mechanical property of AH was evaluated by nano-indentation. Data from the culture experiment were treated with student's t test (alpha = 0.05).

Results: Amount of collagen deposition at day 28 was 1.2 times greater on AH than on the TU. SEM observation showed that collagenous matrix was well-expanded but thin on TU at day 28. In contrast, deposited collagen fibers on AH tangled with and partially intruded into nano-tuft-like structure on the surface. Thirty five percent of deposited collagen still existed on AH after ultrasonication in contrast with a 3 % survival on turned surface. Over 35 or 44 % of deposited collagen survived on AH after collagenase or hydrogen peroxide exposure in contrast with a 4 or 27% survival on turned surface, respectively. Hardness and Young's modulus of AH was 0.6 and 20.3 GPa, respectively. Those values were comparable with the values of dentin or cementum in the articles dealing with the same analysis.

Conclusion: AH surface exhibited substantial mechanical property and enhanced human dermal collagen production and binding strength of deposited collagen to surface; this indicated that alkali-heat treatment might provide percutaneous part of cranio-maxillofacial titanium implant with firm soft tissue sealing.



Poster 67

Use of the Hounsfield Units for 3-Dimensional Finite Element Analysis of Immediately Loaded Implants Treatment Planning

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Purpose: Immediately loaded implant treatment has become popular; however it has been contraindicated for patients with severe sleep bruxism, especially in cases of edentulous maxilla, since micro-movements due to bruxism associated occlusal forces have potential to hamper osseointegration. We recently developed a new implant simulation system, which allows biomechanical analyses under simulated loading condition using a three-dimensional finite analysis model for individual patient. In this model the Young's modulus of the bone was calculated using Hounsfield Units (HU) of the patient's CT data. The aim of this study was to investigate the effect of Young's modulus (predetermined data vs. HU based data) on the result of 3-D FEM analyses.

Methods & Materials: Two patients (1 male and 1 female) with an edentulous maxilla, who received immediately loaded full-arch dental implant treatment, were selected. Their 3-D FEA models were created using their CT DICOM formatted data. 2 kinds of the models were prepared. One model used uneven bone Young's modulus value calculated from HU and the other used the Young's modulus value reported in the literature. Regarding the implant placement, 4 vertical implants or 2 vertical mesial and 2 inclined distal implants were simulated. For the distal implants, 2 different sizes were simulated (4.0 (diameter) x 10mm (length) and 4.0 (diameter) x 18mm (length)). Acrylic resin provisional prosthesis was designed between bilateral second premolars without cantilever. Implant surfaces made contact with alveolar bone but were not connected to the bone to simulate immediately loaded condition. A load of 40-270 N was applied on right upper lateral incisor, canine, first and second premolars in order to simulate tooth grinding toward the right side. The magnitudes of displacements of the implant fixture and equivalent stress on the bone were analyzed.

Results: The displacement magnitude and equivalent stress of the model that used reported Young's modulus was approximately 26-61% and 97-220% of the model that used HU-based Young's modulus, respectively.

Conclusion: The results of 3D FEA that used patient's bone density data as measured by HU was different from those of traditional 3D FEA, suggesting that our method has a potential to allow precise biomechanical analysis under simulated loading condition.

Poster 68

Effect of Rhbmp-2 Immobilization to Heparinized Bio-Oss® on Bone Regeneration

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Purpose: This study was aimed to evaluate the effect of rhBMP-2 immobilization withheparin toBio-Oss®on new bone formation invivo.

Methods & Materials: Eighteen New Zealand white rabbits (12~13 week old, 3.3~3.5kg) were utilized and 36 defects(diameter 8mm) were created on cranial boneby 2 defects for each animal. Experimental groups were divided into non-filled group, Bio-Oss®group,and rhBMP-2 heparinized Bio-Oss®group.To evaluate morphology and surface composition of rhBMP-2 heparinized Bio-Oss®, the SEM(Scanning Electron Microscope) observation, Confocalmicroscopicassessment and XPS(X-ray Photoelectronic Spectroscopy) assessment were carried out. The animals were sacrificed 4 weeks and 8 weeks after graft surgery. Micro-Computed tomography (μCT) analysis was undertaken to analyze newly formed bone(%)by the μCTScanner(Skyscan 1173, Skyscan, Kontich, Belgium) with NRecon software and CT analyzer.Histometric measurementswere carried out to analyze the amounts of new bone(%) and defect closure (%). Means(±SDs) for the groupswere collected and statistically analyzed by one-way ANOVAof SPSS(Chicago, IL) software for comparison between groups and Tukey test for comparison between intervalswith confidence interval ($p < .05$).

Results: In assessment of Confocal and XPS, rhBMP-2 coating to Bio-Oss® by heparinization was confirmed indirectly. In Micro-computed tomography (μCT) analysis, newly formed bone(%) of the heparinizedBio-Oss® coated with rhBMP-2 group was higher statistically than non-filled group and Bio-Oss® group at 4 weeks and 8 weeks after graft surgery. In the histometric analysis, defect closure rate (%) and amount of new bone(%) of rhBMP-2 heparinized Bio-Oss® group was higher statistically than control group and Bio-Oss® group at 4 weeks and 8 weeks after graft surgery.

Conclusion: rhBMP-2immobilization with heparin to Bio-Oss® may effective in new bone formation and defect closure compared to control group and Bio-Oss® group. In addition, these effects could be effective during longer periodwithin the limitation of this study.

Poster 69

Comparison in Early Bone Response Through Continuous Removal Torque Analysis Between Fluoride-Modified and Anodically Oxidized Titanium Implants

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Purpose: The purpose of this study was to compare between a fluoride-modified implant and an anodized implant with different geometries by continuous measurement of the removal torque and calculation of the angular momentum of each surfaced implant.

Methods & Materials: Six New Zealand white rabbits were used in the study. Each tibia received one implant. A bioactive fluoride-modified implant with a conical connection and microthread design was inserted into one tibia, and a bioinert anodically oxidized implant with an external connection design was inserted into the other. After 2 weeks of implant insertion, the removal torque values were continuously measured according to time. Using the time-torque curve resulting from the measurements, the maximum values were determined and the angular momenta were calculated.

Results: The anodically oxidized implant had significantly higher peak removal torque and angular momentum values than the fluoride-modified implant.

Conclusion: The impact of the fluoride-modified bioactive implant on early bone response remains unclear. Considering the angular momentum of dental implants may assist in elucidation of the effect of implant geometry on bone response.

Poster 70

10 Years Evaluations of All-On-4 Implant Bridge Rehabilitation: A Prospective Study

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Purpose: Objective An “All-on-4” implant bone-anchored bridge has become an accepted modality for fixed restorations in fully edentulous jaws. To evaluate a reliability of All-on-4, clinical and radiographic findings were reconsidered using stomatognathic functional analyzing system at 5 and 10 years.

Methods & Materials: Materials and Methods Ten edentulous patients (8 female and 2 male, mean age of 56.7) who visited Sakuragawa Dental Office since 2002, were rehabilitated and evaluated in this study. After four implants (Astra Tech Implant system, Sweden) were placed according to All-on-4 concept, bone-anchored bridge were immediately delivered. Radiographic bone loss, electrophysiologic balance, implant stability quotients (ISQ), and occlusal force were evaluated using X-ray examination, electromyogram (EMG), resonance frequency analysis (Osstell, Astra Tech, Sweden), and Dental Prescale (Occluzer, GC, Tokyo), respectively, at 0, 5, and 10 years follow up.The obtained data were analyzed one factor repeated measure ANOVA and Tukey’s multiple comparison test (a=0.05).

Results: Results and discussions One hundred survival rates could be achieved by the use of four implants to support a full-arch fixed prosthesis in edentulous. Peri-implantitis and bone resorption around implants could not be observed in all implants after 10 years. Of the EMG, ISQ and occlusal force, there were no significant differences among 0, 5 and 10 years ($P<0.05$).

Conclusion: Conclusions The results support the conclusion that use of the All-on-4 immediate-function implant concept in fully edentulous may be viable in the long term. Four implant-supported bridge indicated effectiveness modality to rehabilitate the stomatognathic function after 10 years.

Poster 71

Prediction of Prosthetic Complications in the Superstructure by Assessing Changes in the Provisional Restoration

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Purpose: Dental implant has been accepted as one of the effective therapies to edentulous dental arch. However, prosthetic complications such as resin or porcelain veneer fractures often occur during long-term follow-up. Various factors that cause prosthetic complications may affect the occlusal surface of the provisional restoration within a short period. Although the provisional restoration provides useful information on the final superstructure's design, there is little study providing such information to predict occurrence of prosthetic complications using the provisional restorations. The aim of this study was to clarify whether a prosthetic complication, that is resin/porcelain veneer fracture is predicted or not with the use of provisional restorations by comparing the experimental perspective study and retrospective clinical study.

Methods & Materials: In the retrospective study, we surveyed the incidence of hybrid resin/porcelain veneer fractures, fracture sites, occlusion schemes, prosthetic conditions of antagonistic teeth, and materials used for superstructure fabrication in 133 superstructures of 83 patients. In the experimental perspective study, the changes of occlusal surfaces on 31 provisional restorations were quantitatively evaluated using a digital scanner after superstructures that were in use for more than months were replaced with provisional restorations. Logistic regression analysis, ?2 test, and Mann-Whitney test were used as statistical analyses.

Results: 25.4% of the superstructures showed hybrid resin and porcelain veneer fractures, and these fractures occurred at the occlusal surface site concentrated the occlusal stress.

Conclusion: These results suggest that occlusion is an important factor that induces these fractures. The fracture and occlusal surface change of the provisional restoration had a tendency to be correlated with the fracture of final restoration. This study indicated that provisional restoration may be useful in predicting the prosthetic complications.

Poster 72

The Effect of Mucosal Cuff Shrinkage Around Dental Implants

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Purpose: Measuring the shrinkage of the mucosal cuff around implants after removing of the healing abutment

Methods & Materials: Study population consisted of 87 patients who were treated with implant supported fixed partial dentures, between 2004-2009. Implant's location, type, length, diameter, gingival biotype and the dimensions of the healing abutments were recorded. Mucosal cuff shrinkage was measured immediately after removing the healing abutments and after 20 seconds, 40 seconds and 60 seconds.

Results: 120 implants were placed in the maxilla and 191 in the mandible. All parameters were analyzed using ANOVA. Time had a statistically significant influence on the mucosal cuff shrinkage around dental implants ($p < .001$). At time 0 the mean diameter was 4.1 millimeters. After 20 seconds the diameter decreased to 4.07 , after 40 seconds the mean diameter was 3.4 millimeters .After 60 seconds, the mean diameter became 2.81 millimeters. The gingival biotype had no statistically significant influence on the mucosal cuff shrinkage with time ($p = .672$).

Conclusion: When replacing a healing abutment, or connecting prosthetic components time is crucial in order to avoid pain and discomfort for the patient and misfit of the prosthetic elements.

Poster 73

A Prospective Clinical Trial on Early Loading Protocol for Partial Edentulous Patients in Posterior Mandible Site: A 1-Year Follow-Up Study

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Purpose: To evaluate biologic and prosthetic outcomes of early-loaded implants supporting splinted crowns.

Methods & Materials: A total of 33 implants were placed in 12 consecutive patients with partial edentulism. All implants were subjected to an early loading protocol by means of two-unit or three-unit splinted prostheses and observed between 6 and 12 months. The radiographic marginal bone loss and peri-implant soft tissue scores (Plaque Index, Bleeding Index, and Calculus Index) were recorded. In addition, prosthetic complications were recorded during the period of the study.

Results: Early or late implant failures were not observed, resulting in 100% implant survival and success of the implants. One crown loosen was observed. There were no signs of excessive bone loss with or without swelling or suppuration of the peri-implant soft tissue, and the soft tissue scores indicated good soft tissue integration.

Conclusion: In mandible posterior site, early loaded implants supporting fixed prostheses showed optimum radiographic, clinical, and prosthetic outcomes in an up-to-12-month assessment period.

Poster 74

Bi-Functionalization of Calcium-Phosphate-Coated Titanium Surface with Antibacterial Activity and Osteoinductivity using Slowly-Released Simvastatin and Metronidazole

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Purpose: Coating the surface of titanium implant or other bone substitute materials with calcium phosphate (Ca-P) crystals is an effective way to enhance their osteoconduction capabilities. However, single Ca-P coating cannot confer osteoinductive and antibacterial capabilities on implants. Recently, it was reported that Ca-P coating can serve as a carrier for biological agents which will improve the performance of implants and bone substitutes. This study aimed to construct a novel bi-functional Ca-P coating combined with osteoinductive and antibacterial capabilities together. Different concentrations of metronidazole (MNZ) and simvastatin (SIM) were integrated into biomimetic Ca-P coating on the surface of titanium disk. The biological effects of this bi-functional biomimetic coating on human bone marrow mesenchymal stem cells (hBMMSCs), human adipose derived stromal cells (hASCs) and Porphyromonas gingivalis (Pg) were assessed by in vitro experiments. Moreover, systematic observations of the drug loaded coatings including the surface characteristics, slowly-released property, osteogenic inducement capabilities, and antibacterial effects were performed to screen the optimal coating systems. Through our study, we conclude that this novel bi-functional Ca-P coating loaded with optimal concentration of MNZ and SIM is a promising surface modification method for orthopaedic or dental implant. Keywords: Titanium; Calcium phosphate coating; Mesenchcymal stem cells; Metronidazole; Simvastatin

Esthetics and Ceramics

Poster 75

The Era of Digital Impresssion

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Purpose: Impressions are considered to be the basis of a sound prosthetic restoration. The aim of our study is how to get accurate impressions without having messy and lengthy techniques with equally messy materials. To reduce the cost as well as chair side time of the dentist in general and prosthodontist in particular .

Methods & Materials: The most important part is investing in a good quality of scanner, the software which can create a good quality digital impression . The optical quality which results in detailed and completed model of the patient's arch. The first system CEREC 1 which used a still camera to take multiple pictures that are stitched together with a software. The iTERO system uses camera that takes several views as well as a small probe touching the tooth to give optimal focal length. The LAVA uses a continuous video stream of the teeth.

Results: These scanners result in accurate impressions , opportunity to view, adjust and rescan the impressions. No physical impressions for the patient is required. It also gives the opportunity to view the occlusion and control cross infection. The restorations are accurate, wear and chip resistant and cost effective. There are no layering / baking errors, no casting/soldering errors.

Conclusion: Having used this technique for several years , the patients enjoy the benefit of one visit restoration. They appreciate the convenience of no provisional restoration which is also economical. This technology results in highly accurate restorations which allow users to have a minimal learning curve and fabricate restoration with ease

Poster 76

Influence of Residual Stresses on Fractographic Pattern of Zirconia Bilayered Crowns

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Purpose: Chipping of the veneering porcelain has been recognised as the main disadvantage of bilayered zirconia restorations, due to their propensity to develop increased residual stresses within the veneering porcelain. Fractogrpahic analysis of statically loaded-to-failure of fast and slow cooled zirconia molar crowns was done in order to identify fractorgrahic patterns influenced by residual stresses.

Methods & Materials: Ten identical Procera zirconia copings (Procera, Nobel Biocare) pressed with IPS e.max ZirPress (Ivoclar Vivadent) based on a mandibular molar form, were divided into 2 groups. Half the specimens were slow cooled during the final glazing cycle and the other half fast cooled. Following cementation of the zirconia crowns to epoxy resin abutments using Rely-X Unicem (3M ESPE), the disto-lingual cusp of each crown was subjected to a simulated occlusal adjustment prior to loading-to-failure using a universal testing machine, using the following parameters: 4mm diameter stainless steel ball at the distal aspect of the crown; and cross-head speed of 0.1mm/min. Qualitative fracture analysis of each fractured sample was initially carried out by a visual interpretation. Three samples from each group were chosen for examination by scanning electron microscopy.

Results: The average load-to-failure for the fast cooled group was slightly lower than that recorded for the slow cooled group (901.54 N and 1013.00 N respectively), however this difference was not statistically significant ($P > 0.05$). Fractographic analyses confirmed the presence of differential residual stress profiles in the veneering porcelain of fast cooled zirconia crowns by the presence of high concentrations of twist hackles, compression curls, and multi-plane fractures, which were not observed in the slow cooled zirconia crowns. Peripheral cracks on the non-loaded mesial side of four out of five fast cooled specimens were observed, all being independent from the primary distal fracture sites on the loaded sides. None of the slow cooled specimens demonstrated similar cracks on non-loaded sides.

Conclusion: Crack propagation and fracture patterns were highly influenced by the cooling protocols used, with fast cooling causing peripheral cracks on non-loaded aspects of zirconia crowns, indicating high tensile zones within the veneering porcelain.

Poster 77

Cad/Cam-Generated Provisional Restorations for the Treatment of Complex Cases: A Case Report

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Purpose: The use of provisional restorations is an essential tool for the dental clinician, particularly in cases of full-mouth rehabilitation where all parameters concerning esthetics, phonetics and function should be defined before the definitive reconstruction. The increased besides application of ceramics in these cases, necessitates a more accurate design so that corrections and complications are limited to minimum possible.

Methods & Materials: CAD/CAM technology is extensively applied for definitive reconstructions and recently has been introduced as well as in the production of provisional restorations by milling high-density polymers. The new materials guarantee optimum properties resulting to durability, esthetics and accuracy. The new materials are high-density polymers with the same origin as the up-to-now used for provisional restorations but industrially constructed under completely controlled conditions. These blocks are homogenous providing increased mechanical properties and esthetic appearance. The major dental material companies released different block-sizes for the fabrication of veneers, crowns or multi-unit bridges. The fabrication process includes the precise digital design and milling. A full or partial digital workflow may be applied. The first step includes either a digital or conventional impression that needs to be digitized for the design procedure. The milled product is then constructed with minimal thickness in preparation line while keeping the high standards of properties. Currently, some manufacturers offer the possibility of a product milled from special type of wax allowing for an alternative for the try-in sessions. A clinical case is presented where CAD/CAM-generated provisional restorations have been constructed on teeth and implants for the temporary treatment phase of a bruxer patient with loss of vertical dimension. The re-established esthetics and function have been tested through the new type of provisionals for a successful, predictable and low-risk final restoration.

Results: The use of CAD/CAM provisionals allowed for a long control period of the increase in vertical dimension, interocclusal relationship, esthetic appearance and phonetics without the complications often observed with the conventional temporary reconstructions. Nevertheless the established shape has been later on precisely transferred to the final full-contour zirconia restorations.

Conclusion: The new CAD/CAM-fabricated polymer provisionals allow for a high standards intermediate phase and a predictable definitive result.

Poster 78

How Will Surface Treatments Affect the Translucency of Porcelain Laminate Veneers?

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Purpose: The purpose of this study is to evaluate whether surface treatments affect the translucency of laminate veneers with different shades and thicknesses.

Methods & Materials: A total of 224 disc-shaped ceramic veneers were prepared from A1, A3, HT and HO shades of IPS e.max Press (Ivoclar Vivadent) with thicknesses of 0.5 mm and 1.0 mm. The ceramics were divided into four groups for surface treatment: Group C: no surface treatment; group HF: etched with hydrofluoric acid; group SB: sandblasted with 50-µm Al2O3; and group L: irradiated with an Er:YAG laser. A translucent shade of resin cement (Rely X Veneer, 3M ESPE) was chosen for cementation. Color values of the veneers were measured with a colorimeter, and translucency parameter (TP) values were calculated. A three-way ANOVA with interactions for TP values was performed, and Bonferroni tests were used when appropriate ($p=0.05$).

Results: There were significant interactions between the surface treatments, ceramic shades and thicknesses ($p=0.001$). For the 0.5-mm-thick specimens, there were significant differences after the SB and L treatments. There was no significant difference between the HF and C treatments for any shades or thicknesses ($p>0.05$). For the 1-mm-thick ceramics, there was only a significant difference between the L and C treatments for the HT shade ($p=0.01$). There were also significant differences between the SB and C treatments, except not for the HO shade ($p=0.768$).

Conclusion: The SB and L treatments caused laminate veneers to become more opaque; however, HF treatment did not affect the TP values. When the laminate veneers were thinner, both the shade of the ceramic and the SB and laser treatments had a greater effect on the TP values.

Poster 79

Ceramic Materials for Posterior Restorations. An Evidence-Based Decision Tree

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Purpose: Ceramic materials for dental use have evolved significantly in the last century and especially in the last decade. These materials offer improved aesthetics due to their ability to closely mimic the natural dentition. Anterior ceramics show high success rates but posterior restorations and fixed partial dentures present with more complications. Ceramics have poor tensile strength making them brittle. Addition of fillers such as leucite has improved the tensile properties, but often at the cost of aesthetics. Yttrium-stabilized and monoclinic zirconium have been used as monolithic restorations or as core ceramics, but many adverse effects over time have been reported. The literature on ceramic restorations is vast but lacks long-term randomized controlled clinical trials (RCTs), which makes the clinical choice of ceramic a constant challenge. We therefore set out to see if it would be possible to provide clinicians with a graphic decision tree based on the best available evidence and highlight where the needs are for long-term RCTs.

Methods & Materials: A PubMed search was completed using the MESH terms “Ceramics” [MAJR] AND “Dental Restoration, permanent” [MAJR]. Studies were limited to “English” and “humans”. Studies reporting exclusively on anterior restorations were excluded. Systematic reviews, meta-analyses, RCTs and controlled clinical trials were used. Manual searches of further references were carried out from the reference list of included studies. The abstracts of the studies were read to determine if they met with inclusion criteria, and results recorded.

Conclusion: The results of the literature analysis will be presented in the form of a graphical decision tree, based on the variables presented in the literature. Levels of evidence will be identified, and where evidence for specific materials/clinical situations is lacking in included articles, the highest level of evidence in the original search will be indicated.

Poster 80

Comparison of the Strength of Ceramic Denture Teeth Manufactured in 2-D and 3-D Tooth Color Systems

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Purpose: The optical properties, esthetic and wear resistance of ceramic denture teeth are the main reasons for their use in dental prostheses. Today, with the advancements in material science, ceramic denture teeth can be manufactured according to three dimensional (3-D) color system, as well as conventional two-dimensional (2-D) system. The purpose of the study is to compare the fracture resistance of ceramic denture teeth manufactured according to 3-D and 2-D color systems.

Methods & Materials: Five groups of samples were prepared from opaque, dentine, incisal, and combination (both mixed and layered) groups of ceramic dough and baked according to the instructions of the manufacturer (Enta, Atlas Enta, Gulsa Company, Turkey). The samples were prepared in bar shape (1.2x4x25mm) according to both 2-D and 3-D systems (n=12). A1 shade was selected for the conventional and 1-M2 shade was used for the 3-D color system. Each sample in each group was checked for shade accuracy with a spectrophotometer (Easy-Shade, Vita, Germany). Samples were subjected to 3 point bending test using Universal Testing Machine (Autograph, Shimadsu, Japan). Data were statistically analyzed by Independent t-test (a=0.05).

Results: Mean fracture resistance results were: Opaque A1: 70.5±10.9, Opaque 1-M2: 75.6±14.3, Dentine A1: 61.2±13.5, Dentine 1-M2: 65.5±11.3, Incisal A1: 58.8±19.6, Incisal 1-M2: 71.8±11.2, Mixed A1: 62.3±13.4, Mixed 1-M2: 73.4±13.9, Layered A1: 63.6±10.9, Layered 1-M2: 71.6±26.8 N/mm2, respectively. Mean fracture resistance results were statistically insignificant for all groups ($p>0.05$) except for the incisal ceramic group ($p=0.046$).

Conclusion: Manufacturing ceramic denture teeth according to 3-D color system increased the fracture resistance more than the teeth manufactured conventionally. Furthermore, fracture resistance improved significantly in the incisal ceramic group.

Poster 81

Effect of Engraving Speeds of CO2 Laser Irradiation on in- Ceram Alumina Roughness

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Purpose: The aim of the study was to determine the effect of CO2 laser on surface roughness of glass-infiltrated alumina ceramic.

Methods & Materials: Four aluminum-oxide ceramic disc specimens were prepared (6 mm in diameter and 4 mm in thickness) of In-Ceram Alumina. One side of each ceramic disc received CO2 laser irradiation with different engraving speeds (100, 400, 600 and 800 mm/min) as a surface treatment.Laser energy was delivered in pulse mode with a wavelength of 10,6 μm,frequency of 1000 Hz and power of 10W. Then the roughness of glass-infiltrated alumina ceramic surfaces was measured on digital elevation models reconstructed from stereoscopic images acquired by scanning electron microscope. Surface roughness data (Ra) were analyzed with one-way analysis of variance. Roughness was the dependent variable, and the CO2 laser irradiation engraving speeds the influencing factor. The level of significance was set at $p < 0.05$.

Results: There was no significant difference between the roughnesses of surfaces after treatments with different CO2 laser

irradiation speeds (p=0.82). Due to higher laser durations, partial melting signs were observed on the surfaces. Tearing, smearing and swelling occurred on melted surfaces. Swelling accompanying to melting increased the surface roughness while laser power was fixed and different laser engraving speeds were applied.

Conclusion: Researches interested in effects of different settings of laser applications on glass-infiltrated alumina ceramic surface roughness need to consider the lasing duration, which seems to have a major effect on roughness.

Poster 82

A Three-Year Clinical Evaluation of Three and Four-Unit Fixed Zirconia-Posterior Fixed Partial Dentures

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Purpose: The aim of this study was to evaluate the clinical performance of posterior three and four-unit fixed dental prostheses (FPDs) made of a zirconia-based ceramic system after three years of clinical follow up.

Methods & Materials: Twenty posterior 3-unit FPDs and twenty-one posterior 4-unit FPDs were placed in 35 patients using LavaTM (3M ESPE) zirconia ceramic system. Abutment preparation guidelines were: oclusal reduction of 1,5 to 2 mm, axial reduction of 1 mm, and 1 mm-wide circumferential chamfer placed at gingival level. Frameworks were fabricated using CAD/CAM technology. All FPDs were cemented using resin cement (RelyX Unicem 3M ESPE). Two calibrated examiners evaluated the FPDs independently at 1 week (baseline), 1 year, 2 years and 3 years of placement using California Dental Association (CDA) quality evaluation system. To evaluate the gingival tissue, Plaque Index, Gingival Index, probing depth at abutment and Margin Index were assessed. Data were analyzed by descriptive statistics, Wilcoxon signed-rank and Mann-Whitney U tests.

Results: Five FPDs were lost. Four four-unit structures fractured by the distal connector and one abutment tooth was removed due to a vertical root fracture on a three unit FPD. No caries were found. The survival rate was 85%. The remaining FPDs were recorded as satisfactory according to CDA criteria. The gingival parameters showed a slight decrease on gingival health. No significant differences were found between groups, but significant differences were found comparing baseline to 3 year measurements at gingival parameters, but having no clinical relevance. Chipping of veneering ceramic was found on 25% of FPDs.

Conclusion: The use of posterior three and four-unit zirconia-based FPDs showed good performance at three year follow-up. More clinical trials should be done.

Poster 83

The Effect of Different Surface Finishing Procedures for Zirconia on Antagonistic Human Enamel Wear: An In Vitro Study

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Purpose: To investigate how different finishing and adjustment procedures for zirconia affect antagonistic human enamel wear.

Methods & Materials: Two-body wear resistance tests were conducted in vitro using a masticatory simulator (Willytec dual-axis chewing simulator; SD Mechatronik GmbH, Feldkirchen-Westerham, Germany). Five groups of twelve specimens each were tested. Four groups tested different finishing and adjustment procedures for zirconia opposing human enamel: laboratory polished (LP), glazed (G), clinically adjusted (CA), clinically adjusted and repolished (CAR). Human enamel opposing human enamel group was used as a control. Pre-testing surface roughness for each group was determined using

contact profilometry (Mitutoyo SV600 Surftest; Mitutoyo America, Illinois, USA). Each enamel specimen was subjected to: 120,000 cycles in distilled water at a frequency of 1.6Hz; lateral movement, 1mm; vertical movement, 2mm; downwards and lateral speed, 50mm/second; loading force, 49N. Volumetric and vertical enamel loss was measured by superimposition of pre- and post-testing images using a three-dimensional laser scanner (Rexcan DS; Solutionix, Seoul, South Korea) and analysis software (Geomagic Qualify 2013; Geomagic, North Carolina, USA). Scanning electron microscopy (Zeiss EVO 50; Carl Zeiss AG, Oberkochen, Germany) was used for qualitative surface analysis of pre- and post-testing zirconia and enamel surfaces. A statistical significance level of a = 0.05 was used.

Results: Mean surface roughness (Ra) for LP, G, CA, CAR and control groups was 0.08µm, 0.42µm, 0.47µm, 0.09µm and 0.27µm respectively. Mean volumetric enamel loss for LP, G, CA, CAR and control groups was 0.15mm³, 0.15mm³, 0.34mm³, 0.10mm³ and 0.34mm³ respectively. Mean vertical enamel loss for LP, G, CA, CAR and control groups was 210µm, 197µm, 309µm, 162µm and 299µm respectively. Using Bonferroni multiple comparison test, the CAR group produced statistically significantly less ($p<0.05$) volumetric enamel loss compared with the CA and control groups, and statistically significantly less ($p<0.05$) vertical enamel loss compared with the CA group. Volumetric loss and vertical loss of enamel were highly correlated.

Conclusion: Zirconia restorations requiring clinical adjustment should be repolished following all adjustments to reduce antagonistic human enamel wear.

Poster 84

Influence of Surface Treatment on the Aging Sensitivity of Dental 3Y-TZP: An In-Vitro Study

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Purpose: The zirconia-based dental ceramics are prone to time dependent moisture induced instability (aging). As the low temperature degradation starts on the surface, the surface adjustments carried out in a clinical set-up can have a profound long-term effect. This becomes even more significant due to the increase in the use of full-contoured zirconia dental prostheses.The purpose of the study was to investigate the role of grinding and polishing, on the aging sensitivity of a 3Y-TZP dental ceramic and to propose surface treatment protocols that are conducive to long-term mechanical integrity of the material.

Methods & Materials: CAD-CAM milled as-sintered zirconia samples (n=48) were subjected to grinding with a green-band diamond bur (coarse-grit), red-band diamond bur (fine-grit) and diamond impregnated green-stone (fine-grit) followed by polishing with either a dedicated zirconia polishing kit or generic ceramic polishing kit. The as-sintered, ground and polished samples were then subjected to accelerated steam autoclave aging for the equivalent of approximately 3, 6 and 9 years in-vivo. The average surface roughness (Ra) was appraised with a contact profilometer while phase transformation was investigated with X-ray diffraction. The relative amount of tetragonal(t), monoclinic (m) and rhombohedral (r) phase fractions were calculated using the Garvie-Nicholson approach.

Results: Surface roughness varied as per the grit size of the grinding and polishing instruments. Aging had no significant effect on the Ra values. XRD investigation revealed that different surface treatments had significant effect on the extent of t-m and t-r transformation. The relative amount of m content increased more in ground samples as compared to polished samples after accelerated aging. Large amount of t-r transformation was also noted more so in samples polished with generic ceramic polishing kit compared to ground samples. Aging had minimum effect on t-r transformation. The most interesting finding was the complete absence of t-m and t-r transformation before and after accelerated aging post polishing with zirconia polishing kit.

Conclusion: The results of this study confirm that the entire machining and polishing process has a significant influence on the aging sensitivity of 3Y-TZP. It is recommended that polishing with appropriate polishing implements should follow CAD-CAM machining and coarse adjustment of exposed zirconia.

Poster 85

Randomized Clinical Evaluation of Zirconia and Metal-Ceramic Posterior Fixed Dental Prostheses: A 5-Year Prospective Study

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Purpose: The aim of this study was to compare the survival rates and biological and technical complications of three-unit metal-ceramic posterior fixed dental prostheses (FDPs) with those obtained when using a zirconia-based system. The null hypothesis was that no differences would be found between the parameters studied for each type of restoration.

Methods & Materials: Thirty-six patients in need of 40 three-unit posterior FDPs were included in the study. The FDPs were randomly assigned to 20 zirconia and 20 metal-ceramic restorations. Abutment preparation was performed as follows: a 1-mm-wide circumferentially chamfer, axial reduction of 1 mm with 10-12-degree taper, and an occlusal reduction of 1.5 to 2 mm. Full-arch impressions were taken using addition silicone (Express Penta Putty and Express Penta Ultra-Light Body, 3M ESPE). Provisional restorations (Protemp Garant, 3M ESPE) were then made and cemented using a temporary eugenol-free zinc oxide cement. (Integrity TempGrip, Dentsply De Trey GmbH). The ceramic restorations were prepared using a IPS e.max ZirCAD (Ivoclar Vivadent) CAD/CAM system and the metal-ceramic ones were fabricated from a chromium-cobalt alloy (Heraenium Pw, Heraeus Kulzer) using the conventional casting technique. The ceramic FDPs were cemented using a resin-based cement (RelyX Unicem, 3M ESPE) and the metal-ceramic FDPs were cemented using a glass-ionomer cement (Ketac Cem, 3M ESPE). All FDPs were evaluated at baseline, and 1, 3 and 5 years after cementation. Restorations were assessed using the California Dental Association quality evaluation system. Periodontal parameters were also assessed. Statistical analysis was performed by applying Wilcoxon signed-rank and Mann-Whitney U tests.

Results: The survival rates for metal-ceramic and zirconia restorations were 100%. No fractures of the zirconia or metal frameworks were observed during the observation period. Restorations from both groups were assessed as satisfactory. Minor chipping of the veneering ceramic was observed in 4 zirconia FDPs after 5 years. No significant differences were observed between the abutment teeth and contralateral teeth for either type of restoration. Significant differences were shown within the groups, for Gingival Index and Margin Index.

Conclusion: The 5-year results indicate that zirconia posterior FDPs using the IPS e.max ZirCAD system are a valid alternative to metal-ceramic restorations.

Poster 86

Influence of Porcelain Veneering on the Marginal Fit of Posterior Zirconia Three-Unit Bridges. In Vitro Study

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Purpose: Marginal fit is a very important factor considering the restoration's long-term success. However, adding porcelain to frameworks may cause distortion and lead to an inadequate fit, which exposes more luting material to the oral environment and causes secondary caries. The aim of this study was to compare the marginal fit of 3-unit zirconia-based fixed dental prostheses (FDPs) before and after porcelain veneering.

Methods & Materials: Forty standardized steel specimens were prepared to receive posterior 3-unit FDPs. FDPs were distributed randomly into 4 groups (n = 10): LavaTM Group (3M ESPE), In-Ceram® YZ Group (Vita), IPS e-max® ZirCAD Group (Ivoclar Vivadent) and Metal-ceramic group (control group). FDPs were fabricated according to the manufacturer's instructions. The vertical marginal discrepancy of the FDPs was measured before and after porcelain veneering by using an image analysis system at 240 points along the circumferential margin. Statistical analysis was performed by Wilcoxon signed-rank test and Kruskal-Wallis test. The the level of significance was set at $P<.05$.

Results: The means and standard deviations of the marginal fit before and after porcelain veneering were: Lava Group 26.4 ± 17.3 µm and 66.5 ± 42.3 µm; In-Ceram YZ Group 39,5 ± 28,4 µm and 48 ± 15,3 µm; IPS e-max ZirCAD 74,1 ± 26,5 µm and 33,6 ± 20,2 µm; Metal Ceramic Group 75,7 ± 25,1 µm and 66,7 ± 31,4 µm. Before veneering, the Lava group structures obtained the best precision in the marginal fit, whereas IPS e-max® ZirCAD showed the best adjustment after veneering. No statistically significant differences were found before and after porcelain veneering in the control, Lava and In-Ceram YZ groups. However, significant differences appeared in the IPS e-max ZirCAD group ($p < 0.002$).

Conclusion: Zirconia-based ceramic FDPs showed marginal gaps that were within a reported clinically acceptable range of marginal discrepancy. Porcelain veneering has a positive influence on the marginal fit of the IPS e-max® ZirCAD FDPs.

Poster 87

An Up to 3-Year Clinical Evaluation of Zirconia-Based Restorations

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Purpose: The aim of this follow-up study was to evaluate the clinical outcome of fixed dental prostheses (FDPs) with zirconia frameworks.

Methods & Materials: Fifteen patients (12 female, 3 male) received 15 FDPs (3- to 6-unit, average 4.53 unit) at the Hospital of Health Sciences University of Hokkaido. Zirconia substructures were fabricated by a CAD/CAM system and veneered using the powder buildup technique. All restorations were cemented with adhesive resin cement. The clinical evaluation of restorations was checked after 1 week after cementation with recall examinations at every 6 month by calibrated investigators. Statistical analysis was performed by descriptive statistics and the Kaplan-Meier survival analysis.

Results: The mean service time was 35.3 (+/- 6.9) months with a range from 27 to 44 months. The survival of FDPs was 100%. No fractures occurred, rendering a 100% success rate of the zirconia frameworks. One FPDs had to be replaced because of technical problem. The survival rate, therefore, was 93.3%.

Conclusion: Zirconia offers sufficient stability as a framework material for 3- to 6-unit posterior FPDs. More research has to be conducted to investigate performance of FDPs with zirconia frameworks under clinical conditions.

Poster 88

Esthetic Rehabilitation in Maxillary Anterior Tooth with Early Childhood Caries Using ZIRKIZ® Crown : A Case Report

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Purpose: The purpose of this case report is to present the esthetic anterior restoration with ZIRKIZ® crown of a early childhood caries(ECC) patient.

Methods & Materials: A 1.6-year-old girl was brought to hospital by her parents for the caries with a complaint of severe pain. Her medical history did not reveal any important information. After clinical and radiographic examinations, she was diagnosed as early childhood caries(ECC) of maxillary primary incisors. Due to the extensive loss of clinical crown, pulpectomy and oral rehabilitation using composite strip crowns were planned for her treatment. The scheduled treatment was performed. After 8 months, she visited hospital complaining of fractured incisor tooth due to trauma and the fracture of the composite strip crown was observed. ZIRKIZ® crown which features both esthetics and strength was considered for its

rehabilitation. The fractured tooth was prepared for ZIRKIZ® crown under infiltration anesthesia and ZIRKIZ® crown was cemented to the prepared tooth using Rely XTM Unicem.

Results: The restoration of primary maxillary incisors using ZIRKIZ® crown showed improved esthetic characteristic and toughness compared to open faced stainless steel crown and composite strip crown.

Conclusion: The ZIRKIZ® crown can be considered alternative treatment option for primary maxillary incisors of child with early childhood caries and high trauma tendency.

Poster 89

The Effect of Psychological Status on Tooth Color Selection

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Purpose: Color selection is an intrinsic factor in crown restoration. However, there is a discrepancy in the colors selected by patients and dentists. The factors of gender, age, race, cultural variation, and psychological status may affect a patient's preference. Therefore, the aim of this study was to clarify the influence of psychological factors on color selection of a tooth.

Methods & Materials: Twenty male subjects (mean age 24.7±2.5) having neither color blindness nor prosthetic treatment on maxillary central incisor were involved in this study. Following completion of a psychological questionnaire for transaction analysis (TEGII), the subjects were asked to select a suitable tooth shade for the upper right central incisor by utilizing shade tabs (Vita classical shade guide; VITA). Furthermore, colorimetric analysis was conducted with a color-measuring system (Crystaleye Spectro Photometer) to analyze the difference between the actual (A) and preferred (P) colors in terms of delta L*, delta a* and delta b*.

Results: There was a negative correlation coefficient of -0.627 ($p<0.01$) between the Critical parent for factor (CP) in TEGII and delta L*. On the other hand, there was a positive correlation coefficient of 0.482 ($p<0.05$) between CP and delta a*. The sample size should be expanded to cover other possible factors for further analysis.

Conclusion: This study suggested that the subjects having CP in TEGII were prone to select lower lightness and more predominantly a red-purple shade as preferred colors compared with the actual ones. With the limitation of the study design, the subjects' psychological status may have affected shade preference.

Poster 90

Pontic Site Development and Soft Tissue Transfer on Anterior Esthetic Area

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Purpose: Soft tissue collapse is inevitable after removing provisional restoration. When inserting gingival cord, soft tissue is displaced to undesired contour. Viscosity of impression material also causes gingival displacement. Therefore, the consideration to transfer the prosthetically contoured soft tissue to master cast is required, especially in the esthetic area. In this report, the methods to maintain and transfer desired soft tissue contour to master cast will be introduced.

Methods & Materials: In first case, fifty one year old male presented with porcelain-fused-to-metal fixed partial denture on #11-22. His chief complaint was porcelain fracture of #22. In radiograph, impacted supernumerary tooth existed with cystic

change, and also atrophy of residual alveolar ridge was observed. Extraction of impacted supernumerary tooth with ridge augmentation was planned. After surgery, gingiva was contoured using provisional restoration. In pontic area, soft tissue morphology was transferred to master cast with modified zirconia coping pick-up impression. Final restoration was fabricated using zirconia coping and e.max ZirPress. In second case, twenty two year old female presented with root fracture of #21. Fixed partial denture on #11-22 and single crown on #12 were planned to replace root fractured #21 and modify contours of peg lateralis on #12 and 22. Gingiva was contoured with provisional restoration and the soft tissue was transferred to master cast using pattern resin. Final restoration was fabricated using e.max Press.

Results: Harmonious contour of soft tissue was achieved by provisional restoration and transferred to master cast by various techniques. By transferring the emergence profile of provisional restoration on final prosthesis, satisfied esthetic and functional result was achieved

Conclusion: Additional procedure is needed to transfer the harmonious contour of the soft tissue developed by provisional restoration on the working cast, and also maintain it on the final prosthetic. Using this method, satisfied prosthetic and treatment outcome can be predicted.

Poster 91

Fabrication of All-Ceramic Crowns Using a New Method Improvement of Fit by Drying of Slips

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Purpose: At present, all-ceramic crowns are produced using porcelain firing, lost wax process, and CAD/CAM methods, and their fit and strength are compatible with those of metal and metal-ceramic restorations. However, further improvement is necessary because they have the disadvantages that a long time is necessary until completion, and specific equipment is required for their production. Therefore, we have devised a method for producing copings of all-ceramic crowns in a short time, which does not require specific equipment and duplicated models, and evaluated the possibility of clinical application. In this study, to improve the fit of copings, we evaluated the influence of the drying of slips with a dryer and with natural drying on the fit after primary and secondary firings in the coping production process.

Methods & Materials: Metal molds of the molar area abutment tooth morphology were used for experiments. A silicone impression material for producing duplicated models (Duplicone, Shofu Co.) was used. High strength dental stone (New Fujirock IMP, GC Co.) was applied as the model material.

Copings after completing primary and secondary firings were repositioned in working models, and the distance between the 4 marginal areas of the coping and those of the working model was measured using a universal measuring microscope (TOPCON TUN-200, TOPCON Co.), and the measurements were set as the amount of margin space. Ten specimens were used for each condition.

Results: Drying of slips using a dryer improved the fit of copings after both primary and secondary firings, in comparison with conventional natural drying.

Conclusion: These experimental results suggest that firing after drying slips using a dryer in the coping production process caused the development of dried gel because of the gelation of slips in an environment of almost 100°C, and, because shrinkage did not occur thereafter, improvement of the fit of copings after firing was noted.

Poster 92

A 3D Finite Element Analysis of the Stress Distribution in Different Restorative Materials Used in Long Span Implant-Supported Maxillary Prostheses in Response to Loading

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Purpose: The stress distribution from loading on implant-supported prostheses (ISP) and bone is poorly understood. Recently finite element analysis (FEA) using patient specific data has been made possible with software manipulation of computerized tomography (CT). The purpose of this study was to analyze stresses within cantilevered ISPs of different restorative materials on an all-on four distribution of angulated implants

Methods & Materials: Pure DICOM data from a high resolution CT of the edentulous maxillae of a patient were imported into Mimics™ software (Materialise; Belgium). Co-axis implants (Southern Implants; Irene) were then digitally placed with an appropriate anatomical distribution. The super-structure from the patient's original prosthesis was scanned separately. The study elements were meshed separately and the meshed assembly re-imported and superimposed on the CT scan. Material properties were assigned to the meshed study elements. The project was then exported as a Nastran bulk file (.bdf) into the FEA software, NX Nastran (Siemens; USA) for analysis. Prosthetic screws were simulated and a preload of 300N applied to each screw. A vertical load of 600N on the distal cantilever enabled an analysis of the von Mises stresses. The prosthesis was modeled with the material properties of monolithic polymethylmethacrylate (PMMA); monolithic zirconia (ZrO2); titanium veneered with polymethylmethacrylate (TiPMMA); titanium veneered with porcelain (TiP); chrome-cobalt veneered with polymethylmethacrylate (Cr-CoPMMA); and chrome-cobalt veneered with porcelain (Cr-CoP).

Results: The von Mises stress values were consistent in all material permutations when a screw preload was applied. In the monolithic prostheses, ZrO2 had higher stress values that were more distributed within the prosthesis compared with PMMA. In the veneered substructure prostheses, Cr-CoPMMA had the highest stresses reaching 200MPa in the connector area. The stress values were less on both the titanium and chrome-cobalt substructures when veneered with porcelain compared with PMMA. This corresponded to a higher stress distribution in the porcelain superstructure than the PMMA superstructure.

Conclusion: Superior stress distribution occurred within more rigid prostheses with higher concentrations at the connectors. This highlights the need for adequate surface area at the connector sites. These results also provide important information about the clinical failures seen at the porcelain-substructure interface.

Poster 93

Zirconia Resin-Bonded Prosthesis: A Case Report

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Purpose: The resin-bonded prosthesis (RBP) has been widely used in dental practice for decades. Zirconia presents the great advantages for aesthetic area. Aim of this work is to present a clinical case of rehabilitation of a mandibular central incisor by means of a zirconia RBP.

Methods & Materials: A 69-year-old woman presented with the chief complaint of rehabilitating the mandibular right central incisor. The tooth was extracted two weeks before for periodontal reasons. The clinical and radiographic examination revealed a large vertical and horizontal bone defect (Fig.1), so implant placement was excluded. After discussing the possible treatment options (fixed and removable dental prosthesis), in accordance with the patient a zirconia RBP was chosen. The retainers of the RBP were decided to be extended from canine to canine to splint the mandibular anterior teeth and reduce the existing slight mobility. The preparation of lingual surfaces of anterior mandibular elements consisted in a minimal chamfer finishing line in the enamel thickness. An impression was taken using polyvinylsiloxane impression

material (Heraeus Flexitime®) and individual tray. The dental technician poured the impression and scanned the cast for virtually designing of the framework (Fig.2). The framework was milled using yttria-stabilized tetragonal zirconia polycrystals (Y-TZP). It was clinically tried on, checking for the fit. After veneering with feldspathic porcelain (Ivoclar Vivadent IPS e.max® Ceram), a first esthetic control was performed, before glazing, showing the need of modifying some aspects (color and characterization). The subsequent control showed a perfect esthetic integration of the RBP. Before cementation, the zirconia framework was internally sandblasted for increasing micro-retention (alumina particles, 110 micron, 1.5 bar), and cleaned with ultrasound and cooling water (Fig.3). Rubber dam was adapted to the anterior teeth. The lingual surfaces were polished (prophylaxis brush and pomice powder) and etched (37% phosphoric acid for 60 sec). A self-curing luting composite (Ivoclar Vivadent Multilink®) was used to cement the RBP.

Results: The 3 years follow-up showed the maintenance of both adhesion and esthetic and functional integration of prosthesis (Fig.4).

Conclusion: In the Authors' opinion RBD is a valid therapeutic option for rehabilitation of anterior teeth and zirconia may be the first choice material in aesthetic area.

Poster 94

Fatigue Resistance of Various Metal-Free Cantilever Bridges Supported by Laminate Veneers

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Purpose: The aim of this study was to evaluate the contribution of different connector configurations to the fatigue resistance of anterior metal-free cantilever bridges.

Methods & Materials: Hundred and thirty five extracted upper canines were prepared for laminate veneer restoration (n=15 per group). A lateral incisor cantilever was constructed with 1 mm (Groups Z1,E1,F1) and 3 mm (Groups Z2,E2,F2) incisal overlap laminates and 1 mm overlap laminate with lingual wing (Groups Z3,E3,F3) for Zirconia, IPS Empress 2 and everStick C&B E-glass fibre reinforcement with G-aenial Posterior restorative composite. Bifix QM resin cement and Solobond plus adhesive was used for cementation. After 4 weeks water storage (37°C), the teeth were potted in poly(methylmethacrylate) 1 mm below cement-enamel junction. Two specimens of each group were tested monotonically at 30° angle with 4 mm diameter stainless steel sphere to estimate the maximum fracture load. Fatigue testing at 5 Hz was initiated at approximately 85% of the maximum load (R= 0.1) using an Instron ElectroPuls E1000 dynamic testing machine. For successive specimens the cyclic load was decreased in increments of approximately 50 N. The process continued until reaching the load at which specimens did not fracture within 1.2x106 cycles. The fatigue life distribution was evaluated in terms of the cyclic force and number of cycles to failure. The groups were compared using Wilcoxon Sum Rank Test (alfa=0.05). Fracture patterns were also classified.

Results: The maximum fracture load ranged between 140 and 516 N and the highest resistance to fracture was with Z2, followed by E3 and F3. The fatigue resistance of the cantilever groups showed significant differences ($p<0.05$). The ranking of the groups and statistically significant groups (superscript letters indicate similar groups) from higher to lower was as follows: Z2a,E3ab,F3ab,F2ab,Z3ab,E2bc,Z1bc,F1bc,E1c. The primary fracture patterns were cantilever-laminate connector failure (E1,E2,E3,F1,Z3) or debonding of the laminate veneer (Z1,Z2,F2,F3). Cantilevers supported by only 1 mm overlap laminates seem to fail by debonding or connector failure at relatively smaller loads.

Conclusion: Using suitable reinforcing elements gives a higher fracture strength compared to 1 mm incisal overlap laminates. Cantilevers supported by laminate restorations may give an esthetically viable alternative to full crown restorations.

Poster 95

The Response of Maxillary Bone to Loading of Long Span Implant-Supported Prostheses of Different Restorative Materials Using a 3D Finite Element Analysis

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Purpose: The stress distribution from loading on implant-supported prostheses (ISP) and bone is poorly understood. Recently finite element analysis (FEA) using patient specific data has been made possible with software manipulation of computerized tomography (CT). The purpose of this study was to analyze the stresses within the bone of the maxilla from loading ISPs of different restorative materials on an all-on four distribution of angulated implants.

Methods & Materials: Pure DICOM data from a high resolution CT of the edentulous maxillae of a patient were imported into Mimics™ software (Materialise; Belgium). Co-axis implants (Southern Implants; Irene) were then digitally placed with an appropriate anatomical distribution. The super-structure from the patient's original prosthesis was scanned separately. The study elements were meshed separately and the meshed assembly re-imported and superimposed on the CT scan. Material properties were assigned to the meshed study elements. The project was then exported as a Nastran bulk file (.bdf) into the FEA software, NX Nastran (Siemens; USA) for analysis. Prosthetic screws were simulated and a preload of 300N applied to each screw. A vertical load of 600N on the distal cantilever enabled an analysis of the von Mises stresses in the bone around the implants. The prosthesis was modeled with the material properties of monolithic polymethylmethacrylate (PMMA); monolithic zirconia (ZrO2); titanium veneered with polymethylmethacrylate (TiPMMA); titanium veneered with porcelain (TiP); chrome-cobalt veneered with polymethylmethacrylate (Cr-CoPMMA); and chrome-cobalt veneered with porcelain (Cr-CoP).

Results: The maximum von Mises stress values were observed in the crestal bone immediately posterior to the distal implant on the loaded side. The more rigid prostheses displayed more favourable distributions of stresses in the bone. There was a greater localization of stress in the bone on the same side as the load with the less rigid PMMA prosthesis.

Conclusion: The different restorative materials did not elicit obvious differences in the range of von Mises stress values in the maxilla. However, the distribution of these stresses was related to the rigidity of the prostheses. This suggests that compromised maxillary bone may require a more rigid ISP.

Poster 96

Clinical 4-Year Follow-Up Study of Zirconia Single Crowns

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Purpose: In fixed prosthodontics zirconia has become a material of choice beside the metal ceramics. The aim of our study was to evaluate the technical complications of zirconia single crowns in 4-year clinical follow-up study.

Methods & Materials: Altogether 66 patients (30 men and 36 women; age 19 – 81 years, mean age 60.4 years) treated with 204 zirconia single crowns attended the clinical 4-year follow-up examination. The mean follow-up time was 4.0 years (2.0 – 6.0 years). The single crowns were performed by undergraduate dental students at the Institute of Dentistry, University of Oulu.

Results: The most usual technical complications were chipping of the porcelain (11 crowns, 7 %) and loss of retention (9 crowns, 5 %). Other complications were crown renewals for root fracture (2 crowns, 1 %) and loss of crown for endodontic reasons (2 crowns, 1 %). The wear of occlusal surfaces of crowns seen as roughness felt with probe was found in 41 % of single crowns.

Conclusion: In the 4-year follow-up of zirconia single crowns the most common technical complications were chipping of the porcelain and loss of retention. Wear of occlusal surfaces of the crowns was also frequently seen.

Poster 97

New Computerized Design Method for Complex Dental and Maxillofacial Rehabilitations

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Purpose: The aim of this study is to obtain an aesthetic preview in complex dental and maxillofacial reconstructions.

Methods & Materials: Ten patients with different clinical situations and various degrees of impairment in facial aesthetics were selected. For each patient, a standardized set of procedures is performed: facial photos, intra-oral scans for dental arches and for mandibulo-maxillary relations, CT-scans. All the recordings are collected and processed with a special software.

Results: Tridimensional computerized personalized models are obtained; these ones allow to build-up a preview for the aesthetic dental and maxillofacial rehabilitations, in accordance with the facial details of each patient.

Conclusion: This method proves to be a valuable instrument for diagnosis and treatment, successfully applied in clinical situations that require complex dental and maxillofacial restorations.

Poster 98

Perceived Color Shift of Ceramics According to the Change of Illuminating Light with Spectroradiometer

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Purpose: Perceived color of ceramics changes by the spectral power distribution of ambient light. This study aimed to quantify the amount of shifts in color and color coordinates of clinically simulated seven all-ceramics due to the switch of three ambient light sources using a human vision simulating spectroradiometer.

Methods & Materials: CIE color coordinates, such as L*, a* and b*, of ceramic specimens were measured under three light sources, which simulate the CIE standard illuminant D65(daylight), A(incandescent lamp), and F9(fluorescent lamp). Shifts in color and color coordinate by the switch of lights were determined. Influence of the switched light(D65 to A, or D65 to F9), shade of veneer ceramics(A2 or A3), and brand of ceramics on the shifts was analyzed by a three-way ANOVA.

Results: Shifts in color and color coordinates were influenced by three factors($p<0.05$). Color shifts by the switch to A were in the range of 5.9 to 7.7DeltaE*ab units, and those by the switch to F9 were 7.7 to 10.2; all of which were unacceptable (DeltaE*ab>5.5). When switched to A, CIE a* increased (Deltaa*:5.6 to 7.6); however, CIE b* increased (Deltab*:4.9 to 7.8) when switched to F9.

Conclusion: Clinically simulated ceramics demonstrated clinically unacceptable color shifts according to the switches in ambient lights based on spectroradiometric readings. Therefore, shade matching and compatibility evaluation should be performed considering ambient lighting conditions and should be done under most relevant lighting condition.

Poster 99

In-Vitro Comparison of Loads to Fracture Monolithic Zirconia Anatomical Contour Crown Restorations with Variations of Marginal Thickness

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Purpose: To investigate and compare the loads required to fracture monolithic zirconia anatomical contour crown restorations with variations of marginal thickness.

Methods & Materials: A mandibular first molar typodont was sequentially prepared to receive a monolithic zirconia anatomical contour crown restoration but with three different finish line depths; feather-edge (FE: 0.3mm); chamfer (Ch: 0.5mm); deep chamfer (DCh: 1mm) and duplicated in type IV gypsum die stone to form three master stone dies. The master stone dies were then scanned to construct tooth-form analogues made from Tufnol 10G/40 to receive four variations of zirconia anatomical crowns (n=80). Test groups of zirconia anatomical crowns exhibiting the different marginal thicknesses comprised of deep chamfer (DCh: 1mm), chamfer (Ch: 0.5mm), feather-edge (FE: 0.4mm) and feather-edge adjusted (FEAd: 0.3mm). The crowns were cemented to their corresponding tooth-form analogues using resin-modified glass-ionomer cement and after 24 hours subjected to load testing in a Dartec servo-hydraulic machine at a crosshead speed of 0.5mm/min until fracture occurred. A one-way analysis of variance was used to analyse the data and post-hoc multiple comparisons tests were applied to ascertain where the differences existed at a P=0.05 significance level.

Results: The mean (± standard deviation) fracture loads were 2419.75N (± 401.44N), 2352.30N (± 348.57N), 2947.65N (± 554.83N) and 2530.05N (± 528.72N) for the DCh, Ch, FE and FEAd groups respectively. One-way analysis of variance showed significant differences between the test groups and post-hoc multiple comparisons demonstrated a significantly greater failure load between the FE group and the DCh (P=0.004), Ch(P=0.001) and FEAd (P=0.036) groups. There were no significant statistical differences found between the DCh, Ch and FEAd groups (P>0.999).

Conclusion: The load to fracture monolithic zirconia anatomical contour crown restorations regardless of marginal thickness exceeded clinically exerted forces.

Poster 100

Prospective Evaluation of Zirconia and Metal-Ceramic 3-Unit Posterior Fixed Dental Prostheses: A 7-Year Clinical Results

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Purpose: The aim of this prospective study was to evaluate the clinical behaviour and the survival rates over 7 years of posterior three-unit FDPs made of metal-ceramic and zirconia-based framework. The null hypothesis was that there would be no differences between the two materials.

Methods & Materials: Thirty-six patients in need of 40 FDPs replacing one posterior tooth (molar or premolar) were included in the study. The FDPs were randomly assigned to 20 zirconia-ceramic and 20 metal-ceramic restorations. All abutment teeth were prepared as follows: occlusal reduction of 1.5 to 2 mm; axial reduction of 1 mm with 10-12-degree taper and 1-mm-wide circumferentially chamfer. Impressions were taken using addition silicone (Express, 3M ESPE). The zirconia frameworks were produced by a CAD/CAM system (NobelProcera Zirconia, Nobel Biocare). The metal-ceramic restorations were fabricated by means of the traditional lost-wax technique. The zirconia FDPs were cemented using a resin-based cement (RelyX Unicem, 3M ESPE) and the metal-ceramic FDPs were cemented using a glass-ionomer cement (Ketac Cem, 3M ESPE). Each case was reviewed at 1 week and 1, 3, 5 and 7 years following placement. Restorations were assessed using the California Dental Association (CDA) criteria. Periodontal parameters and were also evaluated. Statistical analysis was performed using Wilcoxon signed-rank and Mann-Whitney U tests.

Results: The survival rate was 85% for zirconia and 100% for metal-ceramic restorations after 7 years. No fracture of a zirconia or metal framework was observed. Two zirconia restorations failed for biological reasons. Chipping of the veneer was observed in 8 restorations of the zirconia group, one of them resulting in the need to replace the FDP. The CDA rating of satisfactory was given for 100% of the remaining restorations at a7-year evaluation. Significant differences between both groups were shown for surface and color. No differences in periodontal parameters were observed between both types of FDPs.

Conclusion: After an observational period of 7 years, the survival rate observed for zirconia posterior FDPs was inferior to those obtained for metal-ceramic FDPs. Higher rates of tecnical complications were found at zirconia FDPs compared to metal-ceramic FDPs, mainly caused by chipping of the veneering ceramic.

Poster 101

Esthetic Articulation Techniques: A Review

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Purpose: Incorrect 3-dimensional orientation of a dental cast may compromise the functional and esthetic result of prosthetic restorations. Traditional face-bow transfer techniques orient the maxillary cast on the articulator from the points of anatomic or arbitrary condylar axis. Head asymmetry may result in a divergence between the interpupillary line and the intercondylar axis the face-bow record transfer converts asymmetrical axis locations to the horizontal symmetrical axis of the articulator. This divergence may result in a canted incisal plane of the final restorations. Therefore, face-bow transfer for anterior indirect restorations may have adverse aesthetic consequences, unless the intercondylar axis and the aesthetic reference planes of the face are parallel or unless the difficulty is recognized and compensated for during the transfer operation. This paper aims to review esthetic orientation techniques which compensate for the patient's asymmetric intercondylar axis.

Methods & Materials: a literature review regarding esthetic articulation techniques on Pubmed was carried out.

Results: Six orientation techniques are described in order to fulfill the aesthetic orientation requirements so as to achieve predictable results. The most simple being Diagrammatic Landmark Transmission and Cast Indexing Technique. The Aesthetic Face-Bow Transfer is an alternative method which uses the aesthetic face-bow. Modified face bow transfer advocates relocating ear bow to compensate for asymmetric axis. Articulator correction platform is another simple way to compensate for cant in axis without compromising for esthetics and function. Kois Dento Facial Analyser also utilizes such esthetic orientation technique. It also provides additional golden proportion gauges for restorations

Conclusion: The master model must provide the ceramist with the same perspective of the patient as is seen by the clinician — facing the viewer. Unless precise information is transferred to the laboratory, the ceramist can only estimate horizontal and vertical alignment. Thus it becomes imperative on the dentist to use one of these six orientation techniques to achieve predictable esthetics in clinical practice. Most easy and accurate being correction platform and Kois Dento Facial Analyser.

Poster 102

The Effect of Bleaching Agents on Dentine Collagen

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Purpose: This research aimed to: 1- Determine any changes in dentine collagen of extracted teeth following the application of either 5 or 10% concentrations of a tooth whitening agent (carbamide peroxide (CP)) for 2 different application times for a 1 week period. 2- Establish if a correlation exists between any change in collagen and concentration or exposure time of the peroxide agent.

Methods & Materials: Ethical approval was obtained from the Ethics committee prior to conducting this research (10/H0311/49 Committee East of England – Hertfordshire) For this study, 35 non-carious extracted teeth were divided into 5 groups of 7 (control + four test groups). The 4 test groups were exposed to 5% and 10% CP for 2 hour and 4 hour durations on a daily basis, for 1 week. The control group received no treatment. 35 Premolars were sectioning transversely at mid-coronal level to create disks of 3mm thickness. CP was applied to an external enamel window (5mm× 5mm) and washed off after 2 or 4 hours respectively. Sectioned disks were examined using the Raman Spectroscopy to measure a minimum of 4 sites along a transverse line bucco-lingually from the enamel window (buccal DEJ, buccal pulp, lingual pulp & lingual DEJ).These measurements allowed detection of absorption and intensity changes in the dentine proteins (Amide I &Amide III).

Results: Changes were noticed in the intensity of Amide I & Amide III in the treatment groups compared to the control samples. Group 1 (10% cp for 4 hours) showed a visible reduction in Amide I & Amide III with respect to all sites in the treatment groups. Group 2 (5% cp for 2 hours) show minor reductions in Amide I & Amide III. There was an obvious difference in the distributions of the amide I & amide III absorbance in the four sites. The most marked changes occurred at the buccal DEJ site in Group 1 (10% CP for 4 hours).

Conclusion: Dentine collagen showed changes in Amide I & Amide III intensity (Raman output) following the application of different concentrations and time intervals of CP. The greatest change was seen with a higher CP concentration and longer application time.

Poster 103

Influence of Air-Particle Abrasion and Low-Temperature Aging on Flexural Strength of Monolithic Zirconia

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Purpose: The aim of this in-vitro study was to evaluate the effect of air-particle abrasion and artificial aging on biaxial flexural strength of monolithic zirconia.

Methods & Materials: Fourty-eight zirconia disc-shaped specimens with 15 mm diameter and 1 mm thickness were prepared from monolithic zirconia blocks (Prettau, Zirkonzahn) and submitted to one of the protocols (n=8 per group): (a) Control, (b) Control + artificial aging, (c) Sandblasting with 50 µm Al2O3 particles, (d) Sandblasting with 50 µm Al2O3 particles + artificial aging, (e) Sandblasting with 110 µm Al2O3 particles, (f) Sandblasting with 110 µm Al2O3 particles + artificial aging. Biaxial flexural strength was measured with a universal testing machine using piston-on-three-ball technique at a crosshead speed of 1 mm/min. Data were analyzed with one-way ANOVA, Tukey HSD, and Student's t tests (a=.05).

Results: Low-temperature aging adversely affected the biaxial flexural strength of monolithic zirconia for all groups tested ($p<0.05$). 50 µm Al2O3 sandblasted groups exhibited significantly higher strength values in comparison to control and 110 µm Al2O3 groups regardless of low-temperature aging process ($p<0.05$). Sandblasting with 110 µm Al2O3 particles significantly decreased the flexural strength of monolithic zirconia ($p<0.05$).

Conclusion: The results of this study indicated that sandblasting monolithic zirconia surface with 50 µm Al2O3 particles increases the biaxial flexural strength whereas air-particle abrasion with 110 µm Al2O3 particles adversely affected the material strength. Low temperature aging process decreased biaxial flexural strength of monolithic zirconia.

Poster 104

Finite Element Analysis of Preparation Geometries for CAD/CAM Restorations

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Purpose: The introduction of materials such as zirconia to provide strong cores for all-ceramic restorations was accompanied by many reports of chipping of the veneering ceramics over these cores. Whist this may have been due to incorrect thermal cycles for the veneering ceramic, we hypothesized that the preparation geometry may also have been a factor. In terms of the occlusal forces transmitted to and through the ceramic, preparation geometry may either resist those forces or convert them into tensile stress, thereby inducing chipping. Whilst there is some evidence that marginal geometry influences tensile stresses, occlusal form may also have a significant effect. Finite Element Stress Analysis (FEA) has proven to be of significant value in measuring stress in solids and materials with complex geometries. We therefore decided to carry out such an analysis because of the ability to change the variables of the geometry used for the marginal, as well as the occlusal form.

Methods & Materials: A proposed ideal tooth preparation for an all-ceramic crown was first made to provide a starting geometry. This preparation had an internally rounded marginal shoulder, and a convex occlusal form. This preparation was scanned (using the Sirona InEos® laboratory scanner) to produce a digital stl file. This file was them imported into Solidworks™ software. Using predetermined geometric parameters, both two and three-dimensional virtual models were produced. Data for dentine, cement and ceramic were introduced to define the properties of these models. The ceramic material properties chosen were those for e.max CAD™ a Lithium Disilicate monolithic ceramic. The analysis involved two stages. The first was undertaken within the Solidworks™ software and the second exported to be analysed in Ansys™ FEA software. This was to confirm the reliability of FEA readings obtained in the Solidworks™ software.

Conclusion: The models allowed for variations to be made in both the marginal configuration and the occlusal form, to determine the principal stress distribution patterns. These results will be presented with recommendations as to the optimum marginal and occlusal form for all-ceramic restoration to best withstand occlusal forces with the least amount of tensile stress within the ceramic.

Poster 105

The Effect of Different Surface Finishing Procedures of IPS E. Max (Lithium Disilicate) on Antagonist Enamel Wear: An In Vitro Study

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Purpose: To investigate the effect of how different surface finishing procedures of IPS e.max affects the wear of the antagonist enamel

Methods & Materials: Two body wear resistance tests were conducted using the Willytec chewing simulator under the following conditions: - 2 axis movement (2mm vertical movement, 1mm lateral movement) - Wet cycling - 120,000 cycles at frequency of 1.6Hz - Loaded weight of 49N Enamel specimens were obtained from extracted impacted mandibular third molars with clinically sound enamel. Ceramic specimens were polished under laboratory conditions then allocated into 5 groups (12 per group) for surface finishing and/or adjustment: 1. Highly polished ceramic (P) Ra=0.014µ 2. Glazed ceramic (G) Ra=0.034µ 3. Clinically adjusted ceramic obtained following simulated clinical adjustment (A) Ra=1.044µ 4. Clinically adjusted and repolished ceramic (R) Ra=0.014µ 5. Control - enamel opposing enamel (C) Ra=0.076µ Wear analysis was performed by superimposition of 3d laser scans pre and post testing to determine height loss and volumetric loss of the antagonist enamel

Results: The mean volumetric loss for the P, G, A, R and C groups respectively was 0.2972, 0.4436, 0.4457, 0.5921 and 0.2311 mm3. The mean height loss for the P, G, A, R, and C groups was 0.2722, 0.3271, 0.3123, 0.3957 and 0.2994 mm. There was no statistically significant effect on wear volume (p=0.082) or height (p=0.263) between the 5 groups

Conclusion: The surface finish of IPS e.max did not influence the degree of antagonist enamel wear

Poster 106

A Colorimetric Study of Natural Teeth: Relationship Between the Color and the Thickness of Right and Left Upper Central Incisor Teeth

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Purpose: Although it is important to understand specific colorimetric features for esthetic zone restoration, such as that of upper central incisors, little study has been conducted concerning the relationship between tooth color and shape. The purpose of this study, therefore, was to determine the colorimetric characteristics and corresponding thickness of teeth.

Methods & Materials: Twenty-six dental students at Meikai University (21 males, 5 females, mean age 24.1 ± 0.6 years old) were enrolled as subjects without any restorations or fillings in their upper incisor region. Colorimetric measurement was conducted with a dental color measuring device (Crystaleye Spectrophotometer®). Silicone impressions were taken to make plaster casts of the teeth. Thickness measurement was carried out with a digital vernier caliper (IP67 ABS caliper®). Colorimetric measurements were carried out for three cervical and incisal points of the right and left upper central incisors, and tooth thickness measurements were conducted for corresponding points. Then, the relationship between colorimetric parameters and tooth thickness was analyzed using SPSS ver.20.0.

Results: Moderate correlative relationships were shown between b* and the thickness in the right tooth cervical ($r=0.320$) and the middle ($r=0.364$) regions. However, significant correlative relationship between the parameters were not found ($p>0.05$, Pearson's correlation coefficient). We need to expand size of the subjects for further analysis in the nearest future.

Conclusion: Despite the limitation of the study design, tooth color tends to tinge yellow in proportion to tooth thickness in the upper central incisors.

Poster 107

In Vitro Evaluation of Retentive Properties of Different Luting Cements on Zirconia Copings

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Purpose: The purpose of this in vitro study was to evaluate the retentive properties of zirconia copings luted with different cements against with base metal alloy copings after artificial aging.

Methods & Materials: Caries-free extracted 120 mandibular premolars were prepared with 6° taper. After preperation, 60 of the speciments were cast in 3Y-TZP, whereas the 60 speciments were cast in an Ni-Cr alloy. Cementation was performed with 3different luting cements (zincphosphate cement, Panavia F2.0, RelyX U100) in each group. Speciments were thermocycled between +5°C and +55°C for 2500 cycles, with a dwell time of 30 seconds. Dynamic loading of 10 speciments in each subgroup was performed for 100 000 cycles at 50 N at a frequency of 0.5 Hz. Vertical tensile force was applied with a constant speed of 10 mm/min until separation was noted. The data were evaluated by multivariate ANOVA and Post-hocBonferroni for comparing quantitative data, Pearson Chi-square Test for qualitative data ($p<0.05$).

Results: The highest mean retentive force for the Ni-Cr alloy copings was observed (281.10N) for PAN speciment only recieved thermocycle; for the zirconia copings was observed (171.40N) for ZPC speciment only recieved thermocycle.

Conclusion: Retentive force of Ni-Cr and zirconia was different each other. Also artificial aging affected retentive force anf failure modes of Ni-Cr and zirconia copings differently. The mean retentive force of all cements in Ni-Cr group after dinamic loading decreased however all cements in zirconia group had similar mean retentive force values before and after dinamic loading.

Poster 108

Fracture Load and Failure Modes of Different Machinable Ceramics Cemented with Self-Adhesive and Multi-Step Adhesive Bonding Systems

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Purpose: This study evaluated the effect of different bonding systems and cyclic loading fatigue on the fracture load and failure modes of sirona CEREC Blocks and IPS e.maxCAD blocks under various conditions.

Methods & Materials: Ninety-six intact human third molar teeth were prepared for (1) sirona CEREC blocks, (2) IPS e.maxCAD blocks, each were cemented with (A) self-adhesive Multilink Speed resin cement (n=24) and (B) Variolink N resin cement (n=24). Seventy-two specimens (18 for each ceramic with each cement) were loaded in a universal testing machine under air, distilled water and artificial saliva conditions (n=6).The other 24 specimens were also loaded after cyclically fatigued for 100,000 cycles in a masticatory simulator. SEM microscopy were used to evaluate the failure modes. The data were analyzed with three-way ANOVA analysis (a=0.05).

Results: The cements, wet environment and cyclic loading had a statistically significant influence on the fracture load of the ceramic ($P<0.001$). During the cyclic loading, no fractures occurred, but the fracture load of test groups decreased significantly. The wet environment significantly lowered the fracture load in each test group ($P<0.005$), but the fracture loads had no significant difference between the water and saliva groups ($P=0.1$). All of the B groups had higher fracture load values than that of A analog groups ($P<0.05$). With the A cement, there were significant differences between the fracture loads of the two ceramic systems ($P<0.005$) but not with the B cement ($P>0.05$).

Conclusion: Wet environment and cyclic loading significantly reduced the fracture load of the ceramics. The multi-step adhesive cement significantly increased the fracture loads more than the self-adhesive one. Furthermore, the multi-step adhesive cement reduced the difference of the fracture load between the two ceramics.

Poster 109

Clinical Fracture and Chipping Rates of Zirconia-Based Crowns

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Purpose: The aim of this systematic review is to evaluate the clinical fracture and chipping rates of tooth supported zirconia-based crowns.

Methods & Materials: Clinical trials on zirconia-based crowns with a follow-up period over 36 months were searched in the following databases: Medline/PubMed, EMBASE and Cochrane Library from 1990 to 2013 and complemented by additional manual search. The annual fracture and chipping rates of anterior and posterior area were calculated and compared with Poisson regression mode. Moreover, the 5-year cumulate incidence was calculated.

Results: Four publications were finally screened out from about 1500 titles and abstracts with a mean follow-up period of 48 months. Base on the results of 435 tooth supported zirconia-based single crowns, no core fracture was observed and an acceptable overall 5-year veneer fracture and chipping rate of 2.2% was demonstrated irrespective of the tooth types. Anterior crowns showed a 5-year veneer fracture rate of 2.0%. Posterior crowns demonstrated a relatively higher veneer fracture rate of 2.3%, while this difference did not reach significance ($P = 0.117$). However, a more accurate fracture rate of each tooth types could not be caculated since the absence of data.

Conclusion: Within the limitations of the present study, current zirconia-based dental materials demonstrated a great 5-year core and veneer fracture incidence when used for tooth supported single crowns in both anterior and posterior segments. Higher veneer fracture or chipping tendency was not found for posterior crowns. Moreover, it is recommended that randomized controlled trials with large sample size should still be undertaken to obtain more definitive results.

Poster 110

Accuracy of Linear Measurements Derived from Cone-Beam Computed Tomography Scans

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Purpose: This study was carried out to determine the accuracy of linear measurements derived from 3 cone beam CT systems used in dental and maxillofacial imaging and their associated imaging software.

Methods & Materials: A CADCAM model was constructed using PEEK (polyetheretherketone) and ruby (Al2O3/Cr2O3) spheres representing teeth on a dental arch. The model was scanned using the 3D Accuitomo 170 in standard mode at 0.16 mm resolution, Carestream CS 9300 at 0.3 mm resolution and I-CATR Next Generation at 0.2 mm, 0.3 mm and 0.4 mm resolution. Eight distances between pairs of spheres in the horizontal plane were repeatedly measured directly using a co-ordinates measurement machine (CMM), and indirectly on CBCT scans viewed utilising a PC monitor. The mean distances were compared between the CMM measurements, as gold-standard, and the CBCT systems at differing resolutions.

Results: Descriptive statistical analysis demonstrated high intra-rater repeatability of CBCT scan measurements (SD range from 0.00 - 0.59) and repeatability of CMM measurements (SD = 0). Paired t-test with a significance level < 0.01 were carried out on a total of 120 scan and 48 CMM measurements. P values were all > 0.01 (p values = 0.44, 0.17, 0.28 for the 3D Accuitomo 170, CS 9300, I-CATR Next Generation 0.3 mm resolution respectively), when comparing measurements between CBCT scans and CMM, between different systems (p values = 0.25, 0.24, 0.84 for the CS 9300 vs 3D Accuitomo 170, the CS 9300 vs I-CAT 0.3 mm resolution, for the I-CAT 0.3 mm resolution vs 3D Accuitomo 170 respectively) and between 0.3 mm and 0.4 mm resolutions for the I-CAT system (p value 0.67). McBride (2005) descriptive scale was applied to Lin's concordance correlation coefficients. Substantial to high levels of agreement were demonstrated when analysing repeatability of measurements.

Conclusion: Linear measurements derived from CBCT scans in this study are precise and accurate. No significant difference was found in measurements taken between different CBCT systems or between resolutions on the I-CATR Next Generation.

Poster 111

In-Vitro Study of Fracture Resistance in Anterior Post and Core Restoration Between Zirconia and Fiber Post with Different Diameters

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Purpose: To observe and analyses the fracture resistance of post and core restoration made by zirconia or fiber post in different diameters.

Methods & Materials: Twenty-four extracted maxillary central incisors finished with root canal treatment were randomized distributed into 4 groups, which were restored by 1.5mm?1.35mm diameters of Zirix posts and 1.5mm?1.375mm Luxaposts, respectively, and these posts were all cemented and build-up core with Luxacore resin material, and covered with metal crowns. The fracture resistance of samples were tested by universal test machine and the fracture modes were observed.

Results: The fracture resistance of 1.5mm and 1.35mm diameters of Zirix post groups was 508.4±143.3N and 434.9±141.7N; 1.5mm and 1.375mm diameters of Luxapost groups was 292.2±54.5N and 238.5±79.1N. There was a significant difference between the prefabricated zirconia post groups and the fiber post groups($P<0.05$), whereas there was no significant difference between different diameters of each zirconia or fiber post groups($P>0.05$). The fracture mode of zirconia post and core restorations were destructive as post fracture or tooth cervical destroyed, but most of the fracture mode of fiber post and core restorations were restorable as the posts decemented from teeth.

Conclusion: It is the material, not the diameter factor that plays an important role in fracture resistance of post and core restoration. Zirconia post can bear higher fracture load, but fiber post propensity to protect the tooth roots.

Poster 112

Application of PERT/CPM in Dental Clinic

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Purpose: PERT/CPM(Program Evaluation & Review Technique /Critical Path Method) is the process which manage all procedure of construction by representing visually interrelation of operation or sequence setting. PERT/CPM is used in architecture or production for optimizing cost and period needed for all phase. The extensive prosthodontic treatment needs dental team approach and long treatment period. Although several studies were tried to reduce duration of treatment, there was no standardized system in dental clinic. The purpose of this study was for reducing treatment period and higher efficiency of treatment through application of PERT/CPM in dental clinic.

Methods & Materials: The patients were selected for study who needed more than 2 departments' cooperation for prosthodontic treatment in Wonkwang Dental University Hospital.

Control group : The patient's whole treatment plan, treatment period, number of hospital visit, treatment costs, treatment results.
Experiment group : The patient's virtual treatment data based on PERT/CPM technique.

We applied PERT/CPM in operation analysis.

Results: There were no differences in treatment plan between control group and experiment group. Treatment period, number of hospital visit was decreased when we applied operation analysis. Also treatment cost in experiment group was little economized compared with control group's treatment cost.

Conclusion: Application of PERT/CPM in dental clinic can achieve reliable treatment and reduced treatment period and establish plan of minimum treatment cost. Also it makes treatment process more effective and enhance dental team approach by cooperation. Therefore, Application of PERT/CPM in dental clinic can make treatment result which both patients and dentists can be satisfied with.

Poster 113

Examination of Tongue Movement During Mastication of Coronal Section Using Ultrasonography

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Purpose: The purpose of this study was to pursue simplified evaluation method of tongue movement during mastication with observation of its morphological changes by ultrasonography.

Methods & Materials: Ten young subjects (mean age 27.0 years) and six dentate elderly subjects (mean age 72.7 years) were selected. Movements in chewing with one side of the left or right were observed. Two swallowing movements were selected; instructions or free. Test food was cooked rice 10g. Using ultrasonography for extracting tongue movements, waveforms on the center of the tongue surface during mastication were observed in M-mode. Waveforms of the tongue were classified into three terms; initial, middle and final one. As each period coronal B-mode image, the lowest points of five consecutive M-mode waveforms in each period were traced. The distances to the surface of the mandible skin from two points on the surface of the tongue in the left and right 15mm away from the midline were measured. Height difference between the left and right sides of the tongue were compared by repeated one-way ANOVA and Tukey's test in each period. The null hypothesis was "With masticatory progress, the height difference of tongue does not change".

Results: In unilateral mastication with free swallowing, the height difference was significantly decreased in each period on both young and elderly subjects ($p<0.05$). In unilateral mastication with instructing swallowing, it was significantly decreased between the initial and the middle term, and the final term on young ($p<0.05$), but it was decreased in each period on the elderly ($p<0.05$).

Conclusion: It was revealed that tongue form changed into flat just before swallowing in all subjects. However, the difference was observed between young and elderly people for the process of tongue morphological changes during mastication of the left and right side with instructional swallowing.

Poster 114

Wear Behaviour of Human Enamel Opposing Lithium Disilicate Glass Ceramic and Type III Gold

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Purpose: The purpose of this research was to investigate the friction and wear behaviour of human tooth enamel opposing two different indirect restorative materials, namely heat pressable lithium disilicate glass ceramic (IPS e.max Press, Ivoclar Vivadent, Schaan, Liechtenstein) and type III gold (Maxigold, Ivoclar Vivadent).

Methods & Materials: Friction-wear tests on human enamel, opposing IPS e.max Press and type III gold, were conducted in a ball-on-flat configuration using a reciprocating horizontal wear testing apparatus. The wear pairs were subjected to a normal load of 9.8N with a reciprocating displacement of ~200 mm and frequency ~1.6 Hz for ~1,100 cycles per test. The frictional force of each cycle was recorded and the corresponding friction coefficient (m) for different wear pairs was calculated. Following completion of the wear testing, the wear scars on the enamel specimens were examined under SEM (S360, Cambridge Instruments, Cambridge, UK).

Results: The results showed that type III gold had a lower *m* and caused less wear damage on enamel than IPS e.max Press. The enamel surface opposing the IPS e.max Press specimen exhibited cracks, plough furrows and surface loss, indicating abrasive wear as the predominant wear mechanism. In comparison, the enamel surface opposing type III gold showed little wear scar with small patches of gold smear adhering to the surface, indicating the adhesive wear mechanism.

Conclusion: Within the limits of this *in vitro* research, the following conclusions were drawn:
1. Type III gold has a lower *m* and causes less wear damage on the enamel than IPS e.max Press.
2. Abrasive wear was the main wear mechanism for the IPS e.max Press and enamel wear pair, while adhesive wear occurred predominantly for the type III gold and enamel wear pair.
Further *in vitro* research is required to characterise and predict the wear behaviour of human enamel against a range of dental restorative materials.

Poster 115

The Effect of Intermittent Use of Stabilisation Splint Devices on Sleep Bruxism

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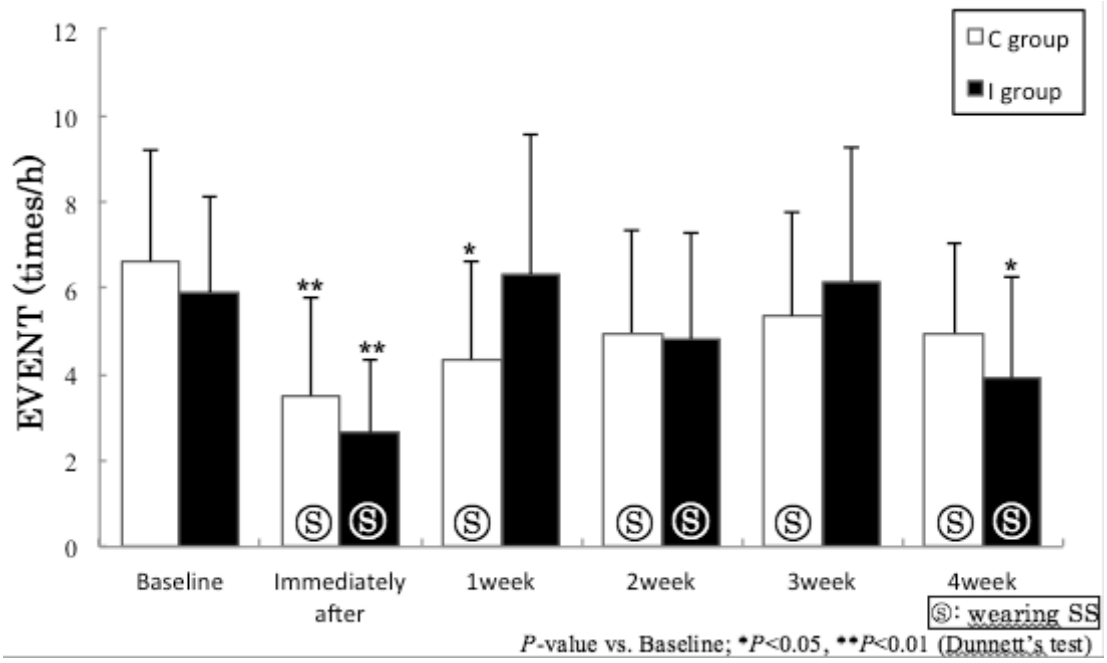
Purpose: Stabilisation splints (SS) have been reported to decrease masseter muscle activity in more than 50% of bruxers. However, there are clinical reports that splints did not diminish sleep bruxism (SB) activity with long-term observation. Whereas, the positive short-term effects has been shown that SB activity is decreased immediately after wearing splints. The present randomised clinical trial aimed to examine the effect of intermittent use of SS on SB compared with that of continuous use by measuring masseter muscle electromyographic (EMG) using a portable EMG recording system.

Methods & Materials: Twenty bruxers were randomly allocated to the continuous group (C group) and intermittent group (I group). Subjects in the C group wore SS during sleep for 29 days continuously, whereas those in the I group wore SS during sleep every other week, i.e., they used SS on the 1st-7th, 15th-21st, and 29th days. EMG of the masseter muscle during sleep was recorded for the following six time points: before (baseline), immediately after, and 1, 2, 3 and 4 weeks after the insertion of a SS. The number of SB events per hour of sleep (EVENT), total duration expressed as the percentage against the duration of sleep (DURATION), and total EMG (AREA) were calculated for each night. Dunnett's multiple comparison tests were performed to evaluate the treatment effect of each use of splints.

Results: The average number of SB event was 6.6 ± 2.6 and 5.9 ± 2.2 times/h in the C group and I group, respectively, with no significant difference between the two groups. SB events were significantly reduced immediately and 1 week after the insertion of SS, and duration were reduced immediately after the insertion in the C group, but no reduction was observed at 2, 3 and 4 weeks after insertion. On the other hand, SB events and duration were significantly reduced immediately after and also 4 weeks after insertion of SS in the I group.

Conclusion: This study has demonstrated that the intermittent use of SS may reduce SB activity for a longer period compared with that of continuous use. Supported by Grants-in-Aid for Scientific Research from the Japan Society for the Promotion of Science 25861852



Poster 116

Three-Dimensional Measurements of Tooth Wear Comparing Abrasive and Low-Abrasive Fluoride Preparations on Human Enamel

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Purpose: To investigate differences in wear of human enamel on an in-vitro erosion-abrasion model using Colgate Total™ in comparison to a novel low abrasivity dentifrice (Fluor Protector Gel™ [FPG]).

Methods & Materials: 36 native enamel sections from unerupted third molars were subjected to 10 wear cycles. Each cycle consisted of initial remineralisation for 1 hour in artificial saliva, followed by 10 minutes immersion in 0.3% citric acid (pH 2.8) and finally tooth-brush abrasion in either a slurry of 3:1 by weight of artificial saliva:dentifrice G1=control (artificial saliva) or (G2= Colgate Total™ or G3=FPG). Tooth brushing was carried out for 2 minutes under a load of 200g (2N). Samples were scanned before and after the experimental protocols using a contacting scanner and paired samples were superimposed using surface matching software to carry out three-dimensional measurements of tooth wear. Representative SEM images were obtained from each group to assess for qualitative changes.

Results: Mean and (SD) tooth wear for G1=21.9µm (6.4); G2=15.2µm (2.8) and G3=16.9µm (3.2). One-way analysis of variance showed there were no statistically significant difference in tooth wear measurements between G2 and G3 ($p=0.99$). There were statistically significant differences between the dentifrices and the control ($p>0.05$), indicating that both dentifrices resulted in less tooth wear compared to the control. SEM images showed rougher surface topography in the control group, followed by Colgate Total™ and followed by FPG which showed the smoothest surface. Surface deposits were observed in both Colgate Total™ and Fluor Protector Gel™.

Conclusion: Enamel samples brushed with Colgate Total™ or FPG showed no differences in tooth wear between them. Both dentifrices resulted in less wear compared to the control.

Poster 117

Assessments of "Quality of Mastication": Relationship Between Overall Eating Behavior and Mastication

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Purpose: There has been an explosion in research into possible associations between dental problems and various systemic diseases and conditions, such as periodontitis and diabetes mellitus. It has been reported that the significant increase of cerebral blood flow and the activation on histamine nervous system within the brain was found during the mastication and the obesity was closely related to the masticatory function. We need to pay attention to not only physical masticatory efficiency, but overall eating behavior and food properties before and after mastication to clarify an appropriate mastication for systemic conditions, that is "Quality of Mastication". The aim of this study was to examine the relationship between overall eating behavior and masticatory behavior, and to clarify "quality of mastication", especially assuming that food volume in each mouthful is an important factor in masticatory behavior.

Methods & Materials: The participants consisted of 15 females aged 19-21 years. Overall eating behavior was evaluated using a self-administered questionnaire and the measurements of actual masticatory behaviors. This questionnaire, which has been validated by us, provides to assess three factors: dietary recognition, eating habit, and eating action patterns. We asked to chew each food material with each favorite volume in a mouthful and evaluated the masticatory behaviors with the following: food volume in a mouthful, mastication number, bite force, masticatory efficiency, and the crushed food properties just before the swallowing: hardness, adherability and aggregability. Three types of food materials were used: Japanese cooked rice, fish meat sausage and peanuts.

Results: Significant correlations between eating habit and masticatory number of cooked rice; and between masticatory efficiency and eating action were found. Food properties just before swallowing were characterized by food volume in a mouthful and masticatory process conditions.

Conclusion: Our results suggest that the eating behavior is closely related with actual masticatory behaviors and food properties and food volume in a mouthful might be important factors to assess "Quality of Mastication".

Poster 118

Investigating Effects of Bisphosphonate on Osteoclasts During Bone Regeneration in Zebrafish – Model Simulation of BRONJ

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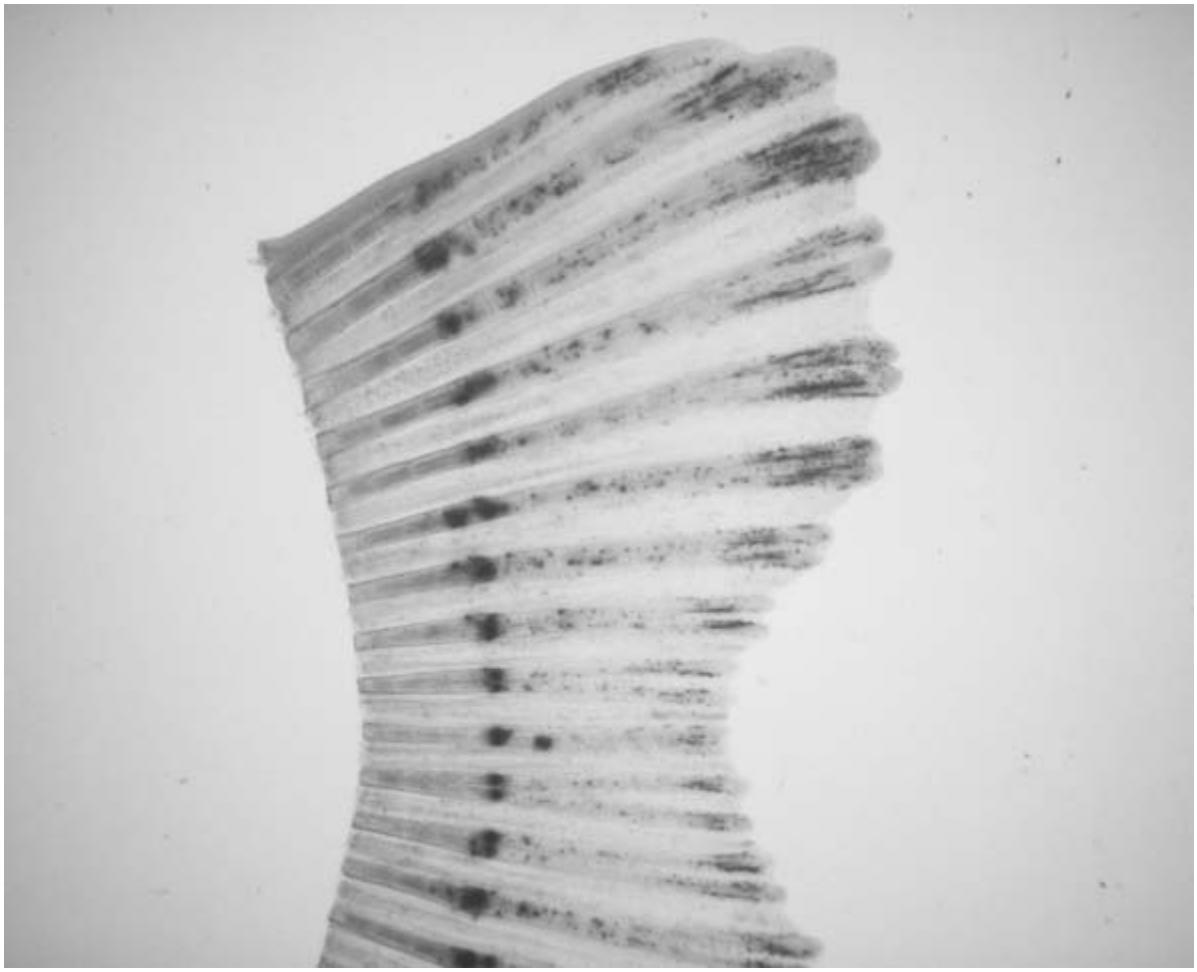
Purpose: Bisphosphonates are widely used for treating osteoporosis and metastatic bone malignancy, which impede the bone-reabsorbing function of osteoclasts by blocking enzyme activities in the mevalonate pathway. However, recent clinical reports have implicated these drugs in adverse effects on bone homeostasis, including bisphosphonate-related osteonecrosis of the jaw (BRONJ). To unveil the effects of bisphosphonates on bone regeneration and osteoclasts in vivo, we employed a fin-regeneration model in an animal model, zebrafish, to investigate the effects.

Methods & Materials: Zebrafish caudal fin rays were amputated and allowed to regenerate in the presence of alendronate, an aminobisphosphonate at three doses. The growth tendencies of the fin ray bone were observed for 11 days after amputation. Osteoclasts were located by TRAP staining during the regeneration. In addition, a GFP-labeled osteoclastic transgenic line of zebrafish and in situ hybridization of Cathepsin K gene expression were also used to evaluate the influence of alendronate on osteoclasts. Eventually, the defects of bone regeneration by alendronate were further examined by TRAP staining and rescued by exogenous application of geranylgeraniol (GGOH), an intermediate product in the mevalonate pathway, essential for osteoclast function.

Results: The results showed that alendronate affected osteoclastic TRAP activity and bone regeneration in a dose-dependent manner. At a low dose, 2.5×10-5M, TRAP expression was slightly affected during fin regeneration, whereas bone growth did not seem to be affected. At high doses, 5.0×10-5M and 7.5×10-5M, the distribution of osteoclastic TRAP activities was drastically reduced, and bone re-growth was inhibited. These effects were accompanied with local enhancement of TRAP signal in the fringe of caudal fin at a high dose of 7.5×10-5M after 5 days of fin amputation, which may be interpreted as localized bone necrosis, culminating TRAP expression of osteoclasts. Besides, either by GFP-labeled osteoclastic transgenic zebrafish or by in situ hybridization of Cathepsin K gene expression, the function of osteoclasts was impaired by alendronate. Ultimately, the bone regeneration in fin was rescued by administration of GGOH and the presence of osteoclasts were restored to normal as the control group.

Conclusion: In this study, we demonstrate the effects of alendronate on bone regeneration and on osteoclast activities. Although this is a far-fetched model, the regeneration process of fin in zebrafish provides a vivid dynamic paradigm to investigate BRONJ in vivo, and further to test the possibility of application of geranylgeraniol (GGOH) as a potential treating agent of BRONJ. Herein, we established an effective novel system to reveal bisphophonates on bone metabolism in vivo.



Fixed & Removable Prosthodontics

Poster 119

Effect of Insertion and Removal of Tooth Supported Overdentures on Retention Strength and Fatigue Resistance of Two Commercially Available Attachment Systems - An In Vitro Study

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Purpose: The main problem with semi-precision attachment retained prosthesis is that they need frequent servicing in terms of replacing the female component. There is a need for a study to assess the life span and frequency of replacement of elastic components in the attachment systems.

Methods & Materials: Rhein OT cap (micro) and Ceka sagix attachments were procured. Acrylic resin mandibular models fabricated with teeth embedded at overdenture positions. Bar framework with attachments were cast and cemented on the model. Denture fabricated on this model was subjected to universal testing machine (UTM Instron 5900 series) for retention and fatigue test. The retention strength was measured at various cycles namely 1440, 2880, 4320 and 5760 cycles to check for the loss of retention and development of fatigue on the basis of average number of removals and placements per day for 1,2,3 and 4 years respectively. The values of both the attachment systems were recorded at the respective cycles and a graphical analysis was carried out representing the retention loss and development of fatigue.

Results: ANOVA was used as part of the statistical analysis to compare the retention strength and fatigue resistance of both the attachment systems used. The results obtained proved that the retention values of both the attachment systems on tooth supported overdentures had a significant variation as they were subjected to increased number of cycles.

Conclusion: Sagix and Rhein attachment systems showed adequate retention values upto the first 2-3 years (2880- 4320 cycles). Fatigue test simulating 4 years of denture insertion and removal did cause subsequent reduction in the retention values but no component fracture of attachment systems.

Poster 120

Effect of Thermocycling on Color Stability of Polyamide and Polymethyl Metacrylate Denture Base Resins

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Purpose: Metal free restorations are gaining popularity in restorative dentistry. Retainers and connectors are the metal components of conventional removable partial dentures. Polyamides are being marketed for the construction of retantive and supportive components of removable partial dentures. By this, removable denture may be fabricated without metal alloys. In the past polyamide was introduced as a flexible denture base material, proving to be entirely unsatisfactory owing to its poor ability to resist oral conditions and color change. The aim of this study was to compare the effect of thermocycling on the color stability of polyamide denture base materials with conventional acrylic resin.

Methods & Materials: The color stability of polyamide (Bre-flex, Deflex, T-crystal,Valplast) denture base materials were compared with heat-cured acrylic (Meliodent) denture base material. For each material 12 disc shaped (10 mm in diameter, 2 mm in height) specimens were prepared. Each specimen has smooth and rough surfaces. After manufacturing, the color of all samples were measured by a colorimeter based on CIE Lab system. Then the specimens were subjected to 10.000 thermocycles with a dwell time of 30 sec, between 5 to 55 ºC and color measurements were repeated. Comparisons between groups of material in a smooth and rough surfaces, Wilcoxon signed rank test, according to the Bonferroni adjustment of $p < 0.010$ was considered to be statistically significant, comparisons between smooth and rough finishes in a material, Kruskal-Wallis test, according to the Bonferroni adjustment of $p < 0.025$ was considered to be statistically significant.

Results: There is no statistically significant difference between smooth and rough surfaces in each material ($p > 0.025$). The highest and the lowest color differences were measured in polyamide groups. PMMA demonstrated statistically significant higher color change than two polyamide groups ($p < 0.010$). To relate the amount of color change to a clinical environment, the data were converted to National Bureau of Standards units; conventional PMMA exhibited marked change while polyamides exhibited slight, perceivable, marked and extremely marked change.

Conclusion: Within the limitations of this study, it is hard to reach a general conclusion about polyamide denture base materials however polyamides may be a good alternative to conventional PMMA in some respects. Further investigations should be done to compare our findings.

Poster 121

The Relationship Between Clinical Quality of Complete Denture and Patient's Quality of Life: A Clinical Study

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Purpose: The current cross-sectional study was conducted in order to investigate the possible relationship between clinical quality of complete dentures and the patient's quality of life.

Methods & Materials: A random sample of 32 completely edentulous patients in both jaws who were rehabilitated by means of conventional complete dentures at the College of Dentistry, King Saud University took part in the study. All complete dentures were examined to evaluate their quality based on six criteria: esthetic, retention of upper and lower denture, stability of upper and lower denture and occlusion. Then all patients were asked to fill out the validated "Oral Health Impact Profile-20" questionnaire. Bivariate association was the statistical method employed in this study.

Results: A total of 32 patients (15 males and 17 females) met the inclusion criteria and completed the study successfully. Kappa test for examiner agreement revealed almost perfect agreement between the three clinicians and perfect agreement for intra- examiner reliability.The mean total score in denture quality evaluation was 5.63± 1.50 (out of 7), and OHIP-20 was 84.41 ± 31.24 (out of 120). The level of patients' satisfaction with their complete dentures was 72.66 %. A significant association was found between stability of lower denture and total OHIP score (p=0.045).

Conclusion: Lower denture stability appears to be the most important clinical factor to affect patient's quality of life.

Poster 122

Is Palate Helpful to Increase the Support for Maxillary Complete Denture?

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Purpose: Palate area is considered as one of the supporting areas for maxillary complete denture, however, its supporting capability is still unknown. The purpose was of this study was to determine the supporting capability to the palate area in tooth- or implant supported maxillary overdentures in vivo.

Methods & Materials: Five subjects (3 men and 2 women, average age 71.2±5.6) participated in this study with informed consent and approval by institutional ethics committee. An experimental metal framework was set up on working model using strain gauges for each patient at the same method as our previous study (Ando et al, 2011). Loads were applied progressively 100N through a force transducer. Recordings were performed with the metal framework only or with the metal framework and two kinds of denture base. The denture base was designed to cover only residual ridge area (denture base A) and residual ridge area and palate area (denture base B). The baseline condition was considered as implant and abutment tooth support only and its value corresponded to 100%, and the Load Supporting Ratio (LSR) was calculated. Statistical differences were determined by the Student t-test and a P value < .05 was considered statistically significant.

Results: In all subjects, LSR of palate was smaller than those of residual ridge. Though the applied load increased, LSR value was always less than 10% and did not exhibit large increase, irrespective of tooth- and implant supported.

Conclusion: Within the limitation of this study, LSR of palate was about 10%. This means that functional loads are mainly supported by abutments (tooth or implant) and the residual ridge, and it is not necessary to cover the palate when the retention is expected with other elements.

Poster 123

Contact Angle and Hydrophilicity of Newly Formulated Polyvinyl Siloxanether Impression Materials

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Purpose: The purpose of this study was to compare contact angle and hydrophilicity of polyvinyl siloxane, polyether and newly formulated polyvinyl siloxaneether impression materials.

Methods & Materials: Polyvinylsiloxane (Virtual Monophase, Ivoclar Vivadent AG, Liechtenstein), Polyether (Impregum Penta Soft Quick, 3M ESPE, Minnesotta USA), and Polyvinylsiloxaneether (EXA'lence 370, GC America, Chicago USA) set impression materials were investigated with respect to their water contact angle measurements using the commercially available Drop Shape Analysis System (KSV CAM 200, KSV Istruments, Espoo, Finland). In order to examine the contact angle and wettability, five different impressions have been made for each impression material.. Data was collected at 0-5-10-15 and 20 seconds. One-way analysis of variance was used to test for statistically significant difference within groups and Tukey was used to test for across groups with a significance value of $p < 0.05$.

Results: Lowest initial contact angle was measured at polyvinyl siloxanether group (94,846° ± 0,749°), and highest initial contact angle was measured at polyvinyl siloxane group (100,704° ± 0,548°). Lowest contact angle after 20 seconds was measured at polyether group (50,589° ± 0,571°), and highest contact angle after 20 seconds was measured polyvinyl siloxane (96,352° ± 0,317°).

Conclusion: Polyvinyl siloxanether impression material was measured as hydrophilic at all times. Polyether impression material was measured as hydrophobic at 0 seconds and hydrophilic during all times. Polyvinyl siloxane impression material was measured as hydrophobic.

Poster 124

Efficacy of Structured Office-Laboratory Communication on Quality Outcome of Single Crowns

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Purpose: Clear and effective communication between clinical office and dental laboratory is a prerequisite for production of high quality fixed and removable prostheses. Investigations published in the literature have demonstrated that communication of design information for fixed prosthodontics is poor. A Surgical Safety Checklist, mutuated from the experience of the aviation industry, has been introduced by WHO to reduce the number of errors during surgical operations The aim of this study was to evaluate the efficacy of structured comunication between dentist and dental technician by evaluating the quality outcomes of crowns before and after the introduction of a checklist.

Methods & Materials: Four couples of dentists and dental technicians were asked to check the outcome of all their single posterior metal-ceramic crowns produced in their offices between July 1st 2011 and January 31st 2012. A total of 112 metal-ceramic crowns were evaluated at the try-in clinical appointment by scoring the clinical acceptability of the following parameters: Contact area, Precision of fit, Occlusion, Tooth morphology, and Shade From March 1st 2012 until December 31st 2013 each couple of dentist-dental technician was asked to produce another set of 112 crowns, but this time following a structured communication protocol by means of a checklist. The new crowns were checked at the try-in appointment with the same criteria described previously.

Results: The scores before and after the use of the checklist were compared using Mann–Whitney Test (Significant two-tailed P value <0,05) The statistical analysis showed that median scores of contact area, precision of fit, and occlusion differed significantly before and after the use of the checklist. Median scores of tooth morphology and shades instead did not differ significantly.

Conclusion: Within the limits of this study, the introduction of a checklist improved the communication between dentists and dental technicians resulting in an increased quality of the metal ceramic crowns produced by the dental laboratories.

Poster 125

The Teaching of New Materials and Techniques in the Field of Teeth Supported Fixed Partial Denture in the US and Canada Dental Schools: A Survey

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Purpose: The use of teeth-supported fixed partial dentures (FPD) remains common practice, yet new materials and digital fabrication processes gradually replace the traditional methods. The variety of new developments calls for dental schools to expand the teaching to new horizons. The aim of this study was to examine the nature and the extent of the theoretical and practical training in the clinical teeth supported FPD courses, and to which degree the new methods and innovations are incorporated.

Methods & Materials: A questionnaire was sent online to 58 dental schools in North America, exploring the theory and practice aspects of teaching in the FPD clinical courses, including new restorative materials and new fabrication techniques.

Results: 36 schools responded to the survey, a response rate of 62.1%. The responding schools, include theory and practice of porcelain-fused-to-metal restorations in their program, and almost all the schools teach and perform full metal FPDs. Zirconia-based FPDs are in use by dental students In more than half (57.1%) of the schools. Students place partial veneer FPDs in less than one fifth (17.9%) of the schools. The average minimum requirement number of crown restorations for completion of the FPD clinical course is 7.3 FPD units. The assessed percentage of tooth-color copings (zirconia/alumina/porcelain) FPDs among the total FPDs performed by dental students in the FPD clinical course was 16.2%. None of the schools produce CAD/CAM copings or crowns within the school.

Conclusion: In North American dental schools all respondents teach and perform PFM restorations; only in one third of the schools do students perform ceramic based crowns. The low average number of minimum crowns required by the schools may lead to graduates not being exposed to and trained in contemporary dental restorative materials and techniques.

Poster 126

Short-Term Effect of Removable Partial Denture on Self-Reported Oral Health Status

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Purpose: This study aimed to evaluate the early impact of removable partial treatment on self-reported oral health status.

Methods & Materials: A total of 22 patients treated with removable partial denture (RPD) in a French university clinic assessed their self-reported oral health status using a General Health Oral Assessment Index (GOHAI) questionnaire before (T0) and from 1 to 3 weeks after treatment (T1). Pre- and post-treatment changes in GOHAI scores (Add-GOHAI and fields of the GOHAI questionnaire) were evaluated using a Wilcoxon matched pairs signed-rank test.

Results: Pre-treatment mean add-GOHAI score (T0) was 43.4 ± 11.6. After RPD placement, mean Add-GOHAI score improved significantly ($p<0.05$). Post-treatment add-GOHAI score (T1) remained however under 50 for about 41% of patients treated with RPD. Only psycho-social fields scores increased significantly ($p<0.05$) during the study period.

Conclusion: The use of the GOHAI questionnaire seems to be a potent tool to understand integration process with RPD. Generally speaking, insertion of RPD has a positive impact on short term self-reported oral health status, especially regarding psycho-social aspects. Although the decrease of the number of patients having an Add-GOHAI score lower than 50 during the study period, more than a third of patients presented a poor self-reported oral health status after RPD treatment.

Poster 127

Influence of Thickness Increase of Intraoral Autopolymerizing Hard Denture Base Liners on the Temperature Rise During the Polymerization Process

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Purpose: The purpose of the study was to determine whether the increase of hard autopolymerizing reline resin thickness contributes to additional temperature increase at the basal seat area of the denture, during the polymerization process.

Methods & Materials: Four PEMA and one PMMA autopolymerizing reline resin products at three different thicknesses were tested in this study. A Cr-Co edentulous maxillary cast was used to obtain 150 stone casts, 50 for each thickness layer of 1, 2 and 3mm (n=10). Polystyrene baseplates were used as denture substitutes, filled with the autopolymerizing reline resin mixture and placed on the Cr-Co cast which was mounted on a reline jig. Two thermal probes were used to monitor the temperature rise which was recorded at 30-sec intervals, until no further increase was noted. Collected data were subjected to a 2-way analysis of variance (ANOVA) (a=.05).

Results: Mean temperature increase for the chair-side denture reline procedure ranged from 39.45oC for the 1 mm thickness to 46.10oC for the 3mm thickness. . The 2-way ANOVA revealed significant differences (P<.001) between different reline resin materials and tested thicknesses. All materials produced an exothermic chemical reaction. The increase of thickness was always accompanied by an increased temperature value. Tukey HSD test revealed that the highest temperature increase for all 3 thicknesses was demonstrated by the PMMA resin.

Conclusion: The PMMA autopolymerizing hard denture base liner produced a significantly higher (P<.001) exothermic reaction when compared to the rest of the materials included in this study. One of the PEMA resins included in the study, presented a higher exothermic reaction than the PMMA product at a 3mm thickness, but the difference was not statistically significant. The PMMA resin demonstrated the highest mean time to reach the maximum temperature for all 3 thicknesses.

Poster 128

Immediate Rehabilitation of Edentulous Arches Using Intra-and Extra Oral Welding - Retrospective Study with 2 Years of Follow Up

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Purpose: This retrospective study evaluates intra and extra-oral welding for the fabrication of a provisional restoration for edentulous arches inserted within 48 hours of surgery (immediate functional loading) using different dental implant systems and different surgical technique (axial and angulated implants; post-extractive and delayed implants).

Methods & Materials: Between July 2008 and July 2012 (mean follow up of 2 years) a total amount of 253 immediately loaded implants were placed: Way Venezia (n=83, Geass S.R.L), AB (n=61, dental device, Israel), Southern implants (n=99, S.I.R, Irene-Sud Africa), Tekka (n=9, Biometic S.R.L) and one zygomatic implant. All implants were immediately loaded with a fixed provisional restoration supported by an intra- and extra-orally welded titanium framework. Straight and angulated multi unit abutments (M.U.A) were connected to all implants. Provisional abutment were connected to the M.U.A and a titanium bar was welded to them. At the lab, additional titanium wires were added to the welded structure with extra-oral welding to improve its mechanical properties (stiffness and strength).

Results: The implant success rate is more than 99%, only one Way posterior dental implant failed after 3 months. The prosthetic survival of the 57 rehabilitations (41 all on four, 4 all on five and 10 all on six) is 100%. No fracture or radiographically detectable alteration of the welded frameworks was evident. The rate of technical complications was 7.14%

(three fractures of the acrylic prosthesis and a loosening of a screw happened) and biological ones is 5.35% (recessions involving four dental implants). These complications involve Way and AB implants only.

Conclusion: The results suggest that the rehabilitation of the edentulous jaws with immediate loading of provisional fixed implant-supported prostheses using intra and extra-oral welded titanium framework is an available and effective technique. This prosthetic protocol is cost-effective, easy to perform, well accepted by patients and effective regardless of the type of dental implants used. Southern implants have proved best adaptability to the present technique. Not only all implants osseointegrated, but also there weren't biological or technical complications correlated to them. The implant's platform inclination allows the connection to straight MUA, thus facilitating the management of peri-implant tissues and prosthetic procedures, and reducing costs.

Poster 129

Reliability of an Impression Replica Technique

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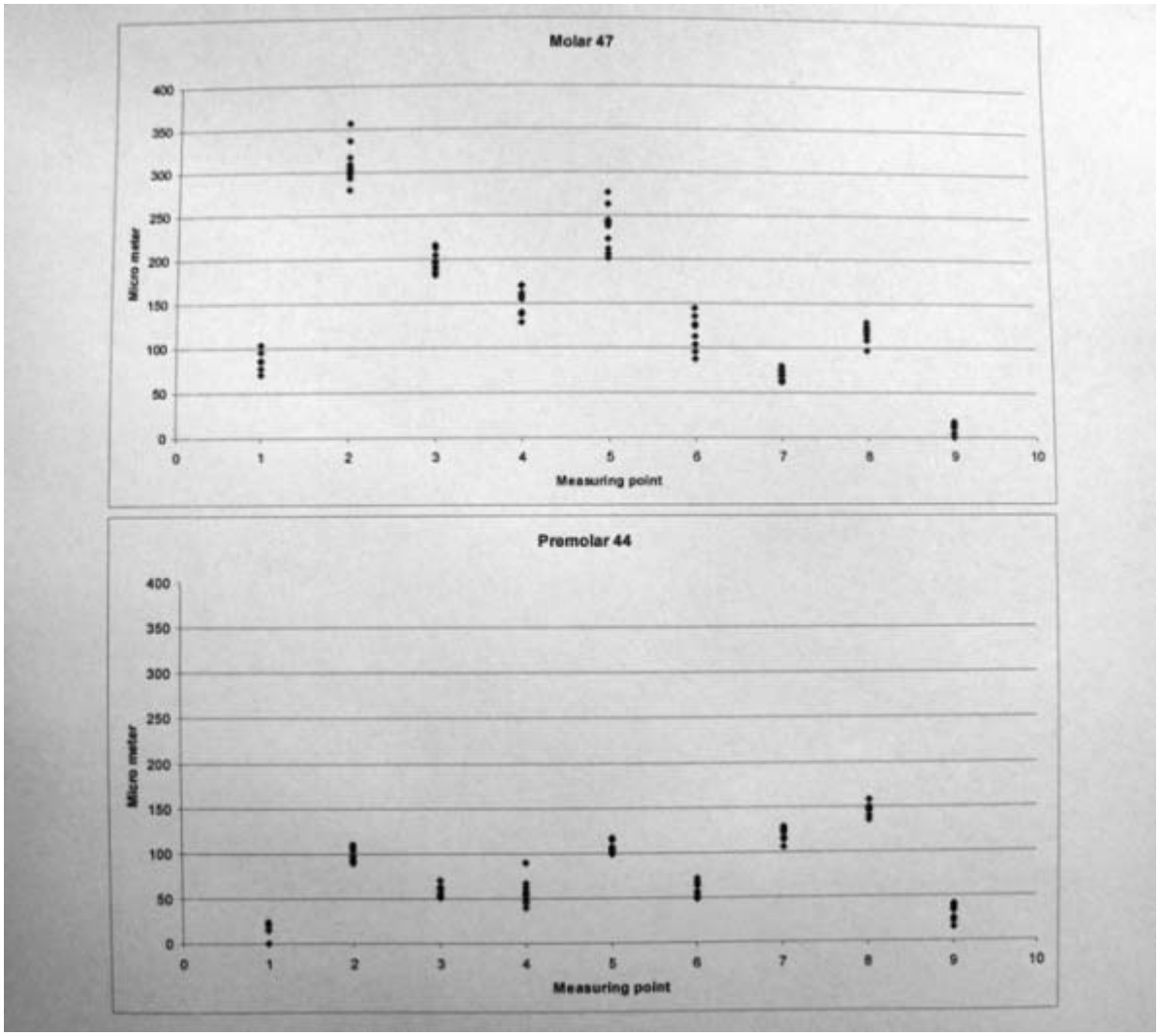
Purpose: To investigate the reliability of impression replica technique used for measuring the internal fit of FPD:s.

Methods & Materials: Preparation for a 4 unit FPD (47 46 45 44) on artificial plastic model teeth was made following the criteria for zirconia/metal-ceramic crowns. Impression and models were made of dental stone Type III and IV for scanning and another model was duplicated in shrink-free epoxy resin for fit check of the FPD. The FPD was produced by CAD-CAM, double scanning technique, in a presintered zirconia material, 3Y-TZP. The copings were filled with a light body a-silicone impression material and the FPD was placed with a force of 20 N on the abutment teeth on the duplicated master epoxy model. The silicone film corresponding to cement space was then stabilized with another a-silicone in a different colour. The silicone replica was cut in a mesio-distal aspect and measurements of the silicone film thickness were recorded in a microscope. Nine measurement points were recorded on each abutment. One operator performed the impression replica technique repeatedly 10 times using the same FPD on the same epoxy model to evaluate the reliability of the method.

Results: A total of 180 measuring points were recorded. The mean values, including cement gap at the margin, for the internal silicone film thickness for the molar 47 was 143 µm with standard deviation of 88,5 µm. For the premolar 44 the corresponding values were 75 µm with standard deviation of 43 µm. The values for each measuring point are presented in fig 1 and 2. For the FPD the variation, range, for marginal fit values were 17 – 33 µm and the internal fit surfaces 18 – 75 µm.

Conclusion: The repeated measuring of the internal fit of FPD:s shows moderate variation. The reliability of impression replica technique has further to be compared to other methods.



Poster 130

Impression Procedures for Metal Frame Removable Dental Prostheses: A Pilot

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Purpose: Generally, specific impression procedures for conventional removable dental prostheses (RDPs) (conventional = without (semi)precision attachments) are recommended for specific types of RDPs. E.g. 'complex' procedures for distal-extension RDPs (custom trays, functional border molding combined with elastomer impression material) versus 'simple' procedures for tooth-bounded RDPs (stock trays combined with alginate).

This pilot study aimed to analyze impression procedures related to RDP type as performed by dentists (general practitioners) in region Arnhem-Nijmegen, The Netherlands.

Methods & Materials: Head of RDP departments of three dental laboratories considered representative for region Arnhem-Nijmegen were asked to complete a questionnaire for all incoming impressions for conventional RDPs during period 01.12.2011 - 31.01.2012. The questionnaire included information on: dentist (university/year of graduation); dental status (absence/presence of teeth); RDP type (distal-extension (uni- or bilaterally)/tooth-bounded /combination (distal extension

and tooth-bounded)); and impression procedure (1) tray-type (custom-made (individually)/stock), (2) impression material (elastomer/alginate) and (3) functional border molding with a specific material (yes/no). Chi-square tests were used for statistical analyses.

Results: All completed 132 questionnaires (from 69 dentists) were analyzed: 58 (44%) concerned distal-extension RDPs, 37 (28%) tooth-bounded RDPs, and 37 (28%) combined types of RDPs.
Custom trays (n=111 (84%)) were used in most cases combined with elastomer (n=73 (66%)) or alginate (n=38 (34%)). Only 4 custom tray impressions had functional border molding. Stock trays (n=21 (16%)) were combined with alginate (n=17 (81%)) or elastomer (n=4 (19%)); not any had border molding. Of mandibular impressions (n=84), 48 (57%) included a distal-extension, 16 (19%) a tooth-bounded, and 20 (24%) a combined RDP. Of maxillary impressions (n=48) only 10 (21%) included a distal-extension, 21 (44%) a tooth-bounded, and 17 (35%) a combined RDP. Proportion of mandibular distal-extension RDP was significantly higher than maxillary RDP (P <.001).
For all 58 distal-extension RDP impressions, 50 custom trays were combined with elastomer in 35 cases; 15 with alginate. For all 37 tooth-bounded impressions, 28 custom trays were combined with elastomer in 20 cases. For all 37 combined impressions, 33 custom trays were combined with elastomer in 18 cases (differences RDP type vs. tray type: P=.24; differences RDP type vs. impression material: P =.27). Significant differences were not found between dentists' university (P=.09) or year of graduation (P=.29) and impression procedure.

Conclusion: In this pilot study, approximately 2/3 of RDP impressions concerned custom trays, approximately in 2/3 of cases combined with elastomer. A relation between RDP type and impression procedure could not be demonstrated.

Poster 131

Influence of the Bite Impression Technique on Reproducibility of Occlusal Contacts of Working Casts for Implant

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Purpose: The bite impression technique with higher degree of reproducibility of occlusal contacts has been developed and applied in fabrication of crowns. However, there have been few reports on application of the bite impression technique to fabricate implant superstructures. In this study, the influence of the bite impression technique on reproducibility of occlusal contacts of working casts for implant was investigated.

Methods & Materials: Eight patients who had a single-tooth implant to replace the missing posterior tooth at the Osaka Dental University Hospital were selected. The custom measuring device was fabricated in order to measure the occlusal contacts relationship with the opposing teeth and the implant body. The measurement conditions were in intraoral, on the working cast made from the bite impression technique and on the working cast made from the open tray impression. The occlusal contacts relationship was recorded using silicone impression material. The occlusal contacts areas and number of occlusal contacts points at the thickness of silicone less than 30μm were measured using image analysis. The occlusal contacts areas and points were compared by using the repeated one-way ANOVA and Bonferroni test conducted at a=.05. The null hypothesis was "There is no difference in occlusal contacts areas of the measuring device in three conditions" and "There is no difference in number of occlusal contacts points of the measuring device in three conditions"

Results: In the occlusal contacts areas, a significant difference was observed (P<0.01). According to the multiple comparison test, in intraoral or on the working casts made from the bite impression technique were significantly different from the working casts made from the open tray impression. In the number of occlusal contacts points, a significant difference was observed (P<0.01). According to the multiple comparison test, significant differences were presented in each measurement conditions.

Conclusion: These data suggest that the bite impression technique can produce working casts for implants that reproduce the intraoral occlusal contacts relationship.

Poster 132

Relating Physiologic and Anatomic Mandibular Dentures to Alveolar Ridge

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Purpose: The purpose of this clinical trial was to relate the arch-shape of mandibular dentures to the crest of the edentulous mandibular ridge using two methods of setting-up teeth.

Methods & Materials: Two wax trial dentures were made for each of 24 edentulous patients using conventional prosthetic procedures. The posterior mandibular teeth were set following 1) anatomical guidelines (Pound's triangle), and 2) neutral zone index. Set-ups using anatomic guidelines were called "anatomic set-ups" and the ones using the neutral zone index were called "physiologic set-ups". Standardized images of the 2 types of trial dentures on the cast were calibrated and digitally measured 5 times at 5mm intervals along a posterior-anterior midline drawn on the cast. This midline was perpendicular to a line connecting the tips of the retromolar pads. The depth of the mouth was also measured from the line connecting the retromolar pads up to a point where the midline met the crest anteriorly. Using equations of parabola, mean intercepts and slopes for the ridges and the 2 different set-ups were determined and compared using paired t-tests. $P<0.001$ was considered statistically different.

Results: The real mean values of width for physiologic set-ups were predominantly higher than for anatomic set-ups. Mean differences in real width between the 2 set-ups were 3.40mm, 5.03mm, 5.56mm, 5.96mm, 4.77mm, 3.00mm and 0.50mm for the 5mm incremental distances along the posterior-anterior midline. Comparing mean intercepts of the anatomic set-up and the alveolar crest, there was no difference (mean intercept=2.2155, $t=1.49$, $p=0.161$). Comparing the mean intercepts of the physiologic set-up and the alveolar ridge, there was a significant difference (mean intercept=9.6432, $t=6.19$, $p<0.001$). Comparing the mean intercepts of the physiologic and anatomic set-ups, there was a significant difference (mean intercept=7.4278, $t=5.16$, $p<0.001$).

Conclusion: Using formula of parabola the width of the 2 types of set-ups and the alveolar crest could be compared. The shape of mandibular dentures differed according to the technique used for setting up the posterior teeth. The anatomic set-ups resulted in teeth conforming closer to the crest of the alveolar ridge, producing significantly narrower dentures compared to the physiologic set-ups.

Poster 133

Tooth Survival in Patients with Partial Removable Dental Prosthesis

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Purpose: The partial removable dental prosthesis (PRDP) is used widely to replace missing teeth. The further tooth loss should be prevented to have a good prognosis of the patients wearing a PRDP. Our purpose was to identify clinical risk factors of tooth loss in patients with PRDPs.

Methods & Materials: Clinical records from 9 men and 25 women (mean age: 65 years) of patients with PRDP and who received their new dentures in Osaka University Dental Hospital in 2003 and had been receiving the maintenance treatment for at least five years were analyzed retrospectively to identify risk factor for tooth loss. Each subject received a clinical examination and panoramic radiographs were made at baseline. The information of tooth loss during five years was also recorded. Kaplan-Meier statistics were used to create survival curves. We performed Cox regression analysis to assess the influence of the variables of interest. (age, gender, caries, pocket depth, mobility, bleeding on probing, endodontic treatments, crowned teeth, abutment of fixed and removable partial dentures, maxillary or mandibular) This analysis was done in all teeth (590) and within abutment teeth (136). Statistic analyses were performed by STATA 11.2. (Light Stone, USA)

Results: 44 (7.5%) of the 590 teeth in all teeth and 15 (11%) of 136 abutment teeth were lost among the 34 participants during the 5 years. Cumulative survival rate of teeth was 93% and of abutment teeth was 89%. In all teeth, there was a

significant difference in the survival rate in the comparison of endodontic treatment, crowned teeth and pocket depth respectively. ($p<.05$) Endodontic treatment and pocket depth were significant risk factors of tooth loss. (hazard ratios: 3.1 for pocket depth; 2.4 for endodontic treatment) And in abutment teeth, there were significant differences in the comparison of a pocket depth and mobility respectively. Pocket depth and mobility were significant risk factors of tooth loss. (hazard ratios: 23.8 for pocket depth; 4.0 for mobility)

Conclusion: Endodontic treatment and pocket depth in all teeth and the pocket depth and mobility in abutment teeth were the important risk factors of tooth loss in patients with PRDP.

Poster 134

Effect of Reinforcement with Different Fillers on the Mechanical Properties of PMMA

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Purpose: The aim of this study was to evaluate the transverse strength and elastic modulus of heat-polymerized acrylic resin after reinforcement with different fillers.

Methods & Materials: Transverse strength and modulus of elasticity test specimens were prepared in the dimensions of 65x10x2.5mm. There were 3 main filler groups as halloysite, modified halloysite and silica. Each main group has subgroups according to percentage of filler weight as 0.5, 1, 2, 3, 4, 5, 6, and 7 %. The non-filler test specimens (n: 10) was attended as a control group. The specimens were tested for transverse strength with the use of a 3-point loading apparatus in a universal testing machine. Transverse strength and Elastic modulus values were calculated according to the formula. The data were analyzed with Kruskal Wallis and Connover tests ($p<0.05$).

Results: All the main filler groups had statistically significantly increased the elastic modulus of PMMA while decreasing the transverse strength according to the control group.

Conclusion: Reinforcing with fillers had substantially improved the elastic modulus of PMMA however diminished the transverse strength.

Poster 135

Effectiveness of the Obturator Prostheses for Facial Morphology Restoration in Unilateral Maxillary Defect Patients

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Purpose: The purpose of this study was to investigate the effect of maxillary obturator prostheses on facial morphology in unilateral maxillary defect patients by using three-dimensional (3D) digital stereophotogrammetry.

Methods & Materials: Nine patients with unilateral maxillary defect and facial asymmetry participated. Three-dimensional surface morphologic data of subjects' faces with and without maxillary obturator prostheses were acquired by using non-contact 3D digitizer. The mid-facial plane was set by overlapping an original facial image with the mirror image of the original image on 3D scanning software. The distances of displacement of 18 measurement points including 7 bilateral pairs on the face were measured by comparing 3D coordinate with and without the prostheses. In 7 bilateral pairs, the points obtained by inverting the unaffected side points to defect side were defined as the ideal points. The distances between the ideal and defect sides points were also measured. Asymmetry indices of 7 pairs of the points were calculated and compared with and without the prostheses. The parameters with and without prosthesis were compared.

Results: In comparing displacements of measurement points of both sides, there were significant displacement in the lateral and inferior points of the nosewing on defect side. The distances of the displacement of the lateral nosewing of the

unaffected and defect sides were about 1.8 and 3.5 mm respectively. Those of the inferior nosewing of those sides were about 2.5 and 6.5 mm respectively. Except these two measurement points, there were no significant displacements. The distances between the ideal and defect sides points in the inferior nosewing and the corner of mouth significantly decreased with the obturator prostheses. The inferior nosewing and the corner of mouth points had approached about 1.1 and 1.3 mm to each ideal point respectively. There were no significant differences in asymmetry indices.

Conclusion: The asymmetry faces with maxillary defect could be assessed by using this 3D digitizer and the 3D analyzing system. The maxillary obturator prostheses have an effect on the facial morphology in the region of the nosewing of defect side in patients with unilateral maxillary defects.

Poster 136

The Influence of Alveolar Bone Size on Maxillary Partial Denture; Full Arch Bone Support vs Aramany Class IV Defect

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Purpose: The aim of this study was to compare the physical behavior of two different size of maxillary defect with obturator prosthesis. The von Mises stress and displacement were calculated by three dimensional (3D) finite element (FE) analysis.

Methods & Materials: Two different of maxilla alveolar bone size, i.e. Aramany class IV maxillary defect and non-defect were used. Two different denture clasp design, i.e. double Akers clasps and multiple I-bar clasps were selected in this study. 3D FE models of removable prosthesis with non-defect maxilla, obturator prosthesis with Aramany class IV defect maxilla, were constructed with mucosa, alveolar bone, molars (26, 27 teeth) premolars (24, 25 teeth), double Akers clasps and multiple I-bar clasps. In boundary condition, base area of alveolar bone base was fixed in all directions. A vertical force of 30N applied to the center on 14, 15, 16, 17 teeth (Total: 120N). FE Model construction and FE analysis were performed on a personal computer (Precision Work Station 670, Dell) using a FE analysis program (ANSYS 14 Sp, ANSYS).

Results: Maximum values of von Mises stress at the supporting bone on the Aramany class IV defect model were approximately fifteen times higher than the non-defect model. Comparison of higher stress value between clasp designs, multiple I-bar clasps model were lower than double Akers clasps model. Direction and amount of displacements were different, and they were related with bone size. A higher value of displacement was observed in the Aramany class IV defect model, and twist motion was also observed. The differences of clasp designs were not affected for displacement.

Conclusion: Higher stress value and widely stress distribution on the alveolar bone were observed on the big maxillary defects model. The multiple I-bar clasp designed prosthesis reduced von Mises stress on supporting bone. The twisted motion of obturator prosthesis was observed on Aramany class IV defect model.

Poster 137

Development of the Tooth Abutment Preparation Image-Guided System

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Purpose: The ideal abutment form is required for fixed prosthetic denture excellent in a function and aesthetic appreciation. However, also in dental treatment, tooth preparation is difficult technical one and a technical acquisition takes time. Accordingly, for efficiency of the technical acquisition, the development of the preparation of abutment tooth support system by the medical engineering technique was tried. This system was structured the tooth preparation simulation for education with the contact sensation by a three-dimensional inner force sense device, and the navigation which supports formation

visually. The purpose of this study was to construct the hard tissue grinding model that is most suitable for simulation and preparation of abutment tooth necessary for navigation system.

Methods & Materials: In order to perform this simulation, the tooth deformable model, which is able to represent the accurate deformation according to pressure and friction between a tooth and the turbine, is necessary. In this study, the following method details the construction of the tooth deformable model: (1)Scan the grinding tooth model using 3D scanner and construct the 3D polygon model as STL format. (2)Fill with the group of the voxels inside of the polygon structure. (3)Construct the bounding sphere (b-sphere) region of the tooth and construct the b-sphere of the voxels. (4)Detect the collision between each bounding sphere and the turbine model, using octree algorithm. (5)Grind the collided voxel and reconstruct the polygon structure using the Marching Cubes technique. (6)Compute the force feedback parameter according to the collision situation. (7)Return the visual feedback and force feedback to user.

Results: The hard tissue grinding model which has a simulation facility was construct, and the quantitive modification state was displayed by the simulator. And, the simulator was similar to real preparation of abutment tooth by this that collision pressure in grinding it was provided from haptics. In addition, an application to navigation is enabled by replacing operation system of this simulator with an optical position sensor. The future examination quantifies quantity of deletion and the collision pressure by the adjustment of the formation parameter of the simulator.

Conclusion: This approach allowed image and force feed back in real-time of the tooth abutment preparation image-guided system.

Poster 138

Does a Dentist's Clinical Experience Affect Treatment Satisfaction of a Complete Denture Wearer?

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Purpose: This study aimed to investigate whether a prosthodontist's clinical experience affected treatment satisfaction of a complete denture wearer. The null hypothesis was that no difference in satisfaction ratings existed between complete denture wearers treated by experienced dentists (ED) with over 10 years of experience and those treated by inexperienced dentists (ID) with less than 3 years of experience.

Methods & Materials: From April 2004 to July 2006, we conducted a randomized controlled trial at 2 centers, including 74 edentulous patients; of these, 32 and 30 were randomly allocated to the ED or ID group, respectively. All the patients rated their satisfaction with dentures, including general satisfaction and satisfaction of chewing ability, speaking, cleaning, stability, retention, comfort, and esthetics. These satisfaction ratings were measured by a 100-mm visual analog scale (VAS). Perceived chewing ability to foods, divided into 5 grades, was measured using a questionnaire. The mastication index (MI) was calculated for each grade.

Results: General satisfaction and satisfaction of speaking, stability, and retention were significantly higher in the ED than in the ID group ($p = 0.049$, 0.003, 0.019, 0.041, respectively). No significant difference existed between the MI of the ED (71.3 ± 18.4) and ID group (64.1 ± 16.53). However, the perceived chewing ability of grade 5 food, whose texture was the hardest among all the grades, was significantly higher in the ED group than in the ID group.

Conclusion: Within its limitations, this study showed that a clinician's prosthetic experience affects a complete denture wearer's satisfaction ratings.

Poster 139

Does Wearing Dentures Change Sensory Nerve Responses Under the Denture Base?

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Purpose: This study aimed to clarify the effect of the denture wearing on sensory nerve function, and conducted two researches by using CPT. Research 1 investigated whether or not the denture wear alter sensory nerve function of underlying denture-supporting area by comparing CPTs of whom wore dentures (WD) and whom had never worn dentures (ND). Research 2 investigated whether different type of dentures induce different functional alteration of sensory nerve by comparing CPTs among participants with three conditions: retaining their natural teeth or having fixed prostheses (Dent), patients wearing partial dentures (PD), or patients wearing complete dentures (CD).

Methods & Materials: Research 1:Maxillary Kennedy class II partially edentulous patients, with or without subdivisions, were recruited. Recruited participants were sub classified in to the WD group (15 participants) and the ND group (22 participants). A single operator obtained mucosal CPT measurements around the greater palatine foramen of the edentulous and dentulous sides using a Neurometer® NS3000 device (Neurotron Inc., Baltimore, MD) to deliver electrical stimulations at frequencies of 5, 250, and 2000 Hz. Research 2:The participants wearing the Complete Denture (CD, n=45), Partial Dentures (PD, n=30), and Dentate patients, retaining their natural teeth or having fixed prostheses, (Dent, n=40) were recruited. The measurement method of research 2 was followed the methods as research 1 mentioned above.

Results: Research 1:The CPT values were proportional to the stimulation frequency, but only the 2000 Hz frequency resulted in significant differences in the CPTs between the groups. Research 2: The CPTs at respective frequencies levels increased in the following order: Dent < PD < CD. Responses to stimulations in the sensory nerve underlying the denture-supporting mucosa differed among patients with dentate, partial dentures, or complete dentures.

Conclusion: Denture wearing affects sensory nerve function underlying denture-supporting area, and the impact of denture wearing on sensory nerve function depends on edentulous area of denture wearer.

Poster 140

The Measurement Site Was Decided in Newly Developed Chairside Measuring System for Denture Retention

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Purpose: Retention and stability are essential for successful complete denture treatment. The purpose of this study was to assess the reproducibility of a new compact device for measuring retention forces of complete dentures and to identify ideal sites for measurement.

Methods & Materials: The system for measuring denture retention comprised a metal spatula and strain gauge. Experiment 1 involved measurement of palatal plates in 14 dentate individuals. Palatal plates were fabricated and three oral moisturizers differing in viscosity were used. The palatal plate was pressed, then pulled out with the measuring system at a specific speed. Measurements were repeated five times per moisturizer, and retention forces to detach the plates were measured. Experiment 2 involved denture retention measurement in four edentulous individuals. Jigs were put on hooks at the following four sites: posterior margin (site 1) ; point of intersection of the line joining the right and left first molar central fovea (site 2) ; left first molar central fovea (site 3) ; and right first molar central fovea (site 4) . Artificial saliva was used between the mucosa and dentures. The measurement condition was identical to that in experiment 1 ; however, measurement was discontinued at 30 N due to pain. The site was considered immeasurable if it could not be measured twice in succession. Two-way ANOVA and Tukey's multiple comparison tests were used for statistical comparison.

Results: In experiment 1 , retention forces of the palatal plate ranged from 0.9 N to 17.7 N in the following order: artificial saliva< liquid type< gel type. No significant difference was found among subjects and oral moisturizers in the three groups ($p< 0.05$) . However, the retention measured five times in each moisturizer was significantly different. In experiment 2, retention forces of the denture ranged from 1.8 N to more than 30 N. Sites 2, 3 and 4 were immeasurable in most subjects.

Conclusion: The new system for measuring denture retention was able to measure retention forces effectively with good reproducibility in the oral cavity. Therefore, this system can be used at chairside. It is suggested that posterior margin might be suitable for reproducible measurement of denture retention force.

Poster 141

Factors Affecting the Accuracy of Impression Materials

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Purpose: The purpose of this study was to evaluate the effects of (1) various impression materials, (2) type of tray used for making impression, (3) different storage times in distilled water and (4) immersion in disinfectant solution.

Methods & Materials: Impression was made of a master model with alginate impression materials and silicone impression material by using stock tray and two different individual trays. Corresponding casts were made by Type IV gypsum and were optically digitized. Accuracy was analyzed by computing. The percentage data points within the contact area that deviate within a ? 0.1 mm tolerance limit (PDP100) was defined as an index for spatial accuracy. Greater values indicate higher 3-D accuracy of impression materials on the accuracy of impression.

Results: Significant differences were observed for PDP100 value between alginate impression material and silicon impression materials. The long storage time of the distill water shows the less accuracy. However, the storage time of the disinfectant solution tested within 120 minutes did not show the significant different for PDP100 values.

Conclusion: The accuracy and reproducibility of impressions were determined by 3-D analysis. The newly developed PDP 100 was successfully used to quantify spatial dimensions for models. The accuracy of the silicone impression materials was better than that of alginate impression materials. Bland and storage times of alginate impression materials in the distilled water and the disinfectant solution tested affect the accuracy of the impression.

Poster 142

A Study on the Efficiency of Complete Denture Treatment

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Purpose: Improvements in the efficiency of dental treatment is beneficial in both dentists and patients. Clinical researches on complete denture treatment have included surveys of dentists' opinions regarding chair times and patients' satisfaction about treatment. However, few studies have been conducted on improving treatment efficiency. In the present study, timetables were created based on complete denture treatment data recorded on video. The purpose of this study was to clarity whether treatment efficiency could be improved by modifying the timetable.

Methods & Materials: Subjects were 31 patients wearing complete dentures, and a total of 12 assistants and 14 dentists were surveyed at the time of denture adjustment. Based on the video data, dental procedure was classified into three categories, specifically time of tasks that could only be performed by a dentist, time of tasks that could also be done by an assistant, and time spent not doing anything (inactivity time). Rules for improving treatment efficiency (rules for shortening

chair times in the timetable and rules for making effective use of time in the timetable) were created using the classified treatment data. The possibility of the treatment efficiency by improving the timetable according to the rules was examined.

Results: The rules for shortening chair times in the timetable resulted in a 2.4 min (8%) reduction in mean chair times (28.8 min). In addition, rule for making effective use of time in the timetable resulted in 7.1 min (25.7%) and 6.4 min (23.3%) decrease in the inactivity time, which had been about half of the mean chair times, for patients and assistants, respectively.

Conclusion: These rules (rules for shortening chair time in the timetable and rules for making effective use of time in the timetable) were effective for improvement of treatment efficiency. To follow the rules, cooperation between dentists and assistants might be important.

Poster 143

Prospective Comparative Clinical Trial of Ball Attachment Retained Implant Overdentures in Edentulous Patients

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Purpose: This clinical trial was aimed to compare the effect of ball attachments on the treatment outcomes of mandibular implant overdentures in terms of implant survival rate, implant mobility, peri-implant tissue status, prosthetic maintenance and complications, and patient satisfaction.

Methods & Materials: Fifty-one patients from 177 complete denture patients were selected for this study by inclusion and exclusion criteria. The number of subjects who took part in the trial was finally 40. They received two implants (Simpline II, Dentium, Suwon, Korea) in canine regions. Two months after implant placement, one from 2 ball attachments (Ball attachment of Dentium Co., Korea or Anchor attachment of Straumann AG., Switzerland) were randomly placed on the implants and the respective matrices were incorporated in existing lower complete denture. Clinical recalls were scheduled 1, 8, 9, 10 week, 3, 6, 12, 18 months after implant placement. The following clinical parameters were assessed: 1) implant survival rate, 2) implant mobility, 3) peri-implant tissue status, 4) prosthetic maintenance and complications, and 5) patient satisfaction in terms of function, esthetics, pronunciation, pain, and general satisfaction at baseline, 3, 6, 12, 18 months later. The parameters were analyzed by following statistical methods with SPSS software version.20 as follows: 1) Student's T-test for implant success rate, implant mobility, and marginal bone loss, 2) ANOVA for implant mobility (different period in a same group), and 3) Mann-Whitney U test for prosthetic maintenance and complications, and patient satisfaction (VAS score).

Results: The implant survival rate of both groups was 100% at stage II surgery and during follow-up period. The ISQ values for Ball attachment and Anchor attachment were respectively 77.2±3.6 and 78.9±3.5 at implant installation and 77.7±3.3 and 79.1±3.2 2 months later. The Periotest values for Ball attachment were -4.7±1.3 and -5.6±0.8 3 and 6 months later and those for Anchor attachment -5.2±1.1 and -6.1±0.5 respectively. There was no significant difference in ISQ value and Periotest value between two attachments ($P > .05$). The mean values of marginal bone loss was 0.15±0.33, 0.13±0.38 in Ball attachment 3 and 6 months later and 0.07±0.04, 0.23±0.57 in Anchor attachment respectively. No statistical difference in the change of marginal bone levels was observed between two groups ($P > .05$). Overgrowth of peri-implant tissue was observed in 6 patients and poor oral hygiene was observed in 12 patients. Fracture of female attachment was observed from 1 patient in Anchor attachment group. For patient satisfaction, both attachments showed significantly increased VAS score after connection of attachment, especially function and there was no significant difference in patient satisfaction between two groups.

Conclusion: Within the limited observation period, there was no significant difference on treatment outcomes between Dentium Ball and Straumann Anchor attachment groups in terms of implant survial rate, implant mobility, peri-implant tissue status, prosthetic maintenance and complications, and patient satisfaction.

Poster 144

Comparison of the Accuracy of Digitally Fabricated Polyurethane Model and Conventional Gypsum Model

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Purpose: The accuracy of a gypsum model (GM), which was taken using a conventional silicon impression technique, was compared with that of a polyurethane model (PM), which was taken using an iTero™ digital impression system.

Methods & Materials: The maxillary first molar artificial tooth was selected as the reference tooth. The GMs were fabricated through a silicon impression of a reference tooth, and PMs were fabricated by a digital impression (n=9, in each group). The reference tooth and experimental models were scanned precisely using a 3 shape convince^{TM} scan system. Each GM and PM image was superimposed on the registered reference model (RM) and 2D images were obtained. The discrepancies of the points registered on the superimposed images were measured, and defined as GM-RM group and PM-RM group. Statistical analysis was performed using a Student's T-test ($\alpha < 0.05$)

Results: A comparison of the absolute value of the discrepancy revealed a significant difference between the two groups only at the occlusal surface. The GM group showed a smaller mean discrepancy than the PM group (p < 0.05). Significant differences in the GM-RM group and PM-RM group were observed in the margins (point a and f), mesial mid-axial wall (point b) and occlusal surfaces (point c and d) ($p < 0.05$).

Conclusion: Under the conditions examined, the digitally fabricated polyurethane model showed a tendency for a reduced size in the margin than the reference tooth. The conventional gypsum model showed a smaller discrepancy on the occlusal surface than the polyurethane model.

Poster 145

Full-Mouth Rehabilitation through Multidisciplinary Approach of Young Patient with Multiple Missing Teeth and Collapsed Occlusal Plane

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Purpose: Collapsed occlusion due to multiple missing posterior teeth results in abnormal occlusal plane, tilting tendency of teeth toward missing space, and loss of vertical dimension. And tilted movement to the extracted space brings out occlusal interference, excessive teeth reduction for proper prosthetic path, and additional endodontic treatment. Preprosthetic orthodontic intervention before full-mouth rehabilitation provides some of the advantages such as minimum tooth reduction and need of endodontic treatment, possibility of vertical dimension modification, and the least strategic extraction through proper teeth repositioning.

Methods & Materials: A 20-year-old male patient visited complaining about multiple missing teeth and masticatory difficulty because of severe dental caries. He had lost most of his posterior teeth, occlusal plane collapsed, and opposite teeth supra-erupted. Considering patient's age, conservative treatment was necessary. So multidisciplinary treatment such as orthodontic intervention preceded before prosthetic treatment to recover occlusal plane and reposition improperly positioned teeth.

Results: Orthodontic teeth repositioning was completed after 7 months, and implantations were performed 2 months later. Intrusion of supra-erupted teeth was done during implant retention period. Final prosthetic treatment was completed within 15 months since first visit. The patient was satisfied with esthetics and masticatory function after treatment and there was not any complications at 6 month periodic f/u visit.

Conclusion: This clinical report presents that more esthetic and conservative full mouth rehabilitation was possible with multidisciplinary approach combining with orthodontic treatment. The treatment outcome retained as many natural teeth as possible and avoided the alternative extractions and replacement with prosthesis.

Poster 146

Evaluating Adhesion of Modified Polyurethane to Maxillofacial Silicone Elastomers

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Purpose: Lining the facial prosthesis with polyurethane liner (P), which has better mechanical and pyhsical properties is recommended by the authors. However it is very difficult to have strong adhesion between polyurethane and maxillofacial silicone elastomer. This weak adhesion decrease the life of the prosthesis and satisfaction of the patient. The aim of this study is to test and compare the peel strength of modified polyurethane (MP) elastomers to maxillofacial silicone elastomers.

Methods & Materials: 240 strip shape (7.5 x 0.5 x 0.6 cm3) test specimens have been prepared using different silicone elastomer (A-2000, A-2186F, MDX4-4210/Silastic medical adhesive Type A),primer (A-335, A-330G, A-304), and liner (commercial polyurethane liner and new modified polyurethane elastomer) materials. Test specimens subjected to T- peel strength test immediately after deflasking by universal testing machine with a crosshead speed of 25.4 mm/min. T-peel strength (N/mm), peak load (N) and peel distance (mm) were evaluated for each specimens. Data were analyzed using three-way ANOVA and post-hoc with Tukey. ($p < 0.05$)

Results: There were statistically significant differences ($p < 0.05$) between different silicones, liners and primers groups for T-peel strength, peak load, and peel distance. Post-hoc analysis indicated that for A-2000 silicone groups, P/A-2000/A-335 were highest and statistically different from MP/ A-2000/ nonprimer, P/A-2000/A-330G and P/A-2000/A-304. For A-2186F silicone groups, P/A-2186F/A-304 were lowest and statistically different from MP/A-2186F/nonprimer, P/A-2186F/A-335 and P/A-2186F/A-330G. For Type A silicone groups, P/Type A/A-335 were highest and stastistically different from MP/Type A/nonprimer, P/Type A/A-304 for T- peel strenght, peak load and peel distance and P/Type A/A-330G did not adhere to polyurethane liner. And polyurethane liner did not adhere to silicone elastomers without primers in all groups.

Conclusion: Within the limitations of this study it can be concluded that modified polyurethane elastomers can be used as a liner in maxillofacial prosthesis without primers. Polyurethane liner must be used with primer, if adhesion is desired between polyurethane and silicone elastomer.

Poster 147

Incidence of Endodontic Treatment of Teeth with Crowns

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Purpose: To record the incidence of endodontic treatment of vital teeth after crown or bridge therapy within the dental school of the UMC St Radboud (the Netherlands) during 5 years.

Methods & Materials: Patient files of the student dental clinic were traced for vital teeth having received a full crown or bridge abutment crown during the period September 2004 - March 2006. Recordings of the particular patient files were made until March 2011. In total 332 vital teeth were included, made in 170 men and 162 women (mean subject age 55 yrs). The number of single crowns included was 237, FPD abutments included were 95; sixty-seven anterior teeth were included, and 265 posterior teeth. Provided were metal-fused-to-porcelain crowns (237), metal crowns (83) and full ceramics (12). Zincfosfate-cement was most often documented as the luting cement (198), followed by glassionomer cement (70), and composite cement (6); the type of cement of the remainder (58) was not documented. From the digital patient file any problem resulting in endodontic treatment of the specific tooth during the follow-up period of 5 years after placement was recorded. Appropriate periapical X-rays before and some years after treatment were available for 99 teeth. They were examined for periapical abnormalities of potential endodontic origin.

Results: Four (1.2%) of the 332 teeth were endodontically treated during the follow-up period. Endodontic therapy was performed 1.3 to 4.3 years after placement of the crown or FDP. Five other teeth (5% of 99 teeth) showed a periapical radiolucency on follow-up x-rays, but endodontic therapy was not performed. The low number of endodontic complications (periapical radiolucencies on x-ray and/or endodontic treatment), did not enable further analyses into relations between tooth/subject characteristics and endodontic complications.

Conclusion: Incidence of endodontic treatment of vital teeth after crown or bridge therapy was 1.2% in a period of 5 years. Crowned vital teeth showed periapical radiolucencies in 5% of the cases, but endodontic treatment was not provided.

Poster 148

Attractive Force Analysis of Magnetic Attachment Using Three Dimensional Finite Element Method - Influence of the Keeper Thickness on Attractive Force

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Purpose: The present study focused on the effect of magnetic keeper thickness, and investigated upon the influence of keeper thickness and attractive force using a three-dimensional finite element method.

Methods & Materials: An analysis model was constructed using a special software program (MENTAT - MSC Software) and the external and internal attachment measurements. Element breakdown of the analysis area selected was determined to be 10 mm x 10 mm in height and width. A three-dimensional model with ¼ minor axis section in size was constructed considering the axis shape of a GIGAUSS C 600 (GC) magnetic attachment. The element type designation was three-dimensional hexahedral element. Element count was 12052, and nodal point was 10395. The GiD (CIMNE) was used for the input of the analysis condition, and the MAGNA/FIM (CTC Solution) was used for the analysis. Nastran format was used for the file exchange between MENTAT and GiD. Thirteen items were analyzed when the keeper thickness was changed by 0.05 mm between 0.30 and 0.90 mm. The analysis was performed on the magnetic flux density distributions and attractive forces when the keeper thickness was changed.

Results: 1.Magnetic flux density distribution
The comparison of the magnetic flux density distribution between major and minor axes in the keeper showed a significant difference in the saturated magnetic flux density distribution in the thinner keeper, and increase in the oversaturated magnetic flux distribution in the long axis.
2.Attractive force
The attractive forces were 95% in 0.6 mm, 86% in 0.5 mm, 71% in 0.4 mm, and 38% in 0.3 mm when the 0.7 mm thickness was defined as 100%.

Conclusion: The present study focused on a keeper of a magnetic attachment, and investigated the influence of the keeper thickness on attractive force using FEM. The following results were obtained:
1. The area of the oversaturated magnetic flux density distribution increased with a decrease of keeper thickness. Oversaturated magnetic flux density distribution was observed in the saturated magnetic flux density distribution.
2. Attractive force peaked at 530 gf in a 0.7 mm keeper, and gradually decreased with a decrease in the keeper thickness. Ninety percent attractive force was maintained in keepers of >0.55 mm thickness.

Poster 149

Comparative Evaluation of Pressure During Impression of Maxillary Edentuious Ridge on Stress and Non-Stress Bearing Areas – A Observational Study

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Purpose: To compare the pressure changes on the stress & non-stress bearing areas and whether provision of spacer & escape holes helps in reduction & selective application of pressure on stress bearing and non-stress bearing areas.

Methods & Materials: It is a Cross-sectional pilot study including 10 healthy edentulous subjects. Identical custom trays with and without spacer were used to record secondary impression and an indigenously made instrument was used to evaluate pressure on the stress and non-stress bearing areas, the difference in pressure was observed on the instrument & recorded. Data was analysed using Minitab 13 for Windows. Paired t-test was used for comparison of means. P value of less than 0.05 was considered significant.

Results: The pressure exerted during impression on stress & non-stress bearing areas was non significant inconclusive of custom tray design. Yet Provision of escape holes, resulted in significant reduction of pressure in trays with or without spacer. The maximum increase in pressure was observed in midpalatal region, whether tray with without spacer was used.

Conclusion: It was not possible to subject the stress bearing areas to higher pressure as compared to other areas within a tray. Combination of spacer with escape holes leads to decrease in pressure while making impression.

Poster 150

The Influence of the Major Connector on Masticatory Performance of Free-End Removable Partial Dentures: A Comparison Between Lingual Bars and Lingual Aprons

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Purpose: The purpose of this study was to determine the influence on masticatory performance of the major connector of free-end removable partial dentures (fRPDs) fabricated with a lingual bar or a lingual apron.

Methods & Materials: Five subjects (4 males and 1 female; mean age 63.4±6.7 years) who had missing free-end partials (Kennedy class I or class II) participated in this study. Two types of 5 fRPDs, with either a lingual bar (LB) or a lingual apron (LA), were fabricated for each of them. The 5 fRPDs with LBs or LAs were randomly worn to conduct a crossover clinical trial. Masticatory performance was evaluated using the sieve method, measured while wearing, immediately after wearing, and one month later. Data were analyzed using a one-way ANOVA to describe the masticatory performance of the major connector designs and the wearing periods, individually.

Results: Immediately after wearing, masticatory performance for LAs was 56.0±12.3% while that for LBs was 46.1±12.1%. One month later, masticatory performance for LAs was 65.6±11.5% while that for LBs was 51.8±11.1%. A statistically significant difference in the value of masticatory performance was found between the major connector designs and the wearing periods ($p<0.001$).

Conclusion: Within the limitations of this study, masticatory performance in patients wearing free-end removable partial dentures with a lingual apron was better as compared to patients wearing those with a lingual bar.

Poster 151

The Study of Anatomical Structures in Establishing Posterior Palatal Seal Area for Maxillary Complete Denture

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Purpose: The aim of this study was to investigate the relative location between fovea palatini and vibrating lines and to determine correlation between the posterior palatal seal area and the palatal contour.

Methods & Materials: In total, 50 subjects were examined in this study. The valsalva maneuver was used to determine the anterior vibrating line and the phonation ('Ah') method was used for the posterior vibrating line. The distance from anterior to posterior vibrating line and distances between fovea palatini and anterior, posterior vibrating lines were measured. The lateral cephalogram was taken to trace hard and soft palate contour accurately and angles of the palatal contour were measured by using V-ceph program (Osstem Co, Seoul, Korea). Correlation analysis was conducted by SPSS (version 12.0, SPSS Inc., Chicago, IL, USA) to examine relevance between the distance from anterior to posterior vibrating line and the angle of the palatal contour at the junction of hard and soft palate.

Results: The anterior vibrating line was located approximately 2.58±1.19mm anterior to the fovea palatini, and posterior vibrating line was located 0.71±0.68 mm posterior. There was a positive correlation between the distance of anterior to posterior vibrating line in lateral sagittal and the angle of the palatal contour at the junction of hard and soft palate. Correlation coefficients were 0.479 in left sagittal, 0.560 in right sagittal. ($p < 0.05$)

Conclusion: Considering its proximity to posterior vibrating line, fovea palatini could be a reliable reference point for locating the posterior border of the maxillary denture. This study results also suggest that wider posterior palatal seal area could be obtained if one has gentle palatal contour at the junction of hard and soft palate.

Poster 152

Prosthodontic Treatment of the Russel-Silver Syndrome: Case Report

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Purpose: Russel-Silver syndrome is a genetic disorder characterized by intrauterine and/or postnatal growth restriction, abnormality and distinctive physical asymmetry. Patient with the syndrome rarely shows the sign of mental problem. Therefore, specific caution performing oral examination or preventative treatment is not required. Symptoms involved with Russel-Silver syndrome can affect social life negatively. The fact that patient has a similar appearance and function with peers is important in terms of psychological development.

Methods & Materials: Seven-year-old Russell-Silver syndrome patient was referred from department of pediatric dentistry for prosthodontic reconstruction. Due to severe caries on primary dentition, most of teeth are extracted. Considering the eruption of permanent teeth, however, root rest extraction was postponed. Due to small size of dental arch, cooperation of the patient, adaptation of denture, difficulties were expected in making final prosthesis.

Results: Interim removable overlay denture was fabricated and the patient was instructed to wear the denture for 2 months. Definitive denture was made to reconstruct the arch, shape of gingiva, contour of primary dentition. The patient and his parents were satisfied with masticatory function and esthetics of denture.

Conclusion: Overdenture using remaining primary teeth can be optimal treatment for Russel-Silver syndrome patients. It is important for young Russell-Silver syndrome patient to visit hospital periodically after treatment. Because the repair and replacement of the prosthesis is required as the patient grows up, 3-6 months interval is recommended. After the permanent teeth erupt, relief of the denture will be necessary. When eruptions of permanent teeth are complete according to the extent of growth, implant supported prosthesis or removable partial denture will be considered.

Poster 153

Analysis of Saliva Proteins From Head and Neck Cancer Patients

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Purpose: To investigate the role of saliva proteins in the colonisation of the oral cavity by Candida albicans in a group of patients that had received radiation therapy for head and neck cancer. In particular, to investigate whether increased expression of the putative C. albicans receptor SPLUNC2 can explain the increased prevalence of candidiasis in such individuals.

Methods & Materials: Patients were recruited from two clinics (Christchurch and Dunedin). Controls matched for age, sex and smoking history were also recruited. Following determination of the saliva flow rates of patients and controls, saliva wash samples were collected, treated with protease inhibitors and stored frozen for subsequent polyacylamide gel electrophoresis (PAGE) and immunoblot analysis. Gels were stained with silver. Blots were probed sequentially with antibodies to two saliva proteins, SPLUNC2 and IgA. PAGE-separated polypeptide profiles, and immunoblot reactivities were compared using a specialised image analysis programme.

Results: All patients had reduced saliva flow rates compared to controls and 7 of 17 patients could be classified as having dry mouth. Some differences between individual protein profiles were detected but were not consistent within groups. IgA was detectable in all samples, but SPLUNC2 expression was only detected in 6 patient samples and in 13 control samples.

Conclusion: No consistent saliva protein profile changes were detected in the patient group. SPLUNC2 expression varied between individuals and was not related to IgA expression. Therefore, the presence of SPLUNC2 could not be linked to susceptibility to C. albicans colonisation in this study.

Poster 154

Mechanical Analysis of Extracoronal Magnetic Attachment Using Three-Dimensional Finite Element Method

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Purpose: The purpose of the present study was to investigate the mechanical strength of extracoronal magnetic attachments using a three-dimensional finite element method to compare the results with the actual measurement data. The housing with joints was attached to extracoronal magnetic attachments.

Methods & Materials: Preliminary experiment to verify elastoplastic analysis and main experiment to verify extracoronal magnetic attachment were performed. Analysis models were fabricated for each experiment, and boundary condition and material constant were determined. The procedure is shown below. Patran was used for model fabrication and result display, and a general purpose nonlinear structure analysis solver program (Marc 2008, MSC software) was used for the analysis.

Results: 1. Preliminary experiment
Verification of elasto-plastic analysis was performed by actual measurement and load displacement curve. The figure shows a load displacement curve. The X axis stands for the z axis displacement of the preliminary experiment analysis model, and the Y axis stands for the stress value applied on the test sample of the preliminary experiment. Values in the load displacement curve after hardening and softening heat treatment of the metal were approximated the actual measurements.
2. Main experiment

1) Stress distribution
Stress distribution was evaluated using von Mises stress. Stress concentration was observed in the upper margin of the extracoronal attachment groove. The result confirmed that stress is transmitted to the upper and lower margins of foundation.
2) Load displacement curve
The horizontal axis of the load displacement curve shows z axis displacement of an extracoronal magnetic attachment, and the vertical axis shows a load in the measurement point shown in the slide. The result confirmed that plastic deformation occurs over 733 N in the hardening heat treatment and over 390 N in the softening heat treatment.

Conclusion: The results of the elasto-plastic analysis confirmed that an extracoronal magnetic attachment has wide elastic area as actual measurements. Analytical values demonstrated that deformation does not occur until 733 N in the hardening heat treatment, and 390 N in the softening heat treatment.

Poster 155

Clinical Application of Dental Magnetic Attachment Using the Direct Bonding System

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Purpose: Dental magnetic attachment (DMA) is very useful and it has many advantages compared with other attachments such as good retention, minimal force to horizontal direction, simple structure, no reduction of retentive force, easy technical laboratory work. Although an attachment with complicated structures is difficult to wear dentures, DMA is easy to wear and remove them by the magnetic attractive force. Furthermore DMA is also easy to control of dental plaque for its simple structure. Although to create MR image degradations is the only disadvantage, it is able to cope with use the direct bonding system (DBS) of the keeper. The purpose of this report is to introduce the several kinds of clinical application of DMA applying the DBS.

Methods & Materials: The Japanese Society of Magnetic Applications in Dentistry (JSMAD) submitted the new work item proposal to receive the International Standard (ISO) of our dental magnetic attachments to the ISO/TC106 in 2007, and we received the ISO13017 in 2012. Physio magnet (Neomax, Tokyo, Japan) or Gigauss C and D (GC, Tokyo, Japan) were used to the patients. Fabrication method of a root cap for fixing a keeper is very easy by using a ready-made keeper housing pattern. After casting, a keeper is fixed by using the adhesive resin cement.

Results: We got some advantages by using this system. Attractive force does not decrease because the keeper is set after casting of the root cap. When the needs of MR projection, the problem of the degradation is clear by removing the keeper only. Before the development of this system, we have removed the root cap before the MR projection and re-fabricated the root cap after the projection.

Conclusion: The DBS is very useful for the dentists who will apply DMA for the patients.

Poster 156

Crossover Trial Comparing the Clinical Results of the Biofunctional Prosthetic System and Conventional Complete Dentures

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Purpose: The biofunctional prosthetic system (BPS®) is a complete system for the fabrication of dentures, designed to provide patients with optimal form, function, and aesthetic. This system includes a comprehensive package of simple, standardized techniques for impression-making, recording of the maxillomandibular relationship, tooth placement, fabrication and processing, with training in these procedures for dentists and technicians offered by the manufacturer. However, though a few clinical report was published, there are no scientific investigations about BPS®. The aim of this

study was to compare the clinical results between complete dentures using by the biofunctional prosthetic system (BPSCD) and complete dentures with conventional procedure (CCD) by randomized cross-over trial.

Methods & Materials: The study participants were 10 with a mean age of 76.5 years (67–86years). The patients were divided into two groups by randomly. One group received BPSCD treatment in the first phase, and the other group received CCD treatment in the first phase. After 3 months of wearing the first set of dentures, all patients returned for follow-up visits and first-evaluation was carried out. Subsequently, the prostheses were changed and second-evaluation was carried out after another 3 month. Evaluated items were 1.Denture satisfaction, 2.Masticatory Performance, 3.The number of adjustment, 4.The opinion of the prosthodontist.

Results: Almost all of them satisfied well with their new dentures. The mean VAS score (denture satisfaction) of BPSCD was higher than the score of CCD. However, there is no significant difference. Masticatory performance score were higher with BPSCD than CCD, significantly. Regarding the number of denture adjustment, BPSCD required significantly fewer occasion (the mean number of adjustment: 3.5 times) than for CCD (5.2 times). A blinded prosthodontist evaluated BPSCD significantly higher than CCD.

Conclusion: There were differences in clinical results between complete dentures fabricating by the biofunctional prosthetic system and complete dentures with conventional procedure. Biofunctional prosthetic system was one of the reliable methods for fabricating complete dentures.

Poster 157

Influence of Vertical Dimension of Complete Denture on Electroencephalogram

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Purpose: Occlusal surface complete denture is worn out by long-term use, resulting in a decrease of vertical dimension. This study investigated the influence of vertical dimension of complete denture on their emotion and brain function.

Methods & Materials: The subjects for this study were 21 complete denture wearers (Mean Age: 78 years; 12 men, 9 women). Three dentures with different vertical dimensions (normal, 5 mm increase, and 3 mm decrease) were prepared. To evaluate emotion and emotion, an electroencephalogram (EEG) was recorded for three minutes both before and after gum chewing using three dentures. The data obtained by ESA-pro (Brain Function Laboratory, Inc., Kawasaki, JAPAN) were transferred to the brain wave analysis center at Brain Functions Laboratory Inc., and emotional indexes, Da, and NPV calculated using Emotion Spectrum Analysis Method (ESAM), the Diagnosis Method of Neuronal Dysfunction (DIMENSION) analysis and the Neuronal Activity Topography (NAT), respectively. The data were statistically analyzed using the Wilcoxon's test ($a=0.05$) to compare emotional indexes (negative & positive), brain function (Da) and neuronal activity (NPV) before and after gum chewing.

Results: Emotional indexes were divided into the negative (stress and depression) and positive indexes (joy and relax). By the change of vertical dimension, the negative index was significantly increased and the positive index was significantly decreased after gum chewing ($p<0.05$). Brain function was significantly improved after gum chewing in 5 mm increase denture ($p<0.05$). Comparing the neuronal activity, there was a significant difference in the normal denture between before and after gum chewing in the motor area and the sensorial area ($p<0.05$).

Conclusion: This study indicated that vertical dimension of denture was suggested strongly influence to emotion and brain function.

Poster 158

Stress Distribution in Abutment Tooth of Partial Removable Dental Prosthesis

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Purpose: Root fracture is one of the main reasons for tooth loss. To prevent the root fracture, it has been examined the influence of endodontic post on stress distribution of teeth, however there has been no study analyzing on abutment tooth of partial removable dental prosthesis (PRDP). The purpose of this study is to determine the influence of the endodontic post on stress distribution in abutment tooth by using three dimensional finite element method to prevent the root fracture of abutment tooth of PRDPs.

Methods & Materials: Three dimensional (3D) finite element models were constructed by using CT data from patients with distal extension missing and analyzed by 3D analysis software (MECHANICAL FINDER Ver. 6.1 Extended Edition, Research Center of Computational Mechanics, Inc., Japan). 3D parts of a second premolar tooth, bone, residual mucous membrane and PRDP were prepared. The premolar teeth had four types of endodontic post (metallic cast post and core, composite resin post and core, composite resin core with fiber post, composite resin core with metallic post). Simulated PRDP had Akers clasps retained on the abutment teeth. Material properties for each unit except bone were set according to previous studies and that for bone was set by the Keyak's formula. A vertical load of 98N was applied on the occlusal surface of PRDP. The model was constrained on the bottom surface of the bone. Stress distribution of the abutment teeth was observed and the largest maximum principle stress was compared.

Results: A stress concentration in abutment tooth with metal cast post and core was observed in mesial cervical area and mesial upper third of root surface. In the models with other types of post, stress concentration was observed in mesial cervical area. The maximum principal stress of resin core with fiber post and resin post and core was smaller than that of metal cast post and core and resin core with metal post.

Conclusion: The post without metal can reduce the stress concentration in the abutment teeth of PRDP. It is suggested that the further tooth loss caused from root fracture prevented and the better long-time prognosis of PRDP can be achieved by using fiber post and resin core material.

Poster 159

The Impact of Guide Planes and Guiding Surfaces on Removable Partial Denture Retention

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Purpose: To compare the retentive forces in a denture fabricated on master models with no guide planes on the abutment teeth, with guide planes, and with guiding surfaces on the denture adapted to those guide planes.

Methods & Materials: Master models simulated bilateral upper edentulous areas bounded by a premolar and molar. Extracted teeth were set in a 2mm layer of polyether to simulate the periodontal ligament. Three casts were made from three different impressions of the master model, and sent to a commercial dental laboratory with just the instruction to make acrylic resin removable partial dentures (RPDs). These were then fitted individually onto the master model, a hook positioned mid-way between the saddles, and placed on a custom-made jig on an Instron testing machine. The force to remove the denture was measured at antero-posterior angulations of 0°, 2° and 5°. Guide planes were then prepared on the teeth. Another three alginate impression were made, poured immediately and again sent to a commercial dental laboratory with the same instruction as for the first RPDs. These were tested in the same way. Then the guiding surfaces of the denture were modified using autopolymerizing resin to obtain the best fit against the guide planes of the teeth. These modified dentures were then tested in the same manner.

Results: The differences in retentive forces recorded for each situation showed a large improvement when just guide planes were prepared on the teeth, and an even greater improvement when the denture's guiding surfaces were closely adapted to the guide planes.

Conclusion: This in vitro study simulated a clinical situation and confirmed our clinical experience that guiding surfaces adapted intra-orally to prepared guide planes on abutment teeth greatly improve retention and can reduce or eliminate the need for clasps in removable partial dentures.

Poster 160

Influence of the Measuring Methods on the Attractive Force of Magnetic Attachments

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Purpose: Several different methods have been proposed to measure the attractive force of a magnetic attachment since its development. We devised a custom made jig to confirm its validity. However, a more simple method to measure the attractive force was proposed by the Australian magnet research institute in 2009 ISO conference. The proposed method provides reliable measurements in the traction. It can be achieved even for flexible traction using cotton string by controlling the sideslip between a magnetic assembly and a keeper with a simple jig. We compared the results of the attractive force measurement method proposed by Australian magnetic institute with our measurement method.

Methods & Materials: GIGAUSS C (GC) was used as a magnetic assembly testing subject. Attractive force was measured using a compact tabletop EZ-test tensile tester (Shimazu). Attractive force measurement using a special jig Attractive force of a magnetic assembly was measured using a special jig. In obtaining measurements of attractive force measurement using a conventional jig, there have been vertical and horizontal restrictions on the attractive surface between a magnetic assembly and a keeper when vertically separating a magnet potentially interfering with vertical measurement accuracy.

Results: Attractive force measurement method using a special jig The results of the attractive force measurement using a special jig. Minor variation was noted in measurements between each sample. The maximum attractive force was 570 gf, and the minimum attractive force was 543 gf. It was confirmed that the standard deviation for measurement precision was subtle in 10 measurements of each sample.

Conclusion: The measurement error was the smallest in the measuring method using a special jig that controls vertical and horizontal direction during traction, and the highest attractive force was measured. Although attractive force measurement using a simple guide fabricated according to the proposal appears to provide horizontal displacement. The effectiveness of this design component was not shown.

Poster 161

Change of Blood Flow in Palatal Mucosa by Different Chewing Rate

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Purpose: Pressures from occlusal force, mastication, and clenching etc. induce changes in blood flow of denture underlying mucosa. Our recent study showed that mucosal blood flow was increased by intermittent loading; however the study did not investigate variation in chewing pattern. Previous studies have reported individual differences in chewing pattern and rate. Therefore, it is necessary to investigate the changes in mucosal blood flow caused by different rates of intermittent loading arising from variation in chewing patterns. The purpose of this study was to determine the effect of chewing rate on blood flow of denture underlying mucosa.

Methods & Materials: Subjects included 8 healthy dentulous men (mean age, 28±2 years). Chewing was simulated by repeated loading (10 N) on the left lateral aspect of the hard palate using a 2-cm2 (circle with an 8-mm radius) experimental

denture base. The loading duration was 30 s. A non-contact laser flow meter (Advance/ ALF21, Tokyo, Japan) was used to measure blood flow. Mean blood flow during each loading period was expressed as the rate of blood flow after loading compared with that at pre-loading. Mean blood flow was compared between the following 4 loading patterns: (i) fast chewing (masticatory cycle, 500 ms; occlusal time, 200 ms); (ii) typical chewing (masticatory cycle, 750 ms; occlusal time, 300 ms); (iii) slow chewing (masticatory cycle, 1000 ms; occlusal time, 400 ms) and (iv) clenching (continuous loading). Comparisons were made using a paired t-test and the Bonferroni–Holm correction (a = 0.05).

Results: Mean blood flow during loading during slow chewing, typical chewing, fast chewing and clenching was 1.46 ± 0.52, 1.11 ± 0.45, 1.01 ± 0.24 and 0.21 ± 0.09, respectively. With the exception of typical chewing and slow chewing, significant differences were observed in the mean blood flow between the other loading patterns.

Conclusion: This study showed that chewing rate affects palatal mucosal blood flow and that blood flow during fast chewing is higher than that during slow chewing.

Poster 162

Implant Retained Overdenture Using Milled Titanium Bar with Locator® Attachment on Fully Edentulous Maxillae : A Case Report

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Purpose: The purpose of this case report is to introduce new applied attachment system(milled titanium bar with Locator® attachment) for implant retained overdenture in maxillary edentulous patients.

Methods & Materials: A 56-years-old male patient visited the hospital due to the mobility of his maxillary fixed partial dentures(10-unit bridge). Including temporomandibular joint(TMJ), there was no specific PMHs to influence dental treatment.In radiographic and clinical evaluation, there was a severe bone resorption and mobility in maxillary teeth. Accordingly all the remaining maxillary teeth was extracted and fabrication of implant supported overdenture was planned. The milled titanium bar with Locator® was designed as an attachment system, considering the stability and retention of denture, masticatory efficiency, oral hygiene care, esthetics, pronunciation, and patient's financial state. The milled titanium bar was manufactured using CAD/CAM technology, and Locator® attachment connected to the bar by tap & drill method.

Results: For over 3-year, in terms of function and esthetics, satisfactory result was obtained.

Conclusion: This applied implant retained overdenture using milled titanium bar with Locator® attachment may be regarded as acceptable alternatives to the other traditional overdenture systems on fully edentulous maxillae.

Poster 163

Mechanical Strength Analysis of Extracoronal Magnetic Attachment by Three-Dimensional Finite Element Method

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Purpose: We have developed extracoronal magnetic attachments for vital teeth, and they are widely used in clinical practice. However, the mechanical strength of such magnetic attachments is not fully confirmed. Platinum gold alloy is frequently used than Au-Ag-Pd alloy in clinical practice.In the present study, we focused on heat treatment of platinum gold alloy, and mechanical strength analysis of an extracoronal magnetic attachment was performed. The purpose of the present study was to investigate mechanical strength of platinum gold extracoronal magnetic attachment up to the elastic limit.

Methods & Materials: As a preliminary experiment, the stress-strain curve of dental gold casting alloy. Heat treatment was

calculated, followed by the elasto-plastic analysis of a simple-shaped sample based on the stress-strain curve. The finite element model of an extracoronal magnetic attachment was fabricated, and elasto-plastic analysis was performed to examine mechanical strength of extracoronal magnetic attachments. Stress-strain curves were measured using finite element analysis to investigate mechanical strength of an extracoronal magnetic attachment. Actual measurement allowed to know material properties specific to the metal, and to introduce proper mechanical properties to the finite element model. Although the elasto-plastic analysis is rarely introduced in the medical field, it is actively introduced in the industrial field and its credibility has been established. In the present study, actual measurement of the preliminary experiment and comparison with the explanatory analysis were performed before the analysis of an extracoronal magnetic attachment to confirm practicality and credibility. A finite element model of the present study was fabricated by constructing an extracoronal attachment model based on the commercialized and normalized CAD data. Stress distribution was evaluated using von Mises stress.

Results: The stress distribution chart indicated stress concentration of the stress applied on the top surface of an attachment on the neck part of an attachment. Elastic limit was 1.5 mm at 1100 N loading for hardening heat treatment, 1.3 mm at 800 N as cast, and 1.1 mm at 600 N loading for soft heat treatment.

Conclusion: Three-dimensional finite element analysis showed that the elastic limit of an extracoronal magnetic attachment fabricated with platinum gold alloy exists around 1,000 N.

Poster 164

Fingernails As Predictors of Toothshape

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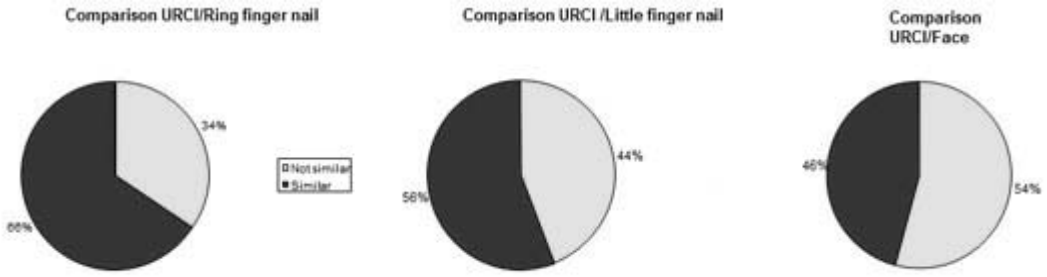
Purpose: Wiktop syndrome, also known as “Nail and Tooth syndrome” or “hypodontia and nail dysgenesis” it is an ectodermic dysplasia, it occurs due to a mutation of MSX1 gene; presents nail dysplasia and conical shaped crowns or hypodontia. This leads to the hypothesis that there might be some morphological similarities between fingernails and tooth shape. The purpose of this study was to determine the shape of fingernails of ring and little fingers as a predictor of the shape of central incisor in comparison with shape of the face; this may help in tooth shape selection and reconstruction. To determine similarities between nail and tooth shape, the shapes of the upper central incisor, fingernails and face were compared.

Methods & Materials: 61 patients were selected. For each, 4 photographs were taken: right upper central incisor, nail of the right ring finger, nail of the right little finger, and face. Using Adobe Photoshop 7.0 the contours of the structures were outlined. Two diagonals were drawn over the upper central incisor outline, dividing the contour in four segments. The images were proportionally adjusted in order to leave them at the same outline width. Each image was printed in a translucent foil and through superimposition were compared to the upper right central incisor, determining the coincidence of contours of the cervical, right and left segments (incisal segment was excluded due to tooth wear and nail maintenance variability)

Results: Results were analyzed with the Squared-Chi test (p= 0,05). Data showed that there is similarity only between the shapes of the upper central incisor and the nail of the ring finger (65,5% similarity). The shapes of the little finger (56% similarity) and face (46% similarity) were not statistically similar.

Conclusion: Within the limitations of this study, the shape of ring finger nail is a better predictor of tooth shape (upper central incisor) than little fingernail and the shape of the face.



Poster 165

Effect of Parylene Coating on the Surface Roughness of PMMA After Brushing

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Purpose: Acrylic resins are widely used in the manufacturing of different types of intra-oral devices. Due to their rough surface and vulnerability to scratching and abrasion from mastication and brushing, colonization by microorganisms is common and potentially endangers the general health of the prosthesis wearer. Parylene (poly-para-xylene) is an organic polymer synthesized as a thin coat. It is widely used to coat medical implantable instruments. The aim of this experimental project was to investigate the influence of Parylene coating on surface roughness of Poly-methyl-methacrylate (PMMA) samples after simulated cleansing using an electric toothbrush and two brushing media (paste and pumice).

Methods & Materials: Coated and uncoated PMMA samples were subjected to simulated brushing with paste and pumice. Changes in surface roughness before and after coating with Parylene and before and after brushing with the two media were measured with a laser non-contact profilometer and compared. The results were analysed using the Paired t-test. Multivariable Linear Regression analysis was undertaken to analyze the effect of coating and brushing medium on the final roughness after adjusting for the initial roughness.

Results: In the coated samples the mean surface roughness remained the same before and after brushing in the Paste group 2.69μm (SD=0.92 and SD=0.87 respectively) and increased from 3.73μm (SD=1.25) to 5.05μm (SD=1.40) in the Pumice Group. In the uncoated samples the mean surface roughness increased from 4.45μm (SD=0.92) to 6.73μm (SD=1.73) in the Paste group and from 3.67μm (SD=0.74) to 7.50μm (SD=2.25) in the Pumice Group. Differences between the coated and uncoated groups were statistically significant ($p<0.05$).

Conclusion: The results of this study demonstrated that Parylene coated PMMA samples showed a statistically significant lower mean surface roughness after the brushing procedures compared to the uncoated samples. The coated samples brushed with paste showed no change in roughness before and after the brushing procedures. The samples brushed with pumice in both groups showed a higher roughness after brushing than the ones brushed with paste.

Poster 166

Material Property of Cohesive Silicone for the Denture

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Purpose: Xerostoma, vulnerable oral mucosa, scar tissue due to general and local disease and/or the side effects of various treatments including radiotherapy and surgical treatment of head and neck cancer, frequently lead to disadvantages for the retention and stability of convention dentures. Providing adhesive property to the retention surface of denture base could be effective to improve the problem mentioned above and avoid the undesirable results by denture adhesives, such as inflammation of oral mucosa, due to the difficulty of cleaning off up the residues from oral and the denture. In the present study, two prototypes of cohesive silicone were developed as adhesive denture materials and their mechanical properties and level of instantaneous adhesions were investigated

Methods & Materials: Polyvinyl siloxane, platinum catalyst and, cross-linking agent were used to make two prototypes, type1: middle cohesive and type2: high cohesive (different catalyst/cross-linking agent ratio). A-2186F(Factor?, Inc., Lakeside, AZ), a silicone elastomer, with adhesive characteristics at catalyst/base silicone ratio of 1/60, previously reported, was used as a control. The tensile test was performed three specimens for each group, and their peak loads were recorded using a universal testing machine at 500mm/min crosshead speed (Instron 5565). The rolling ball tack test measures the level of instantaneous adhesion of silicone specimens.

Results: Control silicone has two problems, such as, difficult manipulation and bubble entrapment in specimens. Two prototype of the present study, cured by using equivalent amount of a catalyst and base silicone, improved ease of manipulation of the silicone and bubble entrapment. The results of tensile test showed that the peak loads for the cohesive

silicone specimens; control, type1, and type2 were 0.3±0.1N, 0.1N, and 0.23±0.57N, respectively. There were no significant differences in peak load between control and type2 specimens. The rolling distances for the cohesive silicone specimens; control, type1, and type2 were 37.2±1.48, 32±3.22, and 26.2±2.04mm. The rolling distances for the control were significantly higher than those for type2.

Conclusion: These results suggested that newly developed cohesive silicone has potential for the adhesive denture material improving the denture retention.

Poster 167

Relining or Repair Procedures of Polyamide Denture Using New Adhesive System

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Purpose: The use of polyamide dentures can solve the esthetic and allergy problems of conventional dentures. However, auto-polymerized polymethyl methacrylate (PMMA) resin cannot be bonded to polyamide thermoplastic resin. This presentation will describe the bonding procedures of PMMA repair and reline resins to polyamide dentures in chair side with 4-META/MMA-TBB resin based on our experimental data.

Methods & Materials: After ill-fitting and failure of the polyamide denture base (Valplast, Valplast, USA) was observed, it can be relined repaired as following procedures: 1) The denture base is cleaned using brush; 2) The bonding surfaces are sandblasted with 50 μm alumina particles (0.48 MPa); 3) As an adhesive agent, 4-META/MMA-TBB (Sun Medical, Japan) of the form of slurry (P/L ratio: 0.5 g, and catalyst: monomer= 1: 4) is primed on the surfaces; 4) After repair or reline PMMA resin (Meta Base M, Sun Medical) were mixed and poured on the surface; 5) the polyamide denture is delivered to the patient mouth; 6) After polymerization, the repaired or relined denture base is finished and polished. For soft tissue conditioning, acrylic soft lining material (Softliner, GC, Japan)can be used as well as PMMA resin.

Results: For repair and reline of the existing dentures, the adhesive property of acrylic resin must be indispensable for long term use. In our previous study, the bonding strength between acrylic resin and polyamide thermoplastic resin was greatly improved with 4 META/MMA-TBB resin as adhesive agent. In consequence, polyamide denture can be repaired and relined in chair side.

Conclusion: Using new adhesive system, not only recovery of denture form and better fitness but also denture function and patient satisfaction can be immediately obtained.

Poster 168

Development of Retainer Fabrication Method Using Laser Sintering

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Purpose: Laser sintering is a three-dimensional fabrication method, and has been used to fabricate a metal coping of the Porcelain-Fused-To-Metal by layering Co-Cr alloy powder (25 μm). However, the method has yet to be applied to denture. At present, the framework of a metal plate is fabricated by skilled dental technicians. However, the accuracy of a framework varies due to complicated laboratory procedures. If the laser sintering method can be applied to the fabrication of a denture framework, the final product can achieve constant accuracy and fit despite the skill of technicians, suggesting a potential clinical value. The aim of the present study was to investigate setting conditions of the laser sintering method for retainer fabrication.

Methods & Materials: A retainer was fabricated by laser sintering method using the metal prototype developed based on the size of the lower first molar. Akers clasp was designed using a CAD software (Dental Wings DWOS, Data Design System). The CAD data was converted to the Nc data using Work Nc (Sescoi), and a sample was fabricated using a laser sintering machine (EOSINT M270, EOS), followed by evaluation of setting conditions of the rest and clasp fabrication.

Results: The Akers clasp was an assumed retainer. The retainer could be set on the model by setting the offset of a rest to 0 μm, and that of a clasp to 160 μm. The gap on the cutting surface was compared between laser sintering and conventional methods. The results showed that the laser sintering method could be applied in clinical practice.

Conclusion: A fixed frame was required near the clasp tip of a retainer fabricated using the laser sintering method to avoid deformation during lamination. The potential for clinical application was suggested by setting appropriate offset values of a retainer.

Poster 169

The Change in Preparation Paradigm: The Conservative Prosthetic Preparations for Anterior Teeth

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Purpose: In the last few years there have been remarkable changes in prosthetic preparations. The advancement of ceramic materials and the possibility of making ceramic crowns and bridges without a metal framework enable the clinicians to make more conservative preparations. Above all, using monolithic all-ceramic restorations to reduce the thickness of the crown while maintaining adequate strength improves the prognosis of the restorations of the teeth to be restored, and obtains a better adhesion when the restorations are bonded to the enamel. The preview of the final volumes of restorations as suggested in the APT technique facilitates a better calibration of the preparations and the removal of less dental tissue. Making multiple adhesive restorations on a single tooth, as in the "sandwich technique", helps to preserve the interproximal dental tissue. The full veneer design restores both the vestibular and palatal surfaces by means of an extended laminate. In addition, the new emphasis on feather edge preparation instead of the classical butt preparation and the B.O.P.T. technique with the creation of a new emergency profile enable us to save dental tissue in the marginal area of the tooth. The authors of the study aim to analyse various protocols and illustrate some of the related clinical cases in order to point out the advantages and disadvantages of the various clinical options.

Methods & Materials: Starting with a review of the scientific literature and the clinical experience of the authors, various methods for saving dental tissue in prosthetic preparations will be explained.

Results: The new protocols for prosthetic preparations are effective in limiting the invasiveness of the treatment on frontal teeth. It is essential, however, to fully understand the details of each technique, the association between the preparation protocols and the restorative materials, and the possible limitations of each technique.

Conclusion: The traditional approach to preparations of the anterior teeth must be re-assessed in light of newer protocols, with the aim of reducing the thickness of the tissues removed and improving the prognosis of the abutments.

Poster 170

Evaluation of Repeatability of Intraoral Digital Impression: An In-Vitro Study

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Purpose: The aim of this study was to compare the repeatability of intraoral digital impression method with the repeatability of extraoral scanning after conventional silicone impression method by using Geomagic Studio 12 as an analyzing software.

Methods & Materials: One Nissin Dental Study Model (upper jaw) with prepared abutments were designed into 5 set of arrangements according to the layout of prepared abutments (arrangement 1: single prepared maxillary central incisor;

arrangement 2:single prepared maxillary first molar; arrangement 3:prepared maxillary canine and second premolar with first premolar absent; arrangement 4:half of upper arch with 7 prepared teeth; arrangement 5:entire upper arch with 14 prepared teeth). For the experimental group, each arrangement of Nissin Dental Study Model was scanned by TRIOS intraoral digital scanner for 10 times; For the control group, 10 plaster models were made from each arrangement and delivered under scanning using 3Shape extraoral scanner. 100 STL files (50 files for each group) were exported from these two scanners. All the data were processed and analyzed using Geomagic Studio 12 software to determine the repeatability of both impression methods which represented the accuracy and precision of scanning devices.

Results: Significant differences of 3D average deviations were revealed between control and experimental groups with regard to arrangement 1, arrangement 4 and arrangement 5 ($p<0.05$), no significant differences were found in arrangement 2 and arrangement 3. Significant differences of 3D standard deviations between control and experimental groups considering arrangement 1, arrangement 2, arrangement 4 and arrangement 5 ($p<0.05$), no significant difference was revealed in arrangement 3.

Conclusion: 1.Accuracy of intraoral digital scanner was better than extraoral scanner when scanning single incisor; it was worse than extraoral scanner when scanning half or complete dental arch.
2.Precision of intraoral digital scanner was better than extraoral scanner when scanning single incisor and single molar; it was worse than extraoral scanner when scanning half or complete dental arch.
3.Accuracy and precision of intraoral digital scanner were sufficient when scanning single incisor, single molar and three-unit teeth; they were insufficient when scanning half or complete dental arch.
4.Accuracy and precision of extraoral scanner were sufficient when scanning any size of arch region.

Poster 171

Load Pressure During Upper Edentulous Impression Procedure

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Purpose: Since complete dentures are load-bearing on the mucosa under the dentures, the residual ridge is closely involved in the impression method. Since the residual ridge is compressible, the pressure during impression-taking deforms it. The impression method relying on occlusal pressure is generally employed for impression-taking of complete dentures, but there is no sufficient EBM for residual ridge deformation on impression-taking, and it is entrusted to the experience and subjective judgment of operators in most cases. Considering that clarification of the appropriate impression pressure is very important, we analyzed impression pressure-induced deformation of the residual ridge.

Methods & Materials: Using a measurement system employing the ultrasonic pulse method, we measured the residual ridge thickness with changes in the load pressure during the upper edentulous impression procedure. The load pressures during the upper edentulous impression procedure performed by operators with different years of experience were then measured for 60 seconds. The maximum load and mean load held for 30-60 seconds as a mean holding load were analyzed.

Results: The load during impression-taking was 14.7 N, and the mucosa was assumed to have been markedly deformed, showing that a load greater than 14.7 N is unnecessary for the impression procedure. There was no gender difference or specific tendency due to the years of experience in the maximum or mean holding load. However, many operators loaded a maximum load exceeding 14.7 N, and the mean holding load was lower than 14.7 N and persisted for 30-60 seconds in most operators.

Conclusion: It was clarified that a slightly smaller load for a prolonged period is necessary to minimize residual ridge deformation during impression-taking.

Poster 172

The Effect of Reinforcement Structure on the Share Strain of Palateless Denture

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Purpose: Although maxillary complete dentures without full palatal coverage are recommended to allow natural sensations in the palate and have often used as implant overdenture, there have been a few mechanical analysis. In our previous study, we revealed that palateless dentures deformed differently and greater than complete dentures with palate and strains of palateless dentures were decreased by embedding the reinforcement. However, whether palateless dentures fracture easier than conventional dentures or not is still unclear.

Denture fractures occur from crack initiation and propagate to areas of greatest share strain. Therefore, we conducted this study to reveal the difference of share strain between the two dentures and the effect of reinforcement structure on share strain of palateless denture.

Methods & Materials: A model of edentulous maxilla with artificial mucosa and five types of maxillary complete dentures with or without palate were fabricated. Three types of reinforcements (one is on the top of the residual ridge, another is on the top of the residual ridge with palatal bar, and the other is palateless metal base) were made from cast cobalt-chromium alloy.

Two strain gauges were attached to the polished surface and connected to sensor interfaces controlled by a personal computer. A vertical occlusal load of 49 N was applied bilatelaly in the region of the first premolar and first molar respectively. The strains were measured and the share strains were calculated and compared statistically with one way analysis of variance ($p<0.05$).

Results: In both loadings, the share strain of palatal side of palateless denture without reinforcement was significantly higher than that of conventional complete denture and palateless dentures with reinforcement ($p<0.05$).

The share strain of palateless denture was decreased in the order of with reinforcement, reinforcement with palatal bar and with metal palatal base.

Conclusion: The share strains of palateless denture were significantly greater than those of conventional complete denture and all types of reinforcement could reduce them. From the results of this study, palateless denture with palatal bar or metal base palateless denture is recommended to prevent denture fracture.

Poster 173

The Bending Strength and Surface Property of a Soft Acrylic Resin for Denture Material in Comparison with Conventional Denture Materials

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Purpose: PALATE RESIN SOFT® (PRS, GC) is a heat-polymerized soft acrylic resin for denture bases and lining materials. The aim of this study is to investigate the bending strength and surface property of PRS in comparison with conventional denture materials, polymethyl methacrylate (PMMA) and silicone.

Methods & Materials: PRS, Acron® (PMMA, GC) and GC RELINE Soft® (Silicone, GC) were prepared as test plates (50 x 10 x 2 mm) by the manufacturers' instructions. For bending strength test, two types of PRS, hard type (10/5 of power/liquid ratio) and soft type (10/9 of power/liquid ratio) were used, and for the other tests, moderate type of PRS (10/7 powder/liquid ratio) were used. Bending strength, surface roughness (Sr) and water contact angle (Ca) of the test plates were

measured by three-point bending, with non-contact measurement (LEXT OLS3500, OLYMPUS) and drop method (Master DM-501, Kyowa Interface Science Co.,Ltd.) , respectively. The latter two values were measured before and after salivary treatment, in which test plates were coated with human stimulated saliva collected from a healthy male.

Results: The bending strength values of hard and soft types of PRS were 44.4 ± 11.0 and 1.79 ± 0.28 MPa, respectively, while those of PMMA and silicone were 87.3 ± 7.60 and 3.33 ± 0.12 MPa, respectively. Saliva treatment decreased Ca values of PRS from 87.5° to 61.1°, respectively ($p < 0.001$), which was a change similarly to PMMA (from 79.6° to 58.7°, $p < 0.001$). Saliva treatment also increased the Sr values of PRS and PMMA, though the increases were not significant. Silicone had a higher Sr value compared to those of PRS and PMMA ($p < 0.01$ and $P < 0.001$) and a similar Ca value to those of PRS and PMMA, and showed no significant change in Sr and Ca values by saliva treatment.

Conclusion: These results indicate that PRS was more elastic than PMMA and silicone, depending on the powder/liquid ratio, while the Sr and Ca of PRS had a similar behavior to PMMA by saliva treatment. PRS might be compatible with PMMA, although further study, such as bacterial adherence, is required.

Poster 174

Relationship Between the Incidence of Lifestyle-Related Diseases and Nutrient Intake and Occlusion

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Purpose: There is a lot of the middle aged who have contracted the lifestyle-related disease in Japan. The lifestyle-related disease was made up of the diabetes mellitus, hypertension,serum lipid abnormalities,obesity, cerebral apoplexy and cardiology.

Food intake is closely associated with the incidence of lifestyle-related diseases. In the elderly, an increased number of missing teeth may negatively influence the nutritional balance. The purpose of this study was to examine the relationship between the incidence of lifestyle-related diseases and status of nutrient intake in the daily diet of the elderly.

Methods & Materials: A total of 14 females aged 65 and over, independently living in Daito City, were selected. Based on the results of oral examination, the participants were classified into the following 3 groups: dentate (dentate): 6; those with missing teeth without dentures (non-denture): 3; and those with removable dentures (denture): 5. Evaluation items included: masticatory efficiency; the presence/absence of lifestyle-related diseases; conditions of the oral cavity; and the levels of intake of each nutrient and food group.

Results: As the results, the masticatory efficiency was highest in the dentate group on comparison among the 3 groups. However, all groups took the recommended amount of calories for the Japanese Dietary Reference Intake criteria (2010 version). On the other hand, in the non-denture group, fat intake tended to be higher. Regarding minerals and vitamins, calcium, vitamin C, and dietary fiber were frequently lacking in the denture and non-denture groups. Lifestyle-related diseases were absent in all groups; hypertension and serum lipid abnormalities were observed only in the non-denture group.

Conclusion: The association between obesity, metabolic syndrome, and eating behaviors is being clarified. It has been reported that chewing food well before swallowing prevents metabolic syndrome. In fact, in previous animal experiments, differences in the chewability of foods influenced energy metabolism, and obesity frequently occurred in rats fed soft foods, with decreased thermogenic activity.
It was suggested that recommendations for the Japanese Dietary Reference Intake criteria (2010 version) were met in the non-denture group with lower masticatory efficiency. However, they should take care of their health for the presence of signs of lifestyle-related diseases and a poor nutritional balance. This study was supported by the Japan Society for the Promotion of Science, Grant-in-Aid for Scientific Research-24592944.

Poster 175

Full Mouth Prosthetic Case Applying Magnetic Attachments in Various Shapes

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Purpose: The patient was a 83-year-old female who lost her bilateral molar occlusion due to the bilateral upper free-end and multiple tooth loss. The patient was not using the lower denture due to poor fitting of a denture at first visit. Bilateral occlusal support was lost, and malalignment of anterior teeth due to advanced periodontal disease and the collapse of the occlusal plane were observed.

Methods & Materials: Severe alveolar resorption in the anterior area, poor prosthesis in the right molar area, and the remaining teeth in the left molar area were observed in the mandible. Treatment plans in the mandible were root canal treatment in the remaining teeth, followed by an overdenture for all the remaining teeth to improve the crown-root ratio. Treatment plans in the maxilla were prosthetic restoration of the remaining teeth for esthetic and functional recovery, and denture in the bilateral missing molar areas. A study model was mounted on an articulator using a face bow transfer. For the maxillary dental arch, ideal dental arch and shape were fabricated using dental wax to use as a guide of final restoration for esthetic recovery.

Results: The designs of the mandibular restorations included radicular-type magnetic attachments in the lower anterior area between the right lateral incisor and the left canine, and attachment denture using MT crowns in the well-preserved lower right second molar. The condition of the upper remaining teeth was fair without mobility. An extracoronal magnetic attachment was placed on the bilateral upper second premolars, and esthetic attachment denture without a clasp was placed on the bilateral molars. Three abutment teeth up to the canine were joined using porcelain-fused-to-metal crown.

Conclusion: The patient did not complain of pain, and there was no problem in masticatory function and esthetic appearance at 3 years after the placement of final restorations. The results of the present study confirmed the effectiveness of magnetic attachments which can be applied in various shapes such as extracoronal attachment, MT crown, and root cap attachment depending on the clinical situations.

Poster 176

Prosthodontic Difficulties in Bimaxillary Overdentures Created by the Last Teeth: A Case Report

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Purpose: Highlighting the causes which lead to denture's wear inability, in a case of bimaxillary overdentures and the therapeutic attitudes which arrive in order to solve the case.

Methods & Materials: Our study was accomplished on S.A., a female 57 years old patient, bimaxillary edentulous, with the presence of 11 and 21 teeth on upper jaw and 33, 43 on lower jaw, with overdentures on natural teeth, anchored with OT CAP ball attachment systems(Rhein'83), unsatisfied because of the physical and psychic discomfort caused by the dentures, the recurrent fracture of the mandibular denture and the impossible wear and use of the dentures(almost impossible mastication, unsatisfying esthetics). We evaluate the case by the case history, extra and intraoral exam, Rx exam, study cast's, overdentures's and photo's analysis.

Results: We highlighted the next faults: the occlusive vertical dimension overrated with 7 mm, that explains the recurrent fracture of the mandibular denture and difficulties in wearing them, the lack of vertical prosthetic space, consequence of the teeth presence and ball attachment systems. We also observed the incorrect put up of the teeth on artificial arches and the upper jaw's denture short base, which determined it's instability .The evaluation of the muco – osseous prosthetic areas of the both jaws, showed good conditions for the prosthetic treatment, high and wide ridges,thick and adherent mucosa, and the

vertical prosthetic space in the presence of the ball attachment systems was insufficient even if on only one jaw. Due to these conditions we choose the ablation of all 4 special systems and simple overdenture treatment, keeping the 4 residual teeth, with simple filings to reduce the ridge's reduction, keeping in mind that our patient is young.

Conclusion: Overdentures, and especially those on both jaws, can create difficulties during the prosthetic treatment, when the vertical prosthetic space is insufficient, the evaluation is incorrect and the principles of the prosthetic treatment are not kept, with functional affectation and discomfort which can lead to the impossibility of wearing the dentures.

Poster 177

The Dimensional Distortion of Acrylic Resin Denture Bases Subjected to Different Dual Cure Materials and Methods

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Purpose: Mucosa-borne complete dentures are the only treatment available for patients who cannot afford the alternatives of implant dentistry. Complete denture therapy will therefore remain an invaluable aspect of treatment modalities for the edentulous patient. There have been methods proposed to reduce the number of visits necessary for complete denture therapy under the philosophy of Appropriatech, thereby reducing costs. The use of acrylic bases after the first visit, to record jaw relations means that a dual cure is necessary, but the costs associated with this could be further reduced by reducing laboratory processing times. Therefore we sought to establish the amount of distortion that occurred to the denture base when different curing methods were used for a second cure, in order to see if shorter curing cycles could be used without compromising the quality of the prostheses.

Methods & Materials: A standardized method of fabricating a maxillary denture base with suitable markers for measurement was established, as well as a standardized mold for setting the teeth. The markers were set at different heights, three in the palate and three in the external flanges of the denture, to enable three-dimensional recordings. Measurements were made in a reflex microscope, which can record x, y, and z axes to an accuracy of 4 μm. First, the teeth were set in wax on the clear acrylic resin heat-cured base, and the positions of the markers recorded. These bases were then subjected to a second processing when the wax supporting the teeth was replaced with acrylic, and measurements again taken. Four dual cure methods of varying temperature and time were used to process the heat cured acrylic. For a fifth method, the wax was replaced with autopolymerising acrylic, which required no heat and sets under pressure in a silicone mold in 25 minutes.

Conclusion: preliminary tests have shown that, whilst there is some distortion in all second cure methods, the differences are small and unlikely to be clinically significant. The final results will be presented as the recommended time-saving method.

Poster 178

Influence of Palatal Plate Composed of Ce-TZP/Al_2O_3 Nanocomposite on Patient Comfort

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Purpose: Metal-free restoration is preferred not only for fixed prosthodontics but also for removable prosthodontics. Yttria-stabilized zirconia (Y-TZP) has been incorporated in the framework of fixed prostheses and dental implants. Because zirconia/alumina nanocomposite stabilized with cerium oxide (Ce-TZP/Al_2O_3 nanocomposite) has higher strength and greater fracture toughness than Y-TZP, we focused on the use of material for fabricating a palatal plate of a maxillary complete denture. The purpose of this study was to investigate the efficacy of Ce-TZP/Al_2O_3 nanocomposite palatal plate in patient comfort.

Methods & Materials: Palatal plates were made with polymethyl methacrylate resin (Acron, GC Corporation; RP), Co-Cr alloy (WIRONIUM, BEGO; MP) and Ce-TZP/Al_2O_3 nanocomposite (P-nano ZR, Panasonic Healthcare; ZP). The thicknesses of plates were 1.5mm, 0.5mm and 0.5mm, respectively. The subjective comfort during wearing three palatal plates was assessed by healthy dentulous subjects on a 100-mm visual analogue scale (VAS), with scoring based on general satisfaction, ease of swallowing, feeling of taste and feeling of temperature. The subjects also assessed the detection threshold and recognition threshold of taste using the whole-mouth method. The taste test solutions were sucrose for sweet taste, sodium chloride for salty taste, tartaric acid for sour taste and quinine hydrochloride for bitter taste. VAS values and taste thresholds were statistically analyzed using Friedman's test followed by the Bonferroni test ($\alpha = 0.05$).

Results: The VAS values for general satisfaction and ease of swallowing wearing ZP were higher than those wearing RP. There were no significant differences in the feeling of taste and feeling of temperature with RP, MP and ZP. With regard to taste, there were no significant difference in the detection threshold and recognition threshold.

Conclusion: Within the limitations of this study, Ce-TZP/Al_2O_3 nanocomposite palatal plate provided higher patient comfort and ease of swallowing than the resin plate. Furthermore, Ce-TZP/Al_2O_3 palatal plates as well as resin and Co-Cr plates did not inhibit taste sensation. These results suggest that Ce-TZP/Al_2O_3 nanocomposite will be one of the denture base materials with patients' good satisfaction.

Poster 179

Analysis of Small Gtpases In Dendritic Cells and Keratinocytes in Nickel Allergy Mouse Model

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Purpose: Although Nickel (Ni) is well known as one of the most common allergenic dental materials such as for removable or fixed dentures, the mechanisms of Ni allergy development and symptoms have many unknown points. We already reported that the p38 mitogen-activated protein kinase (MAPK) pathway in dendritic cells (DCs) has played an important role in the process of Ni allergy development. Keratinocytes are the major cellular components in skin which are interacted with DCs and produce cytokines in response to cell damages. The aim of this study is to examine whether signaling pathways, especially small GTPases of Rho and Rac1 in DCs and keratinocytes are activated in the model mouse with Ni allergy symptoms.

Methods & Materials: Specific pathogen-free female C57BL/6J mice were injected intraperitoneally with 50 µl of 1 µmol/ml NiCl2 into both flanks. 14 days later, mice were challenged for recall by injecting 20 µl of 0.2 µmol/ml NiCl2 into the pinnae of each ear. 48 hours after the challenge, delayed type hypersensitive reactions were determined by measuring the increment of ear thickness. Epidermal sheets were obtained by peeling ear skin with ammonium thiocyanate. DCs and keratinocytes in the sheets were observed by confocal microscopy. Freshly isolated bone marrow cells were stimulated with GM-CSF for 7 days to induce differentiation into DCs. DCs were cultured by the additional stimulation of NiCl2 for 48 hours and several protein expressions were examined after the stimulation by Western blot analysis, FACS, PCR and ELISA.

Results: We detected an increase in DCs expressing activated RhoA protein right after the stimulation by NiCl2 and it was reduced in a time dependent manner. In addition, expression of integrin alpha6 and beta4 were increased in DCs stimulated with NiCl2. Activated RhoA and Rac1 were observed in keratinocytes in the epidermal sheets.

Conclusion: The Rho family of GTPases is known as its function to regulate many aspects of intracellular actin dynamics. Increase of integrin expressions following the activation of RhoA in DCs which stimulated with NiCl2 might explain the mechanism of migration of DC during the first phase of Ni allergy development.

Poster 180

Reconsrteuction of Mandibular and Lower Lip Defect by Dento-Mandibular Prosthesis and Facial Prosthesis: A Case Report

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Purpose: The lip defect lead to esthetic and functional deficiencies. This defect complicates a problem. Although a dento-maxillary prosthesis and a facial prosthesis can achieve the high outcome for oral cancer patients, there are a lot of difficulties in a lip area. In the case of lower lip defect, we have to consider a lip closure insufficiency. This report presents dento-maxillary prosthesis and facial prosthesis attached with superglue in a mandibulectomy patient with a lower lip defect.

Methods & Materials: The patient is thirty years old man, who was affected by the carcinoma of mandible, with a mandibulectomy and lower lip defect in other hospital. He had severe drooling and difficulty to keep food in the oral cavity during meal. He always goes out with a mask for drooling and esthetic deficiency. Speaking is unclear for lip closure insufficiency. In this case, we planed to make a dento-maxillary prosthesis and a facial prosthesis.

Results: The dento-maxillary prosthesis and facial prosthesis attached with superglue were applied to the patient. Although, these prostheses improved slightly lip closure and food ingestion, they have a limited use at a time of going out. After the treatment, debulking surgery of reconstructed flap was performed for improving poor form of the reconstruction flap. We are considering a remake of dento-maxillary prosthesis and facial prosthesis.

Conclusion: It was suggested that the facial prosthesis for lower lip defect was useful for improving lip closure, but that this treatment was insufficient for other function. Further prosthetic treatment is under consideration.

Poster 181

Fracture Resistance of Teeth with Different Ferrule Lengths, Restored with Parapost® and Paracore®

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Purpose: The aim of this in vitro study is to investigate the effects of different ferrule lengths on fracture resistance of endodontically treated premolar incorporating ParaPost® and Paracore® restoration under direct loading.

Methods & Materials: One hundred extracted human mandibular premolars were distributed into 5 groups(n=20) randomly; not endodontically treated and restored with full metal crown (PC), endodontically treated and restored with full metal crown (NC), endodontically treated and then restored with ParaPost® (ParaPost XT, Coltene Whaledent, Cuyahoga Falls, USA), Paracore® (ParaPost XT, Coltene Whaledent, Cuyahoga Falls, USA) and full metal crown with ferrule lengths of either 0mm(F0), 1mm(F1) or 2mm(F2). The teeth were embedded 3 mm apical to the CEJ in acrylic resin and restored with metal crown after PFM preparation. Thermocycling test was performed for 1,000 cycles. Force was loaded with crosshead speed of 2.54mm/min at an angle of 135 degree to the axis of the tooth using universal testing machine (Instron 8500 Plus, 100 Royal St. Canton, USA). Fracture load(N) and pattern was analyzed. Statistical analysis was performed using one-way ANOVA and Tukey HSD test.

Results: The ANOVA showed a statistically significant difference between 5 groups for fracture resistance($p<.05$). F2 group exhibited the highest fracture resistance among endodontically treated groups($p<.05$). However, no statistical difference was found between F2 and PC or F1 groups. Fracture pattern was mostly oblique fracture, starting from lingual margin extended to 3 mm apical to the CEJ on buccal side.

Conclusion: Premolars restored with prefabricated post, core and metal crown with 2mm ferrule exhibited more fracture resistance than with 0mm or 1mm ferrule. No statistical difference was found between F2 and PC groups. Teeth with post improved the strength of endodontically treated teeth. Fracture pattern was mostly oblique fracture in all groups. F0, F1 and F2 groups showed vertical fracture while PC and NC groups did not.

Poster 182

The Influence of Particle Size of Poly(Ethyl Methacrylate) Regarding the Gelation Time of Tissue Conditioner

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Purpose: Gelation time of tissue conditioner influences the clinical performance during temporary lining. The purpose of this study was to examine the influence of particles size of poly(ethyl methacrylate)(PEM) on gelation time.

Methods & Materials: The polymer powder used was PEM (particle size: 20 ~ 155μm) and liquids comprised 40% dibutyl phthalate(DBP), 47% dibutyl phthalyl butyl glycolate(BPBG), 13% ethanol. Based on the particle size, five different groups were evaluated, including (1) 20 ~ 155μm(control), (2) larger than 106μm classified by vibratory sieve shaker, (3) smaller than 106μm classified by vibratory sieve shaker, (4) larger than 106μm milled by ball milling machine, (5) smaller than 106μm milled by ball milling machine. The powder liquid ratio in this study was 1.2 and gelation time was investigated by rheometer. The particle shapes were analyzed by the scanning electron microscope (SEM).

Results: The gelation time of group 1(control) was 295.7 seconds. In group 2 (larger than 106μm) and 3(smaller than 106μm), the gelation times were 418 and 309 seconds respectively. In group 4 (larger than 106μm) and 5 (smaller than 106μm) by ball milling, the gelation times reduced to 109 and 20 seconds significantly. In SEM analysis, the spherical particles became irregular shapes with fragments after ball milling.

Conclusion: The results suggest that decrease of the PEM particle size reduced the gelation time. Increasing the surface area, particle with irregular shape reduced the gelation time more than smaller spherical particle.

Poster 183

Hardness of Dual-Cured Resin Cements and Core Build-Up Resin Composites for Luting Fiber-Reinforced Posts

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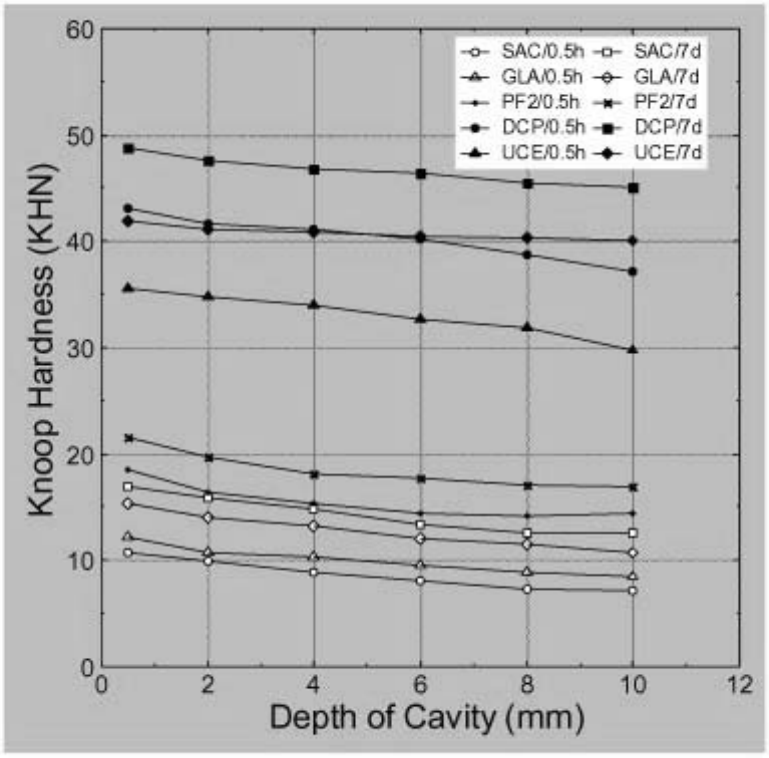
Purpose: The optimal luting material for fiber-reinforced posts, which promotes the longevity of post and core restorations, remains undetermined. The purpose of this study was to evaluate the suitability of 3 dual-cured resin cements (DRCs) and 2 dual-cured core build-up resin composites (DCBRCs) for luting fiber-reinforced posts into cavities by assessing their Knoop hardness number (KHN).

Methods & Materials: Five specimens each of DRCs [SA Cement Automix (SAC), G-Cem LincAce (GLA), and Panavia F2.0 (PF2)] and DCBRCs [Clearfil DC Core Plus (DCP) and Unifil Core EM (UCE)] were polymerized from the top by irradiation for 40 seconds. KHNs were measured at depths of 0.5, 2.0, 4.0, 6.0, 8.0, and 10.0 mm at 0.5-hours and 7-days post-irradiation. Data were statistically analyzed by repeated measures ANOVA, one-way ANOVA, and Tukey's compromise post-hoc test ($P < .05$).

Results: At both post-irradiation times, the 5 resins materials showed the highest KHNs at 0.5-mm depth. At 7-days post-irradiation, KHNs of the resin materials were not significantly different between the 8.0-mm and 10.0-mm depths ($P > .05$).

For all materials, the KHNs at 7-days post-irradiation were significantly higher than those at 0.5-hours post-irradiation at all depths ($P < .05$). At 7-days post-irradiation, the KHNs of the 5 resin materials were found to decrease in the following order: DCP, UCE, PF2, SAC, and GLA ($P < .05$).

Conclusion: KHN depends on the depth of cavity, post-irradiation duration, and material brand. Although the KHNs of the 2 DCBRCs were higher than those of the 3 DRCs, there were notable differences among 5 materials at all depths and both post-irradiation times.



Geriatrics

Poster 184

How to Readapt an Old Denture : The 3 + 1 Steps

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Purpose: Aging is associated with a reduced ability to adapt to new complete dentures. Moreover, numerous aged patients suffer from chronic diseases, reduced mobility, but also economic problems. Consequently, renewal of complete denture including more or 7 appointments is frequently associated with refusal or "bad integration". In order to simplify the oral rehabilitation of edentulous patients with old dentures, the rebasing of these dentures could be the answer to adaptation, time and money problems of aged patients. The aim of this study is first to propose criteria to validate the old denture for rebasing procedure and propose a guideline with 3 clinic appointments and one laboratory step to readapt these old dentures.

Methods & Materials: The old denture is analyze related to occlusal (occlusal plane, vertical dimension of occlusion, centric occlusion) and esthetics criteria. The excluding criteria are : esthetics defects, severe loss of the occlusal vertical dimension, bad height and/or orientation of the occlusal plane, severe occlusal disharmony. The clinical case will be then included or not.

Results: First(1) clinical appointment: For the included cases, 3 steps are undertaken. - If there are mild to moderate occlusal errors, the occlusion will be corrected first. - then the old denture is corrected (length and thickness of the borders ; the denture will be spaced in regard of traumatized denture bearing areas) - third steps, tissue conditioners materials are used as functional impression materials Second(2) clinical appointment: - after clinical examination of the denture bearing area (inflammation or mucosal lesions..); and patient complains about soreness or functional limitations, some correction are realized again on denture borders or inner surfaces of the denture - tissue conditioner is bring specifically on the corrected spots Third (3)clinical appointment: - the denture is sent to the laboratory for rebasing

Conclusion: The advantages of dentures rebasing of old dentures include simultaneous restoration of a healthy basal seat, a better fitting surface of the denture. Moreover the quality of life of patients is improved with a simple procedure.

Poster 185

Influence of Xerostomia on Oral Health–Related Quality of Life of Older People in a 5-Year Longitudinal Study

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Purpose: Xerostomia is understood to be one of the major oral health problems in older people, along with tooth loss. Common among older people, chronic xerostomia affects speech, denture wearing, and the enjoyment and ingestion of food, and there is an accumulating body of evidence to show that it affects OHRQoL. However no longer-term follow-up studies have concurrently investigated oral status, xerostomia status and OHRQoL. The aim of this study was to characterize the change in xerostomia over a 5-year period and its influence on oral health-related quality of life (OHRQoL) in older Japanese.

Methods & Materials: The participants in this study were community-dwelling, independently living people over the age of 60. Data were collected by means of questionnaire and oral examination in 2005. After 5 years, the original participants were solicited by mail for the same examination, and those who accepted this proposal took part in this follow-up study. The Oral Health Impact Profile-14 (OHIP-14) was used to assess the OHRQoL. A higher OHIP score means poorer OHRQoL. The Xerostomia Inventory (XI) was used to measure the severity of xerostomia.

Results: Of the 382 participants who took part in the study at baseline, 51.6% were female, and the mean age was 66.0 (SD=4.2; range 60 to 84). Among the 382 participants at baseline, 99 persons were assessed at follow-up. There were no significant changes in OHIP score, oclusal force or XI score for 5 years. However linear regression models showed that after controlling for age, gender, and baseline OHIP score, the significant predictors of follow-up OHIP score were tooth loss and increase of XI score, that is worsened feeling of dry mouth.

Conclusion: In general, there was an insignificant change in OHRQoL and xerostomia in 5-years period in independently living older Japanese. However change in xerostomia was associated with change in their OHRQoL.

Poster 186

The Influence of Denture Refusal on Unstimulated Salivary Flow Rates

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Purpose: Elderly people gradually exposed to tooth loss. However, some people wear dentures in replacement of missing teeth, and some do not albeit loss of molars. Many have investigated the difference between the denture wears and no denture wear from masticatory outcomes. However, no study has investigated the difference of salivary flow rate regarding to denture wear status. The purpose of this study was to investigate whether tooth loss, denture wearing custom, and insertion of dentures affect unstimulated salivary flow rates. The null hypotheses of the study are no difference of salivary flow rates between denture wear status and pre and post insertion of the denture.

Methods & Materials: The study sample consisted of 54 patient ages between 65 and 80 years old (22 males and 32 females; mean age=70.3 yrs.). The subjects were recruited from patient with natural teeth (DENT, n=11; at least 28 tooth including fixed bridge), partially edentulous (Kennedy class I or II) patients not wearing dentures (PEND, n=16) and wearing dentures at present (PEWD, n=27). Subjects were asked to refrain from swallowing for five minutes and then expectorate the accumulated saliva into a disposable cup. Saliva was collected between 9:00 a.m. and 11:45 a.m. two times at baseline and post insertion of the dentures for PEND. For DENT and PEWD, saliva was also collected at one month interval from baseline. One-way analysis of variance (ANOVA) and Bonferroni were used to test the study hypotheses ($P<0.05$).

Results: At baseline, there were significant differences between the three groups (DENT: 0.59ml/5min, PEND: 0.33ml/5min, PEWD: 0.61ml/5min, P=0.04). A post hoc test showed that PEND and PEWD differed significantly (P=0.04). After one month from baseline (DENT and PEND) and post insertion of denture (PEND), no difference was found between the groups (DENT: 0.52ml/5min, PEND: 0.54 ml/5min, PEWD: 0.46ml/5min, P=0.91).

Conclusion: The results suggest that refusing the denture wear may reduce unstimulated salivary flow rates.

Poster 187

Sterilization Effect of Anti-Bacterial Functional Water (Bioshot®) on Oral Bacteria Attached to Dentures

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Purpose: The purpose of this study was to clarify sterilization effect of anti-bacterial functional water (Bioshot®) on oral bacteria attached to dentures.

Methods & Materials: Sixty Japanese edentulous people (27 males, 33 females, mean age; 75 ± 8 years) were enrolled in the study. All were using maxillary and mandibular complete dentures in good condition. All subjects were informed about the purpose and procedures of the study and obtained given informed consent. All experiments in the present study were performed in accordance with the Edinburgh Revision of the Helsinki Declaration and the study was approved by the Ethics Committee of Tokyo Dental College (#279). Subjects were categorized randomly into three groups in accordance with cleaning solution as follow; Group PO: Polident (GlaxoSmithKline, Philadelphia, PA, USA), Group BS: Bioshot, Group PC: tap water. The number of oral bacteria attached to the denture at baseline was counted by swabbing basal surface at right first molar of upper denture. The number of colony-forming units of each sample, incubated at 37°C for 1 week under anaerobic condition after inoculated in a blood agar plate, was counted. Dentures were chemically cleaned for 10 minutes with each cleaning solution. The number of bacteria attached to the denture after cleaning was counted by swabbing basal surface at left first molar of upper denture as described previously. Decrease rate of the number of bacteria between baseline and after cleaning was calculated, and Scheffe test was performed to comparison between groups after Kruskal-Wallis test ($\alpha=0.05$).

Results: Decrease rates of PO, BS and PC about the number of oral bacteria attached to the dentures were 84.6±79.2%, 78.6±74.0% and 18.0±10.4%, respectively. There were significant differences between PO or BS and PC. The results revealed that BS had strong sterilization ability on oral bacteria attached to the dentures as potent as PO that is prevalent denture cleaner.

Conclusion: We conclude that anti-bacterial functional water (Bioshot®) has sterilization effect on oral bacteria attached to the dentures as potent as a prevalent denture cleaner.

Poster 188

Lip-Closing Pressure While Swallowing

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Purpose: Various organs coordinate to perform swallowing. The lips allow food to enter the mouth in the preparatory stage and sufficiently close, playing important roles: prevention of food leakage from the mouth and elevation of the oral pressure. However, the lips are not included in the swallowing evaluation items in the typical screening test, being likely to be overlooked in evaluation. To evaluate swallowing, the function of the lips should also be accurately assessed. Thus, we devised a system to measure the lip-closing pressure, which serves as an index of lip closure, and measured it while swallowing saliva in healthy adults.

Methods & Materials: Using a plastic plate with a 0.3-mm thickness specified based on a preliminary experiment, a plate for attaching sensors to measure the lip-closing pressure was prepared. The lip-closing pressure while swallowing saliva was measured using these devices. The subjects were healthy adults with no abnormality of the stomatognathic system or defective teeth. The sensor-attached plastic plate was inserted between the lips while in a straight sitting position. After confirming that the lower jaw was in a resting position, the subject swallowed saliva. Sensors were attached to the center of the lips and bilateral angles of the mouth.

Results: No significant difference in the maximum lip-closing pressure while swallowing saliva was noted among the subjects, but the lip-closing pressure significantly varied among the lip regions, and the greatest value was noted at the center of the lips.

Conclusion: The lip-closing pressure was measured using the prepared measurement device. It significantly rose at the center of the lips in healthy subjects.

Poster 189

Three-Dimensional Evaluation of Temporomandibular Joint of Completely Edentulous Subjects, Before and After Prosthetic Rehabilitation.

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Purpose: The purpose of this study was to analyse the Temporomandibular Joint (TMJ) by means of CT-scan in completely edentulous patients before and after prosthetic rehabilitation with maxillary and mandibular complete dentures.

Methods & Materials: Total 20 subjects (50-80years) were selected and equally divided into two groups: group1 control (dentulous subjects) and group2 test (edentulous). The CT scans of the TMJ's of both right and left sides were done to study various parameters such as- anterior, posterior, medial and superior joint space between condyle and glenoid fossa; condylar shape; condylar cortical and medullary bone density; glenoid fossa contour; and masseter muscle thickness, density and anteroposterior spread. For group2, CT scan was performed before (group2A) and after 3months (group2B) of wearing complete dentures, in maximum intercuspal position corresponding to their previously recorded centric relation position.

Results: Result shows increased (5.00 ± 0.94) anterior joint space in edentulous subjects, which has tendency to decrease (4.10±0.74) after using complete dentures, compared to control group (3.80 ± 1.03). Long term edentulousness showed decreased cortical and medullary bone density (531.33±289.73, 214.89±104.37), which improved significantly (632.65±338.40, 233.72±95.91) after wearing complete dentures and closely resembles the control group (686.11±102.78, 429.69±102.62 respectively). Thickness, density and anteroposterior spread of masseter muscle was maximum (12.30±2.21, 54.15 ± 7.45, 44.10 ± 4.48 respectively) in control group, which shows significant reduction (8.70±2.00, 53.52 ± 6.87, 41.30 ± 9.31 respectively) in edentulous subjects, but increased (10.20 ± 3.08, 53.93 ± 4.37, 41.60 ± 6.88 respectively)

significantly after wearing complete dentures. There was no significant change in condylar shape and glenoid fossa contour among different groups. Result shows steep glenoid fossa in control group, while there was shallow glenoid fossa in group2A and group2B. There was no significant change between right and left side of the TMJ, for all the parameters among different groups.

Conclusion: The prosthetic rehabilitation of edentulous subjects with complete dentures has a favourable protective effect on TMJ structures and it helps in regaining the previous healthy status of TMJ. The CT can be satisfactorily used as a single investigatory tool for evaluation of various parameters associated with the TMJ.

Poster 190

Time-Dependent Change in Microbial Count on the Tongue Surface After Tongue Cleaning

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Purpose: The purpose of this study was to investigate the time-dependent change in microbial count on the tongue surface after tongue cleaning.

Methods & Materials: Eight healthy dentulous subjects (mean age, 27 ± 2 years) were enrolled in this study. All subjects were informed about the study purpose and procedures and provide their informed consent. Subjects were instructed to clean their tongue surface according to a prescribed protocol using a tongue brush after brushing their teeth. They were also instructed not to eat, drink or /and perform further mouth cleaning after tongue cleaning. Samples were collected by swabbing the dorsum of the tongue five times with wet sterile cotton under 20-gf pressure immediately before cleaning (baseline), immediately after cleaning and at 1, 2, 3 and 4 h after cleaning. The microbial count in each sample was quantified with a rapid oral bacterial detection apparatus using the dielectrophoretic impedance measurement method and the values were converted into common logarithms. The Dunnett's test was performed to compare the results after tongue cleaning with those at baseline after subjecting the results to a one-way ANOVA. The level of significance was set at 0.05.

Results: There were significant differences between baseline and other measurements except for those at 4 hours after tongue cleaning. The microbial count was the lowest at 1 and 2 h after tongue cleaning. In this study, the microbial count on the tongue surface decreased to approximately 10% after tongue cleaning. Elderly and/or handicapped subjects may have a higher microbial count than others; thus, it is expected that the effect of tongue cleaning will be more pronounced in such subjects than in our study subjects.

Conclusion: Within the limitations of this study with healthy and dentulous subjects, our results revealed that the microbial count on the tongue surface decreased by tongue cleaning, particularly 1 or 2 h after cleaning, and that the cleansing effect was maintained for up to 4 hours.

Poster 191

Adhesion of Streptococcus Sanguinis to Ce-TZP/Al_2o_3 Nanocomposite

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Purpose: Acrylic resin and metals are frequently used as removable denture materials. Though metals such as cobalt–chromium alloy have greater strength and lower levels of bacterial adhesion than acrylic resin, they may lead to metal allergies. Zirconia/alumina nanocomposite stabilized with cerium oxide (Ce-TZP/Al_2O_3 nanocomposite; P-Nano ZR, Panasonic Healthcare) does not undergo low-temperature degradation in aqueous solutions encountered in the mouth, this material has long-term stability and strength. Therefore, its use as a metal-free denture material is anticipated. The purpose of this study was to investigate the adhesion level of *Streptococcus sanguinis* to Ce-TZP/Al_2O_3 nanocomposite.

Methods & Materials: P-Nano ZR, acrylic resin for denture base (Acron No.3, GC Corporation) and cobalt–chromium (Co-Cr) alloy (Wironium, BEGO) were produced with a 1-cm diameter and a 0.5-mm thickness and polished mechanically.

Specimens were polished with diamond wheel up to #1000. Specimens were placed in a S. sanguinis suspension adjusted to a final concentration of 1×10^8 cells/ml and were anaerobically incubated for 24 and 72 h at 37°C. After 24 and 72 h, the specimens were rinsed once with distilled water and adenosine triphosphate reagent (Bactiter Glo, Promega Corporation), were applied to measure luciferase luminescence signals. Statistical analysis was performed using the Scheffe test to compare groups according to luminescence levels after applying the Kruskal-Wallis test ($\alpha = 0.05$).

Results: There were no significant differences between groups after 24 h; however, after 72 h, there were significant differences between P-Nano ZR and acrylic resin and between P-Nano ZR and Co-Cr. Because the surface free energy of P-Nano ZR is low, adhesion by S. sanguinis was reduced.

Conclusion: We conclude that Ce-TZP/Al_2O_3 nanocomposite has lower bacterial adherence by S. sanguinis than acrylic resin or Co-Cr.

Poster 192

3D Scanning Quantitative Evaluation of Facial Profile Variation of Edentulous Patients Pre- and Post Complete Dentures Restoration

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Purpose: To collect and analyze the three-dimensional (3D) facial profile variation of edentulous patients restored by complete denture.

Methods & Materials: The 3D facial images of 20 Kennedey Class II edentulous patients were taken by DSC-2 three-dimensioual facial imaging system before and after restoration of complete denture.Then, the two 3D facial images of each patient pre- and post restoration were registered in the same coordinate system by partial structure overlap. The differences between these two 3D facial images were statistically analyzed.

Results: The major facial profile variation of Kennedey Class II edentulous patients restored by complete denture focus in the area around upper lip and the corner of mouth. The change of lower lip and chin area was not obvious. The shift in the sagittal direction was significantly more evident than that in the vertical direction, while the shift in the horizontal direction was the least one.

Conclusion: The pattern of facial profile variation of edentulous patients restored by complete denture based on 3D imaging may provide reliable data support for prediction and communication in clinic.

Occlusion

Poster 193

Instrumental and Functional Management of Vertical Dimension of a Teeth Grinding Patient in Upper and Lower Full-Arch Rehabilitation: Report of a Case Study

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Purpose: The objective of this work was the management of the rise of the original vertical dimension of a teeth grinding patient, appeared with extensive loss of tooth substance in both arches. We have combined the function of upper periodontal surgery, necessary to restore the correct dento-periodontal relationships ,to the use of a booster device (pre-prosthetic bite) applied on the natural dentition of the patient, therefore, on its usual vertical dimension. (Specific instrumental tests have

been used to find the tolerated and correct vertical dimension, transferring it in the first and second provisionals, and in the final work).

Methods & Materials: Without altering the original vertical dimension of the patient, and without doing any prosthetic procedure, we initially acted carrying out instrumental evaluations such as surface electromyography to evaluate the response of the elevator muscles to the set vertical dimension, the stabilometry on baropodometric platform, to verify any eventual relationship with the postural attitude and balance control strategies, and kinesiography for the registration of Posselt, of free space, of disclusion paths along the rails, of repeatability of the centric and vectors and speed of the mandibular movement in opening, closing, clearance and swallowing. An Easy Bite photo-polymerizable device has been used for the observation of the occlusion in the pre-prosthetic phase, facilitating clinical, instrumental and radiological analysis.

Results: The outcome of these instrumental and functional verification has resulted in the manufacture of a pre-prosthetic bite that the patient has led for 4 months before proceeding with the manufacture of the first provisional teeth. The rise practiced by the device was well tolerated, free from the occurrence of complications or inconveniences such as pain in the temporo-mandibular joint, headaches or muscle tension.

Conclusion: In the illustrated case, according to our opinion it is better to practice an increase in the vertical dimension subject to reversibility, that is without preparing first of all the teeth and apply the provisional ones. It seems important to emphasize that, in order to ensure longevity to the final rehabilitation, an important role is played by the materials used, that is traditional metal-ceramic combined with monolithic lithium disilicate in the posterior sectors, and even stratified lithium disilicate using the cut-back technique in aesthetic sectors such as the upper front sector.

Poster 194

Reducing Occlusal Errors Introduced by Centric Record Taking

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Purpose: Centric relation record is used to relate maxillary and mandibular arches in a position as the reference point or starting point for prosthodontics diagnosis or treatments. The aim of centric relation position is to detect and eliminate occlusal interferences and/or to establish occlusal harmony in either the natural or the rehabilitated dentition.

Methods & Materials: However, the centric relation usually is not coincide with maximal intercuspation and is backwards, it is thus unstable in essence. To capture this position accurately, it is required to bring the jaw and lock in the position with recording material filling into the interocclusal space instantaneously to prevent further sliding into maximal intercuspation. Because of the thickness and flowability of the common used material (e.g. wax) for centric record and the difference of the arc of closure between the patient and articulator, errors would be introduced instead of eliminated!

Results: Therefore, careful manipulation and verification of centric relation position between patients and mounted casts in the articulator is mandatory for all prosthodontic procedures.

Conclusion: Materials and techniques used in centric record taking for fixed, removable and complete dentures will be discussed to reduce errors introduced.

Poster 195

Effect of Change in Occlusal Supporting Zone on the Stabilization of Posture Stance Disturbed by Electrical Stimulation

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Purpose: Previous studies in our laboratory investigated the relationship between dental occlusion and body balance, and revealed that voluntary teeth clenching contributed to stabilization of the postural stance perturbed transiently by electrical stimulation. In the present study, we examined the effect of change in occlusal supporting zone on the stabilization of posture stance disturbed by electrical stimulation.

Methods & Materials: Experiment was performed on 8 young healthy adults (aged 27.9±3.6; mean± SD). All subjects had stable intercuspal position without malocclusion, toothache, pains of orofacial muscles, temporomandibular joint problems and a previous history of injury in lower extremities. The study was approved by the Ethical Committee for Human Research, Faculty of Dentistry, Tokyo Medical and Dental University (No. 695). The subjects were instructed to stand on a force plate with both legs and eye closing. They were stimulated the common peroneal nerve by supramaximal percutaneous electrical stimulation and contracted their peroneus longus and tibialis anterior muscles involuntarily. The testing conditions of dental occlusion were rest position (Condition 1), maximum voluntary clenching (MVC) with anterior tooth splint (Condition 2), MVC with anterior and premolar tooth splint (Condition 3), and MVC with anterior and posterior tooth splint (Condition 4). Experimental data were obtained three times each condition. We analyzed the total length of the body sway (LNG-BS), and the anterior/posterior (A/P-BS) and lateral (L/R-BS) body sway for 3s after electrical stimulation. The statistical significance of the results was analyzed with one-factor ANOVA. The statistical significance was set at $p < 0.05$.

Results: LNG-BSs in Condition 1, 2, 3 and 4 were 6.43cm, 6.43cm, 6.24cm and 5.76cm, respectively. A/P-BSs in Condition 1, 2, 3 and 4 were 0.84 cm, 0.74 cm, 0.70 cm and 0.60 cm, respectively. LNG-BS and A/P-BS of Condition 4 were significantly smaller than Condition 1 ($p < 0.05$). There was no significant difference of L/R-BS among the occlusal conditions.

Conclusion: From these results, it was suggested that occlusal support of molar teeth would play an important role in not only fulfillment of the masticatory function but also stabilization of the postural stance.

Poster 196

Effects of Molarless on Spatial Learning and Memory in KM Mouse

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Purpose: To investigate effects of molarless condition on spatial learning and memory in KM mouse.

Methods & Materials: 90 adult male KM mice were randomly divided into 4 groups: maxillary and mandibular bilateral molarless groups, maxillary and mandibular sham groups. The ability of spatial learning and memory of the mice tested were evaluated using the Morris Water Maze (MWM) eight weeks after operation. The MWM test includes visual test, adaptive training, place navigation test and spatial probe test. The place navigation test lasted for 4 days and escape latency of each mouse was determined each day. On the fifth day, escape latency, frequency of passing the platform (FPP) and stay time in the aim quadrant(TAQ) were determined in the spatial probe test. Statistic analysis on differences of the four groups was carried out at the significance level $a = 0.05$.

Results: The average escape latency for 4 days in molarless groups (maxillary 38.6±14.6; mandibular 39.0±14.0] was obviously significantly greater than sham groups (maxillary 29.0±19.7; mandibular 29.1±18.6) ($p<0.01$). The mice in sham groups had significantly higher TAQ (maxillary 13.6±3.3; mandibular 13.1±4.3) and lower FPP (maxillary 5.8±3.9: mandibular 5.9±2.2) as compared to those in molarless groups ($p<0.01$). The results of both maxillary and mandibular molarless or sham mice in the water maze test show no statistically significant difference ($p>0.05$).

Conclusion: Bilateral molarless may cause certain impairments on the ability of spatial learning and memory in KM mouse. Loss of molars on maxilla and mandible show similar impairments on spatial learning and memory in KM mouse.

Poster 197

Reproduction of Occlusal Contacts on a 3-Dimensional Model of Dental Morphology

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Purpose: In dentistry, the finite element method has been used for clarifying the cause of tooth fracture and for designing a prosthetic appliance through stress analysis generated in the tooth and the prosthetic appliance. In previous reports, theoretical occlusal contact and average occlusal force were used in stress analysis. However, a 3D finite element model reproduced with specific occlusal contacts, occlusal force and dental morphology was necessary in order to diagnosis tooth condition and select appropriate prosthetic appliance for patients. The purpose of this study was to reproduce the occlusal contacts on the 3D model of dental morphology with two different methods, and to validate accuracy.

Methods & Materials: Subjects were dental casts replicated from dental study models and mounted on articulator. The 2 methods for occlusal contacts on dental morphology were evaluated against a control. The control of the occlusal contacts was made by a transmitted image of the inter-occlusal record. Method 1 (Projection method): The occlusal contacts were extracted via transillumination method of an inter-occlusal record. A 3D model of dentition was generated via a 3D scanner. Then, the 2D occlusal contacts' image was projected on the 3D model of dentition. Method 2 (Inter-occlusal distance method): Inter-occlusal distance was measured between 3D models of upper and lower dentition. Registration between 3D models of upper and lower dentition was used with buccal surface of occlusion. Accuracy was verified by comparing the occlusal contacts of two different methods. The evaluation items were the occlusal contacts points and area.

Results: The difference of the occlusal contacts points between the method 1 and the control was 0.8±0.5, and the occlusal contact area was 4.32±0.27 mm2. The difference of the occlusal contact points between the method 2 and the control was 5.8±3.9, and the occlusal contact area was 17.01±17.89 mm2. The occlusal contacts of the method 1 was more similar to those of the control than those of the method 2.

Conclusion: Through this study, in the constructing the patient specific 3D finite element model, the occlusal contact on the 3D model of dental morphology could be reproduced with the projection method.

Poster 198

A Three-Year Time Series of the Periodontal Mechanosensitive Thresholds of Patient Complained Occlusal Discomfort After Orthodontic Treatment

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Purpose: The patients complaining occlusal discomfort without any abnormal obstructive signs have existed. In order to pursue the pathogenesis of occlusal discomfort, we clinically apply the reference range of periodontal mechanosensitive threshold to the patient with occlusal discomfort in this study.

Methods & Materials: 1 subject (male: 28 years old) complained occlusal discomfort after orthodontic treatment was selected. 28 teeth between the bilateral second molar on maxillary and mandibular were selected. Measurement of periodontal mechanosensitive threshold (PMT) was performed using von Frey's hair with his eyes closed, sitting on a chair. In measuring PMT, von Frey's hair came into contact with the subject teeth from the labio-buccal surface side, and stimulation was applied to the lingual direction. Measurement was performed by the dentist with sufficient knowledge and training, and thresholds were determined applying the method of limits of psycho-physical measurement methods. The reference range of PMT reported by Mukai et al. was applied. PMTs were measured from one month after the removal of the orthodontic device. PMTs of each tooth were compared with the reference range of PMT.

Results: PMT one month passed after removal device was 190.0g or less in molar teeth and was 7.0g or less in anterior teeth. PMT one month passed after removal device was deviated from the reference range of PMT. Afterwards, the value of PMT was decreased. The value of PMT three months passed after removal device was reduced to the reference range. And with Falling to the reference range, occlusal discomfort was disappeared. At three years passed after removal device, PMT was continued to fall in reference range of PMT and occlusal discomfort was not occurred.

Conclusion: These results suggested that periodontal mechanosensitive threshold become objective index of teeth sensation.

Poster 199

Efficiency of Oral Stimulations on Brain Function Activities: Evaluations Using Wearable Near-Infrared Spectroscopy

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Purpose: Recently, rehabilitation incorporating the sensory information has become widespread. The activities in the brain region has been reported to be driven by the discrimination or recognition tasks. The discrimination task based on the somatosensory has been used for the rehabilitative therapy with the sensory information. The oral cavity equipped some somatosensory receptors and various researches have been performed to discuss the relationship between the oral sensation and brain function, however little information is available on the efficiency of stimulating the oral sensation for the rehabilitative therapy. The purpose of this study was to clarify the efficiency of vibratory and gustatory stimulations of oral cavity on brain function activities using a wearable near infrared spectroscopy.

Methods & Materials: We enrolled normally young 5 dentate subjects without missing teeth. We performed measurements of cerebral blood flow in the prefrontal cortex using a wearable near infrared spectroscopy (HITACHI, Tokyo, Japan). A vibratory stimulation was applied to the lips, teeth, hand and foot using a micro vibrator (5 mm in thickness and 10 mm in diameter). A gustatory stimulation was performed using taste test solutions with five types of taste: bitter, acidity, umami, salty and sweet (DELICO, Tokyo, Japan) and a drop of each solution was put on the center of the tongue for the gustatory stimulation. To investigate the indirect efficacy of the mastication on the brain activities through the gustatory stimulation, a chewing task was also applied before the gustatory test.

Results: The chewing task before the gustatory stimulation, especially "Umami" taste increased the cerebral blood flow of the dorsolateral prefrontal cortex and left side of the dorsolateral prefrontal cortex was higher. The cerebral blood flow of the frontal pole was high in the vibratory stimulation, and significant difference between the oral cavity and the skin of the hand and foot was not found.

Conclusion: These results suggest that mastication might enhance the cerebral blood flow of the prefrontal cortex in the gustatory stimulation and a beneficial impact for rehabilitative therapy.

Poster 200

Effect of Changing Chewing Side on Autonomic Nervous Response

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Purpose: Previous studies have reported sympathetic nerve activity is enhanced during gum chewing. Chewing side was not considered in these studies though a half or more of the population has a preference chewing side. The relation between automatic nervous response and chewing side, i.e. preference side or non-preference side, was not clear. In addition, chewing side preference could be a factor that effects for a condition setting of detailed studies about mastication. The purpose of this study was to investigate difference between preference and non-preference chewing side chewing on autonomic nervous response.

Methods & Materials: The present study examined the changes in Law Frequency (LF), High Frequency (HF), and LF/HF on electrocardiograph (ECG) in increments of normalized unit (nu) associated with gum chewing, and considered the

function of autonomic nerves system during gum chewing. Eight healthy volunteers (27±2 year-old) chewed gum on preference chewing side (PS) and non-preference chewing side (NPS) for 10 minutes after taking a break for 30 minutes. Subjects were set ECG sensors on chest, and they were analyzed heart rate variability by BioGraph Infiniti (Thought Technology, Canada). The respiration rate regulated to 12 bpm. The Bonfferoni test was performed to compare groups after one-way ANOVA. All subjects were informed about the study purpose and procedures and provide their informed consent.

Results: LF was 40.32 ± 17.93 nu on rest, 58.51 ± 12.65 nu on PS, 61.44 ± 8.26 nu on NPS, respectively. HF was 59.68±17.93 nu on rest, 41.31±19.47 nu on PS, 43.73±8.35 nu on NPS, respectively. LF/HF was 0.74 ± 0.20 nu on rest, 1.09 ± 0.39 nu on PS, 0.96 ± 0.18 nu on NPS, respectively. There were significant differences in LF, HF and LF/HF between the rest and PS, and between rest and NPS. However no significant difference was found in LF, HF and LF/HF between PS and NPS.

Conclusion: Sympathetic nerve activity was enhanced during gum chewing both with preference side and non-preference side. On the other hands, there was no difference in autonomic nervous response between preference side and non-preference side.

Poster 201

Variation of Occlusal Plane Inclination – Cross Sectional Study

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Purpose: In recent years, the percentage of persons in all age groups having over 20 teeth has increased. Therefore, dentists have to consider the various changes in occlusal factors during prosthodontic treatment for elderly dentulous patients. The purpose of this study was to observe variations of occlusal plane inclination in adult patients, and to uncover the factors affecting changes in occlusal plane inclination with aging.

Methods & Materials: Subjects were 143 patients. A cephalometric image was taken of these patients. The cephalometric image was analyzed via image analyzing software, Amira 3.1. In this study, our inquiry points were age, 2 variables on intra-oral findings, and 7 variables on cephalometric analysis. The mean and standard deviation in our 10 variables were calculated. The ceiling and floor effect were investigated. From this result, the appropriateness of our variables was proved. Next, factor analysis was carried out via Principal Factor Method.

Results: In all patients, Camper-occlusal plane angle (COA) ranged from -25.7 to -4.9 degrees (Mean±SD: -6.4±5.36). In 60 patients who have no missing teeth, COA ranged from -11.6 to -4.9 degrees (Mean±SD: -3.3±3.31). From the variations of characteristic values and the findings of the scree plot, the 3 factor structure emerged as the proper number of structural factors for our data. Therefore, we carried out the factor analysis through the Promax rotation of Principal Factor Method when the 3 factor structure was hypothesized. From the result of interfactor correlation matrix, there was significant negative correlation between the first (Occlusal plane) and the second (Aging and missing teeth) factors. Therefore, factor structure analysis was carried out based on the following hypothesis; The occlusal plane inclination and mandibular configuration change with aging. From the results of the structural analysis, it was suggested that the occlusal plane changes to counter-clockwise with aging.

Conclusion: In this study, variations of occlusal plane inclination in adult patients were observed, and the factors affecting changes in occlusal plane inclination with aging were investigated via factor analysis. From our results, it was suggested that the mandibular morphology change and loss of teeth with aging influence the occlusal plane inclination.

Poster 202

Computerised Cephalometric Application for the Level and Inclination of the Artificial Occlusal Plane

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Purpose: The inclination of the occlusal plane in intermaxillary relationships has influence on artificial occlusion stability. The position of the occlusal plane in complete denture wearers should be as close as possible to the position which was previously occupied by the occlusal plane of the natural teeth.The aim of this investigation was to examine the level and inclination of the occlusal plane in subjects with natural dentition which could be used as objective quides for locating the occlusal plane in prosthodontic treatment of edentulous patients.

Methods & Materials: A total of 60 lateral cephalometric radiographs of subjects with natural dentition and class I skeletal jaw relationship, of Serbian nationality from the region of Vojvodina, were included in the investigation. Thirty subjects were males, and thirty females, their age range was 20 to 29 years. Cephalometric analysis was performed by using "Dr. Ceph" computer software (FYI Technologies, GA, USA).The examined angular cephalometric parameters were: angle between palatal plane and mandibular plane (PP/MP), angle between occlusal plane and palatal plane (OccP/PP); angle between occlusal plane and mandibular plane (Occl/MP).The examined linear cephalometric parameters were: anterior upper dental height (Is-PP); anterior lower dental height (is-MP); posterior upper dental height (M-PP); posterior lower dental height (m-MP).

Results: Statistical analysis of data obtained from this study showed the differences between sexes in all parameters: PP/MP,x(m)=21,x(w)=20.9, $p>0.05$; Occl/PP,x(m)=7.8, x(w)=7.1, $p>0.05$; Occl/MP,x(m)=13.90,x(w)=13,$p>0.05$; Is-PP,x(m)=28.11,x(w)=26.8, $p>0.05$; M-PP, x(m)=22.3,x(w)=21.2, $p>0.05$; m-MP, x(m)=30.3,x(w)=29.2, $p>0.05$. Significant differences between the sexes were established only for anterior lower dental height is-MP,x(m)=42.19,x(w)=37.86, $p<0.001$.

Conclusion: Craniofacial morphologic parameters have been established in subjects with natural dentition for the purpose of direct examination of obtained values in edentulous patients. This objective cephalometric examination is indispensable in order to adjust the level and inclination of the artificial occlusal plane according to the skeletal relations of the jaws and other relevant individual morphological features.

Poster 203

The Analysis of Jaw Movements at Peak Masseter Muscle Activities of Rhythmic Masticatory Muscle Activity Events During Sleep

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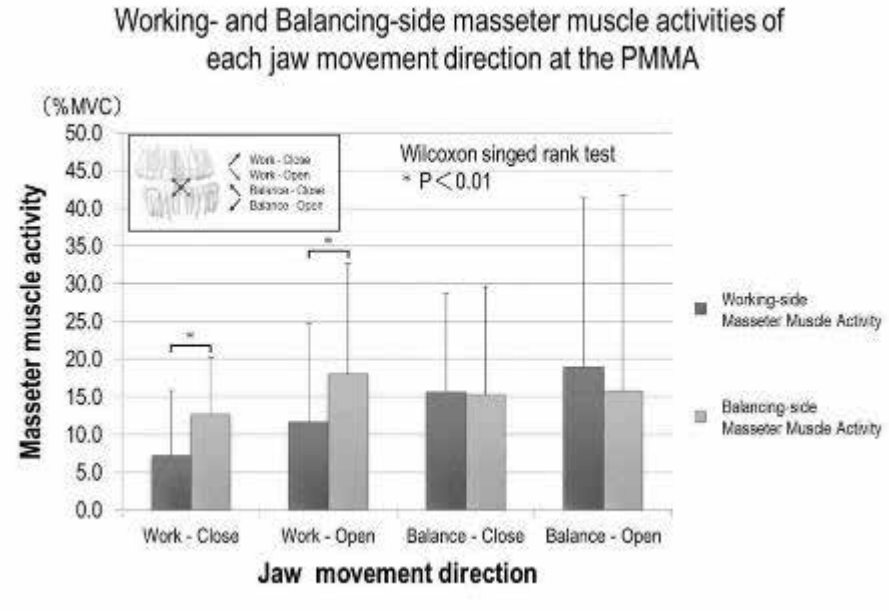
Purpose: Considering the causes of the damage of stomatognathic system, we have to understand the jaw movement as well as masticatory muscle activities during sleep bruxism. However, the detail of the jaw movements during sleep is still unclear. The purpose of this study was to investigate the relationship between the jaw movement and the peak masseter muscle activity (PMMA) of Rhythmic Masticatory Muscle Activity (RMMA) events during sleep.

Methods & Materials: We have developed Six-degree-of-freedom jaw tracking system for sleep study that is constructed a jaw tracking device with intraoral sensors, an ambulatory polysomnogram and an audio-visual monitor. Using this system, we recorded jaw movements, biological signals (Electroencephalograms, Electrooculograms, Electrocardiogram and Electromyograms) and audio visual data during sleep of 6 young healthy volunteers (27.2+/-6.2 yrs old) for two nights. The data from the second night were analyzed. RMMA with more than 3 bursts in masseter muscle activities during sleep were selected for analysis. The PMMA of each RMMA burst was detected, and then the frequency of the PMMA in the four jaw movement phases (Open, Transition, Close and Occlusal phase) and in the four jaw movement directions (Work-Open, Work-Close, Balance-Open and Balance-Close direction) were identified. At the PMMA, the amplitude of the working- and balancing-side masseter muscle activities in the four jaw movement directions was compared.

Results: Among 34 RMMA events (5.7+/-5.0 /Sub), 219 RMMA bursts (6.4+/-3.5 /RMMA) were selected and analyzed. The PMMA was observed most frequently in Open phase (47%), and in Work-Open direction (53%). In Work-Open and Work-Close jaw movement directions, the working-side masseter muscle activity was significantly much less than that of the balancing-side ($P<0.01$), while there was no significant difference between the activities of both masseter muscles in Balance-Open and Balance-Close directions (Fig.).

Conclusion: The PMMA of the RMMA bursts related to sleep bruxism was observed not only medial excursion but also lateral excursion. The PMMA in Work-Open jaw movement direction may occur in lateral excursion. In this study, it is clear that the jaw movements of RMMA during sleep were different from the daytime functional jaw movements.



Poster 204

An Occlusal Model: A Methodological and Graphical Representation of the Dynamic Occlusal Scheme

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Purpose: To create a way to demonstrate the intricate interrelationship between the occlusal determinants.

Methods & Materials: A graphical representation of the structural design and the functional interrelationship between the occlusal determinants is used in order to demonstrate and exemplify the intricate interrelationship between the occlusal determinants.

Results: An occlusal theoretical model is proposed which methodologically and graphically demonstrates the structural and functional interdependency and interrelationship between the occlusal determinants. The proposed occlusal model demonstrates in a clear and straightforward way the two forms in which the occlusal determinants are interrelated. On one hand, the structural design, which demonstrates the interrelationship between the single tooth, an arch segment, and the interarch relationship. On the other hand, the functional relationship as it manifests itself in the form of interarch support and guidance, and subsequently in the form of force distribution acting upon the same building blocks it is comprised of.

Conclusion: The proposed occlusal model demonstrates the complex interrelationship and interdependency between the occlusal determinants in a structural and functional way. The use of the proposed model facilitates a thorough understanding of the occlusal function, necessary for any correct occlusal diagnosis and any efficient therapeutic intervention

Poster 205

Regional Brain Activity Corresponding to the Experimental Occlusal Discomfort

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Purpose: A few but a certain number of patients complain of occlusal discomfort without any abnormal findings in the oral area. There have been many case reports of those symptoms so far, a causal factor has not been well determined. Since peripheral (dental) treatment in the oral cavity mostly does not relieve any discomfort of the patients, we hypothesize that they develop a modified perception of their 'oral' body image, which might be originated from the altered information processing in the higher cognitive areas of the brain. This time, we studied the regional brain activity corresponding to the experimentally generated occlusal discomfort and determined the cortical areas in which the modified and uncomfortable oral sensation is processed.

Methods & Materials: We created an experimental occlusal discomfort with bite raise in healthy subjects and their brain activity was measured by near-infrared spectroscopy (NIRS). Subjective rating of occlusal discomfort was also measured using visual analog scale (VAS). 1. Subjects Fifteen healthy subjects aged from 21 to 49 years participated in the study (10 male, 5 female, 31.1 ± 8.8 years average). They are with their individual occlusion that was not recognized abnormal in terms of the stomatognathic system. 2. Bite raise by metal strips We made occlusal discomfort by placing a piece of metal strip (12 μm thickness) on the occlusal surface of the first molar. Subject grinded their teeth and reported the amount of discomfort to the experimenter. Metal strips were stacked one by one until the subject reported a clear sense of discomfort during grinding. 3. Measurement of prefrontal hemodynamics NIRS measurement was performed using a block design which consisted of alternating 30 seconds of grinding and rest repeated 5 times. We used ETG-7100 (Hitachi Medical Corporation, Tokyo, Japan) to measure oxy-hemoglobin concentration (Oxy-Hb). Subjects performed two sessions of NIRS measurement in which they grinded their teeth with or without metal strips on the molar. Oxy-Hb responses were averaged over five trials with baseline correction. 4. Subjective evaluation of occlusal discomfort After NIRS measurement, subject evaluated the strength of discomfort using VAS. The VAS was varied from 0 (a state that does not feel uncomfortable at all) to 100 (a state that feel intolerable discomfort). 5. Statistical processing In order to cancel out the artifact in Oxy-Hb responses related to the jaw movement, we subtracted OxyHb responses on grinding with metal strips from those without metal strips and used them for further analysis (?Oxy-Hb). Regional brain activity was determined using statistical parametrical mapping using generalized linear model. Correlation between the area under the curve of the ?OxyHb responses during the grinding period and the difference of VAS between the two sessions (?VAS) was also examined at each channel using Spearman rank correlation.

Results: Intervention by metal strips changed subjective discomfort level variously depending on subjects. The subjects were therefore classified into two groups: a group with small increase of discomfort and those with large increase by attaching metal strips. Subject whose VAS increased more than 36 (median value of differences in VAS for all subjects between two sessions) by attaching metal strips was classified into the latter group. The latter group showed statistically significant activity in the right dorsolateral prefrontal cortex (DLPFC) and the frontopolar cortex. We did not find any significant brain activities in subject with little difference in VAS. Channel-base correlation analysis further showed statistically significant positive correlation between ?VAS and ?OxyHb at channel 9 which corresponds to area including the DLPFC ($r = 0.514$ $p < 0.05$).

Conclusion: 1. Discomfort feeling due to grinding with raised bite increased the blood flow in the frontopolar cortex and the DLPFC. 2. The worse discomfort level, the greater the change in blood flow in the frontopolar cortex and the DLPFC. 3. This suggests the possibility of using Oxy-Hb concentration change in the prefrontal area to be quantitative index reflecting a change in subjective occlusal discomfort.

Poster 206

Mechanosensitive Thresholds of Patients with Occlusal Discomfort Seen in Osaka Dental University Hospital

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Purpose: The patients complaining occlusal discomfort without any abnormal obstructive signs have existed. We attempted to elucidate the pathogeneses in patients with occlusal discomfort.

Methods & Materials: Seven subjects (2 males and 5 females with a mean age of 43.4 ± 9.7 years) complained occlusal discomfort were selected. Occlusal contacts in intercuspal position were observed by the add-picture method. Measurement of the Periodontal Mecahanosensitive threshold (PMT) was performed using von Frey's hairs. As the subject teeth of PMT, central incisor, canine, first premolar and first molar were selected. The measurement of static two-point discrimination thresholds (s-2PD) and moving two-point discrimination thresholds (m-2PD) were performed using the 2-PD discriminator. Semmes-Weinstein monofilament test (SW test) was performed using von Frey's hairs. Upper lips, lower lips, tongue and index fingers were selected as the measurement sites of 2-PD and SW test. Each data were compared with each reference range.

Results: None of the subjects with uncomfortable occlusion had simultaneous bilateral equal molar contacts. One patient had abnormal PMT in both maxilla and mandible deviated from the reference range of PMT (Group A), another patient had abnormal PMT only in the maxilla deviated from the reference range of PMT (Group B), and the remaining five patients had normal PMT (Group C). Moreover, the subject in Group A had significant abnormal mechanosensitive thresholds deviated from the reference ranges of s-2PD, m-2PD and SW test in all trigeminal nerve regions.

Conclusion: These results revealed that some patients with occlusal discomfort have perceptual problems. These results suggest that measurement of PMT and categorization based on deviation from the PMT reference range contributes to the diagnosis and helps to determine the treatment plan for patients with occlusal discomfort.

Poster 207

A Physiological Method to Determine the Vertical Dimension of Occlusion

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Purpose: We previously demonstrated that participants efficiently performed isometric contraction of masseter muscles to keep the jaw at the resting position in response to the ramp load applied to the jaw, through the calibration of the spindle activity arising from the primary ending against the sensory information arising from the periodontal mechanoreceptors.(Tsukiboshi 2012) In the present study, we investigated whether or not such a calibration can be made only at the proper vertical dimension of occlusion (VDO), to seek the possibility that the lost VDO in edentulous patients can be determined in a physiological way.

Methods & Materials: The effects of the increase in the VDO on the voluntary isometric contraction of jaw muscles were investigated on 9 participants (9 males; 27.0 ± 1.2 year-old), with a normal occlusion and fully dentate. On the other hand, the effects of the decrease in the VDO were investigated on 6 edentulous participants (6 males; 67.3 ± 4.4 year-old), without any history of neuromuscular disorder. A custom-designed apparatus was set up to apply the increasing positive ramp loads to the lower bite plate, which can smoothly slide vertically by a motor. Participants were instructed to "hold the jaw by adjusting the jaw-closing force just sufficient to counteract the load that increases in a ramp-like manner through the lower bite plate", so that the lower bite plate was kept in contact with the upper bite plate with a minimal contacting force (< 2 N). Pressure gauges were placed between the upper and lower bite plates to measure the excessive bite pressure. A CCD laser displacement sensor was used to measure the vertical mandibular position. A load cell was connected between the lower bite plate and the motor to measure the load applied to the lower bite plate. Surface bipolar electrodes were placed on middle portions of the bilateral masseter muscles to measure EMG activities of bilateral masseteric muscles. The positive-ramp load increasing 0 to 100 N (50N for edentulous participants) at the rate of approximately 27 N/sec was applied 10 sec after

starting the EMG recording. To change the VDO, two resin bite blocks 1mm and 2mm thick attaching to the lower surface of the lower plate were fabricated for the participants with natural dentition, while for edentulous participants these 3 resin blocks were fabricated on the same denture base; the resin block which has the thickness determined by Niswonger method (Control condition), 1.5 mm thicker one, and 1.5 mm thinner one. To compare the EMG activity between participants or trials, the root mean square (RMS) values of the EMG signals were assessed. The Load-RMS relationship was examined to evaluate the influence of the bite-raising on the performance of isometric contraction. The piecewise two linear regression analysis was performed as described earlier (Vieth 1989) to approximate the Load-RMS relationship, by using Excel (Microsoft Japan, Tokyo, Japan). The averaged RMS values of EMG were plotted against the load values.

Results: In participants with natural dentition, in response to increasing-ramp load, RMS of masseter EMG activity almost linearly increased under the control condition, while displaying a steep linear increase followed by a slower increase when the VDO was increased. The regression line of the Load-RMS relationship was significantly steeper in participants with increased VDO than the control, indicating that the participants with increased VDO overestimated the ramp load and excessively counteracted it as reflected in the emergence of bite pressure. In edentulous participants, both under the increased VDO condition and control condition, similar results with those in participants with natural dentition were observed, respectively, while stretch reflex-like response was observed at the onset of the ramp load application when the VDO was decreased. These results can be explained by the activity of gamma motor neuron causes temporal summation and facilitation of EPSP arising from Ia afferents because of its light isometric contraction of jaw closing muscle to contact their both upper and lower plate.

Conclusion: These observations suggest that when masseter muscle was lengthened by increasing the VDO, muscle spindle overestimated the load, causing faster and stronger isometric contraction of masseter muscles than those caused in participants without increasing the VDO. On the other hand, when masseter muscle was shortened by decreasing the VDO, temporal summation and facilitation of EPSP arising from Ia afferents occurred, causing the stretch reflex-like response at the onset of the positive ramp load. These results indicate that the physiologically proper vertical dimension can be determined with this method.

Poster 208

Mandibular Displacement and Stability of Occlusion During Intercuspation in Patients with Occlusal Disharmony

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Purpose: Intercuspal position (ICP) is the most important mandibular position for maintaining the stomatognathic function. In order to maintain the stomatognathic function, it is considered that the stable occlusal contact during intercuspation without mandibular displacement is desired. However, there were few reports about the relationship between mandibular displacement and occlusal contacts with increasing the clenching level in ICP. The purpose of this study was to investigate the difference of mandibular displacement and occlusal contacts in ICP while the clenching level was increased.

Methods & Materials: Eight healthy volunteers without any signs and symptoms about stomatognathic function and occlusion and 5 patients with occlusal disharmony were selected for this study, and were evaluated from three-dimensional deviation of the mandibular incisal point and occlusal conditions. The variations of mandibular deviation, occlusal contact and force were simultaneously measured using mandibular kinesiograph (MKG-K6I, Myo-tronics, USA) and tactile pressure and force measurement system (I-Scan system, Nitta, Japan), respectively. These two devices linked with synchronous signals. The amount of mandibular displacement was calculated between 10 and 90% of maximum voluntary occluding force resulting from the I-Scan data. The mandibular displacement was determined as a square root of total of square values of vertical, lateral and sagittal components of MKG trace. Using I-Scan system, the center of force (COF) is done by calculating the sum of the medio-lateral and antero-posterior force moments of the recorded occlusal contacts, and was represented as the stability of occlusal contacts. In this study, the length of COF trajectory between 10 and 90% of maximum voluntary occluding force was calculated as the index of occlusal stability. The differences between both groups were statistically evaluated using Mann-Whitney U test.

Results: As a result, the amounts of mandibular displacement in patients group showed significantly greater than those in healthy group ($p<0.05$). The length of COF trajectory in patients group were also greater than those in healthy group ($P<0.01$).

Conclusion: In conclusion, large mandibular displacement and unstable occlusal condition during intercuspation was observed in patients with occlusal disharmony in comparison with healthy volunteers.

Poster 209

The Effect of Food Forms on the Secretion of Glucagon-Like Peptide-1 in the Rat

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Purpose: For prevention of diabetes, it is essential how to take in food and control of blood glucose level. Glucagon-like peptide-1 (GLP-1) is synthesized in the enteroendocrine L cells of the intestine and has a function to lower levels of glucose in the blood. Secretion of GLP-1 is regulated by parasympathetic nerve, blood glucose level, and mechanical stimulus by digested food. In this study, we examined whether form of feed (liquid or solid) affect blood glucose level and secretion of GLP-1.

Methods & Materials: Fourteen male Wistar rats were starved for 24 hours and then were divided into two groups: the solid feed group and the liquid feed group. After they fed solid or liquid food for 1 hour freely, blood glucose level were measured by the blood glucose level measuring instrument and collected the blood from caudal vein into the tube containing the inhibitor of dipeptidyl peptidase-4 that cleavages and inactivates GLP-1 at 60 and 90 minutes from the start of feed. The blood was centrifuged for 10 minutes at 10,000 rpm to separate into blood corpuscle and serum. GLP-1 level in serum was measured by enzyme immune assay. The data of blood glucose level and GLP-1 level were analyzed using the Student's t-test. In statistical analyses, $p<0.05$ was considered statistically significant.

Results: Blood glucose levels in the both groups were approximately equal level at 60 minutes. Blood glucose level in the solid feed group increased at 90 minutes whereas that in the liquid feed group decreased at 90 minutes. GLP-1 level in the solid feed group was almost unchanged at 60 and 90 minutes, whereas that in the liquid feed group increased twofold at 60 minutes and decreased slightly at 90 minutes .

Conclusion: Solid feed maintained GLP-1 level and blood glucose level. It can therefore be said that mastication contributes to maintenance and gradual change of blood glucose level via GLP-1.

Poster 210

Precision of Plaster Casts Made From Various Dental Impression Materials: A Preliminary In Vitro Study

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Purpose: The purpose of this study was to develop a precise method for the measurement of the accuracy of impression techniques in vitro.

Methods & Materials: A master model was made in a dental arch form using metal posts embedded in PMMA. ? Three impressions were taken using (1) polyvinyl siloxane (PVS), (2) alginate, (3) alginate. Impressions were casted in plaster models (1) PVS immediately after impression (2) Alginate immediately after impression (3) Alginate 1 hour after impression. All four models were measured using digital length measuring system TESA TG 30. On each model 4 different measures were made (n10). The mean values in all four measurements were paired with standard model and analysed using T-test.

Results: The differences in mean values between pairs (master model vs impression model) were statistically significant ($P< .001$). The smallest differences from the model showed the cast made from alginate immediately after impression. The largest differences were with the cast made from alginate one hour after impression. Cast made from PVS showed the differences near to those from alginate impression casted immediately.

Conclusion: The results indicate that using the method described, accuracy can be measured to within 3 decimal points. The results provide that probably the most precise dental impression material is alginate if it is casted immediately. The factor contributing to these findings will be further investigated to validate the results clinically.

Poster 211

Study on the Correlation Between Subjective and Objective of Vertical Distance Recovery After Occlusal Reconstruction

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Purpose: The purpose of this research is to study on the correlation between subjective feeling of the patient and objective indexes, and the occlusion distribution and masticatory efficiency of the patients with severe tooth wear before and after different vertical height restorations.

Methods & Materials: 12 Patients with occlusal reconstruction treatment in Beijing Stomotology hospital affiliated to capital university of medical science, Peanut spectrophotography was used to determine the masticatory efficiency and T-scan system was used to assess occlusal conditions in intercuspal position was carried out on the participants

Results: There was significant correlation between the masticatory efficiency and subjective evaluation at the beginning of installing the temporary dentures(2mm,4mm,6mm)($P < 0.05$), the correlation coefficient is 0.310. There was significant correlation between the occlusion time and subjective evaluation at the beginning of installing the temporary dentures(2mm,4mm,6mm)($P < 0.05$), the correlation coefficient is -0.395.

Conclusion: There was a positive correlation between subjective evaluation of patients with masticatory efficiency. There was a negative correlation between the subjective evaluation of patients and occlusion time.

Poster 212

Condylar Osteophyte Treated with Splints In the Edentulous Patient: A Case Report

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Purpose: This case report describes prosthetic treatment for a edentulous woman with complete dentures, aged 71, with signs and symptoms of temporomandibular disorders (TMD). The patient complained extremely pain during the mastication and restricted mandibular movements only 1cm opening limitation. Hock-like excrescence 2?2?4mm3 was showed on the central top of her right condyle in CT-graph.

Methods & Materials: The stabilizing splint without any drugs for 3 months. Occlusion adjustment was taken every 2 weeks.CT-graph was taken before and after her treatment.

Results: The pain was relieved after 2 weeks. After three months treatment and maintenance till the eighth month, there was no any complaint from this patient. CT imaging showed that the irregular excrescence of the right condyle disappeared totally. Follow-up in 2005 and in 2007 showed the patient's masticatory function was normal. Fig. A Fig. B Fig.A. Before treatment, the hock-like excrescence was about 2?2?4mm3 on the top of central ridge of right condyle. B. After treatment, the right condyle remodeled.

Conclusion: Occlusion adjustment with the splints may reestablish the physiologic jaws relation, adjusted occlusion, thereby accelerating the neuromuscular deprogramming, promoted the condylar bone remodeling. The splint treatment may be of great benefit to the edentulous patients with TMD.

TMD

Poster 213

Clinical Evaluation of Two Occlusal Splints Used in Myogenous Temporomandibular Disorder Therapy

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Purpose: Treatment of Temporomandibular disorders has a long history; it went through changes in the perspectives from the invasive "surgical" to the non-invasive "conservative" splint therapy. Conservative occlusal stabilization splints have proved to be of great benefit for those suffering from muscular temporomandibular disorders. Myogenous Temporomandibular disorders (M/TMDs) are common findings in the daily dental practice. Myogenous Temporomandibular disorder patients suffer from pain, limited range of opening and they show abnormal muscle activity records. Stabilization splints relief pain, improves the range of mandibular movements, and muscle activity records. However, conventional acrylic (PMMA) or vacuum splints (commonly used) are not aesthetically acceptable by most of the patients; moreover they find them uncomfortable. Patients' acceptance must not be ignored because it sure will affect the duration of wearing the splint.The aim of this case report was to clinically evaluate the pain reduction and patient satisfaction in patients with myogenous TMD treated with thermoplastic poly-oxymethylene.

Methods & Materials: This case report used thermoplastic tooth coloured material (Polyoxy methylene) to construct a splint that meets the patients' aesthetic demands. An occlusal stabilization splint was made to cover and simulate the facial and palatal surfaces of maxillary teeth and restored the missing units. It was used for treatment of Myogenous temporomandibular disorder without internal derangement.

Results: Results were promising the patient was satisfied with her appearance and her pain scores decreased.

Conclusion: Applying thermoplastic materials in the field of splints can be considered a step towards aesthetic splints that therefore, will be more appealing for many patients. At the end, stabilization splint therapy for treatment of myogenous temporomandibular disorders is highly affected by the duration of wearing. The more the duration is, the more the benefits will become.

Poster 214

Effect of Occlusal Splint Therapy on EMG and T-Scan Evaluation of Patients with Different Types of Disc Displacements

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Purpose: Temporomandibular disorder is the term that is widely used all for problems arising from the temporomandibular joint and masticatory muscles, and disorders related to masticatory system function. In the present study, the effectiveness of stabilization splint that applied to individuals which have at least one of two different disc displacement disorders was investigated.

Methods & Materials: Individuals who agreed to participate and who prediagnosed disc displacement with reduction or without reduction as a result of clinical examination, are diagnosed definitely after magnetic resonance (MR) examination. Patient satisfaction, changes in pain complaint, changes in muscle activity and changes at lower jaw contacts were evaluated and have been analysed statistically.

Results: In disc displacement group with reduction, % 68.43 of the patients have pain, this ratio decreased to % 15.78 after 3 months and to % 5.27 after 6 months. In disc displacement group without reduction, % 95.24 of the patients who have pain decreased to %15.78 after 6 months. In % 47.36 of the patients who have disc displacement with reduction, sound of joint disappeared. In both of disc displacement with reduction and without reduction patient groups, stabilization splint causes relocation of the mandibula according to computerized occlusal analysis. This modification occurs until the third month of the therapy. During EMG measurements except clenching activity, anterior portion of temporal muscle have a more active role than masseter muscle.

Conclusion: In patients who used stabilization splint pain complaints and muscle activity have decreased depending on the using time of splint.

Poster 215

Temporomandibular Disorders and Orofacial Pain: An Epidemiological Survey in a Brazilian Population (The *Maringá* Study)

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Purpose: To carry out the first populational epidemiological survey of Temporomandibular Disorders and Orofacial Pain (TMD and OFP) and correlate it with sleep and psychosocial variables in the City of Maringá, State of Paraná, Brazil.

Methods & Materials: The Axes I (questions 0 to 7) and II of the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) and the Sleep Assessment Questionnaire (SAQ) were used for pain, sleep, depression and non-specific physical symptoms (somatization) assessment, respectively. The population was comprised by 1,775 individuals, of both sexes, between 20 and 65 years of age, and users of the Brazilian Public Health System (SUS). The data analysis was performed with STATA 11.0, and the Pearson's Chi Square test and Linear Regression were used for correlations assessment ($p < 0.05$).

Results: The final sample (N = 1,643) was comprised predominantly by men (67.7%), between 20 and 39 years of age, married (48.4%), Caucasian (70%), with an average monthly income between US$ 250.00 and US$ 1,500,00, and with high school education (31%). The Chronic Pain Grade (CPG) Classification demonstrated that the majority of our population had no pain (63.8%) or low intensity pain (18.4%) with low disability (Grades 0 and I); however, 12.7% of the population had high pain intensity with low disability (Grade II), and 5.1% had high TMD pain disability (Grades III and IV). The need for absence leave due to pain was found for very short periods of time (1 to 2 days) in 13.8% of the population. A high global score for sleep disturbances, and low scores for depression and somatization (with and without pain) were found. Positive but low correlations ($r = 0.2$ to 0.3) between Characteristic Pain Intensity (CPI) with all these psychosocial variables were found.

Conclusion: An important part of the Brazilian population presented the need for TMD and OFP multidisciplinary treatment (5.1%) and this should be considered in future public health policies.

Poster 216

The Role of T-MAD in Treating Patient of Severe Obstructive Sleep Apnea

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Purpose: Treating severe obstructive sleep apnea (OSA) can be a challenge.The pressure used with the continuous positive airway pressure (CPAP) in treating those patients can be too high to be tolerated. In this study we would report the outcomes of combing usages of CPAP and a newly designed mandibular advancement device (MAD) in treating extreme severe OSA patients.

Methods & Materials: Severe OSA patients who met the following criteria were invited to join this study: 1. Not able to tolerate CPAP's high pressure; and 2. Even with high pressure, still with residual apnea/hypopnea index (AHI) greater than 5. MAD with tongue backing (t-MAD) were then fabricated. Polysomnogram (PSG) studies were performed with using t-MAD only and in combination with CPAP respectively with one month interval.

Results: 5 patients, whose baseline AHI/CPAP pressure (cmH2O) were 35.2/27, 55.7/10, 63.7/30, 100.9/15 and 68.4/28, have participated to this study. t-MAD alone could not bring sucessful outcome, either. By combining CPAP and t-MAD, the AHI/CPAP pressure were changed to 1/5, 2/7, 2.3/10, 3.9/7, and 2.8/11, respectively. However, only two of them were willing to continue the combination therapy.

Conclusion: Combining CPAP and a mandibular advancing device is effective in treating extreme severe OSA patients by lowering the needed pressure. Since the MAD used in this study is specially designed, to extrapolate the results to general oral appliances should be cautious.

Poster 217

Differences in Articular-Eminence Inclination Between Medieval and Contemporary Human Population

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Purpose: Temporomandibular joint morphology, and consequently, articular eminence inclination depend on the functional and mechanical properties of the craniofacial skeleton. In terms of prosthodontics, values of articular-eminence inclination are important in construction, and adjustments of articulators. But, little is known about the articular eminence inclination in medieval human population. Therefore, the aim of this study was to determine the values of, and differences between the articular-eminence inclination of medieval and contemporary human population.

Methods & Materials: The study was carried out on two dry skull groups. The first group consisted of 30 dry skulls from the early medieval culture groups (ME) of Croatia (4 subgroups), and the other consisted of 137 recent dry skulls from the osteologic collection of the Institute of Anatomy (IA) in Zagreb. The articular-eminence inclination was measured in relation to the Frankfurt horizontal plane on digital images of the skull's two lateral views using VistaMetrix 1.38 computer software.

Results: No statistically significant ($p>0.05$) differences between left and right side inclinations were found among ME skulls, and IA skulls. The mean measured value of articular-eminence inclination among IA skulls (61.99º) was statistically significantly higher ($p<0.05$) than mean articular-eminence inclination value (45.4º) of ME group. Among ME cultural groups, mean value of articular-eminence inclination from Radasinovci cultural subgroup (52.98º) was statistically significantly higher ($p<0.05$) than mean articular-eminence inclination values from other ME cultural subgroups.

Conclusion: Values of articular-eminence inclination vary a lot. Differences between left and right side inclinations were insignificantly but confirmed natural left–right side's asymmetry. Values of articular-eminence inclination differ between IA and ME groups, as well as between ME subgroups, probably due to different type of food consumption in medieval time, and consequently different masticatory loads, and forces.

Poster 218

Development of an Experimental System for Suppressing Sleep Bruxism Before its Onset Without Electrodes

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Purpose: Sleep bruxism (SB) is considered one of the risk factors of temporomandibular disorders. Also, SB causes various problems to teeth and other organs and generates annoying sound, but no definitive therapy has yet been found. Physiological investigations showed that there was increase of heart rates just before SB events. With this knowledge, our previous study demonstrated that over 90% of SB events could be predicted by the increased heart rate monitored by electrocardiogram (ECG), and electrical stimulation triggered by the increased heart rate could reduce SB events about half. The system developed for the above theoretical validation includes electrodes for both ECG recording and electrical stimulation. However, electrodes had disadvantages such as subjects' tolerance, falling off and operating costs. To promote this system to be practically usable, more simplified device should be incorporated. The purpose of this study is to develop an experimental system for suppressing SB before its onset without electrodes.

Methods & Materials: A near-infrared light sensor was employed to monitor pulse wave instead of ECG. Pulse wave was sampled by a frequency of 1kHz and processed to detect the increased heart rate. An electrical stimulator was replaced by a vibratory stimulation generator.

Results: Pulse wave processor and stimulation generator were installed together in a wristwatch main unit, to which a finger ring with a light sensor was attached. This system detected the increase of the heart rate and activated vibratory stimulation to suppress sleep bruxism before its onset. As additional features for the experimental purpose, this system transmitted pulse wave data and stimulation activation triggers to a wireless receiver, which generated sound stimulation from a speaker. Also, the pulse wave data and activation time were stored to a memory card in the receiver.

Conclusion: An experimental system for suppressing sleep bruxism before its onset without electrodes was developed in a style of a wristwatch with a light pulse wave sensor and vibratory and sound stimulation generators. Our future plan includes optimization of stimulation method and intensity, and further improvement of the system by removing the light sensor and the wristwatch to make the system completely harnessless.

Poster 219

The Effect of Stabilization Splints on Masticatory Muscle Pain and Sleep Bruxism: A Randomized Controlled Trial

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Purpose: Stabilization splints (SS) are widely used in a daily clinical practice as a reversible and conservative therapy for masticatory muscle pain and sleep bruxism (SB). However, the evidence for their therapeutic effect is insufficient, and it is difficult to predict the degree of improvement for patients with masticatory muscle pain and SB. Hence, the objectives of this investigator-blinded RCT were to: (1) determine the effect of SS on masticatory muscle pain, (2) reveal the effect of SS on SB activity, (3) verify the relationship between masticatory muscle pain and SB.

Methods & Materials: Sixteen patients who were referred to the TMD clinic at Kyushu University Hospital with masticatory muscle pain and SB participated in this study. They were randomly allocated to either the splint group, who wore SS during sleep (n=8), or the control group (n=8). Electromyographic activities of the masseter muscle during sleep were recorded at baseline, immediately after, and 1, 4, and 6 weeks after the insertion of SS. At baseline and 6 weeks after starting the treatment, masticatory muscle pain was evaluated by a visual analogue scale (VAS) and muscle palpation, and Oral Health Impact Profile 49 (OHIP-49) scores were recorded.

Results: The average number of SB events was 7.34 ± 6.79 times/h, and the average VAS score was 25.8 ± 17.0 at baseline. There were statistically significant differences in the muscle palpation index and OHIP-49 total score between the SS and control groups. However, there was no significant difference in the score of VAS. All parameters related to masticatory muscle pain were improved over time in both the SS and control groups. There was a significant reduction in SB event immediately after wearing SS, but no change at 1, 4, or 6 weeks after starting the treatment. Simple correlation was not found between SB activities and pain parameters.

Conclusion: SS had positive effects on both masticatory muscle pain and SB, but effects on SB were transient.

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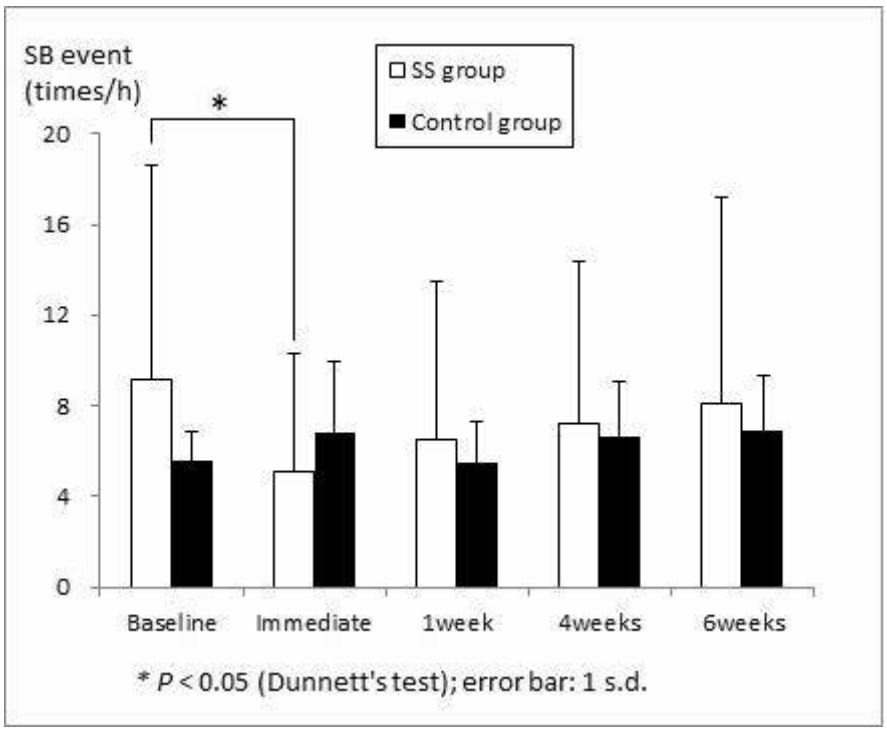

Poster 220

Effect of Newly Developed Cognitive and Behavioral Therapy for Tooth Contacting Habit

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Purpose: Non-functional activities such as sleep bruxism and daytime clenching have been considered etiological factors for temporomandibular disorders (TMDs). The tooth contacting habit (TCH), described as "to constantly touch the upper and lower teeth lightly without clenching forcefully" has recently drawn attention because of its extremely high prevalence in patients with TMDs. For patients with TCH, cognitive and behavioral therapies (CBT) have been indicated, however, accurate cognition of this behavior is the hardest part of this therapy, as majority of TCH occurs unconsciously. We recently developed a novel cellular phone email-based TCH recording system, which periodically sends email massages to the patients asking if their teeth are in contact. This system can be also utilized for CBT for TCH by sending alert messages, which instruct patients not to touch teeth. The purpose of this study was to evaluate this system in comparison with conventional CBT in TMD patients with TCH.

Methods & Materials: Fifteen TMD patients with TCH (10 females, 5 males; ages 31.3±9.7 years) participated into this study after giving informed consent. They were randomly assigned to either email-based CBT (e-CBT) group (n=10) or conventional CBT (c-CBT) group (n=5). All patients received e-CBT or c-CBT for TCH. Three outcome variables, which

included frequency of TCH as measured by the TCH recording system, pain free maximum mouth-opening, and pain level with mouth opening (VAS), were measured before and after the 20 day treatment period and were compared between two groups. (a=0.05, Mann-Whitney U -test)

Results: Before the treatment, there was no significant group difference in each variable ($p>0.05$). After intervention, all of three variables improved significantly in both groups and the magnitudes of improvement of the TCH frequency and pain free maximum mouth-opening were significantly larger in e-CBT group than those of c-CBT group ($p< 0.05$).

Conclusion: The results suggest that the newly developed email-based CBT system has potential to control TCH effectively, which allows better treatment outcome of TMD.

Poster 221

Association between Clinical Features & Sleep Bruxism Assessed by Polysomnography

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Purpose: Accurate diagnosis is important for the management of sleep bruxism (SB) in order to prevent possible damage to the stomatognathic apparatus or to prosthetic restorations. Although the gold standard for diagnosing SB is a polysomnographic (PSG) evaluation, due to the cost and manpower, such an evaluation is not feasible in a clinical setting. Thus, clinical diagnosis is usually made based upon clinical features, which are suggestive of SB, during dental practice. The purpose of this study was to investigate the association between each clinical diagnosis criterion for SB and the frequency of jaw motor events during sleep.

Methods & Materials: Video-PSG was performed on 24 healthy adult subjects (mean age, 27.1 ± 2.5 years). SB subjects (n=17) were chosen based on at least one of the following clinical signs and symptoms of SB: (1) a report of frequent tooth grinding; (2) tooth attrition with dentine exposure through at least three occlusal surfaces; (3) morning masticatory muscle symptoms; and (4) masseter muscle hypertrophy. Control subjects (n=7) were selected on the basis of the absence of these criteria. Episodes of rhythmic masticatory muscle activity (RMMA) and isolated tonic activity were scored visually. These variables were compared with regards to the presence or absence of each clinical sign and symptom.

Results: SB subjects with a report of grinding sounds (n=7) and with tooth attrition (n=6) exhibited significantly higher frequency of RMMA episodes (4.7±2.0/hr and 4.8±2.2/hr) than those without(2.8±1.4/hr and 2.9±1.4/hr)($p=0.039$ and 0.036). Neither frequency of RMMA nor tonic episodes differed between SB subjects with or without morning masticatory muscle symptoms. SB subjects with masseter muscle hypertrophy exhibited a significantly lower frequency of tonic episodes (0.6±0.3/hr) than those without (1.7±1.4/hr) ($p=0.033$). All variables of control subjects exhibited a significantly lower than those of SB subjects.

Conclusion: These results suggest that a report of grinding sounds and tooth attrition status are the clinical findings of SB reflecting RMMA episode.

Poster 222

Effect of Daytime Biofeedback on Sleep Bruxism

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Purpose: Bruxism is considered to be not only a factor contributing to the development of temporomandibular disorders, but also a cause of periodontal tissue destruction, tooth fracture, and damage to dental prostheses. Although it is an important problem to resolve in the field of clinical dentistry, no approaches have been shown to be effective to treat it. This study aimed to examine the effect of electromyogram-biofeedback (EMG-BF) training to improve daytime clenching on nocturnal bruxism.

Methods & Materials: Ten male participants (mean age: 27.8 ± 2.4) with subjective symptoms of daytime clenching or a diagnosis of nocturnal bruxism were randomly divided into biofeedback (5; BF) and control (5; CO) groups to undergo 5-h EMG measurement during the day and nighttime for 3 consecutive weeks. EMG electrodes were placed over the temporal muscle on the masticatory side. The BF group underwent BF training at Week 2, during which a signal was delivered in the event of clenching to enhance their awareness of it. The CO group underwent EMG measurement without any EMG-BF training within the study period. Subsequently, the number of EMG events exceeding individually assigned threshold values was calculated, based on the EMG records obtained from measurement.

Results: Although, there were no significant differences between the 2 groups at Weeks 1 and 2, a significant decrease in the number of EMG events was observed in the BF compared to the CO group at Week 3 ($p<0.05$; Tukey's HSD test); in the former, the number of events significantly decreased at Weeks 2 and 3 compared to Week 1 during both the day and nighttime.

Conclusion: These results suggest the possibility of using EMG-BF training to improve daytime clenching as an effective approach to regulate nocturnal bruxism.

Poster 223

Classification of Jaw Movement Patterns During Sleep Associated Bruxism

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Purpose: Sleep bruxism is defined as a stereotyped movement disorder occurring during sleep. It is characterized by three types of jaw movements: clenching, grinding and tapping. Most of the previous studies have focused on EMG activities of the masticatory muscles, while very few have reported jaw movements during sleep. The purpose of this study is to investigate characteristics of jaw movements pattern during sleep associated bruxism.

Methods & Materials: we developed the six-degree-of-freedom jaw tracking system for sleep study that enable us to record jaw movements, EEG, EOG, ECG and EMG during sleep. Three health volunteers (2 male and 1 female) with no sign and symptoms of stomatognathic dysfunction (25.3+/-2.1yrs) were participated in the study after giving informed consent and examined for an entire night's sleep using this system.

Results: A total of 66 bruxism events (2.7 events/hour) were detected based on the masseter EMG activities above 5%MVC. Mean duration of the masseter EMG in bruxism events were 6.4 ± 4.2 sec. The masseter EMG activity and jaw movement patterns during these bruxism events were used to classify bruxism types independently. They were classified into the clenching-type (33.3%), the grinding-type (51.5%) and the combination-type (15.2%) based on masseter EMG activity. On the other hand, they were classified into the clenching-type (28.8%), the grinding-type (22.7%), and the combination-type (48.5%) based on the jaw movement patterns. The concordance rate between the two classifications was 39.3% of all bruxism except tapping-type events. Furthermore, bruxism events with masseter EMG activities above 5%MVC were observed not only at and around the centric jaw position but also at the eccentric jaw position, contrary to our assumption.

Conclusion: These findings indicate the hazardous nature of sleep bruxism, and the necessity of the jaw movement analysis for accurate and detailed evaluation and diagnosis of it.

Poster 224

Treatment Efficacy on Obstructive Sleep Apnea (OSA) Patients with Tongue-Backing Mandibular Advancement Device (T-MAD): Clinical Trials

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Purpose: Mandibular advancing device (MAD) is effective in treating certain parts of obstructive sleep apnea (OSA) patients, claimed to be through pulling the tongue forward. However, imaging studies in awake have shown that the tongue would incline to drop backwards within the oral cavity with increased void space result from jaw protrusion and opening. Therefore we've developed a MAD with tongue support, the tongue backing MAD (t-MAD). The aim of this study is to report the efficacy of using t-MAD in treating OSA patients.

Methods & Materials: 62 OSA patients, 53 males and 9 females (mean age 51.02 ± 12.94 years) with mean apnea and hypopnea index (AHI) values of 34.85 ± 19.61 have participated to this study. Custom-made t-MAD has been made for all subjects with about 70% of mandible protrusion and 2~3 mm of inter-incisal opening as the treatment modality. Polysomnogram studies have been performed 3 month after t-MAD delivery. Parameters, such as age, body weight and height, and BMI, etc. have also been recorded. Craniofacial morphological analyses based on cephalometric images were also performed. AHI reduction > 50% and residual AHI < 15 have been used as the criterion of success of treatment.

Results: 46 of 62 subjects were ranked as "success" in this trial, i.e. the success rate of 74.19%. OSA patients with younger age, smaller SNA angle, larger overbite, and larger distance between H-Me shown on the cephalometric image, seem to have higher success rate. Moderate OSA patients with higher baseline AHI and severe OSA patients with lower BMI and S-H distance seem to respond better with t-MAD.

Conclusion: The newly designed t-MAD can yield high success rate in treating OSA patients with different severities.

Poster 225

Continuous Effect of Masticatory Muscle Electromyogram Biofeedback on Awake Bruxism Regulation

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Purpose: Although daytime clenching is believed to be one of the oral parafunctions leading to dental problems, a treatment strategy has not yet been devised. Electromyogram (EMG) biofeedback (BF) training was performed to ascertain its effect on regulating daytime clenching behavior. However, the long-term effects remain unknown. Therefore, the purpose of this study was to determine the learning effect one month after EMG-BF training.

Methods & Materials: Eight subjects (mean age, 30.8 ± 3.1 years) who had mild to moderate masticatory muscle pain with daytime clenching behavior were divided into the BF group (6 subjects) and control (CO) group (2 subjects). Subjects were fitted with a hearing-aid-shaped EMG biofeedback apparatus, which was used to record EMG data under natural conditions from the temporal muscle, continuously for five hours on four consecutive days and 1 month after (1 Mo). EMG data on Days 1 and 4 and 1 Mo after were recorded without biofeedback as the pre-test, post-test, and follow-up test respectively. On Days 2 and 3, subjects in the BF group were alerted to their clenching behaviors via an alert sound from the EMG biofeedback apparatus. No alert sound was given to the CO group throughout the recording sessions.

Results: No significant difference was observed in the number of clenching events for five hours between the BF group (7.33 ± 4.93) and CO group (7.5 ± 2.12) on Day 1; however, significant decreases were reported in the BF group between Day 1 (7.33 ± 4.93) and Day 4 (2.32 ± 2.06; $P < 0.05$), and Day 1 and 1 Mo (2.00 ± 1.09; $P<0.05$).

Conclusion: Daytime clenching was reduced in the long term with the help of an EMG biofeedback system under natural circumstances. Daytime EMG-BF training decreased clenching events, and the effect may continue for one month after training.

NOTES

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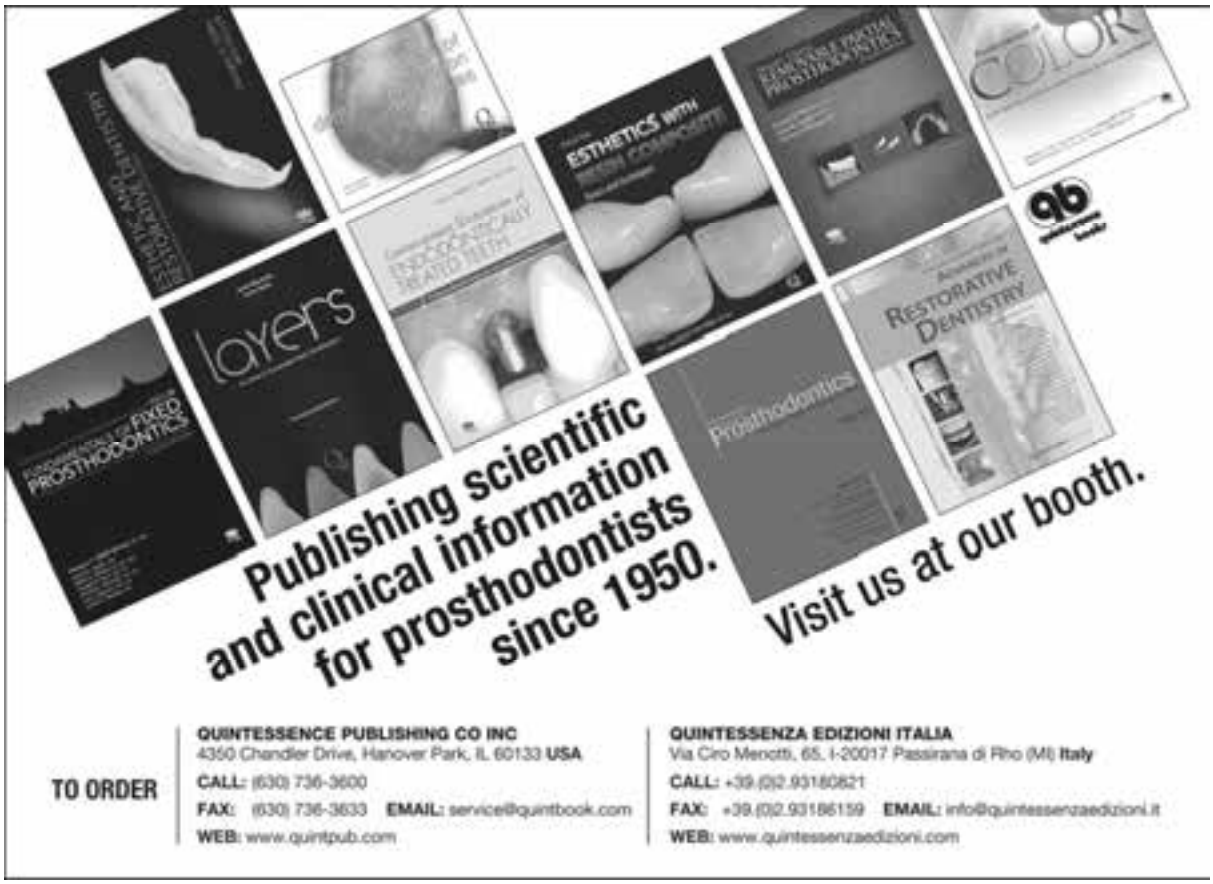

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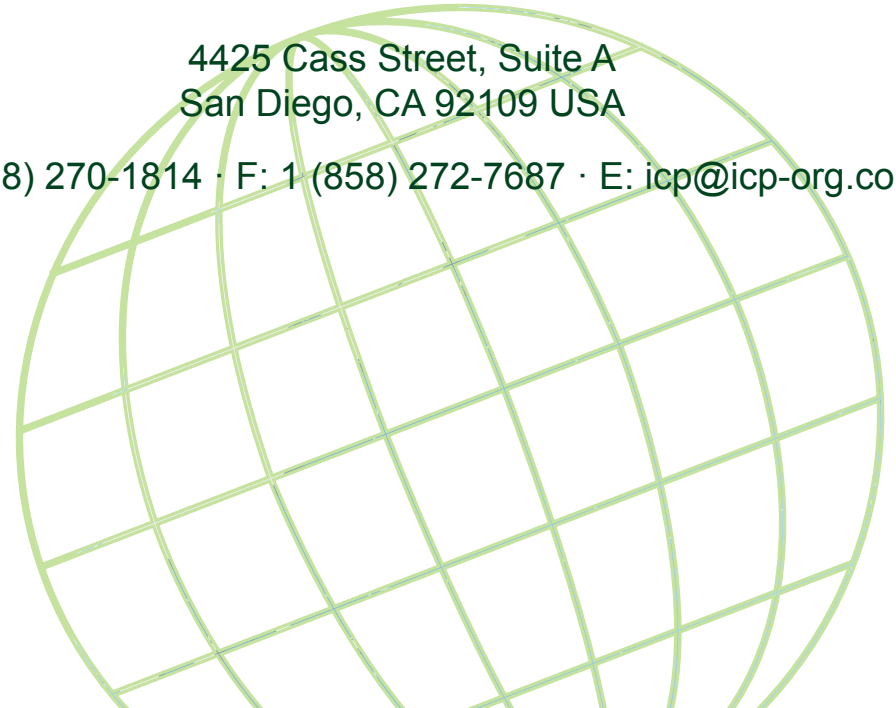
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