PROGRAM & ABSTRACT

Creation, Innovation, and Personalization.

BJC represents the specialists and specialty of prosthodontics in Asia

2015 Biennial Joint Congress of JPS-CPS-KAP

April 10th FRI ▸ 12th SUN , 2015

Venue Hotel Hakone Kowakien, Japan

Japan Prosthodontic Society

CONTENTS

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Welcome Message

It is a great honor to inform you that the 2015 Biennial Joint Congress of Japan Prosthodontic Society, the Chinese Prosthodontic Society (CPS), and Korean Academy of Prosthodontics (KAP) will be held in Hakone from April 10th to 12th, 2015. The main theme of the congress is “Creation, Innovation, and Personalization.” The program of the congress aims to address comprehensively the principles that comprise creative, innovative, and personalized prosthodontics.

Hakone is one of the most beautiful places in Japan and is famous for its hot springs. Nestled along the world heritage area of Mt. Fuji, the town offer s grand landscapes and beautiful natural surroundings with an ideal climate.

We cordially invite you to join the congress in beautiful Japan.

Hirofumi Yatani, DDS, PhD
President of the 2015 Biennial Joint Congress of
JPS-CPS-KAP

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General Information

Speaker Instruction

Duration of oral presentation are:

- 10 min (including 2 min for discussion) for contributed talks
  30 min (including 5 min for discussion) for invited talks

- Equipment
  Oral session room will be equipped with a PC (all computer presentations will be operated by the presenter), an LCD projector (single projection only), a screen (4 x 3 format), a lapel microphone and an aisle microphone. Your presentation will be posted on the PC desktop in your assigned room just prior to your session time. However, you may bring equipment from an outside source such as a personal laptop.

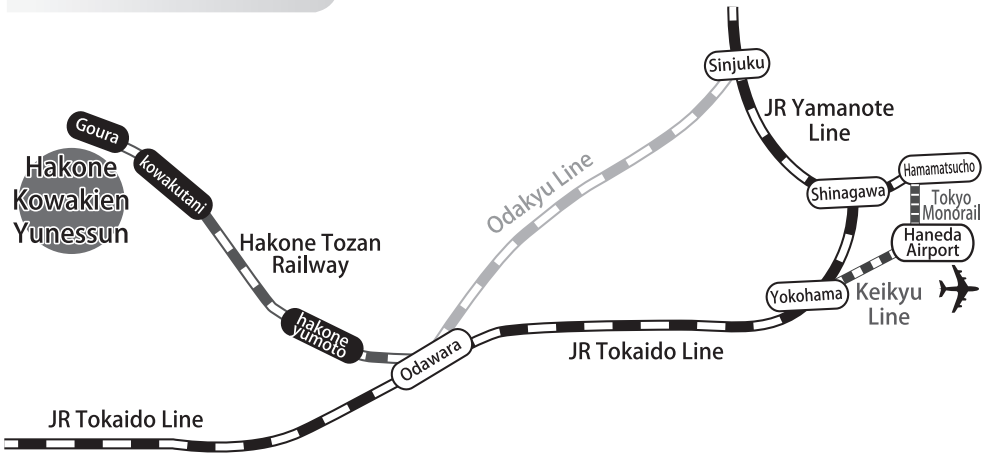
- PC Rehearsal Desk
  All oral presenters must check in at the PC Rehearsal Desk prior to their presentations which is next to the Registration Desk. Any PowerPoint presenter must bring it, on a USB drive, at least one hour prior to the presentation

Poster Instruction

1. All posters should be displayed from Friday, April 10 to Sunday, April 12, 2015.
   You must set up your poster between 12:00 and 14:30 on Friday, April 10.
   You must tear down your poster between 11:20 and 12:50 on Sunday, April 12, 2015.
   All poster presenters are required to be at your poster board during the discussion session time listed below.
   10:30 – 11:20 on Saturday, April 11 for the odd-numbered abstracts
   10:30 – 11:20 on Sunday, April 12 for the even-numbered abstracts

2. The poster board will be used VERTICALLY.
   The maximum dimensions of the poster should be 180 cm high x 90 cm wide.
   The presentation number, the presentation title, author(s), affiliate(s), and the picture of the first presenter should be displayed at the top of the poster.

Access

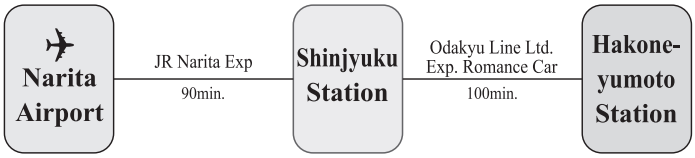


Direction to the Hakone Kowakien Yunessun Resort

From Narita Airport to Hakone-yumoto Station

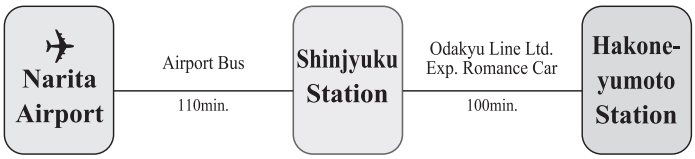
● ***By Train by way of Shinjyuku***

Total travel Time 190 min.



● ***By Bus and Train by way of Shinjyuku***

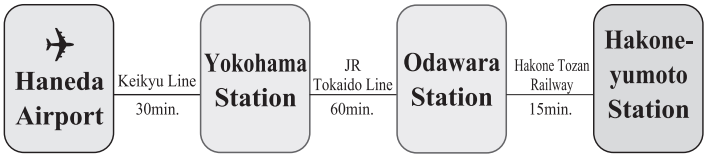
Total travel Time 210 min.



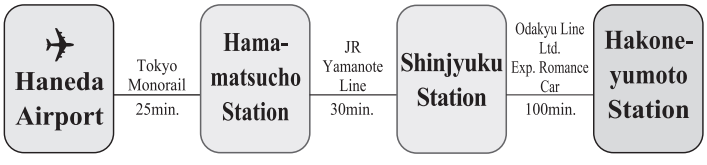
From Haneda Airport to Hakone-yumoto Station

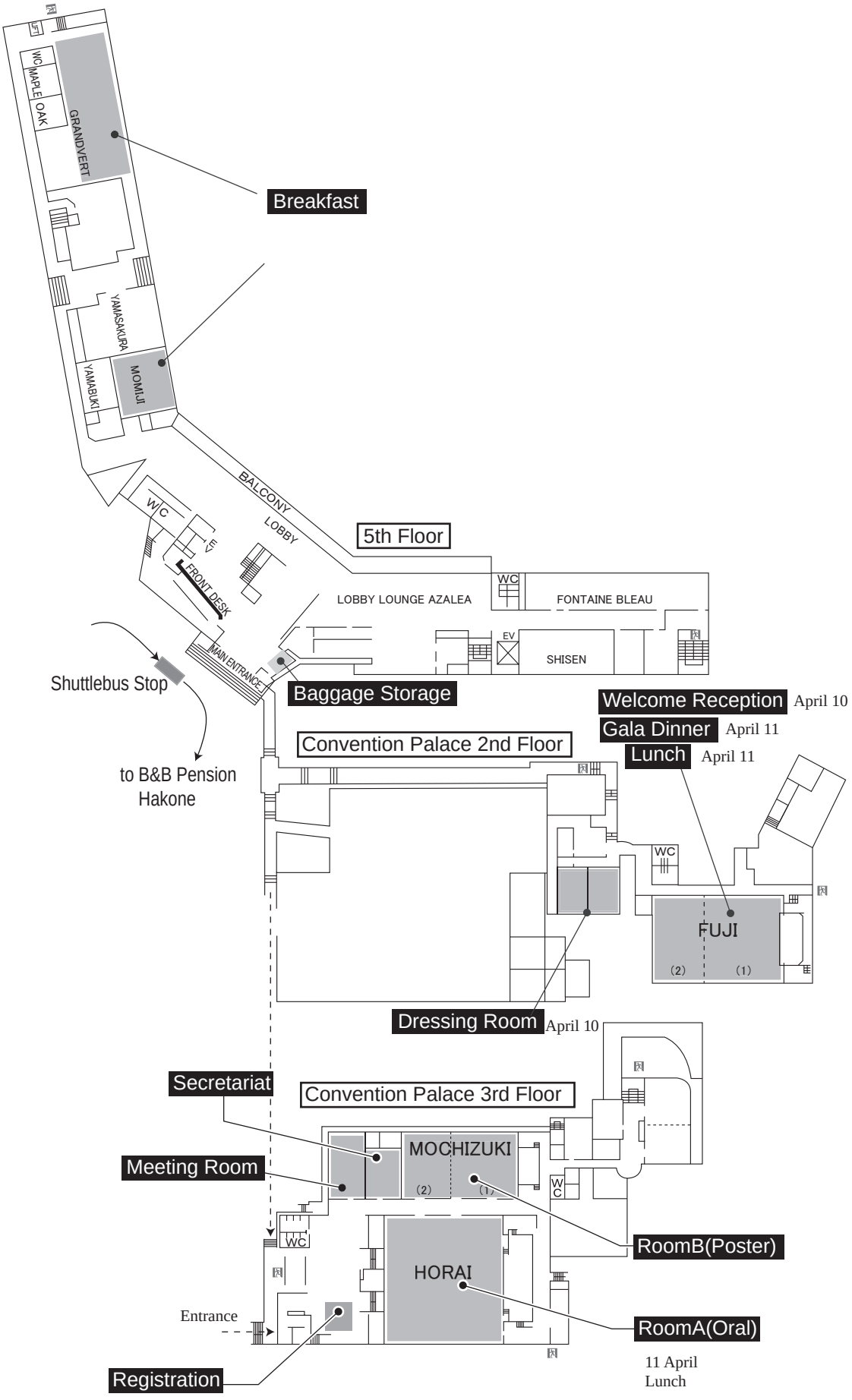
● ***By Train***

Total Travel Time 105min



Total Travel Time 155min




Breakfast
GRANDVERT
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E/V
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5th Floor
LOBBY LOUNGE AZALEA
WC
FONTAINE BLEAU
EV
SHISEN
Shuttlebus Stop
to B&B Pension Hakone
Baggage Storage
Welcome Reception April 10
Gala Dinner April 11
Lunch April 11
Convention Palace 2nd Floor
WC
FUJI
(2)
(1)
Dressing Room April 10
Secretariat
Convention Palace 3rd Floor
MOCHIZUKI
(2)
(1)
WC
Meeting Room
WC
HORAI
RoomB(Poster)
Entrance
RoomA(Oral)
11 April
Lunch
Registration

April 10(Fri), 2015

	Room A (Hourai)	Room B (Mochizuki)
12:00~	Registration Open	Posters set-up begin
14:00~14:30	**Opening Ceremony**	
14:30~15:10	**Oral Session I* Materials** Session Chairperson: Ikuya Watanabe Speaker 1: Jae-Won Choi Speaker 2: Dong Neong Huh Speaker 3: Jian Yang Speaker 4: Do-Hyeon Park	**Poster Sessions Exhibitions**
15:10~15:20	Short Break	
15:20~16:00	**Oral Session II* Implant** Session Chairperson: Ryuji Hosokawa Speaker 1: Jiawei Wang Speaker 2: Masazumi Yoshitani Speaker 3: Naoki Kodama Speaker 4: Young-Gun Shin	
16:00~16:30	Coffee Break	
16:30~17:10	**Oral Session III* Biology** Session Chairperson: Katsumi Uoshima Speaker 1: Yi Zhou Speaker 2: Makiko Saita Speaker 3: Withdrawn Speaker 4: Yasuhiko Kawai	**Poster Sessions Exhibitions**
17:10~17:20	Short Break	
17:20~18:00	**Oral Session IV* Digital dentistry** Session Chairperson: Kazuyoshi Baba Speaker 1: Jianfeng Ma Speaker 2: Chikayuki Odaira Speaker 3: Du-Hyeong Lee Speaker 4: So-Hyoun Lee	
19:00~21:00	**Welcome Reception** (Room Mt. Fuji)	

*Oral Session: 8 min. presentation followed by 2 min. Discussion

April 11(Sat), 2015

	Room A (Hourai)	Room B (Mochizuki)
09:00~10:30	**Symposium I** **"Biologic contribution in the prosthodontic research"** Speaker 1: Hiroshi Egusa, Tohoku University, **"iPS cells: What they are and what they can contribute to prosthodontics"** Speaker 2: Yongsheng Zhou, Peking University, **"What can prosthodontics get from basic research?-PKU experience"** Speaker 3: Jae-Hoon Lee, Yonsei University, **"Personalized medicine for dental disease"** Chairpersons: JPS: Takuo Kuboki, CPS: Cui Huang	**Poster Sessions Exhibitions**
10:30~11:20	Coffee Break & **Poster Discussion (Odd-Numbered Posters)**	
11:20~12:20	**Special Lecture** Speaker: Çetin Sevük, Istanbul University, Turkey, **"Innovations in single tooth restorations from minimally invasive to implants"** Chairperson: Hirofumi Yatani, Osaka University	**Poster Sessions Exhibitions**
12:20~13:30	Lunch / Executive meeting (Room Wakaba)	
13:30~17:30	Excursion (Hakone & Ashinoko Lake Tour, Optional)	**Poster Sessions Exhibitions**
19:00~21:00	**Gala Dinner** (Room Mt. Fuji)	

April 12(Sun), 2015

	Room A (Hourai)	Room B (Mochizuki)
09:00~10:30	**Symposium II** **"The cutting edge of prosthodontic practice"** Speaker 1: Osamu Komiyama, Nihon University Matsudo Dental School, **"The importance of brain function and force control in prosthodontic treatment"** Speaker 2: Haiyang Yu, Sichuan University, **"DLD, a digital approach to dental esthetic design"** Speaker 3: Hyeong-Seob Kim, Kyung Hee University, **"Current trends about zirconia restorations in Korea"** Chairpersons: CPS: Yining Wang, KAP: Jung-suk Han	**Poster Sessions Exhibitions**
10:30~11:20	Coffee Break & **Poster Discussion (Even-Numbered Posters)**	
11:20~12:50	**Symposium III** **"Implant prosthodontics"** Speaker 1: Yasunori Ayukawa, Kyusyu University, **"The acquisition of secure peri-implant soft tissue sealing"** Speaker 2: Xinquan Jiang, Shanghai Jiao Tong University, **"Application of structure and chemical cues in biomaterials design to promote osseointegration"** Speaker 3: Seong-Joo Heo, Seoul National University, **"Clinical application of biomechanical researches in implant dentistry"** Chairpersons: JPS: Kiyoshi Koyano, KAP: Dong-Hoo Han	**Poster Sessions Exhibitions**
12:50~13:00	**Award, Closing Ceremony**	

April 11 (Sat), 2015 Room A (Hourai) 11:20~12:20

Chairperson: Hirofumi Yatani (Osaka University)

Innovations in single tooth restorations from minimally invasive to implants

Prof. Dr. Çetin Sevük

Istanbul University

Abstract

Various restorations are applied in order to replace damaged and extracted teeth. In these situations the aim is to preserve the remaining tooth structure and replace the missing tooth without damaging the adjacent teeth. In other words, a minimally invasive approach should be taken when planning and applying the restorations.

For the restoration of the teeth with excessive material loss, conventional procedures are replaced with new materials matching the shade of the tooth and resistant to functional loads. This is made possible with inlays and endocrowns which are compatible with the remaining tooth structure.

In the single tooth loss cases, conventional bridge restorations are preferred less and procedures such as adhesive bridges and implants are applied instead. For this reason, custom implant procedures are getting popular in addition to contemporary implant applications.

Brief CV

Prof Dr. Çetin Sevük was born in 1949. He graduated from Istanbul University, Faculty of Dentistry in 1974. He completed his post-graduate course and obtained his PhD degree in the Department of Fixed Prosthodontics at the same university in 1979. He was promoted to associate professor in 1988, and professor in 1996. Prof Dr. Çetin Sevük is the president of the Turkish Society of Prosthodontics and Implantology (TPID), board member of European Prosthodontic Association (EPA), Immediate Past president of EPA and also an active member of Computer Aided Implantology Academy (CAIA). Presently he continues teaching at the Department of Fixed Prosthodontics, in İstanbul University, Faculty of Dentistry. He has numerous researches about all ceramic restorations and inlay restorations.

April 11 (Sat), 2015 Room A (Hourai) 9:00~10:30

Chairpersons: Takuo Kuboki (JPS), Cui Huang (CPS)

iPS cells: What they are and what they do in the future of prosthodontics

Prof. Hiroshi Egusa

Tohoku University Graduate School of Dentistry

Abstract

Induced pluripotent stem (iPS) cells can be generated through the reprogramming of somatic cells from different tissues by forced expression of defined exogenous factors. These iPS cells efficiently generated from accessible tissues have the potential to be used for various clinical applications. The oral gingiva is an easily obtainable tissue for dentists, and cells can be isolated from patients with minimal discomfort. We successfully generated iPS cells from adult mouse or human gingival fibroblasts via transduction of the Yamanaka factors without c-Myc oncogene. Gingival fibroblasts demonstrate a higher reprogramming efficiency than the skin fibroblasts which have been conventionally used for the generation of iPS cells. These iPS cells were capable of osteogenic differentiation, which could form new bone in the animal models. The generation of iPS cells from the gingiva is expected to provide a breakthrough, especially in the dental sciences, because it offers a promising method for the facile production of pluripotent stem cells by dental researchers. In this presentation, generation and basic aspects of osteogenic capacity of the gingiva-derived iPS cells will be discussed, with an emphasis on potential applications of the iPS cell technologies in the future of prosthodontics.

Brief CV

1998: Hiroshima University Faculty of Dentistry (DDS)

1999: Technical Assistant, Faculty of Dentistry, Dept. of Oral Biology, University of Hong Kong

2002: Hiroshima University, Graduate School of Dentistry (PhD)

2002-2004: Postdoctoral Research Fellow, Japan Society for the Promotion of Science

2002-2004: Postdoctoral Research Fellow, Weintraub Center for Reconstructive Biotechnology, UCLA School of Dentistry

2004-2014: Assistant Professor, Chief of Biology-Driven Prosthodontics Research Group, Osaka University Graduate School of Dentistry

2014-present: Professor and Chair, Division of Molecular and Regenerative Prosthodontics, Tohoku University Graduate School of Dentistry

April 11 (Sat), 2015 Room A (Hourai) 9:00~10:30

What can prosthodontics get from basic research?-PKU experience

Prof. Yongsheng Zhou

Peking University, School and Hospital of Stomatology

Abstract

Through long-term efforts, we have come a long way in bone tissue engineering or bone regeneration which shows great prospects for oral maxillofacial rehabilitation and implant dentistry in the future. However, biological safety, efficiency, feasibility, cost-effectiveness, etc are still the main factors that determine its wide usage in clinical translation. In order to overcome these difficulties, we have developed some new concepts and new approaches in bone tissue engineering based on human adipose-derived stem cells (hASCs) and cell-homing strategies. We firstly constructed tissue-engineered bone based on hASCs, human Platelet-Rich Plasma, and simvastatin which facilitates the future clinical translation because all the components are easily available. Further, we investigated the potential value of using primary hASCs, non-osteoinduced hASCs in bone tissue engineering and found that primary hASCs or non-osteoinduced hASCs could be used directly in the construction of a tissue-engineering bone. We also examined if we could use small chemical molecules to enhance the osteogenic differentiation of hASCs and found that pargyline and CCB1007 could be used to enhance the osteogenic differentiation of hASCs. Next, a cell homing strategy which eliminated the seed-cell implantation was also introduced in my study. We constructed a novel cell-free bone tissue engineering system using PLGA loaded with SIM and SDF-1a, and applied it in critical-sized calvarial defects in mice. At the same time, the underlying mechanisms such as epigenetic and molecular factors that govern the efficiency, feasibility, and biological safety of bone tissue engineering or bone regeneration were fully investigated. These preliminary explorations will facilitate development of new approaches for treatment of oral maxillofacial defects or bone shortage in implant therapy in the coming era.

Brief CV

Dr. Yongsheng Zhou is the Professor and Chair of Department of Prosthodontics, Peking University School of Stomatology (PKUSS). He achieved his DDS degree in PKUSS in 1994 and PhD in the same school in 1998. He accepted postdoctoral training in University of North Carolina Dental Research Center, Department of Prosthodontics for one year. Dr. Zhou is currently a Diplomate of the Chinese Prosthodontic Society. He is the vice-president of Chinese Society for Oral Maxillofacial Rehabilitation, a standing Committee member of Chinese Prosthodontic Society, Council member of Asian Academy of Prosthodontics, and commissioners of Beijing Municipal Stomatological Association, and National Board of Dental Examiners, etc. He is also a member of Education and Research Committee of International College of Prosthodontists. He is an editor for 6 academic journals in Stomatology. His Researches focus on the usage of bone tissue engineering based on adult stem cells to restore oral bone loss, material surface modification for improving osteogenesis, and digital technology, etc.

April 11 (Sat), 2015 Room A (Hourai) 9:00~10:30

Personalized medicine for dental disease

Prof. Jae-Hoon Lee

Yonsei University

Abstract

Genetic information is stored in the form of DNA and has a direct impact on the characteristics of individual and his or her susceptibility to specific disease. Early diagnosis of specific disease using genetic variants as the marker is very advantageous, because of its low variability, high repetition rate and high stability between generations, which allows effective analysis of genes. Currently, with the completion of human genome project, study of genetic association of disease using NGS, an innovative method to sequence genome is being widely used to find indicators for diseases. However, despite this advancement in medicine, the study and clinical application of this approach is lacking in dentistry and is limited to the study of rare dental developmental disorders. This presentation will address how multi-genic dental disorder is screened with whole exom sequencing and further analyze with bioinformatics including protein networks and variant enrichment analysis. Through this study the genes that play important role in the pathogenesis of the dental disease has been identified and it can be used as a biomarker to find individuals who are susceptible to specific disease. This finding will enable dentist to make early diagnosis and prevention plan in dental disease and eventually, it will bring dentistry a one step closer to personalized medicine.

Brief CV

1994: BS Agricultural Biology at Korea University, Seoul
1999: DDS School of Oral and Dental Surgery at Columbia University, New York
2000: GPR residency Montefiore Hospital, at Bronx, New York
2003: MS Post Graduate Prosthodontics at Columbia University, New York
2003: Pre-clinic instructor: Fixed prosthodontics at Columbia University
2006: Lecturer: Fixed prosthodontics course at Yonsei University
2008: Ph.D Graduate School of Dentistry at Yonsei University, Seoul
2008: Course director: Fixed prosthodontics course at Yonsei University
2010: Visiting scholar Weintraub laboratory at University of California at Los Angeles
2012: Senior-student clinic instructor and secretary at clinical education committee at Yonsei University

April 12 (Sun), 2015 Room A (Hourai) 9:00~10:30

Chairpersons: Yining Wang (CPS), Jung-suk Han (KAP)

The importance of brain function and force control in prosthodontic treatment

Prof. Osamu Komiyama

Nihon University Matsudo Dental School

Abstract

Various esthetic prosthodontic treatments including dental implants are more prosperous than ever with the evolution of dental technology. However, there is general agreement that excessive stress to the prosthesis may result in overload of the human tissue and physical failure of the prosthodontic structure. Many clinicians believe that overload of a dental prosthesis is a risk factor for bone loss and/or may be detrimental for the suprastructure in implant prostheses. It has been documented that occlusal parafunction such as bruxism (tooth grinding and clenching) affects the outcome of prostheses, and those parafunctions are initiated in the central nervous system. During occlusal examination of the patient, the occlusal contact area and the bite force of a patient provide valuable information for prosthodontic treatment and its prognosis.

In a previous paper on the central nervous system, we clarified that the masticatory inhibitory reflex, as a brainstem reflex to interrupt tooth clenching, has a wide variety of appearance threshold individually following stimuli with increasing intensity. We also demonstrated that repeated and standardized tooth clenching tasks triggered significant neuroplastic changes in the corticomotor control of jaw-closing muscles but not of a hand muscle. On the other hand, in previous papers regarding the peripheral masticatory system, we showed that the occlusal contact areas increased with increasing tooth clenching intensity which may affect the tooth and the periodontal tissues, and that an adequate narrative instruction may contribute to taking a stable occlusal recording in natural dentition.

In this lecture, the importance of brain functions and force control in prosthodontic treatment will be discussed to prevent the failure of esthetic prosthodontic treatment.

Brief CV

Osamu Komiyama received the degree in Doctor of Dental Science from the Nihon University, Japan, in 1989, and served as an instructor at the Department of Complete Denture Prosthodontics. After that, he obtained a Ph.D. degree in Dental Science from the Nihon University in 1998. He served as an assistant professor at the Department of Comprehensive Clinical Dentistry, School of Dentistry at Matsudo, Nihon University in 2002, and was a visiting Professor at Catholic University of Leuven from 2003 to 2005 as host Professor Antoon De Laat in Belgium. He is currently an Associate Professor at the Department of Oral Function and Rehabilitation, Nihon University, and the President of a Neuroscience Group of the International Association for Dental Research. His research interests include the development of new somatosensory functional evaluation method in the trigeminal region, clinical neurophysiological evaluation of masticatory function, experimental characterization of orofacial pain patients, and the relation among brain functions, jaw movement, and force control with prosthodontic treatment.

April 12 (Sun), 2015 Room A (Hourai) 9:00~10:30

DLD, a digital approach to dental esthetic design

Prof. Haiyang Yu

Sichuan University

Abstract

The esthetic restoration workflow should includes two steps, dental esthetic design and the clinical treatment. In the first stage, the dentist and the technician make design and treatment plans. Face, lip, gingiva and tooth shape and color should be taken into consideration. It's a creative step. In the second stage, with special transfer techniques, esthetic restorations are finished exactly according to the esthetic design. The key points are esthetic design and esthetic preview. We develop final target based on the different esthetic factors of patients and demonstrate the esthetic effect to dentists, technicians and patients through digital design, wax-up and diagnostic resin veneers, which is helpful to feedback and modification of esthetic effects. In clinical treatment, gingiva tissue, tooth preparation, and restoration fabrication should accord with our esthetic goal. In case need change shape of gingiva curve. We made a wax-up to preview the ideal gingiva level. Then make a transparent index. It provided a clear mark in patient's mouth. According to this marker, the periodontal surgery can be carried out in a controlled way. We usually make depth-orientation grooves to control preparation. But in many esthetic cases, we need change the shape of tooth. Depth-orientation grooves is no longer appropriate in this scenario. Instead, we use silicon index. You can make a impression from wax-up, put it into patient's mouth. It will helps to reveal the exact amount of tooth structure you need.

Brief CV

Dr. Haiyang Yu earned his Bachelor of Medicine degree in 1992 and his Doctor of Medicine degree in 1997 from West China College of Stomatology. He is currently Research Dean and Chair Professor of the Department of Prosthodontics at West China Hospital (college) of Stomatology, Sichuan University.

Dr. Haying Yu is the secretary general of The Guiding Committee of Higher Dental Education, Chinese Ministry Education. He is assistant editor of the Bone Research and subeditor of West China Journal of Stomatology.

Dr. Haiyang Yu is involved in both clinical and research works. As the conductor, he in charge of the State Key Clinical Department of Prosthodontics and the Distinctive Clinic of Implant Rehabilitation. He is expert in Dental ceramic aesthetic rehabilitation, aesthetic removable denture and complex implant rehabilitation. On the basis of his working experience, he put forward several aesthetic rehabilitation theories, such as the line-plane relationship analysis and design principle, esthetic preview and transfer guidance technic, and so on. Those theories and technics have been written down and published.

April 12 (Sun), 2015 Room A (Hourai) 9:00~10:30

Current trends about zirconia restorations in Korea

Prof. Hyeong-Seob Kim

Kyung Hee University

Abstract

Zirconia is one of the most promising restorative biomaterial, because it has very favorable mechanical and chemical properties suitable for medical application. Zirconia based restorations are widely used in Korea such as single crown, fixed partial denture and implant abutment. Y-TZP has the potential for being accepted as a suitable material for fixed prosthodontic dental treatment; however there are a few clinical trials with large sample sizes and longer follow-up periods. The most common complication observed in zirconia based restorations is chipping fractures and delamination of the veneering ceramic. Numerous reasons have been suggested such as mismatch of CTE between the zirconia core and veneering porcelain, mechanically defective micro-structural regions in the porcelain, surface defects or improper support by the framework, overloading, low fracture toughness of the veneering porcelain and the low thermal conductivity of zirconia.

In these days paradigm about zirconia restorations is shifted to full-contour monolithic zirconia restorations. The development of full-contour monolithic zirconia crowns promises an end to the heartbreak of fractured esthetic porcelain on posterior crowns and bridges.

I will present current status about zirconia restorations in Korea and discuss about the key factors for successful zirconia restorations.

Brief CV

1988-1994: DMD, Dental College, Kyung Hee University
1994-1998: Internship & Resident, Department of Prosthodontics, Dental Hospital, Kyung Hee University
1998-2000: Clinical Instructor, Department of Prosthodontics, Dental Hospital, Kyung Hee University
2000-2003: Assistant professor, Department of Dentistry, Medical School, Ewha Women's University
2003-2004: Clinical Assistant Professor, Department of Prosthodontics, Dental Hospital, Kyung Hee University
2004-2007: Assistant Professor, Department of Prosthodontics, Dental College, Kyung Hee University
2008-2008: Visiting Professor, Department of Prosthodontics, Tuebingen University, Germany
2008-2012.8: Associate Professor, Department of Prosthodontics, School of Dentistry, Kyung Hee University
2012.9-present: Professor and chair, Department of Prosthodontics, Dental Hospital, Kyung Hee University
Director of education, training & accreditation, Korean Academy of Prosthodontics

April 12 (Sun), 2015 Room A (Hourai) 11:20~12:50

Chairpersons: Kiyoshi Koyano (JPS), Dong-Hoo Han (KAP)

The acquisition of secure peri-implant soft tissue sealing

Prof. Yasunori Ayukawa

Kyushu University

Abstract

Although peri-implant soft tissue stability is supposed to be equally important to osseointegration from the viewpoint of dental implants with sustainable function, the intervention to this field is relatively insufficient. Especially, while multidisciplinary approaches to the treatment for peri-implantitis are done, the evolution of the material to prevent peri-implant soft tissue disease is eagerly anticipated.

In our previous study, hydrothermal treatment of titanium with CaCl2 solution strongly enhances the osseointegration without any predominant surface alterations. The reason for this enhancement is a consequence of the presence of calcium at the titanium surface. Calcium may enhance the adsorption of Ca-binding proteins such as osteocalcin or osteopontin, which are known to be a substratum for osteoblasts. In the next work, we investigated the possibility of this treatment for the enhancement of peri-implant soft tissue sealing. In our in vitro study, Ca-hydrothermal treatment strongly enhanced the cell attachment durability against the detachment force of both fibroblast and oral epithelial-like cells. Western blotting and immunofluorescence microscopy indicated the development of well-organized adhesion structure-related proteins. In vivo rodent oral implant study indicated that Ca-hydrothermal treated titanium represented secure epithelial attachment with laminin-332-rich adhesive structure, which was almost identical to that between epithelial cells and enamel of the tooth. In addition, barrier property against foreign body penetration into tissue was greater than that of untreated titanium implant and this characteristic sustained for a relatively longer period.

Ca-hydrothermal treatment can be easily applied to titanium, without special devices and minimal surface topographical alteration and our results suggested the possibility for the enhancement of both osseointegration and peri-implant soft tissue sealing.

Brief CV

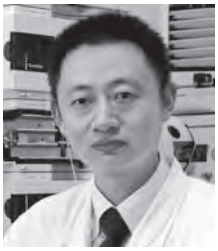
1993: DDS, School of Dentistry, Kyushu University, Fukuoka, Japan
1997: PhD, Graduate School of Dental Science, Kyushu University
1997: Resident, Kyushu University Dental Hospital (2nd Department of Prosthodontics)
1998: Assistant Professor, Kyushu University Faculty of Dentistry (Section of Reconstructive Biotechnology)
2004-present: Lecturer, Kyushu University Hospital (Section of Implant and Rehabilitative Dentistry)
2012: Visiting assistant professor, University of Iowa, IA, USA (Dows Institute for Dental Research)

April 12 (Sun), 2015 Room A (Hourai) 11:20~12:50

Application of structure and chemical cues in biomaterials design to promote osseointegration

Prof. Xinquan Jiang

Shanghai Jiao Tong University
Department of Prosthodontics



Abstract

Bone tissue engineering is an emerging interdisciplinary field that applies the principles of biology and engineering to the development of viable tissue substitutes that restore and maintain the function of human bone. There are many approaches used for bone tissue engineering and all involve one or more of the following key components: seeded cells, growth factors and three-dimensional (3D) biomaterial scaffolds. Adult stem cells, which show promise for bone tissue engineering, have been derived from bone marrow, periosteum, adipose tissue, skeletal muscle, skin, and other sources. And the adult stem cells have been identified from specialized tissues in the craniomaxillofacial region, including dental pulp and periodontal ligament, which may offer advantages for craniomaxillofacial bone regeneration. Bone tissue is composed of a heterogeneous mixture of cell types embedded in mineralized extracellular matrix (ECM) within a 3D structure. The ECM is a particularly rich source of signaling molecules, acts as a structural support, as a reservoir of growth factors, a transducer of mechanical signals, a source of spatial cues delivered via chemical epitopes, and many related features. Biomaterial scaffolds play a critical role in bridging the gap between the developmental context of bone tissue engineering and the diverse context of bone regeneration in terms of clinical needs. Strategies for designing new biomimetic scaffolds which account for the hierarchical organization of natural bone have been investigated. Such scaffold properties, including biomaterial biocompatibility, chemical composition, geometry, porosity, mechanical strength, and degradation rate can be optimized to address the physiological requirements of tissue-engineered bone. More importantly, the design of hybrid micro/nanoscale structures and bioactive trace elements into biomaterials would be a novel strategy to enhance bone regeneration and osseointegration.

Brief CV

Professor Xinquan Jiang is currently the Director of the Department of Prosthodontics, in School of Stomatology, Shanghai Jiao Tong University, China, and the Director of Shanghai Engineering and Research Center in Universities for Advanced Dental Technology and Materials. He is also an honorary professor in Faculty of Engineering and IT, the University of Sydney, Australia.

He received his PhD in 2003 at Shanghai Second Medical University and completed exchange studies at the University of Alberta in Canada and received a visiting scholarship at the School of Dentistry, University of California, Los Angeles (UCLA), in the United States. He serves as the fellow of ICD (international college of dentistry), member of ICP (International College of Prosthodontics) standing committee, regional representative for the Asian Academy of Prosthodontics (AAP), vice president of Chinese Prosthodontic Society.

April 12 (Sun), 2015 Room A (Hourai) 11:20~12:50

Clinical application of biomechanical researches in implant dentistry

Prof. Seong-Joo Heo

Seoul National University

Abstract

Dentists and researchers have debated the identification and application of concepts of biomechanical researches to dental implant treatment for many years. There are many biomechanical factors which should be considered during implant treatments. Following factors will be discussed during the presentation.

1. Occlusal material for temporary restoration and final restoration
2. Type of Occlusion: Canine guidance, group function, Bilateral balanced
3. Occlusal contact height: hypo-occlusion, equal occlusiont
4. Hypo-occlusion due to sinking down of internal connection type implants

Among above factors, occlusal contact height looks very important effects on prognoses of implants and adjacent natural teeth. The concept of light contact during heavy biting and no occlusal contact during light biting was recommended by Lundgren and Laurell and Kim et al. However, some authors have reported that hypo-occlusion of dental implants may cause occlusal disharmony, with adjacent teeth receiving most of the occlusal force, and they suggested equal occlusion for implant crowns and any remaining natural teeth. The our opinion and experiences on occlusal height will be addressed.

Finally the most difficult and challenging cases will be discussed. The cases of implant supported RPD cases and increasing of vertical dimension using implants as key abutments will be also discussed.

Brief CV

1977-1983:	D.D.S., Seoul National University, School of Dentistry
1987-1989:	Specialty in prosthodontics, M.S. in Oral Science State University of New York at Buffalo
1994-present	Professor, Seoul National University, School of Dentistry
1996-1997:	Visiting Professor, Goteborg University, Sweden
2004-2007:	Chairman, Department of Prosthodontics, Seoul National University
2010-2014:	Director, Department of clinical affairs, SNU Dental Hospital
2002-present:	International Journal of Prosthodontics, Reviewer
2013-present:	President Elect, Korean Academy of Prosthodontics
2011-present:	President, Korean Academy of Oral and Maxillofacial Implantology
2007-present:	Vice president, Korean Biomaterial Society
2014-present:	Co-Chair of Scientific Program, ICP 2015 Meeting at Seoul

Oral Session I Materials 14:30~15:10
Chairperson: Ikuya Watanabe (JPS)

I-1

Comparison of changes in retentive force of three stud attachments

Jae-Won Choi, Su-Min Kim, Young-Chan Jeon, Chang-Mo Jeong, Mi-Jeong Yun, Jung-Bo Huh

Department of Prosthodontics, Busan National University, School of Dentistry

The aim of this study was to compare the changes in retentive force of stud attachments for implant overdentures by *in vitro* 2-year-wear simulation.

Three commercially available attachment systems were investigated: Kerator blue, O-ring red and EZ lock. Two implant fixtures were embedded in parallel in each custom base mounting. Five pairs of each attachment system were tested. A universal testing machine was used to measure the retentive force during 2500 insertion and removal cycles. Surface changes on the components were evaluated by scanning electron microscopy (SEM). A Kruskal-Wallis test, followed by Pairwise comparison, was used to compare the retentive force between the groups, and to determine groups that were significantly different (P<.05).

A comparison of the initial retentive force revealed the highest value for Kerator, followed by O-ring and EZ lock attachments. However, no significant difference was detected between Kerator and O-ring (P>.05). After 2500 insertion and removal cycles, the highest retention loss was recorded for O-ring, and no significant difference between Kerator and EZ lock (P>.05). Also, Kerator showed the highest retentive force followed by EZ lock and O-ring, after the 2500th cycle (P<.05). Based on SEM analysis, the polymeric components in O-ring and Kerator were observed to exhibit surface wear and deformation.

After 2500 insertion and removal cycles, all attachments exhibited significant loss in retention. Mechanism of retention loss can only be partially explained by surface changes.

Keywords: Overdenture attachment, Resilient attachment, Retentive force, Surface wear

I-2

Treatment of fractured maxillary central incisors using surgical replantation

Dong Neong Huh, Seong Jae Park

ItPlant Dental Clinic

Surgical replantation has been used to have longer clinical crown length especially when teeth are fractured. One of the most common cases is the fracture of the central incisor. When this happens, the palatal side of the crown tends to be severely damaged leading to the loss of the supragingival part of the side. While forced eruption followed by clinical crown lengthening procedure is widely used, surgical replantation may also be a good treatment option. Although implant treatment is commonly used recently, keeping the natural teeth may be considered first, if possible.

In this case report, the patient had his two maxillary central incisor fractured. Surgical replantation with rotation was performed followed by re-endodontic treatment. Since the occlusal clearance was quite tight, adjustment of the occluding dentition was also carried out.

Fiber posts were inserted and cores were built. Provisional prosthesis was made and delivered. During the provisional period, occlusal clearance was adjusted. Finally, the final prosthesis was made and delivered.

If successful, surgical replantation has advantages over implant treatment since the natural teeth keeps the periodontal ligament. The method may be considered first especially in cases with fractured anterior teeth since it is considered to show better esthetic prognosis.

I-3

Full-month rehabilitation of erosion dentition utilizing chairside CAD/CAM occlusal veneers

Jian Yang, Yongsheng Zhou

Department of Prosthodontics, Peking University, School and Hospital of Stomatology, Beijing 100081, China

Dental erosion, defined as a progressive loss of dental hard tissue as a result of chemical process without bacteria involved. Several reports have proposed to use of minimally invasive procedures to treat such patient in stead of traditional full-crown rehabilitation. the use of lithium disilicate occlusal venners, in combine with improvement in dental adhesion, allow a more conservative approach. A 36 years old male with erosion dentition. Extraoral examination revealed lightly reduced VDO ,Intraoral examination reveals extreme wear of lingual surface of maxillary anterior teeth and occlusal surfaces of most posterior teeth in the patient's mouth ,and incisor margin of the anterior teeth is sharp and become shorter. After space analysis and esthetic evaluation, direct resin composite technique was chosed to restore lower anterior teeth and 2 mandibular premolar, where the tooth wear is not severely. Chairside CAD/CAM technique and lithium disilicate partial coverage veneers were utilized to restore the rest posterior tooth and canine with severly tooth wear, 4 full coverage lithium disilicate veneers were utilized to restore the esthetics of maxillary incisors and anterior guidance. This report combined Chairside CAD/CAM technique and minimal invasive adhesive rehabilitation in the treatment plan for a patient with erosiion dentition.

I-4

Effect of activation modes on compressive strength and diametral tensile strength of dual cured self-adhesive resin cements

Do-Hyeon Park, Ah-Rang Kim, Young-Chan Jeon, Chang-Mo Jeong, Mi-Jeong Yun, Jung-Bo Huh

Department of Prosthodontics, Busan National University, School of Dentistry

Purpose: The purpose of this study was to compare the compressive strength and diametral tensile strength of several dual-cured self-adhesive resin cements by different activation modes and testing time.

Materials and Methods: Six dual-cured self-adhesive resin cements currently used (Rely-X U200, Clearfill SA Luting, G-CEM LinkAce, Maxcem Elite, PermaCem 2.0 and Zirconite) were included for this study. Cylindrical specimens were prepared for compressive strength test (Ø 4 x 6 mm) and for diametral tensile strength test (Ø 6 x 3 mm) according to ISO standard. Each cement divided into six groups in combination with two activation modes (self-cure in water at 37℃, 40 seconds light-cure) and three testing time (immediately, 24 hours after curing, after 2,000 thermal cycles). Both tests were conducted using an universal testing machine according to ISO standard. The data were statistically analyzed using t-test, one-way ANOVA, two-way ANOVA and

the multiple comparison Scheff's test ($P<.05$).

Results: Compressive strengths and diametral tensile strengths of dual-cured self-adhesive resin cements showed variable results from 142.94 MPa to 298.14 MPa and from 22.76 MPa to 44.48 MPa respectively. In the comparison between testing times, the compressive strength and diametral tensile strength after 24 hours were higher than immediate testing. In the comparison between cements, G-CEM showed the highest values compared to other cements except diametral tensile strength immediatly. In the comparision between activation modes, Rely-X U200, PermaCem 2.0 and Zirconite had higher values in light-curing than self-curing activation mode, while another cements revealed no statistically significant differences according to activation modes.

Conclusion: Self-adhesive resin cements revealed differences in compressive strength and diametral tensile strength according to their composition, testing time, activation mode. All cements demonstrated clinically available strength values. This results may be used as the guide line for selecting of resin cements.

Oral Session II Implant 15:20~16:00

Chairperson: Ryuji Hosokawa (JPS)

II-1

Esthetic restoration of anterior hypodontia with oral implant

Jiawei Wang, Yining Wang, Yi Zhou

Wuhan University

Congenital tooth missing is one of the most common dental anomalies, which is associated with anomalies during the formation process and the early development of tooth germ. According to the number of missing teeth, congenital tooth missing can be divided into hypodontia (less than 6 teeth), oligodontia (more than 6 teeth), and anodontia (missing all teeth). The most common tooth agenesis is the third molar, which accounts for 20% of missing teeth, and then is the second premolar, the upper lateral incisor, and the lower anterior tooth. The tooth missing will induce a lots of symptoms in the clinic, such as diastema, midline unalignment, anomaly of overbite and overjet, anomaly of occlusion, deciduous tooth retention, decrease of lower facial 1/3 height, retraction of jaw, tooth transposition, and etc. Although the incidence of anterior hypodontia is low, it heavily influences the patient's countenance and pronunciation. Esthetic restoration of anterior hypodontia with oral implant should take a multidisciplinary approach, which combines the benefits of orthodontic, periodontic, and prosthodontic treatment. Firstly, orthodontic treatment is applied to the patients with aim to adjust the space, correct midline, improve occlusion, and align dentition. After that, the surgeon should pay attention to several characteristics of anterior hypodontia, i.e. deficient horizontal bone volume, excessive vertical bone volume, small missing space, and lower gingival curve of adjacent teeth. The strategies to solve these questions are proposed, which includes GBR, bone trimming, small diameter implant, and crown lengthening. The final restoration is finished by the prosthodontist with the aid of precision impression technique, zirconia abutment and all ceramic crowns. Several typical cases are presented to demonstrate the above mentioned issues at the same time.

II-2

Effects of implant numbers on occlusal force distribution

Masazumi Yoshitani, Yoshiyuki Takayama, Atsuro Yokoyama

Department of Oral Functional Prosthodontics, Division of Oral Functional Science, Graduate School of Dental Medicine, Hokkaido University

Purpose: The aim of this study was to investigate the effects of implant numbers on the distribution of occlusal force in the unilateral defect of the molar region of mandible.

Methods: We constructed three-dimensional finite element models of a mandible with left second molar missing (MT7), left molars missing (MT67), one or two implant(s) placed on MT67 (Im6, Im67). Linear elastic and isotropic material properties were defined for all elements except for the periodontal ligament with biphasic elasticity. The load was assumed intercuspal clenching and generated by the contractile force of masticatory muscles. The amount of the load was defined according to total occlusal force on the occlusal surfaces (200N, 400N, and 800N). Displacement was restricted through nonlinear springs with appropriate biphasic elasticity at temporomandibular joints, central fossa or incisal edge of teeth and superstructures. The elasticity of the springs on the teeth and the implants simulated opposing natural teeth at compression. The springs on the superstructures also had quite small elasticity at low compression to allow some upward movement, which was determined by a trial-and-error method so that symmetric distribution of the occlusal force was observed under load 400N, with slight resistance.

Results: The ratio of the occlusal force on the superstructures increased under larger load. The force distribution in Im67 was almost similar to natural dentition. The occlusal force on the second premolar was 2.3–3.8 and 1.9-2.5 times greater than that of opposite side in MT7 and Im6, respectively. The force distribution of Im6 was almost similar to that of MT7.

Conclusion: From the viewpoint of occlusal force distribution, two implants placement is recommended for the unilateral defect of the molar region of mandibles. The occlusal force distribution with one implant placement was similar to that of second molar missing model.

II-3

The impact of implant-assisted overdenture on nutritional status: A meta-analysis

Naoki Kodama[1,2], Shogo Minagi[1], Elham Emami[2]

[1]Department of Occlusal and Oral Functional Rehabilitation, Okayama Univesity Graduate School of Medicine, Dentistry and Pharmaceutical Sciences
[2]Departement of Restorative Dentistry, Faculty of Dentistry, Université de Montréal

Objective: The aim of this meta-analysis was to quantitatively summarize the evidence for the impact of implant-assisted overdenture on nutritional status of edentate individuals.

Methods: Eligible studies were identified by searching electronic databases including Medline, Embase, The Cochrane Central Register of Controlled Trials, and The Cochrane Systematic Reviews Database (via Ovid) for the period up to October 2014. The eligible studies included randomized-controlled trials in which conventional dentures and mandibular implant overdentures in adult edentate individuals were compared in regard to the outcome of interest. This included nutritional status, and its related indicators such as body mass index, macronutrients and micronutrients. Random effects models were used to pool the effect sizes (ES) of all included studies.

Results: In total, 1,596 non-duplicate articles were identified from database searches. Six publications of six randomized-controlled trials were identified and four were included in the meta-analysis. There was no statistically significant difference in the 14 indicators of nutritional status of edentate individuals wearing implant-assisted overdenture when compared to those wearing conventional denture. The pooled ES for Albumin was -0.37 (Z=1.10, 95% confidence intervals -1.03 to 0.29; p=0.27, Chi2=0.21, df=2, p=0.90, I2=0%) revealing non significant small effect size in favour of the conventional denture treatment.

Conclusion: These findings suggest that there is no evidence of nutritional differences between edentate individuals wearing implant-assisted mandibular overdentures and those wearing conventional complete dentures. Large nutritional epidemiology studies, with long-term follow-up are needed to improve our understanding of the impact of implant overdenture on nutrition.

II-4

Influence of double locking abutment on implant-abutment screw joint stability

Young-Gun Shin, Young-Chan Jeon, Chang-Mo Jeong, Mi-Jeong Yun, Jung-Bo Huh

Department of Prosthodontics, Busan National University, School of Dentistry

The purpose of this study was to examine the effect of the Influence of double locking abutment on Implant-abutment screw joint stability. In this study, 20 internal hex type fixture, 10 single screw abutment and 10 double locking abutment were used.

The implant fixture was fixed to the separately manufactured jig, and the abutment was fastened to the implant fixture. Then a 30 Ncm tightening torque was applied to each abutment screw using a torque gauge. 10 minutes later, the same tightening torque was applied again. 5 minutes later, the removal torque of each abutment screw was measured using a torque gauge. The lower part of double locking abutment screw is fastened to the fixture like single scerw abutment. A 20 Ncm tightening torque was applied to upper part of double locking abutment screw. 10 minutes later, the same tightening torque was applied again. 5 minutes later, the removal torque of double locking abutment screw was measured using. This procedure was repeated 5 times, A repeated load with a 50N and a 2Hz cycle was applied, 5mm away from the center axis of the implant. After 50,000 cycles of repeated load were applied, the removal torque was measured. To compare postload removal torque Loss at each group, statistical analysis was performed using Independent t-test.

In this limited study, there was no significant difference in the initial removal torque between single screw abutment and double locking abutment. Post-load removal torque of double locking abutment was significantly greater than single screw abutment. ($P<0.05$)

This limited study show that double locking abutment is effective to prevent.

Oral Session III Biology 16:30~17:10

Chairperson: Katsumi Uoshima (JPS)

III-1

LIF protects MSCs against hypoxia and serum deprivation-induced apoptosis

Yi Zhou, Xiaoqi Wang

Wuhan University

Introduction: Bone marrow-derived mesenchymal stem cells (MSCs) have shown great promise for tissue regeneration. However, poor viability of transplanted MSCs has limited their therapeutic potential. Ischemia has been reported to be one of the main causes of MSCs death during transplantation. The present study is sought to investigate whether leukemia inhibitory factor (LIF), which plays an essential role in the growth and maintenance of stem cells, could protect MSCs from ischemia-induced apoptosis.

Material & Methods: All experiments were carried out on rat bone marrow MSCs. Effects of LIF were investigated in a model of ischemia consisting of hypoxia and serum deprivation in vitro.

Results: Apoptosis of MSCs was induced by exposure of cells to hypoxia and serum deprivation. Data showed that the protective effect of LIF on MSCs was dose-dependent and peaked at 40ng/ml. Further study revealed that LIF could inhibit the loss of mitochondrial membrane potential, reduce the activation of caspase-3 and decrease the expression of Bim and Bax/Bcl-2 ratio. In addition, LIF induced janus kinase 1 (JAK1) and signal transducer and activator of transcription 3 (STAT3) phosphorylation. The anti-apoptotic effect of LIF could be completely blocked by the JAK1 and STAT3 specific inhibitors.

Conclusion: These results demonstrate that LIF can protect MSCs against hypoxia and serum deprivation-induced apoptosis via JAK1/STAT3 pathway. It implies that LIF may be a promising agent for improving MSCs survival during cell transplantation.

III-2

Metabolome analysis of saliva on occlusal and masticatory stimulations

Makiko Saita[1], Masahiro Sugimoto[2,3], Noriyuki Hoshi[1], Katsuhiko Kimoto[1]

[1]Kanagawa Dental University Department of Prosthodontics & Oral Rehabilitation / Japan
[2]Keio University Institute for Advanced Biosciences / Japan
[3]Kanagawa Dental University Department of Pathology / Japan

[Objective] Saliva is an important role in occlusion and mastication, which improve systemic health and quality of life. The volume and chemical properties are major features of saliva. Although, masticatory stimulation is known to increase the volume, the change of chemical composition has not been clarified. Here, we conducted comprehensive metabolome analysis of hydrophilic small molecules in saliva. The quantitative association between occlusal and masticatory stimulations and the salivary composition was investigated.

[Methods] The Ethics Committee of our university approved this study. Saliva was collected from the following subjects who visited our university hospital: 1) Unstimulated saliva was collected from 3 patients with intact bilateral molar regions (Control group) and 3 patients with defects of the bilateral molar regions (Experimental group) using the spitting method, and subjected to metabolome analysis. 2) Unstimulated saliva (Control group) and stimulated one (Experimental group) were collected using the spitting method and gum test, respectively, from 55 patients with intact bilateral molar regions, and subjected to metabolome analysis using capillary electrophoresis-mass spectroscopy.

[Results and Discussion] 1) Totally 137 metabolites were quantified. Principle component analysis (PCA) differentiated metabolomic profiles between the Control and Experimental groups. 2) Totally, 106 metabolites were quantified. PCA showed clear differences between the Control and Experimental groups. These differences were more distinct in the comparison of gender and age differences. Metabolome analysis revealed that occlusal and masticatory stimulations induced both quantitative and qualitative changes in the salivary compositions.

III-3 Withdrawn

III-4

The simplified conventional complete dentures remains more cost-efficient after decade

Yasuhiko Kawai[1,2], Hiroshi Murakami[1], Yoshiaki Takanashi[1], Jocelyne Feine[2]

[1]Nihon University School of Dentistry at Matsudo
[2]McGill University Faculty of Dentistry

Objectives: Using a simplified method to fabricate conventional complete denture is easier and more cost-efficient than the traditional method in the short-term (Kawai et al 2005, 2010). However, it is not clear whether the usefulness of the dentures, patient satisfaction and oral health related quality of life (OHRQoL) might differ over a longer period. The objective of this study was to determine clinical factors, as well as patient perspectives, of new dentures fabricated with simplified (S) and traditional (T) techniques after a decade of use.

Methods: The study was s 10-year follow-up of a randomized controlled clinical trial (RCT) carried out from 2001 to 2003. One hundred twenty (120) patients who randomly received complete dentures fabricated by two different methods, S and T, and who completed 6-month follow-ups (S: 54 and T: 49, total 103 subjects) were potential interviewees and were interviewed by telephone from September 2012 to December 2013. Variables included patient satisfaction, denture condition and OHRQoL.

Results: Twenty-nine S (54%) and 25 T (51%) participants responded to the interviews. Of those, 21S and 14T were still wearing the original study dentures. Ratings of denture satisfaction and OHRQoL by participants from both groups were similar (maxilla satisfaction; S: 80.7 T: 71.1, p=0.26, mandibular satisfaction; S: 69.9 T: 66.1, p=0.38 and OHRQoL S: 107.7 T: 111.1, p= 0.46). Compared to 6-month follow-ups ratings, there were significant decrease in maxillary T dentures; 6month: 91.7 10years: 71.1, p=0.008.

Conclusion: No differences in patient-based outcomes were detected when complete dentures were fabricated with simplified and traditional methods, both on the short and long term. This indicates that the simplified method remains more cost-efficient than the traditional method over a 10-year period.

Oral Session IV Digital dentistry 17:00~18:00

Chairperson: Kazuyoshi Baba (JPS)

IV-1

A self-made system for rapid prototyping of dental ceramics

Ruibin Zheng, Tingting Lin, Jiangyuan Fan, Siqian Wang, Yixin Mao, Jianfeng Ma

School & Hospital of Stomatology,
Wenzhou Medical University

Slurry-based selective laser sintering (SLS) is an advanced technique to fabricate complex-shaped ceramics in manufacturing industries.Through this way, three-dimensional (3D) ceramic parts can be manufactured directly from CAD models without any specific tooling or human intervention.This study describes the SLS process chain in dental ceramics of zirconia toughened alumina (ZTA) through self-made rapid prototyping system, beginning from slurry preparation,workpiece fabrication to pre-sintering of the green parts. Accordingly, ZTA ceramic slurry is prepared by ZTA powder, the binder polyvinyl alcohol and deionized water.It is worth mentioning that a self-made rapid prototyping system comprising three parts are assembled:computer with CAD software designing the crown shape, the cutting layer software converting the graphics files,the fiber laser machine serving as the laser scanning system to melt the organic binder in a short period of time and sophisticated electronic lifting platform descending for a certain distance of one layer thickness.By executing the single-layer generation cycle repeatedly which includes platform descending, layer paving, drying and scanning, 3D green parts are manufactured. After pre-sintering in a high temperature furnace, the polymeric binder is pyrolysed and the three-point bending strength of ZTA ceramic green body reaches to 25.44±2.47MPa.Meanwhile, the linear shrinkage is minimum, what reveals that the goal of near net-shape is accomplished.What is more, the uniform pores of green part are also obtained, which can provide the basis for glass infiltration in the future process.All in all, 3D green parts of ZTA ceramics are successfully fabricated using slurry-based selective laser sintering, suggesting that SLS has good potential to offer a desired technology breakthrough for dental restorations regarding with rapid prototyping methods.

IV-2

Accuracy of digital impressions for implant prostheses

Chikayuki Odaira, Hitoshi Ajioka, Shota Fukazawa, Hisatomo Kondo

Department of Prosthodontics and Oral Implantology,
School of Dentistry, Iwate Medical University

Objectives

Recently, dental treatments have been digitalized with advance of information technology. Particularly, optical impression by intra-oral scanners is the focus of a lot of attention as a new method to reproduce and measure three-dimensional shapes of oral tissue.

The purpose of this study is to evaluate the accuracy of digital and conventional impression techniques from the point of view of trueness and precision.

Methods

The reference model of the mandible was fabricated, in which abutments were connected to implants, and replicated using a vinyl polysiloxane impression material. A computer numerical control coordinate measuring machine (CNCCMM) was used in measuring the reference model and replicated models. Two intra-oral scanners (Lava COS(3M), TRIOS(3shape)) were used in scanning the reference model. These digitized data were loaded into 3D evaluation software (Focus Inspection, Nikon) and the distance between the center points of two abutments and the angle between the centerlines of two abutments were calculated and assessing accuracy(trueness and precision). One-way ANOVA followed by Bonferroni's post-hoc comparisons tests were performed in all statistical analyses.

Results

The distance error of two abutments by the optical impression showed slightly larger than the scan data from the reference and replicated models scanned with CNCCMM. The Angulation error by showed no significant difference.

Conclusion

These results suggested that some of intra-oral scanners might have comparable performance to conventional impression technique and could be useful in clinical practice.

IV-3

Computer-guided template to make screw-access hole in implant restoration

Du-Hyeong Lee[1], Hye-Won Kang[2]

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[2]Department of Dental Science, School of Natural Science, Kyungpook National University

Several articles have described techniques to facilitate making the screw-access hole. Photographs containing the location of the screw channel or radiographs showing the implant axis provide clinicians with second-hand information of the screw position. Staining a small spot on the occlusal surface of the restoration or using a vacuum-formed template are useful laboratory techniques for indicating the starting point of drilling. Futhermore, as an advanced system, a drilling guide using vacuum-formed template and pattern resin was introduced.

However, the system has been based on conventional manual processes, and has some limitations when applied intraorally. Herein, advanced approaches for fabricating a guide with a handpiece sleeve using digitalized techniques are introduced. The digital processes facilitate accurate guided drilling through the restoration and enables the cooling water to reach the drilling area.

IV-4

Fitness of lithium disilicate CAD/CAM crowns : A multicenter clinical study

So-Hyoun Lee, Se-Jin Nam, Young-Chan Jeon, Chang-Mo Jeong, Mi-Jeong Yun, Jung-Bo Huh

Department of Prosthodontics, Busan National University, School of Dentistry

Objective. This multicenter clinical study aimed to compare the fitness of the metal ceramic crown made from traditional method and that of the lithium disilicate crown utilizingCAD/CAM system.

Materials and methods. This study was approved by Pusan National University Dental Hospital's IRB. A total of 21 patients' (seven for each of the three dental clinics) abutment teeth were prepared according to the conventional methods. Two kinds of prosthetic restorations were fabricated, a metal ceramic crown using traditional method and a lithium disilicate crown utilizing CAD/CAM system (CEREC AC system) per one patients' abutment teeth. Two silicone replicas were produced per restoration at the abutment sites and then seated. Each of which was sectioned in the center of buccolingual and mesiodistal direction to measure the marginal and internal gap. A total 10 reference points per tooth were set, respectively 5 points in each direction, to measure gaps. The measuring microscope (AXIO) and I-solution software was used to measure the thickness of the silicone film at the selected points..Means of the gap width of each center were compared using one-way analysis of variance with Tukey's multiple comparison test at a significance level of 0.05

Results. In the comparison of the differences among each center, no significant difference in gap width was found in the lithium disilicate crown (P>.05) and the metal ceramic crown (P>.05). Significant differences in the MCC group and LDC group were showed reference points of buccolingual direction (P<.001)and reference points of mesiodistal direction (P<.001). As for the marginal gap, no significant difference was noted (P>.05). The internal gap was significantly bigger in the lithium disilicate crown's axial and occlusal surfaces (P<.001).

Conclusion. The difference in internal gap was statistically significant with the lithium disilicate crown generally showing a higher value (P<.001). The difference in marginal gap was not statistically significant (P>.05) and both groups showed fitness levels that can be clinically accepted.

1. Clinical Epidemiology and Prosthodontics

P-1

Occlusal reconstruction of patients with congenital dentition defect and crossbite

Shanshan Gao, Yang Liu, Jie Min, Dandan Yu, Haiyang Yu

West China Hospital of Stomatology,
Sichuan University, Chengdu, China

Objective: The aim of this study was to discuss the effect of applying splint pad removable partial denture for occlusal reconstruction in patients with congenital dentition defect and partial crossbite.

Methods: By analyzing the facial and oral condition, the problems of the patient mainly included six congenital dentition defect, insufficient height of the 1/3 lower faces, crossbite of the right posterior area and three retained deciduous teeth. Asymmetry of the before and after the joint clearance was confirmed by CBCT of temporomandibular joint (TMJ). We decided to elevate and reconstruct the occlusion. Considering congenital absence of part of the permanent teeth germ, several retained deciduous teeth and poor condition of the residual ridge of the mandibular, we used splint pad removable partial denture to repair in order to satisfy the requirement of the patient for retaining the remaining teeth and spending less. During this process, we applied splint pad to redefine the occlusion. When the patient felt no discomfort with the splint pad, the occlusion relationship was recorded and transferred to the full adjustable articulator for further restoration of removable partial denture. In order to evaluate the ability of adapting to the new position of occlusal muscles, patient is reviewed for measurements of muscle function every other month during the first half year.

Results: With the restoration, the face type and aesthetics of patient get improved significantly. The temporalis and masseter muscle electromyography is also ameliorated obviously after permanently repair. Additionally, the position of the joint is improved and the before and after the joint clearance is uniformed.

Conclusion: Standardization of occlusal reconstruction with removable partial denture can improve the appearance and mastication function of the patient. After the occlusal reconstruction, the position of the joint is ameliorated and the function of temporalis and masseter muscle is increased significantly.

2. Fixed/Removable Prosthodontics

P-2

Ceramic crown allergy-One case report

Lei Chen, Weidan Zhang

Department of stomatology of Xiangya Hospital of
Central South University

Weiqiu Liu, female, 43 years old, came to us with the mucosa of the red lips swelling, dissipating and peeling, especially the upper lip. We made a diagnosis as “chronic cheilitis”, but the symptoms didn’t grow any better during more than 1 year with all kinds of medicine.

Then we found that the symptoms occured since she worn the 12-22 PFM union crown restoration 2 years ago, and she never worn any jewelry of base metal. So we dismantled the PFM union crown restoration, and then the symptoms disappeared 1 month later without any medicine. Therefore, we created 4 Cercon all zircon ceramic crowns for her, considering the allergy to the base metal. However, the symptoms came back just 1 month later, and it lasted for more than 3 months.

So we had to dismantle all the 4 ceramic crowns, and the wound of the lips healed about 1 month later without any medicine.

There were several articles about the allergy to nichrome. It might cause oral disease, nephrosis, and even the decreasing of the patient’s WBC. Doctor Pan considered that, base metal could release many kinds of metal ions, which would affect the mucous cells, and the immune systems, to cause DTH. Doctor Hildebrand thought that Ni was the easiest metal to cause allergy, followed by Cr, and Co. And it belonged to T cellular immune response. There wasn’t any article about the allergy to the all ceramic crown till now after searching all the articles of the database.

After all, might it be the adhesives that cause the symptoms of our patient with the all ceramic crowns? The purpose of this report was to warn colleagues, that all ceramic crowns could also cause allergy, for the use of adhesives, disinfectants and other chemical agents.

P-3

One case: Combination of restoration with orthodontics for trauma

Lei Chen, Weidan Zhang

Department of stomatology of Xiangya Hospital of
Central South University

Jiaming Yan, male, 17 years old. The upper alveolar bone fractured because of a car accident. He came to us with disordered occlusion after monomaxillary fixation for 3 weeks.

Ph: 12, 13, 14, 41 had lost, 31 was residual crown and the RCP was finished, the anterior teeth were Io cross bite with the posterior disordered. We found that his mandible could be pushed afterward till the anterior teeth took on edge to edge articulation. So we considered that his occlusal disorders were due to the introversion of 11 and 21 by trauma, and the mandible had to move forward in order to make the molars bite.

So we raised the acclusal plane of the molar teeth, in order to push the introvertive anterior teeth to their physiological place, by using the removable appliance. And we made another removable denture to restore 31 and 41. The upper anterior teeth were moving forward with the gap of the molars decreasing, by the maintenance of the pushing strength and the regulation of the thickness of the occlusal pad. 3 weeks later, the occlusal relation went normal. So we removed the acclusal pad, and the removable partial denture was used to restore the upper anterior dentition defect.

Eventually, it took us only 2 months to regular the occlusal relation and restore the dentition. We planed to use implant prosthesis as the patient grown up.

The purpose of this case was to provide a new treatment for maxillofacial trauma. It could not only regular the occlusal relation, recovered the appearance, but also restore the masticatory function, by the removable appliance, in the early days of trauma; besides, it was easier for the patient to maintain oral hygience; furthermore, it could also help keep the space of the dentition defect for implant restoration later.

P-4

Influence of tray relief and impression material on impression pressure

Masatoshi Iwasaki, Misao Kawara, Yoshihiro Iwata, Yoshihiro Komoda, Sayumi Inoue, Takashi Asano, Takashi Iida, Osamu Komiyama

Nihon University School of Dentistry at Matsudo

Objectives:

To investigate the influence of the thickness of relief in tray and characteristics of the impression material on impression pressure for an edentulous model.

Methods:

Alginate impression material (Algiace Z; AL), silicone impression material (Exadenture; ED), polyether impression material (Impregum soft medium body; IG), and a maxillary edentulous model were used. The tray relief consisted of no relief, 1.40-mm-thick base-plate wax, and 2.80-mm-thick base-plate wax. Miniature pressure sensors were embedded at the incisive papilla, the anterior point and the deepest point of the mid-palatal suture. These measurement points were included within the relief area. The mixing time prior to the experiment was set at 60-s for each material. The measurement of impression pressure started immediately after loading. The duration of the measurement was 150-s, and the sampling rate during all measurements was 10 Hz. The static load to the trays during measurements was set at 2 kgf. Five measurements were taken for each material using three types of customized trays. The mean impression pressures at each point in the three trays were calculated at 10-s from loading in each materials.

Results:

The mean impression pressures of AL, ED and IG in the incisive papilla were 8.56±1.58, 7.75±2.23, and 7.79±0.96 kPa. The mean impression pressures of AL, ED, and IG in the anterior point were 6.11±0.43, 6.02±0.39, and 5.62±0.31 kPa.The mean impression pressures of AL, ED and IG in the deepest point were 4.78±0.36, 4.57±0.50, and 4.86±0.11 kPa.The impression pressures at each measurement point were significantly dependent on the impression materials ($P<0.05$) and tray relief ($P<0.05$).

Conclusion: Impression pressure is dependent on the thickness of the relief and the rheology of the impression material.

P-5

Analysis of bone density in edentulous mandible using CT images

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Objectives: To investigate the correlation between bone density of the edentulous mandibular ridge crest and residual bone height in edentulous subjects using computed tomography (CT) images.

Methods: The edentulous areas examined consisted of 194 regions (47-males and 50-females, mean-age 76.0 years) of CT examinations conducted. All CT examinations were performed using a multislice CT scanner and analyzed on an imaging workstation. Mandibular residual bone height, the CT value at the alveolar ridge crest, and the CT value at the lowest point of the mandible measured from CT images at a position 10-mm distal from the mental foramen. Mandibular residual bone height was classified into the following three groups: Class-1 (>24-mm); Class-2 (16-24-mm); and Class-3 (<16-mm). To evaluate bone density, ratios of the CT value at the alveolar ridge crest to that at the lowest point of the mandible were calculated for all subjects.

Results: The mean mandibular residual bone heights were 27.2±2.1 mm (Class-1), 19.5±2.3 mm (Class-2), and 13.0±2.2 mm (Class-3). The mean CT values at the alveolar ridge crest were 1014.6±262.1 (Class-1), 1274.0±258.2 (Class-2), and 1451.1±199.3 (Class-3). The mean CT values at the lowest point of the mandible were 1722.5±165.4 (Class-1), 1722.6±148.2 (Class-2), and 1720.5±125.1(Class-3). The mean ratios of the CT values at the alveolar ridge crest to the lowest point of the mandible were 0.59±0.15 (Class-1), 0.74±0.14 (Class-2), and 0.85±0.12 (Class-3). A significant difference was evident in the ratios of the CT values at the alveolar ridge crest to the lowest point of the mandible among Class-1, Class-2, and Class-3 ($P<0.05$).

Conclusion: The present results suggest a negative correlation between residual bone height and bone density of the edentulous mandible.

P-6

3D-FEA of the stress distribution for the abutment tooth

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To analyze the effect under various Young's modulus on stress distribution of a pulpless tooth with fiber-post reinforced composite resin, three-dimensional finite element model of maxillary central incisor without coronal structure was constructed. The model simulated the tooth restored with a porcelain fused-to-metal crown (PFM).

Steady static load of 150[N] was applied on the incisal edge of lingual surface of incisor at an angle of 45 degrees. Then stress distribution at an interface between post-and-core and dentin was evaluated. Moreover, stress distribution of adhesive resin cement at the margin was also evaluated.

To evaluate stress distribution, it entailed composite resin at post part of varying Young's modulus and core part with steady value of 13.2[GPa]. Furthermore, core part under various Young's modulus with steady value of 8.4[GPa] for post part was also analyzed.

As decreasing Young's modulus of post part, stress decreased at interface between post-core and dentin in root apex region. Also as increasing Young's modulus of core part, stress decreased at adhesive resin cement at the lingual margin of PFM, while stress increased at lingual interface between post-core and dentin.

From the results above, it is suggested that decreasing Young's modulus of post part allows suppression of stress concentration at the root apex region, and increasing Young's modulus of core part suppress the delamination of adhesive resin cement at crown margin and reduce loose post-core from radicular tooth.

P-7 Withdrawn

P-8

Restoration of partially edentulous patient by using an angled locator® root attachment : case report

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In the restoration of distal extension saddles, lack of adequate support results in bilateral and unilateral displacement of removable partial dentures, causing excessive force to the abutments and weakness of masticatory force. As the canine or molar, which was used as abutments of existing partial denture, was lost, function of the denture was severely compromised. If decay is extensive in the abutments in key position like canine and there is limited tooth structure, a stud type attachment can be a treatment of choice for increased support and retention of partial denture.

A 82-year-old woman sought treatment that would provide her with a stable removable prosthesis. The patient's primary complaints were poor retention due to fallen out of maxillary anterior prosthesis and re-

duced mastication of the existing denture. The patient had the fallen out maxillary fixed prosthesis due to secondary caries, multiple caries, moderate alveolar bone loss and crossbite. The teeth with severe mobility were extracted resulting edentulous areas in both arches. Because the tooth structure of left maxillary canine, which was used as abutment in the existing denture, was not sufficient due to secondary caries and it was opposed with a fixed restoration, a stud type attachment was considered for increased support and retention. Twenty degree of inclined Locator® root attachment was used to make the long axis of labially inclined left maxillary canine identical with the path of insertion of the denture. After 2 weeks of definitive denture delivery, the placement of nylon was done. At a recall appointment 6 months later, nylons had not been replaced. The patient was satisfied with increased support and retention of the denture. This case presents the use of Locator® root attachment system on retained root located in functionally important area, providing increased support and retention.

P-9

Study about reproducing parallel relationship in abutment preparation of removable partial denture

Jai Young Koak, Seong Joo Heo, Myung Joo Kim, Seong Kyun Kim, Jai Bong Lee, Jung suk Han, Sung Hun Kim, Ho Beom Kwon

1. objectives

Objective of this study is to evaluate the accuracy of resin jig index method suggested by Seoul National University Dental Hospital that is used to reproduce parallel relationships between guide planes of stone model milled by surveying machine in oral preparation.

2. methods

A mandible RPD practice model of Kennedy Class II modification 1 missing #35, 36, 46, 47 teeth was used. Using liquid silicone (KE-1300, Shinetsu, Japan), an impression of RPD model was made and 16 yellow stone models was obtained from the impression. One of the yellow stone models was chosen arbitrarily, and duralay resin caps were built on #34, 36, 45 teeth of the stone model. After resin hardened, the model was surveyed on a surveying machine to form parallel guide planes according to path of insertion. Then, duralay resin index were obtained and used to form proximal planes and undercuts for retentive arms on #34, 36, 45 teeth of 15 remaining yellow stone models by hand using high speed bur.

Proximal planes and undercuts for retentive arms on #34, 36, 45 teeth of all 16 yellow stone models were taken picture by oral camera. Using Adobe Photoshop CC (Ireland, v.14.0), areas of proximal planes and undercuts for retentive arms on #34, 36, 45 teeth of all models were measured and compared between areas of model formed by surveying machine and those of models formed by hand.

3. results

Areas of proximal planes of #34, 36, 45 teeth, undercuts for retentive arms of clasp on buccal side of #34, 45 teeth, and plane for reciprocal arm of lingual side of #36 teeth were measured and compared.

1) Proximal plane and undercut for retentive arm of #34: difference of 3.67% and –6.59%

2) Proximal plane and plane for reciprocal arm of #36: difference of 24.15% and 12.96%

3) Proximal plane and undercut for retentive arm of #45: difference of -6.32% and 24.23%

Key Words; surveying, abutment preparation, resin jig, parallel relationship

P-10

Case report: rehabilitation of maxillary edentulism with implant fixed prosthesis and partial denture

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Treatment options for full edentulous patients are complete denture, implant assisted overdenture and implant fixed prosthesis. Many factors such as age, gender, oral hygiene care, economic status, extent of alveolar resorption, residual bone and patient's needs are considered for treatment decision.

In this case, the patient is a middle-aged woman demanding an implant fixed prosthesis for edentulous maxilla. Sufficient residual alveolar bone is necessary for implant fixed prosthesis, but in this case, the patient had an insufficient amount of alveolar bone for implant placement in anterior maxilla. Because it was difficult to restore full arch with implant fixed prosthesis, surveyed implant fixed prosthesis was installed in bilateral posterior regions and Kennedy Class IV RPD treatment was ensued. 5 years of follow- up period showed stable results.

In this case, posterior regions restored with implant fixed prosthesis produced effective masticatory function, and partial denture using surveyed implant crowns and manufactured without anterior clasps had improved esthetics and patient satisfaction. Evidence is not sufficient for usage of implant surveyed crown unlike a natural tooth, so indication should be carefully selected. However, implant placement and partial denture design with careful consideration can produce satisfactory results with a good prognosis for both dentist and patient.

Keywords :Full edentulous; Surveyed crown; Removable partial denture

P-11

Rehabilitation of severely worn dentition with fixed and removable partial denture

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Severely worn dentition declines the masticatory function as well as esthetics. The rehabilitation of such cases is regarded as one of the most challenging and demanding treatment process for both dentists and patients. Severely worn dentition combined with partial edentulous space is even worse in the respect of the limited space for restoration. The ultimate goal of the rehabilitation should be the development of normal healthy function of the masticatory apparatus. The restoration involves the development of sufficient restorative space and proper anterior guidance, while simultaneously fulfilling esthetic, occlusal, and functional parameters essential to long-term success. This report described the multidisciplinary dental treatment of a 76-year-old male patient who have had partial edentulism and severe wear of remained teeth. As a result, the occlusal function and esthetics were improved with fixed and removable dental prostheses in increased vertical dimension.

Key words: tooth wear, worn dentition, partial edentulism, vertical dimension of occlusion

3. Oral Implantology

P-12

Influence of implant distribution on implant of maxillary implant overdenture.

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Objective: Although there have been no consensus or guideline about implant configuration in maxillary IODs, various numbers and distributions of implant has been applied. Therefore, the purpose of this study was to examine the influence of implant number and distribution from the aspect of implant strain under maxillary IODs.

Materials and Methods: A maxillary edentulous model with implants and experimental overdentures were fabricated. Four strain gauges were attached on the implant and the implants were installed bilaterally in anterior, premolar and molar area. Seven supportive types were tested: supported by two independent implants (IIa, IIp, IIm), by four independent implants (IVap, IVam, IVpm) and by six independent implants (VI). A vertical occlusal load of 98 N was applied and the strain of each implant was compared by the one-way analysis of variance ($P = 0.05$).

Results: In the strains of anterior implant, there were significant differences among IIa, IVam, IVap and VI type ($P<0.05$) and it was the maximum in IIa and the minimum in VI. In that of premolar implant, there was significant difference between IIp and VI ($P<0.05$). In that of molar implant, there were significant differences between IIm and the other situations ($P<0.05$) and there was no significant difference among IVap, IVpm and VI.

Conclusions: Anterior two independent implants supporting overdenture were observed the largest strain and should be avoided for supporting overdenture. For maxillary overdenture support, 4 independent implants in premolar and molar regions or 6 implant distributed from anterior to molar area should be utilized.

P-13

Clinical evaluation of implant abutment design and materials

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Introduction

Recently, implant prostheses are demanded from not only function but also aesthetic element. The abutment of implant design is important to achieve these demands. By the introduction of CAD/CAM system, it was possible to use many kind of materials and design of implant abutments. The aim of this study is to investigate the kind of implant abutments with completed cement-retained fixed implant-supported restorations and discussed about used materials and design in Fukuoka Dental College hospital.

Materials and Methods

Fifty-six patients treated by cement-retained fixed implant-supported restorations were used in this study from 2008 to 2012. Those abutments were investigated about a method of making, used materials and the location of implant.

Results

One hundred forty eight implant abutments were used for 56 patients. Ninety-eight percent of these were custom made abutments made by use of CAD/CAM system. Among them, titanium abutments were 68% and zirconia abutments were 23%. Seventy-six percent of titanium abutments were used in the molar region, 64% of zirconia abutments were used in the anterior region.

Discussion

In this study, titanium abutments made by use of CAD/CAM system were most selected (68%). As a reason to select these abutments, it may be greatly affected by implant position. On the select of used materials, titanium was selected in the molar region due to resistant to the occlusal force. On the other hand, zirconia was selected in the anterior region due to require aesthetics demands and stability of soft tissue.

P-14

Treatment effects of prostheses in patients with mandibular distal-extension edentulism

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Purpose: The aim of this study was to compare masticatory performance, occlusal force and oral health-related quality of life (OHRQoL) between implant supported fixed prostheses (ISFPs) and removable partial dentures (RPDs) in patients with mandibular distal-extension edentulism.

Materials and Methods: The subjects were recruited from patients using ISFP or RPDs with mandibular distal-extension edentulism. Masticatory performance was evaluated according to the glucose extraction from chewed gummy jelly. Occlusal force was measured with a pressure-sensitive sheet and computer analysis. The Japanese version of the Oral Health Impact Profile (OHIP-J) was used to evaluate OHRQoL. The masticatory performance, occlusal force and OHIP-J scores of the ISFP group and RPD group were compared using the Wilcoxon rank sum test. In patients with the unilateral mandibular distal-extension edentulism, the masticatory performance of the prosthesis side was compared with that of the natural dentition side using the Wilcoxon signed-rank test. Multivariate logistic regression analysis was employed with the OHIP-J score as a dependent variable.

Results: Nineteen patients with ISFPs (mean age: 60.2 years) and 25 patients with RPDs (mean age: 63.3 years) were recruited in this study. There was no significant difference between the two groups with regard to the masticatory performance and occlusal force. In the unilateral ISFP group, there was no significant difference of masticatory performance between the natural dentition side and prosthesis side, whereas there was significant difference in the unilateral RPD group. The OHIP-J score was significantly lower in the ISFP group than in the RPD group. Multivariate logistic regression analysis showed that younger age, RPDs and lower occlusal force were significantly associated with a higher OHIP-J summary score, indicating lower OHRQoL.

Conclusion: Our results suggest that ISFPs are superior to RPDs with regard to masticatory performance, occlusal force and OHRQoL in patients with mandibular distal-extension edentulism.

P-15

Influence of cementation gap on the retrievability of implant fixed prostheses with a Lingual Slot

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Although cement-retained implant restorations have many advantages, such as aesthetics, occlusion, expense, and passive fit, as compared to screw-retained implant restorations, the lack of retrievability when restoration removal is required is a major limitation.

The purpose of this study was to establish a clinical guideline for generation of a cementation gap for retentivity and retrievability by creating a retrievable cement-type slot(RCS) on the lingual side of the titanium abutment for retrievability in a cement supporting implant fixed prosthesis and to measure the removal torque of prosthesis during development of a zirconia prosthesis as a sealant for the upper region.

The results of this study showed that there was statistically significant difference between 30 μm and 50 μm of cementation gap as well as between 35 μm and 50 μm of gap in the removal torque of prosthesis, whereas there was no difference between 30 μm and 35 μm. These data indicated that the removal torque was depending on the cementation gap of zirconia prosthesis. The findings of this study suggest that when cementation is generated with permanent cement for a cement-supporting implant fixed prosthesis, retrievability should be secured by creating a lingual slot and controlling the cementation gap.

P-16

A case report: Immediate restoration of single implant in anterior maxilla

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Implant immediate placement and loading reduces surgery tim and number. It also reduces the possibility of hard and soft tissue resorption. If primary stability is sufficient, immediate loading can be applied to anterior region. For immediate loading of single implant, primary stability of minimum 32-35 Ncm is required. After immediate implant placement, temporization on the day of surgery provides comfort to a patient and maintains and shapes soft tissue during a healing period. In case of immediate implant placement right after extraction, accuracy may be compromised for immediate restoration using guided surgery. In this case report, immediate restoration of single implant in anterior maxilla was done using Ti base abutment and CAD-CAM milled PMMA block and it produced stable treatment results.

P-17

Full mouth rehabilitation with implant assisted overdenture: Case report

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After multiple tooth extraction due to generalized periodontitis, alveolar bone resorption is severe and residual teeth are located at strategically unfavorable positions. In such case, restoring full or partial edentulism with conventional denture may produce unsatisfactory outcome for both dentist and patient.

On the contrary, treatment using implant can enhance patient satisfaction and function. When implant and removable prosthesis combined treatment is provided for a patient with severe bone resorption, it can create excellent results.

In this case report, a patient with moderate to advanced periodontitis in both maxilla and mandible was rehabilitated with implant assisted overdenture after multiple tooth extraction. 6 implants were placed in full edentulous maxilla, which was then restored with implant supported overdenture using milled bar. 2 implants were placed contralaterally in partially edentulous mandible with unilateral residual premolars. Mandible was then restored with implant retained overdentuer using loactor.

This case report is to study the effectiveness of implant assisted overdenture.

4. Prosthodontics-Related Biosciences

P-18

Comparison of two citrus flavonoids on Streptococcus mutans

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We compared the effects of two types of citrus flavonoids, naringenin and quercetin, on the growth of and biofilm formation by Streptococcus mutans. Minimum inhibitory concentrations, growth curves, and biofilm inhibition rates were determined to assess their effects macroscopically. The results showed that both flavonoid types effectively inhibited growth and biofilm formation, although naringenin tended to have a slow but stable effect and quercetin had a rapid effect but became weaker over time. Confocal laser scanning microscopy and field emission scanning electron microscopy were used to observe the morphology and structure of S. mutans and its biofilm caused by the two drugs; the results revealed that that the naringenin treatment resulted in only small, loose bacterial clumps, whereas the quercetin treatment resulted in larger, denser structures. Further, to investigate the possible underlying mechanisms, bacterial aggregation, bacterial surface hydrophobicity, and real-time PCR for gtfB, gtfC, comD, comE, and luxS mRNA expressions were assessed. The results obtained were agreed with those obtained for the macroscopic observations and photomicrographs. Finally, the MTT test using human dental pulp cells was used to investigate cytotoxicity, revealing that both naringenin and quercetin exhibited favorable compatibility. Thus, our results indicated that these citrus flavonoids had different modes of action and that both naringenin and quercetin have potential clinical use as anti-caries drugs.

P-19

The physicochemical properties and biological activity of CB/CS in vitro

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Intruduction:Dental implants have become an often used alternative to replace missing teeth,but the lack of alveolar bone,which was due to periodontitis,bone disorders,traumar dysplasia,or progressive alveolar bone absorption,often affect the success rates of dental implants seriously.Bone augmentation is one of the main methods to solve the lack of alveolar bone in implant dentistry.The aim of this study was to investigate the feasibility of calcinedbone/chitosan composite materials as bone graft substitutes in alveolar bone argumentation.

Materials and Methods:Calcined bone(CB)obtained by sintering bovin bone, The porous calcined bone / chitosan composite materials were prepared by solution blending method. The prepared CB and CB/CS were characterized by X-ray diffraction(XRD), Scanning electron microscopy(SEM) and Fourier transform infrared(FTIR), and then Adhesion and proliferation of MG63 osteoblast-like cells were evaluated by SEM and CCK-8 assay, In addition, Osteogenic differentiation was

evaluated by measurement of alkaline phosphatase(ALP)activity as well as gene expression analysis of osteogenic markers using real time-RT- PCR.

Results:Results showed that the composite present high surface area and porosity, good biocompatibility and promote cell viability and proliferation, In vitro test show that osteoblast-like cells on the composite surface are able to adhere, proliferate,and migrate through the pores.

Conclusions:The calcined/chitosan composite has good biocompatibility and osteoconduction. It is a potential bone graft substitutes in bone regeneration for implant dentistry.

P-20 Withdrawn

P-21

Investigation of protein adsorption on dental prosthesis

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Objective: A quartz crystal microbalance (QCM) is a highly sensitive and practical device for in situ monitoring of protein adsorption. In this study, poly(methyl methacrylate) (PMMA) sensors that imitate denture surfaces were prepared using a thin-film magnetron to spin-coat PMMA onto gold-plated quartz. We discuss the quality of the PMMA and titanium sensors and evaluate the potentials of high-frequency PMMA and titanium QCM sensors by investigating the binding between the PMMA and titanium QCM sensors and proteins.

Materials and methods: To prepare the PMMA-coated sensors, PMMA in ethyl acetate was used to coat the PMMA thin film onto the gold electrode of the quartz crystal at a spin-coater. Titanium sensors were prepared by sputtering. The surface topologies and roughness of the PMMA, titanium, and bare QCM sensors were evaluated by scanning probe microscopy (SPM). The PMMA QCM sensors were characterized using Fourier-transform infrared (FTIR) spectroscopy and the compositions of the PMMA and titanium coatings were determined using X-ray photoelectron spectroscopy (XPS). QCM measurements were used to quantify the protein related to adhesion of denture plaque.

Results: We fabricated PMMA QCM sensors by spin-coating. SPM, FTIR, and XPS analyses showed that a thin PMMA film with the original composition was coated onto the bare QCM sensor. The titanium sensor had a thin titanium film coated onto the bare QCM sensor. Significantly more protein adhered to the PMMA and titanium QCM sensors than to the bare QCM sensor.

Conclusion: This study describes the technical basis for observing the adsorption of proteins on denture surfaces, and may contribute to the development of denture cleaners that prevent biofilm formation.

P-22

Effect of TNS-modified structure of titanium alloys on cell differentiation

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Titanium alloys are the most frequently used dental implants partly because of the protective oxide coating that spontaneously forms on their surface. We fabricated titania nanosheet (TNS) structures on titanium surfaces by NaOH treatment to improve bone differentiation on titanium alloy implants. The cellular response to TNSs on Ti6Al4V alloy was investigated, and the ability of the modified surfaces to affect osteogenic differentiation of rat bone marrow cells and increase the success rate of titanium implants was evaluated. The nanoscale network structures formed by alkali etching markedly enhanced the functions of cell adhesion and osteogenesis-related gene expression of rat bone marrow cells. Other cell behaviors, such as proliferation, alkaline phosphatase activity, osteocalcin deposition and mineralization, were also markedly increased in TNS-modified Ti6Al4V. Our results suggest that titanium implants modified with nanostructures promote osteogenic differentiation, which may improve the biointegration of these implants into the alveolar bone.

P-23

Zirconia coated with calcium phosphate as a bone substitute

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Dankook Univ. of Dentistry

Purpose

The aim of this study was to evaluate the possibility of a porous zirconia coated with bioactive materials as a bone substitute.

Materials and methods

Twelve adult New Zealand white rabbits were used in this study. Each had four transosseous defects in the calvaria. The defects were filled with zirconia particles, zirconia coated with HA particles and zirconia coated with β-TCP particles. One defect was left empty as the control group. 2, 4 and 8 weeks after surgery, the rabbits were sacrificed and the specimens were taken for the histologic and histomorphometric evaluation of new bone formation.

Results

After 2 and 4 weeks there was significant difference between control group ($p<0.05$) and experimental groups but not between experimental groups. The new bone formation of control group was smaller than that of experimental groups ($p<0.05$). Comparing the mean of new bone formation area between the experimental groups, the zirconia coated with β-TCP group was higher ($p<0.05$). 8 weeks after surgery, there were significant differences between control and experimental groups. Also, zirconia coated with β-TCP group showed higher mean of new bone area than other groups ($p<0.05$). Comparing the zirconia and the zirconia coated with HA group, the mean of new bone formation area of the zirconia coated with HA group was higher than that of zirconia group, but there was no statistical difference.

Micro-CT analysis was performed but because of the artifact effect of zirconia, difference between the groups could not be evaluated.

Conclusion

Zirconia coated with β-TCP showed better capacity as a bone substitute than other materials in this study. This means that biologically inert zirconia can act as a scaffold in the stress bearing area and the new bone formation can be accelerated by the coating of bioactive material like β-TCP

P-24

Genetic association between *VEGF* polymorphisms and BRONJ in Korean population

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Objectives: The purpose of this study was to evaluate the association between vascular endothelial growth factor *(VEGF)* polymorphisms and bisphosphonate-related osteonecrosis of the jaw (BRONJ) in the Korean population.

Materials and Methods: Forty-five individuals (2 men, 43 women; mean age: 68±12 years) were recruited for the current study. All visited Yonsei University Dental Hospital for surgical intervention from January 2012 to January 2013 and had a history of bisphosphonate (BP) administration (oral and/or intravenous). Patients were allocated to BRONJ case (n=26) or control (n=19) groups according to patients' selection criteria. Association between three *VEGF* single nucleotide polymorphisms (rs699947 (-2578 C>A), rs2010963 (-634 G>C) and rs3025039 (+936 C>T)) and BRONJ were investigated using multiple logistic regression analysis (α = 0.05).

Results: The frequency of CC homozygotes of rs2010963 and rs3025039 of VEGF gene was significantly higher in BRONJ case group (p=0.038, 0.026, respectively). Although there was no statistically significant difference in haplotype analysis, the frequency of haplotype C-C (-2578/-634), reconstructed based on LD coefficient values, was higher among cases (p<=0.126). Extended haplotype C-C-C (-2578/-634/+936) was also more common among cases (p=0.177)

Conclusion: The CC homozygotes of rs2010963 and rs3025039 polymorphism in the VEGF gene was significantly associated with increased risk of BRONJ in Korean population. Further epidemiological cohort studies with a larger sample size would be required to confirm the suggestive correlations.

Keywords: Vascular endothelial growth factor; bisphosphonate; gene polymorphisms; bisphosphonate-related osteonecrosis of the jaw

P-25

MPC polymer coating inhibits bacterial plaque on PMMA surface

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Introduction: The polymer 2-methacryloyloxyethyl phosphorylcholine (MPC) is currently used on medical devices to prevent infection. Denture plaque-associated infection is regarded as a source of serious dental and medical complications in the elderly population. Since the surfaces of acrylic dentures, which are made of polymethyl methacrylate (PMMA), are prone to plaque accumulation, denture hygiene is an issue of considerable sigbificance for denture wearers.

Objectives: The objective of this study was to investigate the anti-adhesive effects of MPC polymer [poly (MPC-co-BMA-coMPAz); PMBPAz]coating and its durability on PMMA surfaces for the prevention of bacterial plaque derived biofilm formation.

Materials and Methods: PMMA sheets were dipped in 0.5wt% PMBPAz and dried in ethanol atmosphere for 20 min with ultraviolet irradiation for 2 min. The PMBPAz coating on the PMMA sheets were examined by static contact angle of air bubble in water and X-ray photo electron spectroscopy (XPS). The anti-adhesive effects against bacterial plaque accumulation was evaluated by a S. mutans biofilm formation assay. The durability of the PMBPAz coatings was determined by soaking test for 1 week.

Results: The static contact angle of air bubble on PMMA and PMBPAz-coated PMMA sheets in water were 130 and 160 degrees. Successful coating was also confirmed by XPS, which detected spectra for nitrogen and phosphorus elements only on the MPC polymer-coated surface. Moreover the PMBPAz coating inhibited S.mutans biofilm formation on the PMMA sheets by more than 95%, compared to the uncoated sheets. These findings were also reproduced after being soaked in water for 1 week.

Conclusion: The PMBPAz coating inhibited plaque accumulation on the PMMA sheets significantly and showed remarkable resistance against biofilm formation even after soaking stress. These findings suggest that PMBPAz coating has significant potential to improve health in the elderly population by preventing denture plaque-associated infection.

(292word)

Key words: MPC polymer, PMBPAz, PMMA, Biofilm formation, Denture

5. Oral Physiology and Biomechanics

P-26 Withdrawn

P-27

Ultrasonographic observation of masticational tongue movements in the SDA patient

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The purpose of this study was to observe tongue movements during mastication in patients with short dental arch (SDA).

The subject was a 74 year old female patient with SDA. Tongue movements during left and right unilateral mastication were examined by ultrasonography (SSA-250A, Toshiba Medical Systems Corp.). Waveforms of the tongue movements in M-mode images were classified into the following three stages according to masticating time; initial (chewing immediately after the start of the experiment), middle (period between the initial and final stages), and final (just before swallowing). Coronal B-mode images at the lowest points of five consecutive M-mode waveforms in each stage were traced. Measurement site was premolars region and molars region. Height differences between the left and right sides of the tongue were compared between each stage. The test food was 10 g boiled rice.

In premolars region, the height differences decreased progressively between each stage in both left and right unilateral mastication. However, in molars region, the height differences did not decreased even mastication had progressed.

We have studied the tongue movements during mastication in the dentate persons and in the patients with partial teeth loss so far. Height differences were decreased with mastication progress in the dentate persons, however that were not decreased in patients without partial

dentures. These results were considered that the tongue had to be complemented the role of residual ridge and teeth by compensatory movements in SDA patient. These movements were similar to patients' that with partial teeth missing. It was revealed that different tongue movements were observed in SDA compared with dentate persons.

P-28

Nighttime electromyogram biofeedback affects physical stress

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Sleep bruxism (SB) causes many dental problems such as tooth wear, muscular pain, implant failure and complications with fixed partial dentures on implants. Although it is an important issue in clinical dentistry, no reliable treatment has been found so far. In this study, we used electromyogram biofeedback device SleepGurad™, which can detect the SB and notice you with a gentle beep sound to stop the SB ,wearing on your forehead. We aimed to study the effect of this biofeedback device against SB and clarify the association between the control of SB and the release of stress. 10 subjects (5 females and 5 males) were participated in this study and crossover design was used. Sleep measurements were performed for three consecutive nights obtaining data of Baseline without SleepGuard™, with SleepGuard™ beep sound (Group On) and without beep sound (Group Off), data from the final day were evaluated. Furthermore, to compare psychological and physical stress before and after sleep, assessments were made based on STAI-JYZ and the measurement of salivary chromogranin A (CgA) and Cortisol. To compare each parameter among three groups (Baseline, Group On, Group Off), Friedman's and Dunn's tests were used. As the results, a marked decrease in the number of SB events per hour were observed in seven subjects in Group On. Moreover, salivary Cortisol concentration after sleep in Group On were significantly higher than that in Group Off. Whereas, Sleep Guard™'s beep sounds did not affect the percentage of sleep stages, salivary CgA level, and the Scores of STAI-JYZ. The findings from this study suggest that biofeedback therapy with beep sound can inhibit SB and does not affect sleep quality, however it might increase physical stress.

6. Orofacial Pain and Temporomandibular Disorders

P-29

Effect of hemimastication on the mitochondria of rat masticatory muscle

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Objective: The research was designed to study the effect of hemimastication on the mitochondria of rat masticatory muscle.Methods : Mitochondrial damage index were measured by the electron microscope; Ca^{2+} contents were measured with atomic absorption spectrometry; The mitochondrial permeability transition pore opening was detected by UV spectrophotometry. Results :1 The mitochondrial damage index score in the extraction side was lower than the non-extraction side, and significantly lower than the control group P<0.01 . The 4-week group has the lowest score.2 Compared with the controls, Ca^{2+} contents in experimental group had the higher level except 8 weeks P<0.05 .3 The opening of mitochondrial permeability transition pore had a higher level on the extraction side than the non-extraction side and the control group P<0.05 .4 The opening of mitochondrial permeability transition pore was negatively correlated to mitochondrial damage index P<0.05 and positively correlated to the Ca^{2+} content P<0.05 .Conclusion: The signal way of the mitochondrial permeability transition pore opening was activated by high concentration of calcium, which may cause the damage of mitochondria and apoptosis.It may play an important role in the mechanism that hemimastication result in masticatory muscles dysfunction.

P-30

Oral behaviors and TMD symptoms in Asian dental students

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Purpose : This study investigated the relation between oral behavior and TMD symptoms in South Asian and Southeast Asian dental students.

Subjects and Methods : The oral behavior checklist (OBC), symptoms questionnaire of Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) and additional questionnaire were administrated to 110 dental students from eight Asian countries (Average age: 21.8 yrs., 48 males and 62 females) during Asia Pacific Dental Student Association Congress held on 5th August 2014 in Cambodia. Subjects were allocated into 2 regional groups by their nationality based on United Nations classification, East Asia (Japan, Taiwan, Hong Kong, and South Korea: 41students) and Southeast Asia (Malaysia, Indonesia, Thailand, and Cambodia: 69students). Logistic regression analysis was used to analyze items that affect clinical subtype of TMDs ($p < 0.05$).

Results : The prevalence of TMD symptoms: pain, headache, jaw joint noises, closed locking, and open locking were 40.5%, 16.2%, 36.6%, 17.0%, and 7.3% for East Asia students, and were 39.7%, 48.3%, 24.5%, 4.8% and 4.8% for South East Asia students. Logistic regression analysis showed that headache was likely affected by "bite, chew, or play with your tongue, cheeks or lips" (odd ratio (OR) =14.9, p=0.006), and "chew food on one side only" (OR=7.6, p=0.007). Jaw joint noise was likely affected by "clench or grind teeth when asleep" (OR=14.3, p=0.012), "sleep in a position that puts pressure on the jaw"(OR=8.5, p=0.002), and "bite, chew, or play with the tongue, cheeks or lips"(OR=8.1, p=0.027).

Conclusion : This study showed that several sub type of TMD symptoms were significantly affected by some oral behaviors (e.g. Chew food on one side only etc.).

P-31

Effect of electromyogram biofeedback of awake-bruxism on sleep-bruxism

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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 awake bruxism (AB) on sleep bruxism (SB).

Twelve male participants (mean age: 26.8 ± 2.5) with subjective symptoms of AB or a diagnosis of SB were randomly divided into biofeedback (7; 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 habitually masticatory side. The BF group underwent BF training at Week 2, during which a signal was delivered in the event of AB 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.

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 ($p < 0.05$, Scheffé's 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.

These results suggest the possibility of using EMG-BF training to improve AB as an effective approach to regulate SB.

P-32

Analyzing system in biological phenomena using a portable amplifier

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The purpose of this study was to develop a biological phenomena analyzing system using a portable amplifier that would analyze the biological phenomena of a person during sleep at night.

Five healthy subjects and 5 bruxists who has been explained of the purpose of the experiment were selected as subjects. Using both a wireless telemeter system and a portable system, the EEG, EOG, ECG, masseter muscle EMG, mental muscle EMG were recorded simultaneous throughout the night. Analysis was performed on biological phenomena obtained from wireless telemeter system(NIHON KOHDEN Co., WEE-6112, WEB-5000) and portable system (S & ME Co., DL3100) on an arbitrarily selected section. Sleep stages, heart rate, duration of masseter muscular activity during bruxism and its cumulative value were calculated and compared between the two devices.

The values obtained of sleep stages, heart rate, duration of masseter muscular activity during bruxism and its cumulative value of the arbitrarily selected section were very similar for both devices, and no significant difference was found between the two devices.

From these results it was concluded that the biological phenomena analyzing system using a portable amplifier has similar precision as the wireless telemeter system, and thus could be used clinically in analyzing sleep stages, heart rate, duration of masseter muscular activity during sleep bruxism and its cumulative value.

7. Adhesive Dentistry / Dental Materials / Aesthetic Dentistry

P-33

Effect of polishing treatment on resin bond strength of dentine

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Objectives

To analyze whether the different surface polishing treatments of dentin could affect its resin bond.

Methods

Dentin surfaces from non-carious human third molars were divided into 3 groups. Group A was treated with coarse diamond bur (105-125um). Group B was initially polished with fine diamond bur (25um) following the first step. And group C was fine polished with Sof-Lex polishing discs after the second step. In each group, samples prepared were bonded with composite resin blocks using self-etch Multilink N/primer A&B (SE) and self-adhesive Multilink Speed (SA). Samples were stored for 24 hours at 37℃ and 100% humidity. And then their micro-tensile bond strength was tested. The fracture patterns of samples were defined.

Results

In SE groups, their bond strength was 72.77±9.20Mpa (group A), 60.78±14.42 Mpa (group B), and 71.26±11.77 Mpa (group C). And in SA groups, their bond strength was 32.29±7.40 Mpa (group A), 21.89±5.79 Mpa (group B), 36.51±6.26 Mpa (group C). In both groups SE and SA, the bond strength of group A and group C were significantly higher than group B ($p<0.05$), and no significant difference was shown between group A and group C ($p>0.05$). Most of the fractures were happened on dentin-cement interface.

Conclusion

Surface polishing treatment could affect the bond strength of dentin with self-etch and self-adhesive resin cements.

P-34

The effect of four primers on bonding strength to zirconia

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Objectives:To evaluate the effect of ceramic primers on bonding strength between zirconia and composite resin.

Methods:One hundred and ten polished and air-abrased zirconia blocks were manufactured and divided into ten groups(n=10) according to different ceramic primers and cements:A.No treatment,B. Z-Prime Plus(Bisco Inc.),C. Rely X Ceramic Primer(3M ESPE.),D.Clearfil Ceramic Primer(Kuraray).E. Monobond-S(Ivoclar Vivadent).Composite resin rods were bonded to the zirconia with Panavia SA Cement(Kuraray) and RelyX Unicem cement(3M).Shear bond streagths of the bonded specimens were tested after 37°℃-water storage for 24 hours or 2500 thermocyclings(n=5).Failure modes and cement-zirconia bonding interface were observed with scanning electron microscopy(SEM).

Results:According to ANOVA analysis,before and after thermalcycling, group B,C,D,E presented significantly higher SBS($p<0.05$) when compared with group A,the bond strength of groupD was significantly higher than other groups($p<0.05$),but no differences were found among the B,C,E groups and between two cements($p>0.05$).SEM im-

ages of the bonding interface showed that Group B,C,D,E resulted in a more tightly bongding than groupA,especially for groupD.

Conclusions:

1. The use of zirconia primers improved the bonding strength between zirconia and resin.

2. 10-MDP-containing primers combined with 10-MDP-containing cements produce a stronger and more durable zirconia-resin bongding.

P-35

Investigation of time-dependent wear behavior of dental ceramics pairing enamel

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The excessive abrasion of occlusal surfaces in ceramic crowns limits the service life of restorations and their clinical results. However, little is known about the time-dependent wear behavior of dental ceramics when they paired with enamel. The aim of this in vitro study was to investigate the dynamic evolution of wear behavior of two kinds of dental ceramics when they paired with enamel, as tested in a tribometer. Specimens were prepared of lithium disilicate and feldspathic porcelain. Isolated cusps of extracted molars were used as antagonists. In vitro wear was conducted in the tribometer (10 N vertical load) with lubricant (artificial saliva) for 1.2×10^6 cycles. During the testing, several checkpoints were applied to measure the substance loss of the ceramics and to evaluate the microstructure of the worn areas. After 1.2×10^6 cycles, the entire wear process of both friction pairs revealed three wear stages (running-in, steady and severe wear stages). For the friction pair of lithium disilicate: Running-in wear stage 0-8×10^4 cycles; Steady wear stage 8×10^4-1×10^5 cycles; Severe wear stage 1×10^5-1.2×10^5 cycles. The worn surfaces showed traces of ploughing. For the friction pair of feldspathic porcelain: Running-in wear stage 0-6×10^4 cycles; Steady wear stage 6×10^4-8×10^4 cycles; Severe wear stage 8×10^4-1.2×10^5 cycles. The worn surfaces showed traces of intensive wear during the entire wear process. Comparing the two friction pairs, lithium disilicate showed more wear loss than feldspathic porcelain. In contrast, the enamel paired with lithium disilicate showed less volumetric loss. The results suggest that wear performance of the two friction pairs indicates apparent similarity of the tribological characteristics of the traditional mechanical system. It also exhibited a good correlation among the microstructure and wear loss of worn ceramic. Additionally, the evaluation of the wear behavior of dental ceramics should be based on these three wear stages.

P-36

Cutting efficiency of air-turbine burs on dental ceramics

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Objective: The objective of study was to investigate the cutting efficiency of partially stabilized zirconia (PSZ) materials (Y-TZP and Ce-TZP/Al_2</O_3 nano-composite) and dental ceramics with air-turbine burs (carbide burs and diamond points). Materials and Methods: Five dental ceramics used were IPS e.max Press (Ivoclar Vivadent), IPS e.max Zir-press (Ivoclar Vivadent), ZENOSTAR (WIELAND Dental + Technik GmbH & Co. KG), P-nano ZR (Panasonic), Fieldspar porcelain (Vintage, Shofu Inc.). Rectangular brocks (3 x 5 x 30 mm; n=10) were prepared from each ceramics. Two cutting burs employed were diamond point and tungsten carbide bur with same diameter (1.4 mm). The 3 x 30 mm^2 surfaces were cut at a 80gf of weight and a pressure of 200kPa (4.2 x 10^5 rpm) for air-turbine. Cutting efficiency was evaluated as volume loss from the weight loss cut for 10 s using the density of each material. The data were statistically analyzed ($p<0.05$). Results: The cutting volume of Zir-press (1.1 mm^3) and Vintage (1.3 mm^3) cut with carbide burs were significantly ($p<0.05$) higher than those (Zir-press: 0.2 mm^3, Vintage: 0.4 mm^3) cut with diamond points. The other ceramics (e.max Press, ZENOSTAR and P-nano ZR) had higher cutting volume when the diamond points were used. P-nano ZR showed least cutting volume (< 0.1 mm^3) among the ceramics used. Conclusion: The cutting efficiency of air-turbine burs on P-nano ZR has the least efficiency among the dental ceramics.

P-37

Characterization and behaviors of zirconia discs immersed in simulated body fluid

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Purpose: This study investigated the effect of simulated body fluid (SBF) on hydroxyapatite (HA) precipitation on zirconia discs, and cell proliferation and osteoblast differentiation behaviors on the SBF treated zirconia discs compared with non-treated discs. **Materials and Methods:** In this study, we made corrected SBF at 36.5 °C with ion concentrations nearly equal to those of human blood plasma according to the Kokubo's recipe. 80 Y_2O_3-stabilized tetragonal zirconia polycrystals (Y-TZP) discs were prepared and divided into two groups: test group: SBF treated discs, control group: non-treated discs. Zirconia discs immersed in SBF for 1, 4, 7 and 14 days in a humidified atmosphere of 95 % air and 5 % CO_2 at 37 °C with initial PH of 7.4. Scanning electron microscope (SEM) observation was carried out to reveal HA formation on the discs. Surface structure and composition were characterized by confocal laser scanning microscopy (CLSM), energy dispersive X-ray spectroscopy (EDS) and thin film X-ray diffraction (TF-XRD). Moreover, human bone marrow mesenchymal stem cells (hBMMSCs) were used for further evaluating cytocompatibility of the SBF treated zirconia discs compared with non-treated discs. Cellular proliferation assay and osteoblast differentiation assay such as Alizarin Red S staining, ALPase (ALP) staining and ALP activity assay and reverse transcriptase-polymerase chain reaction (RT-PCR) were conducted at different time periods. **Results:** After soaking different days in SBF, it showed different surface morphology and with time increasing, the amount of HA was increased gradually. At day 7, the HA uniformly covered on the discs, so we used 7 days treated discs as SBF treated group in following research. CLSM showed no difference of surface roughness between two groups ($p>.05$). EDS and TF-XRD revealed vividly that HA formed on the surface after SBF treated. Cell proliferation and differentiation were significantly increased on SBF treated discs ($p<.05$). **Conclusions:** The data in this study demonstrated that SBF has the effective role on formation of HA on zirconia discs. The cell attachment, proliferation and differentiation of SBF treated zirconia discs were comparable to non-treated discs which mean it has the long term research value.

Key words: zirconia disc, simulated body fluid (SBF), hydroxyapatite (HA), human bone marrow mesenchymal stem cells, cell proliferation,

osteoblast differentiation.

8. Maxillofacial Prosthodontics and Dysphagia Rehabilitation

P-38

Effective use of a provisional obturator prosthesis in edentulous patient

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We present a simple solution for rehabilitation of an edentulous patient with an extensive maxillary defect. A 70-year-old man in a nursing home visited our clinic complaining of difficulty chewing and speaking. Fifteen years earlier, he had undergone maxillectomy to remove a malignant tumor followed by prosthetic treatment at a university hospital in other prefecture. Treatment was discontinued, however, after he moved from the area. Examination at our institution revealed an edentulous maxilla with a right maxillary defect. His mandibular dentition consisted of only the right canine and first premolar. Abutment teeth for prostheses were missing, and the soft relining material surrounding the obturator had deteriorated. We diagnosed masticatory dysfunction and articulation disorder due to loss of the abutment teeth and defective dentures. As there were various problems in the denture components, we planned to achieve functional recovery by developing a provisional obturator prosthesis from the old one. It would be used as a template for a definitive obturator prosthesis after functional recovery. We therefore refurbished the old obturator prosthesis to begin correcting the problems. After resolution of the chief complaint, we fabricated the definitive prosthesis. We used a dynamic impression technique and a matrix of the polished surface to transfer information from the provisional obturator prosthesis to the definitive prosthesis. We then fabricated a hollow obturator prosthesis and lower partial denture with a cast clasp. The results of objective and subjective evaluations for mastication and articulation showed improvement over time, with the highest score recorded at insertion of the definitive obturator prosthesis. As a result of allowing functional recovery using the provisional obturator prosthesis and information derived from it for fabricating the definitive prosthesis, it was possible to obtain an excellent treatment outcome.

P-39

Investigation of factors affecting food mixing ability in maxillectomy patients

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Purpose: The purpose of this study was to investigate factors affecting masticatory function in partial maxilletcomy patients with dento-maxillary prosthesis.

Methods: The inclusion criteria for the study were: (i) maxillectomy; (ii) the defect size was less than half; (iii) no complaints by the patient regarding the prosthesis; (iv) no requirement for adjustment of the prosthesis; and (v) at least 6 months experience wearing the prosthesis. From January 2013 to July 2014, a total of 20 maxillectomy patients were enrolled. Explanatory variables were the number of the maxillary abutment teeth, occluding units, palatal perforation and soft plate defect. Dependent variable was a*, which is the food mixing ability and objectively obtained from the chewed color-changeable gum. Multiple regression analysis with stepwise was used to investigate the factors affecting a* (SPSS 22, SPSS Japan Inc., Tokyo, Japan). R square as the coefficient of determination and the adjusted R square value were calculated. (Ethical Committee at Tokyo Medical and Dental University, Approval No. 865) This work was supported by a JSPS Grand-in-Aid for Young Scientists (B) (25861828).

Results: P value of the number of the maxillary abutment teeth was 0.813, occluding units was 0.015, palatal perforation was 0.168 and soft plate defect was 0.536. From stepwise analysis, occluding units was the only factor affecting masticatory function. The R square was 0.302 and the adjusted R square was 0.261.

Conclusions:

In partial maxillectomy patients, the number of the maxillary abutment teeth would not affect a*. On the other hand, occluding units had a significant effect on a*. In other words, the mandibular teeth condition would affect the food mixing ability and masticatory function.

P-40

Prosthodontic rehabilitation of a mandibulectomy patient with an implant-retained overdenture

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A 76-year-old female patient had undergone marginal mandibulectomy due to squamous cell carcinoma and reconstructed with forearm flap. A mandibular removable partial denture was fabricated. Because of caries and root fracture, the right molar was extracted and O-ring attachments (OP anchor attachment) were placed in the anterior residual teeth and a resin based overdenture was fabricated in 2011. In 2013, the overdentrue became unstable because the mobility of one of three OP-anchor attachment increased and another was taken off due to caries. Thus, we planed that two OP anchor attachment would be extracted and the dental implants were placement to the missing mandibular molar site (non defect side). To compare before and after implant treatment, patient's perceived chewing ability and oral health-related quality of life (OHRQOL) were evaluated. Patient's perceived chewing ability was rated using a food intake questionnaire and Masticatory Score (MS) was obtained. OHRQOL was measured using the Geriatric Oral Health Assessment Index (GOHAI) and GOHAI score was obtained. The patient agreed with them and two implants (Branemark Mk III) were placed and an implant retained overdenture was fabricated with stud attachments (Locater). MS was increased from 43% to 61%. GOHAI score was improved to 36 to 51. (Ethical Committee at Tokyo Medical and Dental University, Approval No. 865) This work was supported by a JSPS Grand-in-Aid for Young Scientists (B) (25861828).

P-41

Implant supported obturator prosthesis after partial maxillectomy using stereolithographic surgical template and CAD/CAM-milled titanium bar

Kwantae Noh, Janghyun Paek, Ahran Pae, Hyeong-Seob Kim, Kung-Rock Kwon, Yi-Hyung Woo

Department of Prosthodontics, School of Dentistry, Kyung Hee University

Extensive surgery for maxillary tumor resection cause severe functional, emotional, and social problems for patients. An obturator prosthesis is the most frequently used treatment option because of the complexity of maxillary surgical reconstruction and the uncertainty of the functional outcome. Lack of support, retention and stability are common prosthodontic problems for patients with such defects. If the remaining dentition can't provide sufficient retention and support, the implant placement of zygomatic bone can have dramatic effect on the stabiliy and retention of the prosthesis in the maxillectomy patient.

However, implant placement in the zygomatic bone is difficult due to anatomical intricacies of the curved zygomatic bone. The surgery is not without risk because the drill path is close to critical anatomical structures in the maxillofacial region. A small angular error may result in significant positional errors at the end of the tool trajectory. Furthermore, the limited intraoperative visibility, especially given the anatomical intricacies of the curved zygomatic bone, makes this kind of surgery a demanding procedure. Therefore, before zygoma implant placement, 3D imaging and planning should be performed to ensure the safety of surgery. Custom-made surgical drilling guides based on 3-dimensional (3D) computerized tomography (CT) scanning has many advantages in such cases.

This poster presents the implantation using skeletally supported stereolithographic surgical templates in atrophic zygomatic bone after partial maxillectomy and obturator prosthetic rehabilitation using CAD/CAM-milled titanium bar.

9. Digital Dentistry

P-42

3D imaging and quantitative comparison in human bite mark analysis

Yi Lu, Jun Song

Stomatology Hospital of Xi'an Jiaotong University

Objective: The infliction of a bite is a four dimensional space time event that is ideally analyzed with three dimensional technology. Comparison of 2D images of a bitemark with a 3D replica of the dentition of the suspect is challenging. This study presents a technique that developed for 3D imaging and quantitative comparison in human dentitions and simulated indented bite marks.

Methods: A sample of 63 study models and the corresponding bites which is made by the universal testing machine in dental wax,they all digitized by 3D raster scanning. Generate the digital dentition model and bitemark model using geomagic software. Sign 32 landmarks to describe the dentitions and bitemarks ,and create a deviation matrix to compare all possible combinations of matches and non matches. And then develop a Logistic Regression Model to estimate the probability of a dentition matching its corresponding bite mark. Results: The effectiveness of the method was analyzed by determining the area under receiver operating characteristic curve and sensitivity,specificity for each cut off point. The area under the ROC curve is 0.9763, the sensitivity is 95 percentage and the specificity is 88 percentage.The result also showed for this sample that 12 percentage of non-matches could not be distinguished from the true match, that means there are 12 percentage probability of falsely convicting in an innocent person. Conclusion: This 3D technique allows imagine comparison of a 3D dentition with a 3D bite mark, eliminats distortion in conventional photograph. So the 3D technique can be considered a highly accurate method for bitemark analysis.

P-43

The reconstruction of the digital dental model using grating projection

Qin Zhou , Zhenzhen Wang

Stomomatology Hospital of Xi'an Jiaotong University

Objective To lay the foundation for the establishment of digital model database with normal occlusion, the acquisition of digital dental cast with grating projection and the measurement of model features with reverse engineering were used. Methods The grating projection system controlled by a computer was projected onto the surface of normal dental model. Three-dimensional contour data was obtained by multi-angle shooting. Three-dimensional model was constructed by using the grating projection and the model features were analyzed by using reverse engineering. The digital model compared with the plaster model to detect the consistency which can verify the accuracy of the measurement system. Results The structure of three-dimensional reconstruction model was clear and the system was reliable. The measurement and analysis results with digital model are more accurate by comparing with plaster model using manual measurement. Conclusion Reconstruction of digital model by grating projection technique and reverse engineering can be used for dental model measurement in clinical and scientific research, and can provide a scientific method for the establishment of digital model database with normal occlusion.

P-44

Trial for digital fabrication of complete dentures

Soihiro Hara, Takuya Kobayashi, Yu Yonezawa, Saori Aki, Hisatomo Kondo

Department of Prosthodontics and Oral Implantology, School of Dentistry, Iwate Medical University

Objectives: The development of information technology (IT) and application of CAD/CAM technology has altered the traditional methods in the dental field. The advanced CAD/CAM technology realized digital laboratory work with PCs and milling machines after maxillomandibular registration. However, the impression and the maxillomandibular registration, which are important elements for success of removable denture treatment, are the toughest step in digital workflow to fablicate the removable prothesis. We have been attempting to make digatal 3-dimensional (3D) model and designed the removable denture without impression materials and stone models. This clinical report introduces a novel technique to make removable dentures.

Materials and Methods:

A subject was an edentulous jaw patient. Digital 3D impression was performed in which the patient sat in the normal upright position. During the scanning, buccal muccosa was hold with oa wire retractor and mucobuccal fold was kept in appropriate shape being dried by suctioning. Jaw models were created by 3D primter via STL data obtained by the oral scanning. The record base with occlusion rim was made on the model. The registration of interocclusal relation was done

according to the conventional method. A result of the registration of maxillomandibular relation was scanned, reprodeced on CAD software (Dental System, 3Shape), and a removable denture was designed with arrangement of artificial teeth on the PC.

Results: Complete dentures were fabricated without impression materials and sutone models, using oral scanner and CAD softwares. However, it was difficult to scan the mandiblar muccosa due to its flatten shape, compared to maxilla in which convexity was considerablly clear. Moreover, it was impossible to determine the border between alveolar ridge and buccal nuccosa in this impression sytem.

Conclusion: Digital impression system succesfully reproduced both upper and lower jaws as 3D images although further trials must be required for clinical use.

P-45

3D reproducibility comparison by restoration type and preparation location among 5 intraoral scanners: in-vitro sectional analysis

Rae-Kyeong Nam, Jong-Hun Shin, Eun-Jin Park, Ji-Man Park

Dept. of Prosthodontics, School of Medicine, Ewha Womans University

Purpose

The purpose of the study was to evaluate the scanning accuracy and precision of 5 intraoral scanners by in-vitro sectional analysis

Material and methods

A phantom model having abutments for 3-unit fixed dental prosthesis, MO inlay and single crown was digitized using a reference scanner (Dental Wings 3D scanner) as well as five intraoral scanners (E4D dentist, IOS Fastscan, iTero, Trios, and Zfx intrascan). Datasets obtained from 4 times scanning of each scanners were loaded into reverse engineering software (Rapidform), superimposed, cross-sectioned and compared at 4 specific points on 8 sections. One-way analysis of variance (ANOVA) was implemented to compute differences within groups (precision) as well as comparisons with the reference scan (trueness). A level of statistical significance of $p<0.05$ was set.

Results

Trueness values ranged from 45.17um (IOS Fastscan) to 114.20um (E4D dentist) and precision ranged from 12.98um (Trios) to 132.33um (Zfx Intrascan). And data anaylsis yield statistically significant differences between IOS Fastscan, iTero, Trios and E4D dentist, Zfx Intrascan. All intraoral scanners showed similar trueness values according to preparation location but inferior values at bridge, mesiodistal direction and inlay box. According to the characteristic of intraoral scanners, active triangulation and coating group showed better performance but there were no significant difference between still image group and video group.

Conclusion

Significant differences were found among 5 intraoral scanners. And trueness values could affected by restoration type, scanning technology and necessity of coating. Therefore, dental clinician should consider of this fact when choosing and using an intraoral scanner.

P-46 Withdrawn

Author Index

L

M

N

O

P

Q

S

T

V

W

Y

Z

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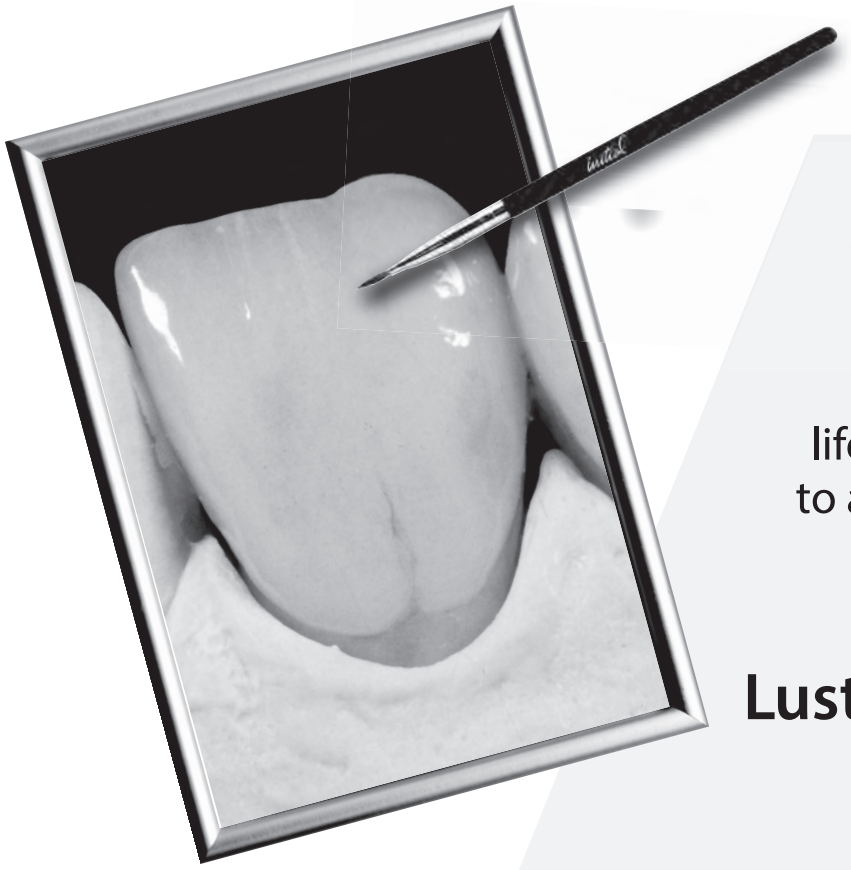

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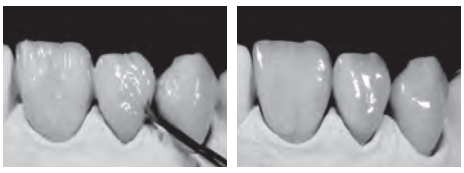

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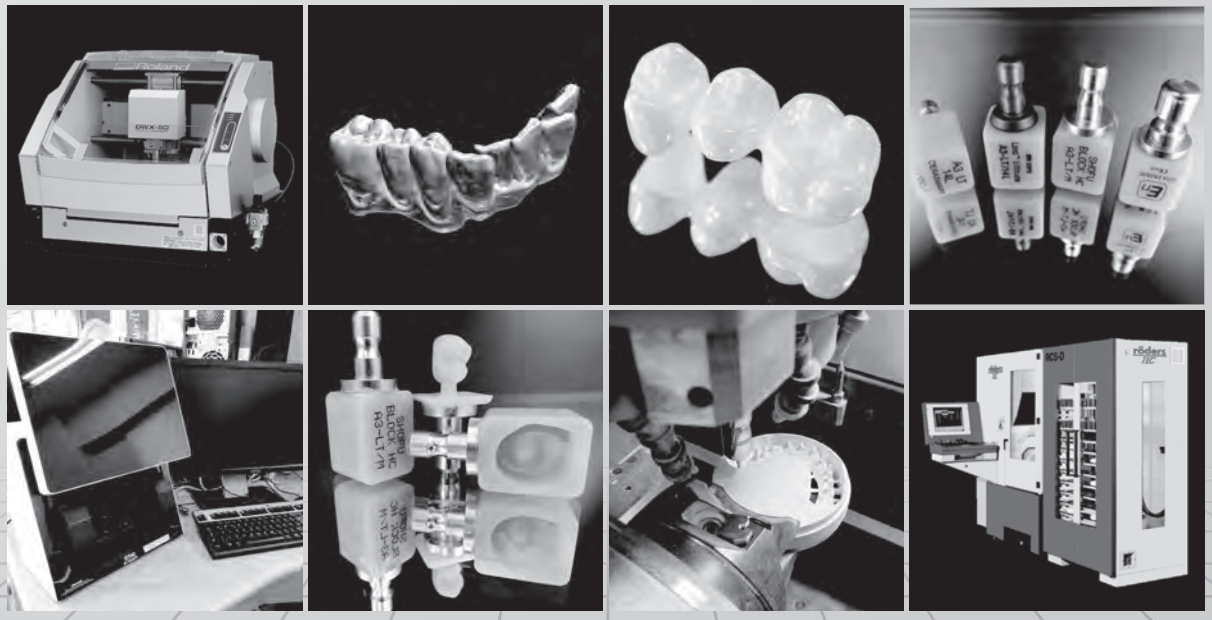

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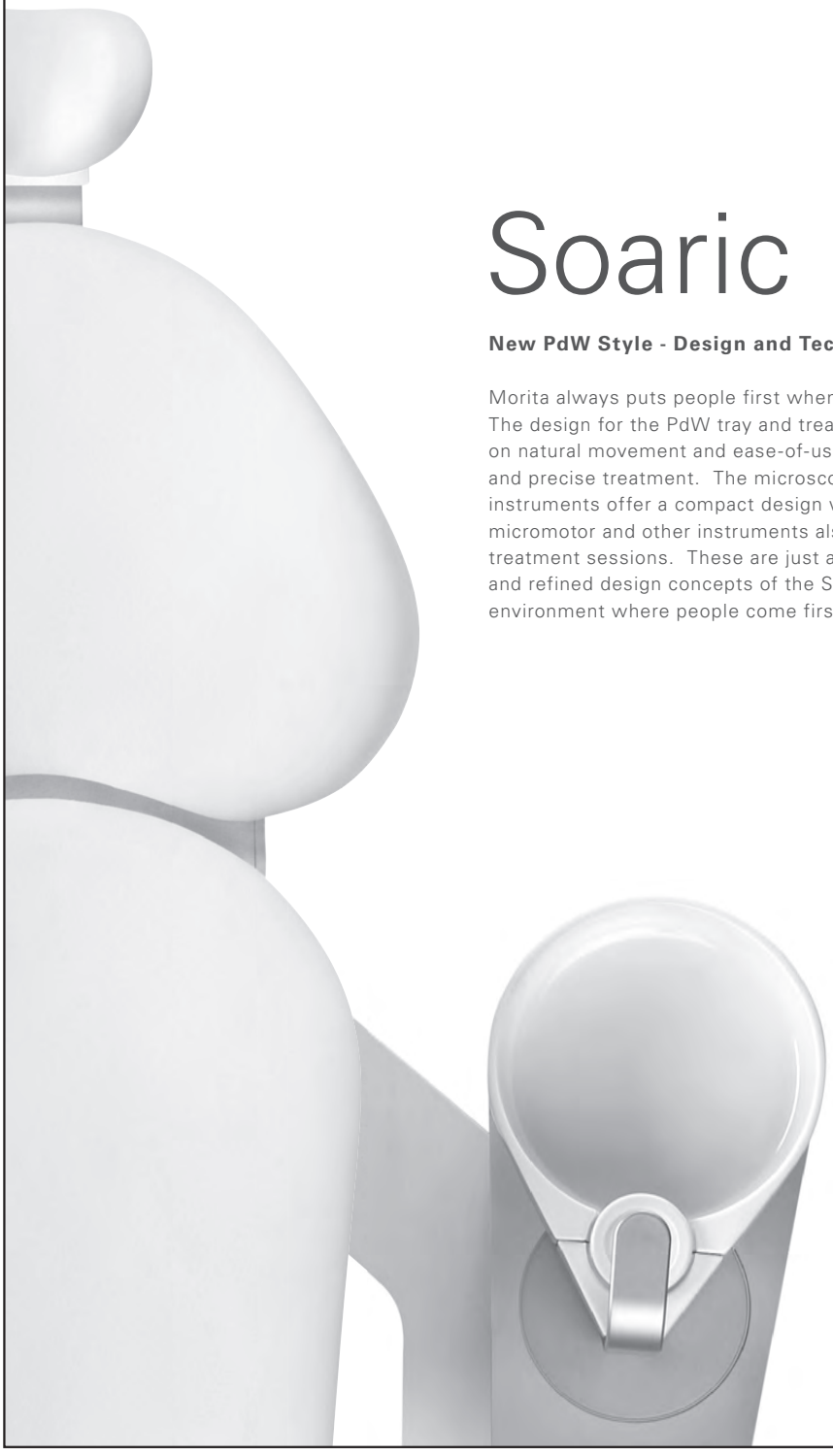

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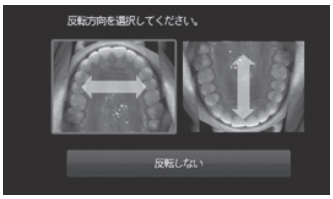

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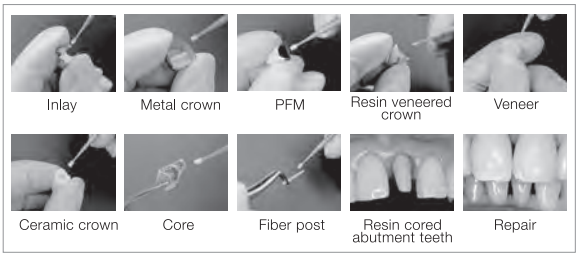

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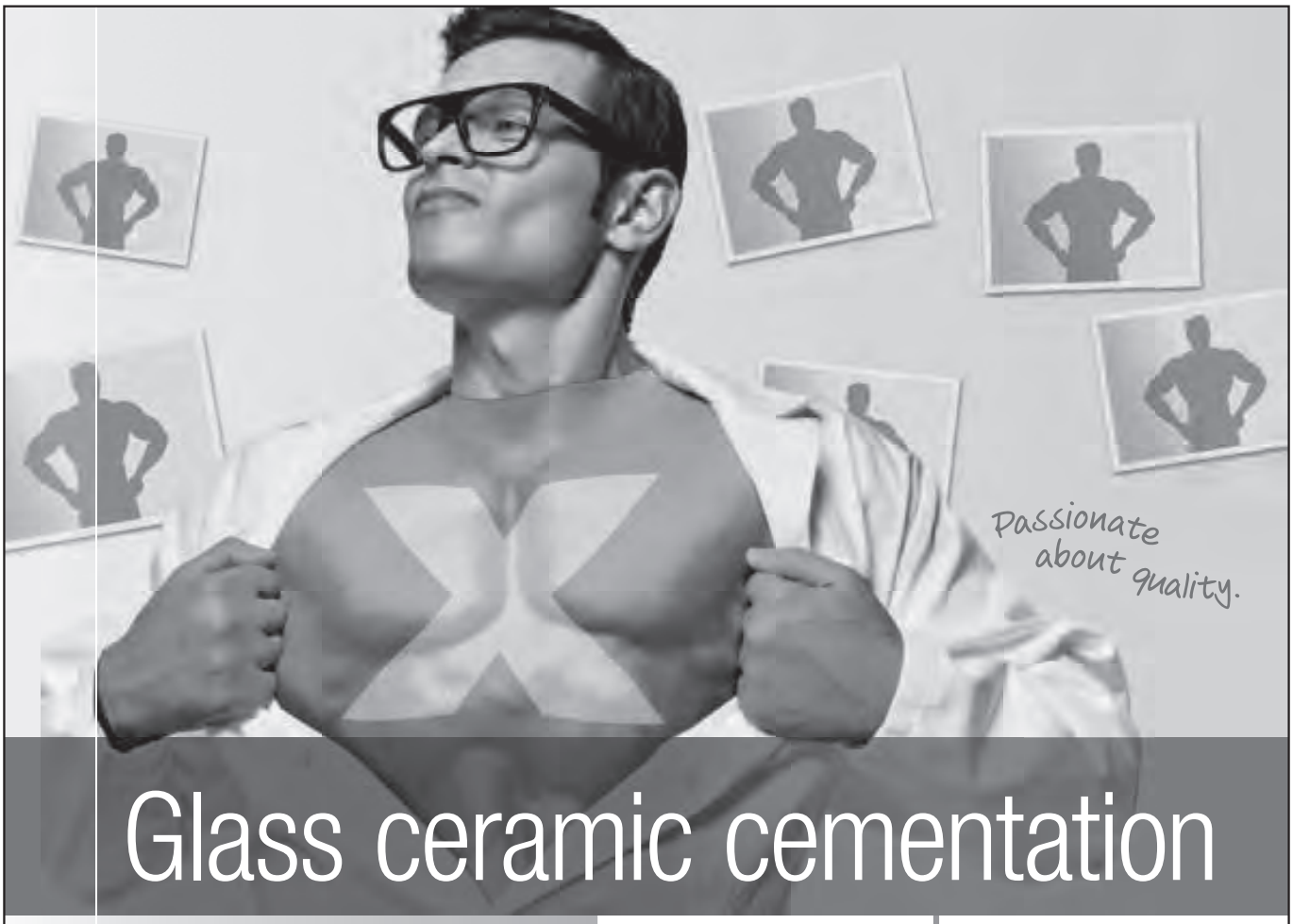

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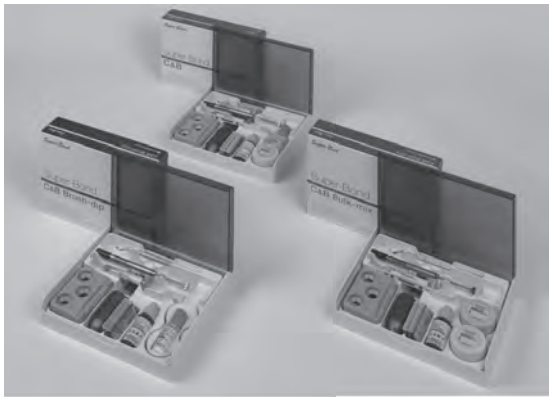

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