International Symposium for Multimodal Research and Education in IOHS-Liaison 2018

-International Symposium for Interface Oral Health Science 2018-

PROGRAM and ABSTRACT

Innovative Oral Health Science Liaison for Multimodal Research and Education Program
Program for Education Funding for Inter-University Research Project
2012-2017, MEXT, Japan

January 13 (Sat) ~ 14 (Sun), 2018
Tohoku University, Sendai, Japan

Tohoku University Graduate School of Dentistry, Sendai, Japan
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Welcome to Sendai

Dear Colleagues and Guests,

I would like to extend my warmest welcome to Sendai and International Symposium for Multimodal Research and Education in IOHS-Liaison 2018. This symposium is also held as the International Symposium for Interface Oral Health Science 2018 organized by Tohoku University Graduate School of Dentistry with the aidi of Education Funding for Inter-University Research Project Grant, Ministry of Education, Culture, Sports, Science and Technology (MEXT), Japan. Our program committee have developed an excellent program, which are composed from keynote and symposium sessions, and a poster session with 39 poster presentations. We could have 16 distinguished invited/keynote speakers and symposia.

“The Interface Oral Health Science” is the novel and unique concept in dentistry, established by Tohoku University Graduate School of Dentistry at 2002, which is based on the following: the normal oral function is maintained through biological and biomechanical harmony between three systems: “structure of the mouth, including teeth, the mucous membrane, bones, and muscles”, “microorganisms in the mouth (parasites)”, and “biomaterials using dental treatment”. Tooth decay, periodontal disease, and other oral disorders can be recognized as “interface disorders”, which are caused by the collapse of the interface between the systems. This concept is shared not only by dentistry and dental medicine but also by a variety of disciplines, including medicine, material science, engineering, and so on. Since 2002, Tohoku University Graduate School of Dentistry has been regarding “Interface Oral Health Science” as the main theme of dental research in the 21st century.

On the other hand, globalization in education and research of oral health science is most important for improvement of the level of dental science and clinical dentistry to realization of the life innovation. Therefore, from 2012 we have launched a multi-modal dentistry innovation program. This is a graduate school education project at establishing a setup for accepting overseas students, focusing on the Joint Education System through collaboration with core universities over the world. In 2012, the “Innovative Oral Health Science Liaison for Multimodal Research and Education Program” based on this project was adopted as a Program for Education Funding for Inter-University Research Project 2012-2017, MEXT, Japan; we developed joint education program (Double-degree PhD program) in Dentistry with the Peking University, Sichuan University, Tianjin Medical University in China, and Seoul National University and Chonnam National University in Korea.

I earnestly desire that this symposium will lead not only dentistry but also a wide range of related disciplines for the next generation, and provide opportunities for significant education and research in Oral Health Science.

Yours sincerely,

Keiichi SASAKI
President, International Symposium for Multimodal Research and Education in IOHS-Liaison 2018
-International Symposium for Interface Oral Health Science 2018-
Director, Tohoku University Graduate School of Dentistry
Dean, Tohoku University School of Dentistry
Floor Plan Map

1st Floor

Main Hall

Small Meeting Room

Office of International Affairs

Registration

Entrance

Banquet Hall (Refresh Corner)

Poster Hall
Access to Graduate School of Dentistry

Graduate School of Dentistry
4-1 Seiryo-machi, Aoba-ku, 980-8575
Sendai, Japan
TEL: +81-22-717-8278

Graduate School of Dentistry
**Time Table**

<table>
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<tr>
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<th>Main Hall</th>
<th>Poster Hall</th>
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<td><strong>January 13 (Sat)</strong></td>
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<tr>
<td>AM 9:00</td>
<td>Registration Open</td>
<td>Poster Set-up 12:00~12:30</td>
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<td><strong>10:00</strong></td>
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<td><strong>11:00</strong></td>
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<tr>
<td><strong>12:00</strong></td>
<td>Opening Ceremony 12:30~13:00</td>
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<td><strong>13:00</strong></td>
<td>Keynote I 13:00~14:45</td>
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<td></td>
<td>Possibility of Joint Education in Dentistry</td>
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<td><strong>14:00</strong></td>
<td>Break 14:45~15:00</td>
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<td><strong>15:00</strong></td>
<td>Keynote II 15:00~17:00</td>
<td>Poster Display 12:30~19:30</td>
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<td>Education System of Dentistry in Asia Countries</td>
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<td><strong>16:00</strong></td>
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<td><strong>17:00</strong></td>
<td>Poster Viewing 17:00~17:45</td>
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<td><strong>18:00</strong></td>
<td>Banquet 18:00~19:30</td>
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<td><strong>January 14 (Sun)</strong></td>
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<tr>
<td><strong>Main Hall</strong></td>
<td>Symposium I 9:30~11:30</td>
<td>Poster Display 9:30~13:00</td>
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<td></td>
<td>Current Research in Oral Health Science</td>
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<td><strong>Poster Hall</strong></td>
<td>Lunch 11:30~13:00</td>
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<td><strong>14:30</strong></td>
<td>Symposium II 14:30~16:30</td>
<td>Poster Display 14:30~17:00</td>
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<td></td>
<td>Research in Interface Oral Health Science</td>
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<td><strong>16:30</strong></td>
<td>Closing Ceremony 16:30~17:00</td>
<td>Poster Removal 17:00~17:30</td>
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**To Poster Presenter**

**Time for poster presentation:** Please set up your poster during January 13 (Sat) 12:00~12:30, and remove your poster after January 14 (Sun) 17:00~17:30.

**Time for poster discussion:** From 13:00 to 14:30 on January 14 (Sun).

**Size of the Panel:** The approximate size of the panel is 90 cm (W) and 180 cm (H) including a label space on the top (20 cm H) indicating the title, author(s) and institution(s).

**Push-pins:** Push-pins will be prepared by the organizers. You cannot use Velcro, tape or staples to mount your poster.

**Banquet:**
5,000 JPY
Student: 2,000 JPY
PROGRAM

January 13 (Sat)

12:30-13:00 Opening Ceremony
Dean and Professor Keiichi SASAKI
Graduate School of Dentistry, Tohoku University, Japan
Dean and Professor Christopher PECK
School of Dentistry, The University of Sydney, Australia
Dean and Professor Suchit Poothong
Faculty of Dentistry, Chulalongkorn University, Thailand
Dean and Professor Ling YE
West China School of Stomatology, Sichuan University, China

13:00-14:45 Keynote I: Possibility of Joint Education in Dentistry
Chairpersons: Professor Nobuhiro TAKAHASHI
Graduate School of Dentistry, Tohoku University, Japan

K1-1 Multimodal Research and Education at Tohoku University Graduate School of Dentistry
Professor Keiichi SASAKI
Graduate School of Dentistry, Tohoku University, Sendai, Japan

K1-2 A New Three-Step Clinical Skill Training Program for Undergraduates of Stomatology
Professor Ling YE
West China School of Stomatology, Sichuan University, Chengdu, China

K1-3 Dental Education in Korea
Professor Min-Suk KOOK
School of Dentistry, Chonnam National University, Gwangju, Korea

K1-4 Double Degree Program of Tohoku University and Chonnam National University
Professor Seung-Ho OHK
School of Dentistry, Chonnam National University, Gwangju, Korea
15:00-17:00  **Keynote II: Education System of Dentistry in Asia Countries**
Chairpersons: Professor Keiichi SASAKI
*Graduate School of Dentistry, Tohoku University, Japan*

K2-1 **Education System at Yonsei University College of Dentistry**
Professor Jeong-Taeg SEO
*Yonsei University College of Dentistry, Seoul, Korea*

K2-2 **Engaging the Community Through Knowledge Exchange**
Professor Chun-Hung CHU
*Faculty of Dentistry, The University of Hong Kong, Hong Kong, China*

K2-3 **Current Evolution of Dental Education and Research in Taiwan**
Professor Ming-Lun HSU
*School of Dentistry, National Yang-Ming University, Taipei, Taiwan*

K2-4 **Dental Education in Mongolia**
Professor Amarsaikhan Bazar
*School of Dentistry, Mongolia National University of Medical Sciences, Ulaanbaatar, Mongolia*

17:00-17:45  **Poster viewing**

18:00-19:30  **Banquet**

**January 14 (Sun)**

9:30-11:30  **Symposium I: Current Research in Oral Health Science**
Chairperson: Professor Hiroshi EGUSA
*Graduate School of Dentistry, Tohoku University, Japan*

S1-1 **Electric microenvironment enhances bone regeneration and osseointegration**
Professor Xu-Liang DENG
*School of Stomatology, Peking University, Beijing, China*
S1-2 Plant-produced osteopontin enhanced osteogenic differentiation
Professor Prasit Pavasant
Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand

S1-3 The Sydney Dental Living Lab-a partnership to transform health and well-being
Professor Christopher PECK
Faculty of Dentistry, The University of Sydney, Sydney, Australia

S1-4 One unusual application of titanium dental implants
Professor Young Seok PARK
School of Dentistry, Seoul National University, Seoul, Korea

13:00-14:30 Poster Discussion

14:30-16:30 Symposium II: Research in Interface Oral Health Science
Chairpersons: Assoc. Professor Guang HONG
Graduate School of Dentistry, Tohoku University, Japan

S2-1 Marginal bone Level comparison between platform switching and platform matching design dental implants- 3 Years follow up study
Professor Wei-Jen CHANG
School of Dentistry, College of Oral Medicine, Taipei Medical University, Taipei, Taiwan

S2-2 NAMPT Is an Essential Regulator of RA-Mediated Periodontal Inflammation
Professor Je-Hwang RYU
School of Dentistry, Chonnam National University, Gwangju, Korea

S2-3 Reconditioning of biofilm-contaminated titanium surface for osteoblast proliferation by hydroxyl radicals generated via H$_2$O$_2$ photolysis
Assistant Professor Keisuke NAKAMURA
Graduate School of Dentistry, Tohoku University, Sendai, Japan

S2-4 Does Reflective Learning with Feedback Improve Dental Students Self Perceived Competency of Clinical Preparedness?
Lecture Jung-Joon Ihm
School of Dentistry, Seoul National University, Seoul, Korea
16:30-17:00  Closing Ceremony

Vice-Dean and Professor Nobuhiro TAKAHASHI
Graduate School of Dentistry, Tohoku University, Japan

Dean and Professor Kwang-Mahn KIM
College of Dentistry, Yonsei University, Korea

Dean and Professor Ming-Lun HSU
School of Dentistry, National Yang-Ming University, Taiwan
Keynote I: Possibility of Joint Education in Dentistry

K1-1
Multimodal Research and Education at Tohoku University Graduate School of Dentistry
Keiichi SASAKI
Dean and Professor, Division of Advanced Prosthodontics, Graduate School of Dentistry, Tohoku University, Sendai, Japan

K1-2
A New Three-Step Clinical Skill Training Program for Undergraduates of Stomatology
Ling YE
Dean and Professor, Department of Endodontics, West China School of Stomatology, Sichuan University, Chengdu, China

K1-3
Dental Education in Korea
Min-Suk KOOK
Vice-Dean and Professor, Department of Oral and Maxillofacial Surgery, School of Dentistry, Chonnam National University, Gwangju, Korea

K1-4
Double Degree Program of Tohoku University and Chonnam National University
Seung-Ho OHK
Vice-Dean and Professor, Department of Oral Microbiology, School of Dentistry, Chonnam National University, Gwangju, Korea
Keynote II: Education System of Dentistry in Asia Countries

K2-1
Education System at Yonsei University College of Dentistry

Jeong-Taeg SEO
Vice-Dean and Professor, Dental Education Research Center, Department of Oral Biology, Yonsei University College of Dentistry, Seoul, Korea

K2-2
Engaging the Community Through Knowledge Exchange

Chun-Hung CHU
Associate Dean and Professor, Faculty of Dentistry, The University of Hong Kong

K2-3
Current Evolution of Dental Education and Research in Taiwan

Ming-Lun HSU
Dean and Professor, School of Dentistry, National Yang-Ming University, Taipei, Taiwan

K2-4
Dental Education in Mongolia

Amarsaikhan Bazar
Advisor to Minister of Health and Member of Advisory Board to President of Mongolia
Professor, School of Dentistry, Mongolia National University of Medical Sciences, Ulaanbaatar, Mongolia
Symposium I: Current Research in Oral Health Science

S1-1
Electric microenvironment enhances bone regeneration and osseointegration

Xu-Liang DENG*
Vice Dean and Professor, Head of Department of VIP Dental Service & Geriatric Dentistry, School and Hospital of Stomatology, Peking University, Beijing, China

S1-2
Plant-produced osteopontin enhanced osteogenic differentiation

Kaewta Rattanapisit¹, Daneeya Chaikeawkaew², Julian Ma³, Waranyoo Phoolcharoen¹, Prasit Payasant²*
¹Faculty of Pharmaceutical Sciences, Chulalongkorn University, Bangkok, Thailand
²Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand
³St. George’s, University of London, London, UK

S1-3
The Sydney Dental Living Lab-a partnership to transform health and well-being

Christopher PECK
Dean and Professor, Faculty of Dentistry, The University of Sydney, Sydney, Australia

S1-4
One unusual application of titanium dental implants

Young Seok PARK
Assistant Dean of Academic Affair, Director of Education Center for Dental Health Science, Professor, Department of Oral Anatomy, School of Dentistry, Seoul National University, Seoul, Korea
Symposium II: Research in Interface Oral Health Science

S2-1
Marginal bone Level comparison between platform switching and platform matching design dental implants- 3 Years follow up study

Wei-Jen Chang1,2, Jerry C-Y Lin1, Eisner Salamanca1, Yung -Szu Hsu1, Peter D Wang1,3, Sheng-Wei Feng1,3, May-Show Chen3,4
1 School of Dentistry, College of Oral Medicine, Taipei Medical University, Taipei 110, Taiwan;
2 Dental Department, Taipei Medical University, Shuang-Ho Hospital, Taipei 235, Taiwan
3 Dental Department, Taipei Medical University Hospital, Taipei 110, Taiwan
4 School of Oral hygiene, College of Oral Medicine, Taipei Medical University, Taipei 110, Taiwan

S2-2
NAMPT Is an Essential Regulator of RA-Mediated Periodontal Inflammation

Je-Hwang RYU
Department of Pharmacology and Dental Therapeutics, School of Dentistry, Chonnam National University, Gwangju, Korea

S2-3
Reconditioning of biofilm-contaminated titanium surface for osteoblast proliferation by hydroxyl radicals generated via H2O2 photolysis

Keisuke Nakamura1, Midori Shirato1, Taichi Tenkumo1, Taro Kanno1, Anna Westerlund2, Ulf Örtengren2, Keiichi Sasaki1, and Yoshimi Niwano1
1Tohoku University Graduate School of Dentistry, Japan
2University of Gothenburg, Sweden

S2-4
Does Reflective Learning with Feedback Improve Dental Students Self Perceived Competency of Clinical Preparedness?

Jung-Joon Ihm1, PhD, Ho-Beom Kwon2, DDS, MSD, PhD, Seung Hyun Han3, PhD, Young-Seok Park4, DDS, MSD, PhD
1Lecturer, Office of Dental Education, School of Dentistry, Seoul National University
2Professor, Department of Prosthodontics, School of Dentistry, Seoul National University
3Professor, Department of Oral Microbiology & Immunology, School of Dentistry, Seoul National University
4Associate Professor, Department of Oral Anatomy, School of Dentistry, Seoul National University
Contents of POSTER PRESENTATIONS

P-1
Satisfaction of Mongolian Dental Students after Taking Summer Clerkship Program
Tsengelsaikhan Nyamdorj¹, Delgertsetseg Jargaltsogt², Soyolmaa Mashbaljir³, Ariuntuul Garidkhuu⁴, Ken Osaka⁴
¹Department of Prosthodontics, School of Dentistry, Mongolian National University of Medical Sciences,
²Department of Pediatric and Preventive Dentistry, School of Dentistry, Mongolian National University of Medical Sciences,
³Department of Restorative Dentistry, School of Dentistry, Mongolian National University of Medical Sciences,
⁴Graduate School of Dentistry, Department of International and Community Oral Health, Tohoku University, Japan

P-2
Study of the mechanical properties of CPTi ceramic alloy after recasts
Song YANG
School and Hospital of Stomatology, Fujian Medical University, Fuzhou, China

P-3
Comparison of dental pulp and periodontal ligament stem cells in regenerating periodontal tissues in an ectopic dog model
Jing LIN, Peng-Fei ZHOU, Yao XIONG, Yu-Ying CHEN, MIN-Kui LIN*
School of Stomatology, Fujian Medical University, China

P-4
Inflammatory and biocompatibility evaluation of antimicrobial peptide GL13K immobilized onto titanium by silanization
Lin ZHOU
Department of Oral Implantology, School and Hospital of Stomatology, Fujian Medical University, Fuzhou, China

P-5
Development of PH sensitive hollow mesoporous silica as delivery devices for biomineralization precursors for management of incipient caries lesions of orthodontics treatment
Wen-Zhou WU, De-Xiong LI, Duan-Qiang ZHANG, Yu-Ming BAI*
School and Hospital of Stomatology, Fujian Medical University, Fuzhou, China
The Fam50a positively regulates ameloblast differentiation via interacting with Runx2

Jeong-Tae Koh¹,², Yuri Kim¹,², Sung-Woong Hur¹,², Min-Suk Kook²,³, Seung-Ho Ohk⁴, Je-Hwang Ryu²
¹Department of Pharmacology and Dental Therapeutics; ²Research Center for Biomineralization Disorders; ³Department of Oral and Maxillofacial Surgery; ⁴Department of Oral Microbiology, School of Dentistry, Chonnam National University, Gwangju, South Korea

Effects of cigarette smoke condensate and nicotine on growth status and cytokine expression of human gingival fibroblast on titanium plate

Jiang CHEN
Department of Oral and Maxillofacial Surgery, School and Hospital of Stomatology, Fujian Medical University, Fuzhou, China

Activation of metastatic cells in the lung by dissection of lymph nodes

Ariunbuyan Sukhbaatar¹,²,³, Testu Takahashi³,⁴, Shiro Mori¹,²,⁴, Tetsuya Kodama¹,²
¹Laboratory of Biomedical Engineering for Cancer, Graduate School of Biomedical Engineering, Tohoku University, 4-1 Seiryo, Aoba, Sendai, Miyagi, 980-8575, Japan
²Biomedical Engineering Cancer Research Center, Graduate School of Biomedical Engineering, Tohoku University, 4-1 Seiryo, Aoba Ward, Sendai, Miyagi 980-8575, Japan.
³Department of Oral and Maxillofacial Surgery, Graduate School of Dentistry, Tohoku University, 4-1 Seiryo, Aoba, Sendai 980-8575, Japan.
⁴Department of Oral and Maxillofacial Surgery, Tohoku University Hospital, 1-1 Seiryo, Aoba, Sendai 980-8575, Japan.

Comparisons with and without retention in orthodontic relapse mouse models

Jiawei Qi*, Keisuke Kimura, Masahiko Ishida, Akiko Kishikawa, Kazuhiro Shima, Saika Ogawa, Wei-Ren Shen, Fumitoshi Ohori, Takahiro Noguchi, Aseel Marahleh, Hideki Kitaura
Division of Orthodontics and Dentofacial Orthopedics, Department of Translational Medicine, Tohoku University Graduate School of Dentistry

Epiregulin promotes lung metastasis of salivary adenoid cystic carcinoma via exosomes

Wen-Wen Yang¹, Lin-Qian Yang¹, Fei Zhao¹, Chu-Wen Chen¹, Li-Hua Xu¹, Jia Fu², Sheng-Lin Li¹,², and Xi-Yuan Ge¹,²
¹Department of Oral and Maxillofacial Surgery, Peking University School and Hospital of Stomatology, Beijing, PR China
²Central Laboratory, Peking University School and Hospital of Stomatology, Beijing, PR China
P-11
Carbohydrate metabolism related to cariogenicity of oral *Bifidobacterium*

Yuki Abiko†, Mai Kameda‡, Kenichi Nagai‡, Atsunobu Sugahara‡, Kazuhiro Murakami‡, Junko Kawashima†, Jumpei Washio†, Nobuhiro Takahashi†

†Division of Oral Ecology and Biochemistry, Tohoku University Graduate School of Dentistry, Sendai, Japan; ‡Tohoku University School of Dentistry, Sendai, Japan; ‡Department of Integrative Genomics, Tohoku Medical Megabank Organization, Tohoku

P-12
Acid production and its fluoride tolerance of a novel caries-associated bacterium *Scardovia wiggsiae*

Mai Kameda†, Yuki Abiko‡, Jumpei Washio‡, Nobuhiro Takahashi‡

†Tohoku University School of Dentistry, Sendai, Japan; ‡Division of Oral Ecology and Biochemistry, Tohoku University Graduate School of Dentistry, Sendai, Japan

P-13
 Fluoride inhibition on the growth and metabolism of *Porphyromonas gingivalis*

H. Domon*, J. Washio, and N. Takahashi
Division of Oral Ecology and Biochemistry, Tohoku University Graduate School of Dentistry, Sendai, Japan

P-14
Social Inequalities in Dental Implant Use among Elderly Japanese: Data from JAGES Project

Hazem Abbas*, Jun Aida†, Ken Osaka†.
†Department of International and Community Oral Health, Tohoku University, Graduate School of Dentistry, Sendai, Japan.

P-15
Therapeutic potential of the lymphatic drug delivery system with 5-FU for the treatment of metastatic lymph nodes

Honoka Fujii*, Sachiko Horig, Shiro Mori†, Tetsuya Kodama†

†Laboratory of Biomedical Engineering for Cancer, Graduate School of Biomedical Engineering, Tohoku University, 4-1 Seiryo, Aoba, Sendai 980-8575, Japan
†Department of Oral and Maxillofacial Surgery, Tohoku University Hospital, Tohoku University, 1-1 Seiryo, Aoba, Sendai 980-8574, Japan

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Effect of environmental nitrate on the nitrite-producing activity of oral
Veillonella
Dimas Prasetianto Wicaksono*, Jumpei Washio, Nobuhiro Takahashi
Division of Oral Ecology and Biochemistry, Department of Oral Biology, Tohoku University Graduate School of Dentistry, Sendai, Japan

P-17
A novel method to screen and isolate nitrite-producing bacteria from the oral cavity
Jumpei Washio*, Yuria Suzuki*, Dimas Pracetianto Wicaksono, Masaki Nishino, Tomona Otake, Shiori Sasaki, Shiori Tadokoro, Seika Takahashi and Nobuhiro Takahashi
Oral Ecology and biochemistry, Tohoku University Graduate school of Dentistry, Sendai, Japan

P-18
The Surface Modification of Nano-zirconia Ceramic by FFC Cambridge Process
Yuhan Wu¹, Guang Hong¹, Jianmin Han², Xuliang Deng², Keiichi Sasaki¹
¹Tohoku University Graduate School of Dentistry, Sendai, Japan
²Peking University School and Hospital of Stomatology, Beijing, China

P-19
Inhibition of lipopolysaccharide-induced osteoclast formation and bone resorption in vivo by glucagon-like peptide-1 receptor agonist
Wei-Ren Shen*, Keisuke Kimura, Masahiko Ishida, Akiko Kishikawa, Kazuhiko Shima, Saika Ogawa, Jiawei Qi, Fumitoshi Ohori, Takahiro Noguchi, Aseel Marahleh, Hideki Kitaura
Division of Orthodontics and Dentofacial Orthopedics, Department of Translational Medicine, Tohoku University Graduate School of Dentistry

P-20
Controlled Transcriptional Regulation of Transgene Expression during Osteogenic Differentiation of Mouse Induced Pluripotent Stem Cells
Takeru Kondo*, Maolin Zhang, Yuya Kamano, Hiroko Okawa, Hiroshi Egusa
Division of Molecular and Regenerative Prosthodontics, Tohoku University Graduate School of Dentistry, Sendai-city, Miyagi, Japan
P-21
Biomechanical effect on bone healing and remodeling in a mandibular reconstruction case using fibula free flap

Nobuhiro Yoda1*, Junning Chen2, Keke Zhang3, Shigeto Koyama1, Michael Swain3, Qing Li1, Christopher Peck3, Keiichi Sasaki1
1Tohoku University Graduate School of Dentistry, Japan, 2University of Exeter, United Kingdom, 3The University of Sydney, Australia

P-22
Activating NOTCH1 Mutation Correlates with NICD Expression and Loss of Myoepithelial Differentiation and Related to High-Grade Revolution and Poor Prognosis in Adenoid Cystic Carcinoma

Zhang Ye, Li Tiejun, Zhou Chuan-Xiang*
Department of Pathology, Peking University School and Hospital of Stomatology, Beijing, PR China

P-23
Identification and characterization of salivary gland antigen-presenting cells and memory resident T cells

*Lu Lu1,2, Yukinori Tanaka1,3, Toshinobu Kuroishi1, Naoto Ishii4, Takashi Sasano2, Shunji Sugawara1
1Division of Oral Immunology, Department of Oral Biology, Tohoku University Graduate School of Dentistry, Sendai, Japan
2Division of Oral Diagnosis, Department of Oral Medicine and Surgery, Tohoku University Graduate School of Dentistry, Sendai Japan
3Division of Pediatric Dentistry, Department of Oral Health and Development Sciences, Tohoku University Graduate School of Dentistry, Sendai, Japan
4Department of Microbiology and Immunology, Tohoku University Graduate School of Medicine, Sendai, Japan

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The Influence of Cellulose Nanofibers on Mechanical Properties of Denture Base Resin

Wei ZOU1, Guang HONG1, Yukiko YAMAZAKI1, Toru OGAWA1, Hiroyuki TANAKA2, Hiromi HASHIBA2, Keiichi SASAKI1
1Graduate School of Dentistry, Tohoku University, Sendai, Japan, 2Chuetsu Pulp & Paper Co., Ltd., Takaoka, Japan

P-25
Targeted drug delivery system using ultrasound and antibody-conjugated microbubbles enhances therapeutic efficacy in a squamous cell carcinoma model

Kenjiro Iwanaga, Fumika Hirabayashi, Kazuhiro Tominaga, Izumi Yoshioka, Takeyoshi Kosheki, Tatsuji Nishihara
Department of Preventive Dentistry, Tohoku University Graduate School of Dentistry, Sendai, Japan
P-26
Gene Transfection In Vivo with Bone Morphogenetic Protein-2 encoding DNA-Functionalized Calcium Phosphate Nanoparticle-Loaded Collagen Scaffolds

Taichi Tenkumo¹, Juan Ramón Vanegas Sáenz¹, Keisuke Nakamura¹, Yoshinaka Shimuzu¹, Viktorya Sokolova², Matthias Epple², Yuya Kamano¹, Hiroshi Egusa¹, Tsutomu Sugaya¹, Keiichi Sasaki³
¹Tohoku University Graduate School of Dentistry, Japan
²University of Duisburg-Essen, Germany
³Hokkaido University, Japan

P-27
Oral management and infection control at the Perioperative Oral Support Center of Tohoku University Hospital

Atsushi Tanaka, Toru Tamahara, Kenjiro Iwanaga, Mina Dodo, Tsubasa Kato, Syungo Watanabe, Naoko tanda, Wakana Iijima, Mana Igari, and Takeyoshi Koseki
Department of Preventive Dentistry, Tohoku University Graduate School of Dentistry, Sendai, Japan

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Sherry Shiqian Gao*, Edward Chin Man Lo, Chun Hung Chu
Faculty of Dentistry, The University of Hong Kong, Hong Kong, China

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Xin-Yi YE, Hai-Yan ZHENG, Neng-Wu JIANG, Hui CHENG, Hao YU*
Department of Prosthodontics, School and Hospital of Stomatology, Fujian Medical University, Fuzhou, China

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H. Sano *, A. Aida 1, G.U. Vidanapathirana 1, A. Wakui 1, Y. Hirabuki 1, Y. Takenaka 1, M. Kawachi 1, H. Aihara 1, J. Washio 2, Y. Abiko 2, G. Mayanagi 2, K. Ishiguro 2, K. Yamaki 2, N. Takahashi 2, T. Sato 1

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Delgertsetseg Jargaltsoo 1, Tsengelsaikhan Nyamdorj 2, Battsetseg Sedsuren 3, Uyanga Samdantsodol 4, Uyanga Erdenebaatar 5, Ariuntuul Garidkhuu 6, Ken Osaka 6

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G. Chimedlkhamrsuren 1, J. Jambaldorj 1, P. Odonchimeg 2, B. Agarzandan 3, B. Tseepil 3, T. Ariuntungalag 3, T. Bilguun 4, M. Enkhhileg 4, D. Ichinnorov 3, J. Sarantuya 1

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Soyolmaa Mashbaljir\textsuperscript{1}, Batbold Gan-Ochir\textsuperscript{1}, Tselmuun Chinzorig\textsuperscript{2}, Anarkhuu Bold-Erdene\textsuperscript{3}, Munkhtsetseg Dagvadorj\textsuperscript{3}, Tsengelsaikhan Nyamdorj\textsuperscript{1}, Bayarmaa Enkhbat\textsuperscript{1}, Ariuntuul Garidkhuu\textsuperscript{1,2}, Ken Osaka\textsuperscript{2}

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Bolormaa Šainbayar\textsuperscript{1}, Ganjargal Ganburged\textsuperscript{1}, Odonchimeg Demid\textsuperscript{1} Oyuntsetseg Bazar\textsuperscript{2}, Keiji Moriyama\textsuperscript{3}

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Syungo Watanabe*, Kenjiro Iwanaga, Toru Tamahara, Mina Dodo, Wakana Iijima, Mana Igari, Tsubasa Kato, Atsushi Tanaka, Jin Kiyonobu, Naoko Tanda, and Takeyoshi Koseki

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Tselmuun Chinzorig\textsuperscript{1}, Jun Aida\textsuperscript{1}, Fujitani Morioki\textsuperscript{2}, Senda Akira\textsuperscript{2}, Maeda Hatsuhioko\textsuperscript{2}, Natsume Nagato\textsuperscript{2}, Ichinnorov Chimedtseren\textsuperscript{4}, Sumiya Sodnomtseren\textsuperscript{5}, Delgerbaigal Munkhjargal\textsuperscript{1}, Ariuntuul Garidkhuu\textsuperscript{1,2}, Ken Osaka\textsuperscript{1}

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Ariuntuul Garidkhuu\textsuperscript{1,2}, Shagdar Batsukh\textsuperscript{2}, Myagmar Bat-Erdene\textsuperscript{2}, Amarsaikhan Bazar\textsuperscript{2}, Purevjav Nyanrag\textsuperscript{1}, Nagato Natsume\textsuperscript{1}, Davaa Gombosuren\textsuperscript{1}, Ken Osaka\textsuperscript{1}

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ABSTRACTS of KEYNOTE SPEAKER

Keynote I: Possibility of Joint Education in Dentistry

K1-1
Multimodal Research and Education at Tohoku University Graduate School of Dentistry

Keiichi SASAKI

Dean and Professor, Division of Advanced Prosthodontics, Graduate School of Dentistry, Tohoku University, Sendai, Japan

Multimodal research and education is the concept of education at Tohoku University Graduate School of Dentistry, as well as School of Dentistry to cultivate the professionals relating to oral health sciences, who can adapt and respond adequately to various occasions in respect for diversity. The multimodal research and education can be carried out based on globalization, interdisciplinary alliances and community cooperation.

In order to develop such students, we have launched a multi-modal dentistry innovation program at 2012. This is a graduate school education project and its main purpose was to establish an organization for accepting overseas graduate students, focusing on the joint education system through collaboration with core universities over the world. In the same year, the “Innovative Oral Health Science Liaison for Multimodal Research and Education Program” based on this project was adopted as one of the Japanese government education programs, Program for Education Funding for Inter-University Research Project 2012-2017, MEXT, Japan.

As a part of this program, we have developed a joint education program (Double-degree PhD program: the DD program) in Dentistry with the Peking University, Sichuan University, Tianjin Medical University in China, and Seoul National University and Chonnam National University in Korea. In the DD program each graduate student enrolls at both his/her home university and our university for a specific period of time. The DD program offers an opportunity to study under the faculties of two universities at the same time. Students will be able to earn degrees from both universities if the requirements are met. Besides such merits for the students, the DD program provides us with various opportunities to develop the international collaborative researches.

Tohoku University Graduate School of Dentistry is aiming to cultivate the professionals of oral health science for the next generation through the multimodal education.

C.V.
Keiichi SASAKI DDS, PhD.
Keiichi Sasaki is Dean at the School of Dentistry, Director at the Graduate School of Dentistry and Professor in Division of Advanced Prosthetic Dentistry, Tohoku University, Sendai, Japan.
Professor Sasaki received his basic training at Tohoku University School of Dentistry (DDS, 1981) and advanced education for prosthodontics and neurophysiology at Tohoku University Graduate School of Dentistry (PhD, 1985). He was also involved in the biomechanical researches with Prof. A. G. Hannam at University of British Columbia, Canada (1987-1989). In 2000, he was appointed as a head of the Department of Prosthodontics, Tohoku University. He has been involved in both clinical and research works, particularly in biomechanics and mechanobiology of stomatognathic systems related to prosthodontics and dental implantology. He is a past president of Japan Prosthodontic Society (2009-2011). Currently he is the president of Japanese Society for Orofacial Pain (2011-).
A New Three-Step Clinical Skill Training Program for Undergraduates of Stomatology

Ling YE

Dean and Professor, Department of Endodontics, West China School of Stomatology, Sichuan University, Chengdu, China

As the artificial intelligence (AI) era is coming, human jobs are more and more prone to be deprived by robot. Although dentist is on the last of the list, the elevation of clinical skill calls for new training model that adapt to the new era.

In the current simulation laboratory, all the training for undergraduates is restricted to nonrealistic procedures using phantom heads, on plastic or extracted teeth. There are prominent shortcomings for this training method such as limited number of the extracted teeth, the powder formed during tooth drill, and safety during student exercises. Besides, manual dexterity development is an important part of pre-clinical training in that the accuracy in using rotating instruments is the basic requirement for operative dentistry. However, no specific treatment was provided for the improvement of manual dexterity of the undergraduates in China.

In the healthcare area, virtual reality (VR) is not only helping in skills acquisition, but also has been utilized for the repeated use of a standardized simulated patient. VR preparations and evaluations may be used to standardize teachers and improve conventional teaching. For now, digital simulation technology in undergraduate dental laboratory training is widespread in many countries, including the United States, Germany, Australia and the United Kingdom.

Based on all above, we build up a new three-step clinical training curriculum program well combined the specific hand skill training, conventional phantom heads and VR techniques together. The curriculum was set as follows:

First stage: It consists of hand skill training curriculums. The curriculums are set for undergraduates in the first 3 years. This stage aims to develop the manual dexterity of the students. Specifically, the curriculums include chopstick practice, knit practice, surgical suture under microscope, drawing from mirror image, sketching in tooth and craniomaxillofacial structures and so on.

Second stage: It is consist of the preclinical training curriculums. Except for conventional phantom head, virtual simulation training machines, including the Moog Simodont Dental Trainer and Morita dental robot, were implemented in dental clinical skills training for undergraduates in the 4th years. Besides, we construct the digital data base for tooth anatomy and many other digital curriculums, as well as develop personalized VR practice training project. We compared the effect of Simodont Dental Trainer and conventional resin slice on the training effect of students’ hand skill and found that Simodont Dental Trainer has significant effect on improving students' skill the accuracy in using rotating instruments during cavity preparation. Furthermore, the result of questionnaire showed that the students had positive attitude toward the use of VR in the preclinical training.

Third stage: Clinical training curriculum. This stage includes preclinical training courses like Treatment of medical disputes, first aid, nosocomial infection control and general clinical practices.

Our practical application suggests that the new three-step clinical skill training program offers significant potential for dental education. At the same time, students also participated in related research, which promoted their ability of innovation. We believe that digital simulation technologies have the potential to revolutionise the way we teach and learn.

C.V.

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2000-2003 West China School of Stomatology, Sichuan University, Ph. D, DDS
1993-2000 Department of Stomatology, West China College of Medical Science
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2003-present West China School of Stomatology, Sichuan University
2004-2005 University of California, San Francisco, Lee Hysan scholar
2010-2011 University of California, Los Angeles, Visiting scholar
Dental Education in Korea

Min-Suk KOOK

Vice-Dean and Professor, Department of Oral and Maxillofacial Surgery, School of Dentistry, Chonnam National University, Gwangju, Korea

There is three dental schools and eight dental college in South Korea. Those are established in six national university (Chonbuk, Chonnan, Kangnung-Wonju, Kyungpook, Pusan, and Seoul) and five private university (Chosun, Dankook, Kyung Hee, Wonkwang, and Yonsei). Traditionally, dental education consisted of a six-year program comprised of two years of liberal arts and science and four years of dentistry (2 + 4 program). In 2003, a new dental education system consisted of a four-year program, so called 4 + 4 program, that allows admission of other college graduates with various academic and social backgrounds. Eight universities (Chonbuk, Chonnam, Chosun, Kyung Hee, Kyungpook, Pusan, Seoul, Yonsei) adopted the 4 + 4 system. The four-year dental education system combines the four years of undergraduate study (bachelor's degree) at a different institution with the four years of professional education at a dental school. Graduates of a dental school are recognized their Master’s degree in dentistry. After a few years of operating four-year program, five universities (Chonbouk, Chosun, Kyung Hee, Kyungpook, Yonsei) decided to return to the six-year program. Currently three universities maintain the four-year program (Chonnam, Pusan, Seoul). There was minor alteration in four-year program, which allows admission of high school graduates. Dental schools provide a seven-year program to high school graduates and it is comprised of three years of pre-dental program and four years of dental program. With the graduation of both dental education systems, Korean dental students acquire a qualification to take the Korean National Dentist Examination (KNDE) and obtain their dentist license with passing the KDNE. Korean dentists can acquire board certification in clinical special fields after one year of internship and three years of residency. Total ten board certifications are available in Korea, which are Conservative dentistry, Oral and Maxillofacial Surgery, Oral and Maxillofacial Radiology, Oral pathology, Orofacial pain and Oral Medicine, Orthodontics, Pediatric dentistry, Periodontology, Preventive dentistry, Prosthodontics. I would like to present about Dental education in Korea through this lecture.

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2011.2. PhD. in Oral and Maxillofacial Surgery;
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2005. 2. M.S.D. in Oral and Maxillofacial Surgery;
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1999. 2. D.D.S.; College of Dentistry, Chonnam National University, Gwangju, Korea

2017. 4.- Present Professor, Department of Oral and Maxillofacial Surgery,
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2017. 2.- Present Vice Dean, School of Dentistry, Chonnam National University, Gwangju, Korea
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2012. 4.- 2017. 3 Associate Professor, Department of Oral and Maxillofacial Surgery
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2008. 4.- 2012. 3 Assistant Professor, Department of Oral and Maxillofacial Surgery
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2006. 3. – 2008. 3 Full-time lecturer, Department of Oral and Maxillofacial Surgery
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K1-4

Double Degree Program of Tohoku University and Chonnam National University

Seung-Ho OHK

Vice-Dean and Professor, Department of Oral Microbiology,
School of Dentistry, Chonnam National University, Gwangju, Korea

The agreement of ‘Double Degree Program between Tohoku University and Chonnam National University’ has been first signed in Jan. 2013. Based on this agreement, the applicants who successfully finished this program will be granted the Doctor’s degree in both sides. This program was originally designed to provide a variety of opportunity for the students to study in other countries. The students who participate in this program and submit a Doctoral dissertation to any side will be granted Doctor’s degree from both institutions.

In Chonnam National University, the students are recognized their Master’s degree in dentistry after finishing 8-year program of dental school. In addition, we have running a special DDS/Ph.D. program with a couple of applicants each year. The students who participated in this DDS/Ph.D. program will study 2 additional research years for their doctoral thesis. After successful finishing the course and the approval of doctoral dissertation, they will be granted the Doctoral degree. Students who might participate the ‘Double Degree Program’ are selected among them.

DDS/Ph.D. program of our school is supported by the Ministry of Education, Republic of Korea. The government has funded special grant to promote the scientist who has both sufficient clinical experiences and scientific knowledge for medicine or dental medicine. They are supported all or part of their tuitions by this grant.

Until now one student of Chonnam National University has studied in Tohoku University for a year in 2016 and returned for the remaining years of his course.

The ‘Double Degree Program’ of Tohoku University and Chonnam National University might encourage the students to research in dental science.

C.V.
Seung-Ho OHK PhD.
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Education

Ph.D., Microbiology, Yonsei University, Seoul, Korea Aug. 1997
M.Sc., Microbiology, Yonsei University, Seoul, Korea Aug. 1993
B.Sc., Food Engineering Yonsei University, Seoul, Korea Feb. 1991

Professional Experiences

Feb. 2017. – present Associate Dean, School of Dentistry, Chonnam National University, Gwangju, Korea
Feb. 2003. – present Professor, Department of Oral Microbiology, School of Dentistry, Chonnam National University
Aug. 2007. – Dec. 2008. Visiting Scholar, Purdue University, West Lafayette, IN, U.S.A.
Keynote II: Education System of Dentistry in Asia Countries

K2-1
Education System at Yonsei University College of Dentistry

Jeong-Taeg SEO

Vice-Dean and Professor, Dental Education Research Center, Department of Oral Biology, Yonsei University College of Dentistry, Seoul, Korea

Yonsei University College of Dentistry (YUCD) is one of 11 dental schools in Korea. The history of Yonsei Dentistry began in 1915 by an American missionary, Dr. W. J. Scheifley who established the Department of Dentistry in Severance Medical College, which later merged with Yonhi University to become Yonsei University. In the early years patient care and dentist training were conducted in the Severance Hospital building. After fund raising in the U.S. by Dr. J. L. Boots, the second director of the Department of Dentistry, the modern dental hospital building was constructed next to Severance Medical College Hospital in 1931. The establishment of the YUCD was authorized by the Ministry of Education in 1967.

The YUCD is strongly committed to preparing graduates who possess the knowledge, skills, and values to begin the practice of general dentistry. The education system at YUCD is a 6-year program, consisting of 2-year predental course and 4-year predoctoral course. During the predental course, the curriculum is designed and taught so that students can learn a wide range of subjects, ranging from humanities and social sciences to natural sciences. Especially, during the first year of the predental course, students study at the Incheon Yonsei International Campus, where residential college (RC) program is provided. All the first year students reside at the Yonsei International Campus, taking regular and extracurricular courses and receiving individualized support. Through RC program, students interact with diverse people and cultures and have chances to improve their English and to develop skills to become a critical and creative thinker.

The predoctoral course offers a step by step and year by year educational program from the first year to the fourth year in basic, behavioral, interdisciplinary, and clinical sciences and clinical practice. Especially, in 2010, the YUCD established specific criteria for competency that is expected of our graduates to be capable of offering comprehensive care in general dentistry. The current competency criteria have three major categories and 22 items. The competency criteria include not only clinical skills and knowledge but also ethical standards, social responsibility, infection control, and dental practice management. The YUCD has adopted and developed innovative educational programs, such as problem-based learning (PBL), team-based learning and self-directed field study to offer various learning opportunities to the students. The YUCD is proud to be the first dental school in Korea to have established a student clinic to allow predoctoral students to practice patient-centered comprehensive dental care under the supervision of highly qualified clinical faculty.

As of February, 2017, the YUCD is accredited for 5 years, from March 2017 to February 2022, by the Korean Institute of Dental Education and Evaluation (KIDEE).

C.V.

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1981.3-1987.2 D.D.S. Yonsei University College of Dentistry
1989.9-1992.2 M.Sc Yonsei University College of Dentistry
1992.4-1995.5 Ph.D. School of Biological Sciences, University of Manchester, U.K.
2007.3- Present Professor, Dept. of Oral Biology, Yonsei University College of Dentistry
2008.9-Present Chairman, Accreditation Committee, Yonsei University College of Dentistry
2014.12- Present Vice Dean for Educational Affairs, Yonsei University College of Dentistry
2017.2-Present Executive Director, Korean Institute of Dental Education and Evaluation
K2-2
Engaging the Community Through Knowledge Exchange

Chun-Hung CHU

Associate Dean (External Relations) and Professor, Faculty of Dentistry, The University of Hong Kong
President-Elect, South East Asian Association of Dental Education

Abstract
The University of Hong Kong (HKU) defines Knowledge Exchange (KE) as engaging, for mutual benefit, with business, government or the public to generate, acquire, apply and make accessible the knowledge needed to enhance material, human, social, cultural and environmental well-being. KE together with Teaching and Research, are the three pillars that underpin all the main activities of the HKU Faculty of Dentistry. KE, being a natural consequence of research and teaching, is at the heart of the wide range of activities that the members of the HKU Faculty of Dentistry undertake with the non-academic sectors of our society. KE is a two-way process. It encompasses all disciplines not only includes technology transfer. The Faculty of Dentistry is committed to contributing to society through community engagement. Community engagement can be defined as the process by which community benefit organizations and individuals build ongoing, permanent relationships for the purpose of applying a collective vision for the benefit of a community. Community engagement focuses less on biomedical technology and more on the societal and environmental factors that contribute to poor dental and general health. In this presentation, a community pr

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Dr Chun-hung Chu is a Clinical Professor and Associate Dean (External Relations) in the Faculty of Dentistry of The University of Hong Kong. He is the President-Elect of the South East Asian Association of Dental Education. Dr Chu was conferred Bachelor of Dental Surgery, Master of Dental Surgery and Doctor of Philosophy by The University of Hong Kong. He also obtained a Post-graduate Diploma in Dental Surgery. He is a dental fellow and examiner of the Royal College of Surgeons of Edinburgh, and fellow and member of specialty board in Dental Public Health of the Royal Australasian College of Dental Surgeons. He is also a master of the Academy of General Dentistry, USA and diplomate of the American Board of General Dentistry. Dr Chu published about 140 journal articles and 200 conference abstracts; and delivered lectures in international meetings. As the principal investigator, he has been awarded various external competitive research grants with a total amount of more than US$ 0.75 million. He also received various foundation funds with a total more than HK$ 0.25 million for Knowledge Exchange and community engagement.
K2-3

Current Evolution of Dental Education and Research in Taiwan

Allen Ming-Lun HSU

Dean and Professor, School of Dentistry
National Yang-Ming University, Taipei, Taiwan

Dental education and research should fit the requirements of current society and future needs. Thus periodically evolution is necessary to meet the demand. There are three main issues that will advance the necessity to progress more faster than ever before. First of all, not only in Japan, but also in Taiwan we are facing the challenge of so called Silver Tsunami. Percentage of elderly people in Japan is 27.7% while it is about 14% in Taiwan. But the increasing rate of elderly change in terms of aging society in Taiwan is much faster than west country which is quiet similar as in Japan. Dental education and research should be revised to fit the necessity of the faster aging society changing for the future demand. The dental curriculum should be prepared to fit the requirement for this goal. The research scope should also be expanded to cover those topic in geriatric dentistry. Second is globalization. International collaboration both in dental education and research among different universities from different countries will enhance the advance of dental science. In order to achieve the goal of dental education which is to improve the knowledge of dentistry by increased communication and exchange of scientific information as well as to stimulate the profession toward great awareness of dentistry both in clinic and research, thus can lead to better achievement in oral health for both countries and even spread the glorious production global-wide. It is necessary to make the scope truly global. The third, is the faster changing of information. Thanks to the development of computer science, today’s update knowledge may become traceable information in the next month. Technology of computer aid design and manufacture system has accelerated the precision and speed for different prosthesis in different ways. Dental education and research should take the advantage of the advanced computer science to fast the efficiency and achievement both in dental education and research.

C.V.
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- DDS, School of Dentistry, Kaohsiung Medical University, Taiwan
- Dr. Med. Dent. Dental Institute, University of Zurich, Switzerland
- Dean and Professor, School of Dentistry, National Yang-Ming University, Taiwan
- President, South East Asia Association for Dental Education (SEAADE)
- Founders Board, International Federation of Dental Educators and Associations (IFDEA)
- Chairman, Committee for Dental Education Ministry of Education, Taiwan
- Chairman, Committee for Post Graduate Training Program, Taiwan
- Editor-in-Chief (2008-2012), Journal of Dental Sciences (SCI)
- Immediate Past President, Chinese Taipei Association for Dental Sciences
- Past President, Asia Academy of Craniomandibular Disorders
- President Elect, International Academy of Comprehensive Dentistry
Dental Education in Mongolia

Amarsaikhan Bazar
Professor, School of Dentistry,
Mongolia National University of Medical Sciences, Ulaanbaatar, Mongolia

Formal dental education in Mongolia began in 1961 with the opening of the first dental education course of Mongolian National University of Medical Sciences formerly called Mongolian National Medical Institute. At that time mostly nurses took the three years course for dental education. Since the beginning of the course, the Institute has been preparing dental professionals at the national level. Department of Dentistry was reorganized in 2000 as School of Dentistry, which is an only governmental school and an integral part of the Mongolian National University of Medical Sciences. In Mongolia there are 5 other private universities, which have dental departments, all located in capital city and founded recently. The private universities are relative young, the first dental department is opened in 2004. School of Dentistry is a most popular among them and has prepared more than 1600 professional dentists since opening their gates.

Dental courses are open to secondary school graduates. Till 2014 5 years bachelor degree curriculum were followed in educational training and transferred to 6 years curriculum for dental students and 3 years diploma education for dental technicians. The Ministry of Education, Culture and Science supervises all dental schools for accreditation. The number of entering dental students increases each year. However, there are limited facilities to increase the enrollment number. There are 4.5 to ten times as many applicants as there are student places available.

In addition to the Doctor of Dental Surgery (D.D.S.) degree, the School offers a DDS/PhD and a baccalaureate degree completion program and advanced education leading to a Master of Science in Dentistry and PhD in Dental Science degree. Postgraduate dental education activities comprises of vocational training, continuing professional education, and specialization in one of the clinical disciplines. Residency training programs are available in Operative Dentistry, Pediatric Dentistry, Prosthodontics and Orthodontics, and Maxillofacial Surgery.

C.V.
Amarsaikhan Bazar DDS, PhD.
Professor Bazar Amarsaikhan Professor and Chief Dental Officer of Ministry of Health and Chairman of Dental Council, Mongolia.

DDS: Graduated, Havana Medical University, Cuba (1985 -1991)
PhD: Received from Graduate School, Tokyo Medical and Dental University (1997-2002)

2017-: Advisor to Minister of Health and Member of Advisory Board to President of Mongolia
2013-2016: Vice President of Research and Development, Mongolian National University of Medical Sciences (MNUMS)
2009-2016: Medical Advisory Committee to President of Mongolia
2004-2013: Dean of School of Dentistry, Health Sciences University of Mongolia (since 2013 University reorganized and became Mongolian National University of Medical Sciences)
2003-2004: Dean of Graduate Studies of Health Sciences University of Mongolia
2005: Assistant Professor, HSUM
2003-2004: Assistant Professor, HSUM
2005-2013: Best Educator of Ministry of Education and Sciences
2012: Best Medical Personnel of Ministry of Health
2013: Golden Polar Awarded by President of Mongolia
ABSTRACTS of SYMPOSIA

Symposium I: Current Research in Oral Health Science

S1-1
Electric microenvironment enhances bone regeneration and osseointegration

Xu-Liang DENG*

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Electrical current or electric potential exists and plays an indispensable role in maintaining bone volume and quality. Electric potential exists in the injured tissue and have been proposed to be important in wound healing. In addition to chemistry and structure, wound electric microenvironment should be a prime directional cue for improved bone regeneration.

In our work, we hypothesized that bone repair can be enhanced by recovering destroyed potential microenvironment. Composite membranes with biomimetic electric are implanted like native periostium covering the bone defect, endogenous bone marrow mesenchymal stem cells can be recruited by galvanotaxis and induced to differentiate into osteoblasts. We also found that built-in electric fields between implant and bone defect could enhance implant osseointegration. We established built-in electric fields between electropositive ferroelectric BiFeO3 (BFO) nanofilms and electronegative bone defect walls to trigger implant osseointegration and biological healing. In the presence of built-in electric fields, implants with BFO nanofilms with downward polarization (BFO+) showed rapid and superior osseointegration in the rat femur. The mechanism of this phenotypic osteogenic behavior was further studied by protein adsorption and stem cell behavior in different time points. BFO+ promoted protein adsorption and mesenchymal stem cell (MSC) attachment, spreading, and osteogenic differentiation. Custom-designed PCR array examination showed sequentially initiated Ca2+ signaling, cell adhesion and spreading, and PI3K-AKT signaling in MSCs. Our results provide a novel strategy for the biomaterials development.

C.V.
Dr. Deng Xuliang was born in Feb, 1972 and gained his Ph.D degree from Beijing Medical University. He is now serving as Professor and vice Dean of Peking University Stomatological Hospital and Head of department of VIP dental service & geriatric dentistry.

Dr. Deng was awarded as Ministry of Education Yangtze river scholar professor, National outstanding youth fund, "Ten thousand plan" National high-level talents, Young Leading Scientist of Scientific and Technological Innovation of Chinese Ministry of Science and Technology, New century excellent talents of ministry of education and national outstanding scientific and technological worker. He is also serving as President of Society of Dental Research Administration, Vice president of national engineering laboratory of oral digital medical technology and materials, Vice president of Beijing biomedical materials laboratory, Vice president of bone Repair Materials and Instruments Branch, Society for biomaterials (China). He is the winner of 2016 Shulan fund youth medical award, winner of 2016 Guanghua engineering science and technology youth award, and winner of innovation award of science research outstanding achievement from minister of education.
Tissue engineering is defined as the combination of cells, materials and biological factors used to improve or facilitate the regeneration of a particular tissue. The potential of recombinant proteins in tissue engineering has been reported. However, the limitation of using recombinant proteins is the high production cost, which impedes the patient access to the treatment. Recently, we produced a recombinant protein in plants platform for the use in bone tissue regeneration. Human osteopontin (hOPN) protein was produced in Nicotiana benthamiana using Geminiviral vector for transient expression. The recombinant OPN was purified from plant proteins using Ni affinity chromatography. The protein could be recognized by human anti-OPN in Western blot and ELISA analysis. Structural analysis indicated that plant-produced OPN had a structure similar to the commercial HEK cell-produced OPN. Biological function of the plant-produced OPN was examined. Osteopontin-coated surface could stimulate proliferation of bone marrow stromal cell from mandible as well as periodontal ligament stem cells as judged by MTT assay. Interestingly, cells seeded on OPN-coated surface also showed the increased expression of osteogenic differentiation-related genes, such as osterix (OSX), dentin matrix acidic phosphoprotein1 (DMP1) and Wnt3a as determined by RT-PCR analysis. The results suggested the potential of plant-produced OPN to be used as a biological factor to induce osteogenic differentiation of stem cells from bone marrow and periodontal ligament.
The Sydney Dental Living Lab—a partnership to transform health and well-being

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Over the next ten years, the University of Sydney Dental School aims to transform health care in our communities by leading the integration of oral and systemic health education, research and clinical service. To enable this, the Sydney Dental School will develop a dental living lab in which it will base most of its activities. A living lab is a system to integrate research and innovation processes in real life activities across the health facilities in which the dental school operates. Its facilities will include clinical research facilities, collaborative zones and other work areas to facilitate collaboration. The living lab is where researchers, educators and clinicians will coordinate their collaborations amongst each other, and with local authorities, citizens and/or businesses.

Within 10 years it is expected that the living lab will be internationally renowned for new models of research excellence built on a partnership approach, to co-create, explore, experiment with, and evaluate new ways of doing business in a real-life context. It will help bring to life a culture of innovation through experimentation and evaluation. It will foster widespread involvement in change amongst the University, the precinct partners and the constituencies supported by them. Through the living lab, we will meet the needs of the community today and into the future by developing a knowledge economy and facilitating intellectual flexibility, curiosity and creativity, the ability to work effectively as part of a team, research and problem-solving skills, and communication skills. An example of the living lab model is the pain management and research centre at the University of Sydney where community, industry, university and government partner to improve individual and community health and well-being through better chronic pain management. This and other models will be discussed.
Titanium dental implants have been used successfully in restorative dentistry for more than 50 years in line with the great advances of bone biology. The speed of dissemination was overwhelming and the dental implants are currently considered as first options for restoring missing teeth. In this regard, it would be meaningful to think over what stage the titanium implants enter into from the perspective of technology life cycle and which direction we should take for further improvement or innovation in the future. In this presentation, one unusual application of titanium implants will be introduced and discussed.
Marginal bone Level comparison between platform switching and platform matching design dental implants- 3 Years follow up study

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Platform-switching technique has proven to be successful in multiple studies, but still data needs to be interpreted carefully. The aim of the present study was to observe the changes at the mesial and distal marginal bone defects around dental implants with platform-switched (PS) and platform-matched (PM), before and 36 months after prosthodontic restoration delivery. 47 patients received 60 sandblasted-acid etched implants. Digital periapical radiographs were recorded before loading (baseline), immediately after loading, 1, 3, 6,12 and 36 months after loading. The implant shoulder was considered as the reference point for measuring vertical and horizontal marginal bone gap of the mesial and distal peri-implant marginal bone defect. We had a success rate of 100%, mean vertical gap reduction during 36 months in PS and PM were $0.96 \pm 1.28\text{mm}$ and $0.30 \pm 1.15\text{mm}$ respectively. ($P < 0.05$) The mean horizontal gap reduction from the baseline until 36 months in PS and PM were $0.48 \pm 1.01\text{mm}$. and $0.37 \pm 0.77\text{mm}$ respectively, with no statistically significant difference. With the limitations of the present study PS seemed more effective for a better peri-implant alveolar bone vertical and horizontal gap reduction than PM, for 3 years. Despite the abutment connection used, the dental implant in the present study presented minimal marginal bone remodeling indicating a stable long-term treatment prognosis. Further studies with longer periods of time and measurements of other parameters are needed.
NAMPT Is an Essential Regulator of RA-Mediated Periodontal Inflammation

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Recent studies have indicated a potential correlation between rheumatoid arthritis (RA) and periodontal inflammation. We undertook this study to verify whether RA mediates periodontitis-like phenotypes in experimental mouse models of RA and to explore the role of nicotinamide phosphoribosyltransferase (NAMPT) in periodontal inflammation during RA pathogenesis. Periodontal inflammation and alveolar bone loss have been reported in mice with collagen-induced arthritis (CIA) and in genetically modified tumor necrosis factor-α (TNF-α) transgenic (TG) mouse models. Among the adipokines examined in our study, NAMPT expression was markedly upregulated in the periodontal ligament (PDL) tissues in RA mouse models and in human PDL cells stimulated by the proinflammatory cytokines, interleukin (IL) 1β and TNF-α. When NAMPT was overexpressed with the Nampt-synthesizing adenovirus vector (Ad-Nampt), the PDL cells exhibited an increased expression of cytokines (IL6), chemokines (IL8 and chemokine [C-C motif] ligand 5 [CCL5]), inflammatory mediators (cyclooxygenase 2 [COX-2]), and matrix-degrading enzymes (matrix metalloproteinase [MMP] 1 and MMP3). Inhibition of NAMPT by the intracellular NAMPT (iNAMPT) inhibitor, FK866, or by the sirtuin inhibitor, nicotinamide, in PDL cells led to inhibition of the IL1β or Ad-Nampt-induced upregulation of catabolic factors, whereas treatment with recombinant NAMPT protein or blockade of extracellular NAMPT (eNAMPT) with blocking antibody did not. Moreover, NAMPT inhibition by the intraperitoneal or intragingival injection of FK866 in CIA mice inhibited periodontal tissue damage, under conditions of RA. Thus, our results verified the co-occurrence of RA and periodontal inflammation using experimental mouse models of RA, suggesting that iNAMPT in PDL cells plays a pivotal role in the pathogenesis of RA-mediated periodontal inflammation by regulating the expression levels of catabolic genes, such as IL6, IL8, CCL5, COX-2, MMP1, and MMP3.
Reconditioning of biofilm-contaminated titanium surface for osteoblast proliferation by hydroxyl radicals generated via H$_2$O$_2$ photolysis

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Background: Titanium dental implants have successfully been used for decades. However, it has been reported that over time some implants are affected by peri-implantitis. As a novel treatment for peri-implantitis, we have developed an antimicrobial chemotherapy, in which hydroxyl radicals generated by photolysis of 3% H$_2$O$_2$ act as the active ingredient, to effectively kill biofilm bacteria and to re-condition the titanium surface for subsequent osteoblast proliferation.

Objective: The aims of the present in vitro study were to evaluate the effect of H$_2$O$_2$ photolysis on properties of intact and biofilm-contaminated titanium surfaces, and to assess the osteoblastic cell proliferation on the treated surface.

Materials and Methods: Titanium disks (Ø = 5 mm) modified by sandblasting and acid-etching were prepared. The disks with or without contamination by biofilm of Aggregatibacter actinomycetemcomitans (a putative pathogen of peri-implantitis) were subjected to ultrasound scaling followed by H$_2$O$_2$ photolysis treatment. The treatment was performed by irradiation of the disk immersed in 3% H$_2$O$_2$ with 365 nm LED light for 5 min. The surface roughness and chemical composition were analyzed using an optical interferometer and an X-ray photoelectron spectroscopy, respectively. In a cell proliferation assay, MC3T3-E1 cells, a mouse osteoblastic cell line, were seeded on the treated titanium disks, and the proliferation after 3-day culture was analyzed.

Results and Discussion: H$_2$O$_2$ photolysis treatment did not significantly change the surface roughness, chemistry, or cell response on intact titanium surface. In contrast, the treatment significantly decreased the percentage of carbon on biofilm-contaminated titanium surface. The cell proliferation on biofilm-contaminated disks was lower than that on the disks without contamination. However, when the biofilm-contaminated disk was treated with H$_2$O$_2$ photolysis, the cells proliferated to the same extent as they did on the disk without contamination. Thus, it is suggested that the antimicrobial technique based on H$_2$O$_2$ photolysis can recondition the biofilm-contaminated titanium surface.
Does Reflective Learning with Feedback Improve Dental Students Self Perceived Competency of Clinical Preparedness?

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Purpose: The value of dental students’ self-assessment is debated in the literature. The objective of this study was to explore whether reflective learning with feedback enables dental students to more accurately assess their self-perceived levels of preparedness on dental competencies.

Methods: Over 16 weeks, all third and fourth year students took part in clinical rotations which incorporated reflective learning and feedback. Following this educational intervention, they were asked to assess their perceptions of their clinical competence. Kappa tests were used to determine the degree of agreement between students’ and tutors’ responses; Mann-Whitney U analyses was used to compare the average responses of 3rd and 4th-year students. Regression models helped to understand whether students’ self-perceived competence predicted their clinical performance.

Results: Dental students felt most confident about performing periodontal treatment (mean score 7.1 on a 10-pointscale) and least confident about providing orthodontic care (mean=5.6). Cohen's kappa was computed between student confidence scores and tutor assessments, varying from 0.10 in orthodontic treatment to 0.26 in periodontal treatment. 4th-year students felt more confident on all the competencies than 3rd-year students. Their self-perceived competencies in periodontal treatment and oral medicine significantly predicted the instructors’ clinical evaluations.

Conclusion: This study resonated with students’ overall experience of reflective learning in clinical rotations and provided some evidence for the inclusion of feedback as a valid component of improving self-perceived competence. As a result, the study offered insights into determining if structured reflective learning with effective feedback helps to increase dental students’ self-perceived level of clinical preparedness.
P-1
Satisfaction of Mongolian Dental Students after Taking Summer Clerkship Program

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Objective: Evaluation of undergraduates’ views on clinical learning experiences is important to ensure quality of program and further improvement. This study investigated the satisfaction of dental students upon completion of “Assistant dentist clerkship” summer program.

Methods: A descriptive cross sectional study was conducted among 70 dental students who were graduating 4th year of School of Dentistry, Mongolian National University of Medical Sciences. Students were attended “Assistant dentist clerkship” program held in various dental clinics in Ulaanbaatar city for four weeks. An anonymous survey with 20 questions consisting of three sections: (i) students knowledge, attitude and skill, (ii) dental clinics’ facility, dentist-coach and (iii) overall evaluation of the program were distributed. SPSS 23.0 software package was used for data analysis.

Results: The majority (95.7%) of students found the clerkship program interesting and met their expectations. About 94.3% of students were encouraged to practice dentistry in the future and choosing dentistry as their career. Forty-nine respondents (70%) reported that improved their knowledge and skills “very well” and 16 (22.9%) as “well”. During the clerkship assignment, 52.8% of students were required to do “non-professional” tasks not listed in the program. Well-equipped clinics and competent supervisors inducts more often into good professional guidance and orientation to the students (p<0.001). The improvement of students’ knowledge and skills were strongly correlated to self-practice and dental teamwork (p <0.001).

Conclusion: Most participants were satisfied with the “Assistant dentist clerkship” program overall and reported positive attitudes towards it. The program is an important practice-based training opportunity for dental students to work under direct supervision of responsible dentists and enhance their clinical knowledge and skills. University has to select dental clinics with well-equipped facilities as well as appoint well-experienced competent dentist for students’ coaching. Although, students were asked doing “non-professional” work, this did not affect the overall satisfaction of the clerkship program.

P-2
Study of the mechanical properties of CPTi ceramic alloy after recasts

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PURPOSE: To investigate the influences of repeated casting on the mechanical properties of CP Ti ceramic alloy. METHODS: CP Ti ceramic alloy samples were prepared and recast for 3 times without adding any new CP Ti ceramic alloy. The physical properties of each specimen were measured. RESULTS: No significant difference was found on the flexural strength of the CP Ti ceramic alloys that had been cast for 2, 3 times, when comparing to that of the alloys being cast for just 1 time (P>0.05). However, the flexural modulus, tensile strength, 0.2% yield strength, surface microhardness of the CP Ti alloys being cast for 2 or 3 times was significantly higher than those of the alloys being cast for 1 time (P<0.05). Elongation of the CP Ti alloys being cast for 2 or 3 times was significantly lower than that of the alloys being cast for 1 time (P<0.05). CONCLUSION: Recasting might cause decreases in tensile properties of CP Ti ceramic alloy.
P-3
Comparison of dental pulp and periodontal ligament stem cells in regenerating periodontal tissues in an ectopic dog model

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Background: The challenge of regenerating periodontal tissue is that it is difficult to obtain the newly formed cementum and the attached periodontal fibers on the tooth root surface exposed in the periodontal defect. Periodontal tissue engineering is expected to solve this problem, in which periodontal ligament stem cells (PDLSCs) is the recognized as the ideal seed cells. However, due to the prevalence of periodontitis, the source of them is limited. Dental pulp stem cells (DPSCs), which can be extracted from non-inflammatoriy pulp, are easily accessible and have mesenchymal stem cell characteristics, such as self-renewal, multipotent differentiation. Therefore, this study explores the biological characteristics of canine DPSCs and PDLSCs and compares their potential of the ectopic formation of periodontal tissues using tissue engineering methods.

Materials and Methods: For the in vitro experiments, the proliferative ability of DPSCs and PDLSCs were compared, so as the biocompatibility of PGA scaffolds for these two cells. In the in vivo experiments, DPSCs and PDLSCs were cultured into the complex of dentin and PGA scaffolds (with static strength) respectively. After 2 weeks of mechanical stimulation, autologous stem cells and material complex were transplanted into the kidney capsule of Beagle dogs. After 8 weeks, the formation of periodontal tissue on the surface of the dentin sheet was observed, and immunohistochemistry for cementum-or tendon/ligament-related markers was performed.

Results: The proliferative abilities of canine DPSCs and PDLSCs were strong, and both of them had the multipotent ability to differentiate into osteoblasts and chondrocytes. CD146, a putative mesenchymal stem cells marker, reached 20-30%, and the cells grew well on aligned PGA. After induction by mechanical stimulation, DPSCs and PDLSCs formed tissue-engineered ligamentous tissues on PGA scaffolds. The in vivo model of renal capsule ectopic transplantation showed that these two stem cells both formed cementum-like tissues on the dentin surface attached with ligamentous fibrous tissues. Cementum-like tissues had positive expression of Periostin, as well as CEM1 (a kind of cementum-specific proteinmarker). Moreover, periodontal ligamentous tissues were positively expressed tendon/ligament related markers, such as Collagen1, Scleraxis and Tenomodulin.

Conclusion: DPSCs can regenerate periodontal tissues comparable to periodontal ligament stem cells, and are expected to be used as alternative seed cells for periodontal tissue engineering.

P-4
Inflammatory and biocompatibility evaluation of antimicrobial peptide GL13K immobilized onto titanium by silanization

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The inflammatory reaction around the implant after implant placement is important not only for osseointegration but also for long-term implant survivals. In our study, GL13K, an antimicrobial peptide, was immobilized onto titanium surfaces to improve its anti-inflammatory properties. The method of silanization was used to immobilize the GL13K, which was confirmed by X-ray photoelectron spectroscopy, scanning electron microscopy, atomic force microscopy, water contact angle measurement. DAPI fluorescence staining and Cell Counting Kit-8 (CCK-8) were used to measure the cell attachment and cell viability of the RAW264.7, which indicated a good cytotocompatibility. Cellular morphology of RAW264.7 on modified surfaces showed less cell pseudopod. ELISA and qRT-PCR were performed to measure the inflammatory activity of the modified titanium surfaces. The secretion levels of pro-inflammatory cytokines interleukin (IL)-1β, tumor necrosis factor-alpha (TNF-α) and inducible nitric oxide synthase (iNOS) were downregulated at 12 h, 24 hand 48 h, while the anti-inflammatory cytokines IL-10 and arginase were upregulated at 12 h, 24 hand 48 h. All results indicate that the GL13K-coated titanium surfaces make the inflammatory process towards a less pro-inflammatory, which may promote the process of osseointegration.
P-5

Development of PH sensitive hollow mesoporous silica as delivery devices for biomineralization precursors for management of incipient caries lesions of orthodontics treatment

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One common side effect during dental clinic is the occurrence of incipient caries lesions, especially in patients with poor oral hygiene. Most of current researches have focused on dental adhesives with antibacterial materials or remineralization agents to inhibit lesions development. However, these adhesives are not “smart” enough, and generally release their active constituent in short term. To overcome this problem, the new “smart” adhesives containing antibacterial materials or remineralization agents are desirable. In the present study, amine functionalization (AF) of expanded pore hollow mesoporous silica nanoparticles(AF-eHMS) were developmented. Poly acrylic acid-stabilized amorphous calcium phosphate (PA-ACP) was chosen as the mineral precursor, and was synthesized by supersaturated solution method. Negatively charged PA-ACP could be effectively loaded by positively charged AF-eHMS through electrostatic interaction. Thus, AF-eHMS was a cargo for loading, storage, and sustained release of PA-ACP. In-vitro release kinetics of mineral precursors from PA-ACP@AF-eHMS was collected at different time intervalin different pH value solution (pH 4.0, pH 5.5, pH 7.0), and was analyzed by inductively coupled plasma-atomic emission spectroscopy (ICP-AES).The inhibitory capacity of lesions formation and remineralization enhancement effect were evaluated using scanning electron microscopy (SEM) and microhardness test. Results showed that PA-ACP@AF-eHMS possessed the capacity to release Ca ions and P ions continuously, and the released amount of Ca ions and P ions from carrier was significant higher when pH value declined. The SEM images and microhardness test confirmed the capacity of inhibition of lesions development and remineralization effect. To our best knowledge, this is first endeavor that combine expanded pore hollow mesoporous silica nanoparticles with amorphous calcium phosphate to control incipient lesions formation. This material is promising in dental clinical practice and provides clinicians a novel strategy for the management of incipient caries lesions formation.

P-6

The Fam50a positively regulates ameloblast differentiation via interacting with Runx2

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Differentiated ameloblasts secrete enamel matrix proteins such as amelogenin, ameloblastin, and enamelin. Expression levels of these proteins are regulated by various factors. To find a new regulatory factor for ameloblast differentiation, we performed 2D-PAGE analysis using mouse ameloblast lineage cell line (mALCs) cultured with mineralizing medium. Of identified proteins, family with sequence similarity 50 member A (Fam50a) was significantly increased during differentiation of mALCs. Fam50a protein was also highly expressed in secretory ameloblasts of mouse tooth germs. In mALCs cultures, forced expression of Fam50a up-regulated the expression of enamel matrix protein genes such as amelogenin, ameloblastin, and enamelin. In addition, up-regulation of Fam50a also increased ALP activity and mineralized nodule formation in a dose-dependent manner. In contrast, knockdown of Fam50a decreased expression levels of enamel matrix protein genes, ALP activity, and mineralized nodule formation. By fluorescence microscopy, endogenous Fam50a protein was found to be localized to the nucleus of ameloblasts. In addition, Fam50a synergistically increased Ambn transactivation by Runx2. Moreover, Fam50a increased binding affinity of Runx2 to Ambn promoter by physically interacting with Runx2. Taken together, these results suggest Fam50a might be a new positive regulator of ameloblast differentiation.
P-7
Effects of cigarette smoke condensate and nicotine on growth status and cytokine expression of human gingival fibroblast on titanium plate

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Human gingival fibroblasts (HGFs) are important for protecting and repairing periodontal tissues. Smoking is a factor that may induce failure of dental implantation. This study investigated the effect of cigarette smoke condensate (CSC) and nicotine on the attachment, growth or expression of interleukin (IL)-6, -8 in HGFs on titanium plate, to uncover the mechanism of smoking in destructing implant gingival interface. Primary cultured HGFs were identified by immunohistochemistry (IHC) staining under SP approach. SRB method was used to detect the adhesion and proliferation of HGFs under different concentrations of CSC. The spreading area and shape index changes were analyzed by a pathology imaging system. Cell adhesion structure was scanned in EM. Levels of IL-6 and IL-8 in the supernatant were detected by ELISA. HGFs showed positive expression of vimentin and negative expression of keratin. Surface adhesion, proliferation, shape index and spreading area were decreased in HGFs after treatment with higher CSC or nicotine concentrations. Such inhibitory effects and IL-6/IL-8 levels were elevated after treated by higher concentrations (P < 0.05) in a dose-dependent manner. Certain concentration of CSC and nicotine can inhibit the attachment and proliferation of HGFs in titanium plate, and facilitate IL-6/IL-8 synthesis and secretion, indicating that toxic substance in cigarette may exert adverse effects on implant gingival interface via modulating the expression of IL-6 and IL-8.

P-8
Activation of metastatic cells in the lung by dissection of lymph nodes

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Lymph node metastasis is detected in most patients with cancer. Lymph node dissection is common for therapeutic and diagnostic methods for lymph node metastasis in head and neck cancer. Although dissection of the primary tumor is beneficial, it may disturb metastatic homeostasis, resulting in the activation and rapid growth of latent tumors in distant metastasis.

However, there is no report whether dissection of normal lymph nodes may be involved in the activation and rapid growth of latent tumors in distant metastasis.

Here we show that dissection of lymph nodes with and without tumors may activate distant metastasis in mice with lymph node adenopathy.

Bioluminescence imaging revealed that metastatic tumor cells in the lung continued to grow after dissection of the subbilic lymph node with and without tumor. In addition, many small foci were detected in the lung ex vivo for tail vein inoculation group comparing with tail vein and intranodal inoculation with lymph node dissection groups.

We anticipate this mouse model may prove to be useful for the elucidation of the mechanisms of latency and inhibit tumorigenesis at an early stage or prevent the formation of metastasis. Furthermore, finding another differentiate diagnostic methods are able to prevent and diagnosing cancer at the early stage of lymph node metastasis.
P-9
Comparisons with and without retention in orthodontic relapse mouse models

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**Objective:** Orthodontic relapse has been a major clinical issue troubled orthodontic dentist and patient. However, the mechanism of relapse is still unknown. Furthermore there are few reports about relapse in mouse model. Therefore, we established orthodontic relapse mouse model, and analyzed relapse distance, relapse rate and histological change after orthodontic tooth movement with and without retention.

**Materials and Methods:** The Ni-Ti closed-coil spring was fixed between the upper incisors and the upper-left first molar to move first molar to mesial direction in 10-weekold wild type mice. After 12 days the tension appliance was removed. Mice were randomly divided into without-retention group(R0), retention for keeping space 2-weeks group(R2) and retention for keeping space 4-weeks group(R4). The relapse check was started in R0 after appliance removing for 15 days. In R2 and R4, light-cured resin was put into the space between first and second molar and solidified through LED light to keep the moved space for 2 or 4 weeks. After 2 or 4 weeks the resin was removed, then the relapse check was started in R2 and R4 for 15 days. The distance was measured every day for the first five days and then measured every two days after appliance or resin removal as relapse. Some mice were sacrificed at several time points in each group for histological analysis.

**Result:** Orthodontic relapse in a distal direction was occurred in all experimental groups. The distance between first molar and second molar in R0 was significantly decreased compared to R2 and R4. R4 showed more space than R2. It was showed a tendency that relapse rate was rapid initially following orthodontic tooth movement or retention with a gradual decrease towards the end of the experimental period. R4 showed more stable relapse rate than other two groups. On mesial side, the osteoclast number at 0-day of relapse was greater than 15-day of relapse in each group.

**Discussion:** In R4, the relapse distance and rate were significantly reduced compared to other two groups, that would be new bone formation on distal side to resist relapse. There was an increase in osteoclast number following orthodontic tooth movement on mesial side. Bone resorption by osteoclast may still occur during retention. The space between first molar and alveolar bone on mesial side was increased after retention. Relapse force may also be decreased because of decreasing of PDL pressure in retention groups.

**Conclusion:** It is considered that retention may inhibit orthodontic relapse in mouse by promoting bone formation on distal side and bone resorption on mesial side indirectly.

P-10
Epiregulin promotes lung metastasis of salivary adenoid cystic carcinoma via exosomes

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Salivary adenoid cystic carcinoma (SACC) is a peculiar malignant tumor, characterized by its slow but inexorable growth, with a high incidence of lung metastasis and poor prognosis. Here, we show the upregulated expression of EGFR ligand epiregulin in a subset of SACC cells correlates with lung metastasis and unfavorable outcome in patients with SACC. We found that upregulation of epiregulin in SACC cells induced epithelial-mesenchymal transition by regulating GLI1/E-cadherin. Elevated epiregulin increased the expression of pro-angiogenic factors, such as VEGFA, bFGF, and IL-8. We also show that epiregulin can be delivered via exosomes and was enriched in exosomes derived from epiregulin-overexpressing SACC cells. Furthermore, treating immunodeficient mice with these epiregulin-enriched exosomes greatly enhanced SACC metastasis to lung. These epiregulin-enriched exosomes significantly enhanced angiogenesis in the neighboring tumor microenvironment and increased vascular permeability in the pre-metastatic lung microenvironment in vivo. Therefore, epiregulin, as well as epiregulin-containing exosomes, may be a novel target for controlling SACC lung metastasis.
P-11
Carbohydrate metabolism related to cariogenicity of oral Bifidobacterium

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Objective: Bifidobacterium have recently been detected in carious lesions, suggesting its involvement in caries etiology. Thus, the purpose was to examine the cariogenic potential of oral Bifidobacterium by analyzing the acid-producing activity, acidic end-products, intracellular polysaccharide (IPS) and related metabolites.

Materials and Methods: B. dentium JCM 1197, B. longum JCM1217 and Streptococcus mutans NCTC10449 were used. The acid production from glucose was measured at pH 7.0 and 5.5 under anaerobic conditions with pH-stat. The acidic end-products were analyzed by HPLC. IPS was isolated from the cells and characterized by absorption spectrum using iodine reaction. In addition, the metabolomic analysis was performed by the combination of capillary electrophoresis and time-of-flight mass-spectrometer (CE-TOFMS).

Results: The acid production of Bifidobacterium was lower than that of S. mutans; however, Bifidobacterium produced acid even without glucose. The acid production of Bifidobacterium was higher at pH 5.5 than pH 7.0. The main acidic end-product was acetate. Absorption spectrum indicated that the IPS was glycogen-like. The metabolomic analysis revealed that the intracellular level of glucose 1-phosphate (G1P, a metabolite derived from IPS) in the absence of glucose was higher in Bifidobacterium than S. mutans, and that the G1P level in Bifidobacterium was higher at pH 5.5 than pH 7.0.

Discussion: Oral Bifidobacterium showed a higher acid production at pH 5.5, and had a considerable amount of glycogen-like IPS, suggesting that these bacteria can maintain and promote a sugar-limited and acidic environment in carious lesions.

P-12
Acid production and its fluoride tolerance of a novel caries-associated bacterium Scardovia wiggsiae

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Objective: Scardovia wiggsiae has frequently been detected from early childhood caries and white spot lesions and now recognized as a novel caries-associated bacterium. Scardovia possesses a unique metabolic pathway for carbohydrate “bifid shunt”, which is not found in most of caries-associated bacteria including Streptococcus mutans. Therefore, the carbohydrate metabolism of S. wiggsiae, especially acid production, acidic end-products and fluoride sensitivity were examined.

Materials and Methods: S. wiggsiae C1A-55 and S. mutans NCTC 10449 were used this study. The acid production from glucose and its acidic end-products were measured with pH-stat system and HPLC, respectively. Fifty percent inhibitory concentration (IC50) of fluoride was obtained by adding a serial concentration of potassium fluoride to the reaction mixture. To identify the inhibitory steps by fluoride the metabolome analysis was performed using the CE-TOFMS.

Results: The acid production of S. wiggsiae was lower than that of S. mutans, while S. wiggsiae continued to produce acid even at pH 5.5. S. wiggsiae mainly produced acetate, whereas S. mutans mainly produced lactate. Tolerance to fluoride was 3.4-5 times higher in S. wiggsiae than S. mutans based on the IC50 of fluoride. By the addition of fluoride, the intracellular accumulation of erythrose 4-phosphate (E4P) and 3-phosphoglycerate (3PG) was observed in S. wiggsiae.

Discussion: Acid-tolerant and fluoride-tolerant acid production of S. wiggsiae suggests its high cariogenicity. To escape from fluoride inhibition, the bifid shunt could provide a bypass pathway for a metabolic flow to acetate not via E4P or 3PG.
P-13
Fluoride inhibition on the growth and metabolism of *Porphyromonas gingivalis*

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**Objective:** *Porphyromonas gingivalis* (*Pg*) is known to utilize proteins/peptides for their growth. Recently, we reported that 1000 ppm F inhibited a peptide-derived metabolic activity by *Pg*. Thus, the present study aimed to evaluate an inhibitory effect on the growth and protein/peptide metabolic reactions of *Pg*.

**Methods:** *Pg* ATCC 33277 was grown anaerobically in the complex media in the presence of fluoride (0, 3.7, 7.4, 14.8, 29.7 and 950 ppm F), and the growth and culture pH were monitored. The *Pg* cells were harvested at 24 and 48 hr, and intracellular amino acids were measured by CE-TOFMS. Furthermore, the activity of gingipain and dipeptidyl peptidase of *Pg* cells grown without fluoride were measured using fluorescent substrates.

**Results:** Fluoride (> 7.4 ppmF) inhibited the growth of *Pg* significantly (*p* <0.01), and fluoride (> 14.8 ppmF) ceased the growth completely. On the other hand, the activity of arg-gingipain and dipeptidyl peptidase was not inhibited by fluoride. Additionally, the uptake of amino acids (produced by protein/peptide degradation) into cytoplasm was not inhibited by fluoride.

**Conclusion:** The low concentration of fluoride (7.4 ppmF) inhibited the *Pg* growth, indicating that fluoride might be effective on periodontitis-associated bacteria, even asaccharolytic bacteria, such as *Pg*. However, the extracellular protease, the periplasmic peptidase and the amino acid uptake were not inhibited by fluoride. These results suggest that fluoride might inhibit the intracellular metabolic pathways for incorporated amino acids. We are now performing metabolomic analysis to estimate the inhibitory steps of the metabolic pathways.

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P-14
Social Inequalities in Dental Implant Use among Elderly Japanese: Data from JAGES Project

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**Background:** Social inequalities in oral health services utilization have been previously reported. Yet, data on the direct association between socioeconomic status and dental implant use appears to be scarce. Except for dental implant, universal health care insurance in Japan covers most of dental care. These policies are considered to affect dental implant use.

**Objective:** To examine the association between socioeconomic status and dental implant use in elderly Japanese.

**Methods:** In 2016, a self-reported questionnaire was mailed to subjects aged 65 years or older living in 39 different municipalities across Japan as part of Japan Gerontological Evaluation Study. Of 279,661 subjects to which questionnaire was mailed, 196,438 responded. We used 62,092 respondents having 19 teeth or less with no missing values. Cross tabulation, univariate logistic regression followed by multivariate logistic regression of income level and educational attainment by implant use was conducted. Covariates were Age, sex, number of teeth, density of dental clinics, smoking, diabetes, musculoskeletal disease, ability of daily living.

**Results:** 3.25% of respondents used dental implants. Higher income level and educational attainment groups tended to show significantly higher dental implant use. Multiple logistic regression showed that after adjustment for educational attainment and all other covariates, compared with our reference the lowest income group (<1 Million yen), the highest income group (=>12 Million yen) showed 5 times significantly higher odds ratio for dental implant use (OR=5.23[95%CI=3.97-6.77]).

**Conclusion:** We found a clear social gradient in dental implant use favoring the higher socioeconomic groups, especially for the highest income level group.
P-15
Therapeutic potential of the lymphatic drug delivery system with 5-FU for the treatment of metastatic lymph nodes

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The lymph node is the first site of metastasis for melanoma, breast and other cancers. Systemic chemotherapy for metastatic lymph nodes (MLNs) faces the difficulty of low tissue selectivity. The lymphatic drug delivery system (LDDS) is a new treatment method for MLNs. With the LDDS, anti-cancer drugs are directly administered into upstream LNs of MLNs to be delivered to the targeted LNs through the lymphatic vessels. The aim of the present study was to evaluate the anti-tumor effects of an anti-cancer drug, 5-FU, delivered to MLNs with the LDDS.

MXH10/Mo-lpr/lpr mice whose most peripheral LNs reach 10 mm in diameter were used. LN metastasis was induced by inoculating two types of luciferase gene expressing tumor cell lines, with different growth characteristics, into the upstream LN of the targeted LN. One was KM-Luc/GFP cells with low-invasive growth characteristics and the other FM3A-Luc cells with high-invasive growth characteristics. Treatment was conducted by injecting 5-FU into the other upstream LN of the MLN when the MLN luciferase activities were confirmed by an in vivo bioluminescent imaging system. The anti-tumor effect was quantified by measuring changes in luciferase activity. When 5-FU was delivered with the LDDS there was significant suppression of tumor growth in the KM-Luc/GFP cells group, whereas there was an only tendency to tumor growth suppression in the FM3A-Luc cells group.

This study shows the effectiveness of 5-FU with the LDDS for MLN treatment.

P-16
Effect of environmental nitrate on the nitrite-producing activity of oral Veillonella

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Introduction: Nitrite is known to inhibit several pathogenic bacterial growth and metabolism. Nitrite can be produced from nitrate in the oral cavity by oral bacteria, such as Veillonella atypica (Va). The nitrite producing activity of Va can be regulated by environmental factors, and our previous study revealed that the activity was increased by lactate. This study aimed to elucidate the effect of nitrate on the nitrite producing activity of Va.

Materials and Methods: Va ATCC 17744 was cultured anaerobically in the medium containing 0.3% tryptone, 0.5% yeast extract, 1.26% sodium lactate with/without 1 mM KNO3. In the logarithmic growth phase, bacterial cells were harvested, washed thrice and re-suspended. The reaction mixture contained bacterial cell suspension (OD = 1 at 660 nm), 1 mM KNO3 and 0-50 mM sodium lactate in 40 mM PPB (pH 5 or 7). After an aerobic incubation at 37oC for 30 min, the reaction mixture was centrifuged, and nitrite in the supernatant was measured with Griess reagent kit. The experiments were run in triplicate.

Results and Conclusion: By adding nitrate to the medium, the nitrite producing activity of Va was increased 5-30 times at pH 7, and 4-17 times at pH 5 (p <0.05). These results suggest that nitrate which is supplied from foods and salivary secretion in the oral cavity, can induce the nitrite producing activity of Va. Consequently, the nitrite can increase in the oral cavity and contribute to preventing oral diseases through inhibiting bacteria.
P-17
A novel method to screen and isolate nitrite-producing bacteria from the oral cavity

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Introduction: Nitrite is known to show an inhibitory effect on the growth of oral bacteria, suggesting that nitrite can contribute to preventing oral diseases. Some oral bacteria can produce nitrite from nitrate, which is abundant in human saliva and diet such as green leaves vegetables. However, there is no method to screen and isolate the nitrite-producing bacteria, thus there is only limited information about the number and species of nitrite-producing bacteria in the oral cavity and its individual difference. Therefore, this study aimed to establish a novel method to screen and isolate the nitrite-producing bacteria.

Materials and Methods: Biofilm samples on the teeth and tongue surfaces were obtained from 6 volunteers. After homogenization and dilution, the samples were dispersed and spread onto blood agar plates. After incubation at 37°C under aerobic or anaerobic condition for 1 week, the total number of colonies was counted. Then, agar containing nitrate and Griess reagent was poured on the plates. Griess reagent is known to react with nitrite to produce red color. Ten min later, the numbers of red colored colonies were counted.

Results and Conclusion: This novel method successfully screened and isolated the nitrite-producing bacteria in the biofilm. The ratio of the red colored colonies to the total colonies was largely different between individuals. However, the ratio obtained by aerobic incubation was higher in the teeth surfaces than the tongue surface, while that by anaerobic incubation was higher in the tongue surface than the teeth surfaces. Bacterial identification is now in progress.

P-18
The Surface Modification of Nano-zirconia Ceramic by FFC Cambridge Process

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Background: Pure titanium has been introduced by Branemark into dental implant material for a half century. Owing to the high success rate of titanium, it is still regarded as a common choice for dental implant. Whereas, more work should be done to solve the problem of metal sensitivity and esthetic, responding to higher and higher requirements from patients and dentists nowadays. Due to its favorable physical, mechanical, biological and chemical properties, zirconia possesses the potential to be a kind of promising implant materials. However, surface modification is necessary to improve the bio-performance of zirconia materials. Farthing–Fray–Chen (FFC) Cambridge process is an efficient and low-cost metallurgical process to manufacture metals and alloys by electrochemical reduction of metal oxides in calcium chloride based melts.

Purpose: Evaluate the effect of FFC Cambridge process on the osseo-integration of nano-zirconia ceramic materials in vitro.

Methods: Nano-zirconia (Panasonic Health Care Co, Japan) specimens were used, and three kinds surface condition are applied: (1) FFC Cambridge processed; (2) machined surface; (3) sandblast and acid-etching. The cell proliferative activity was measured using EdU Apollo In Vitro Flow Cytometry. In addition, osteogenic capability, level of Osteogenetic expression and ultimately mineralization also evaluated by Alkaline phosphatase test, RT-PCR and Alizarin red-staining test.

Results: FFC Cambridge processed nano-zirconia showed significant higher bioactivity compared with machined surface and sandblast and acid-etching surface.

Conclusion: In the scope of this study, our results suggest that the FFC Cambridge process has potential to be an advanced method for surface modification of nano-zirconia materials.
P-19
Inhibition of lipopolysaccharide-induced osteoclast formation and bone resorption in vivo by glucagon-like peptide-1 receptor agonist

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Introduction and background: Glucagon-like peptide-1 (GLP-1) receptor agonists, such as exendin-4, are widely-used diabetic medicines with less side effects. In many animal studies, anti-inflammatory effects of GLP-1 receptor agonist have also been demonstrated. LPS is a cell component of gram negative bacteria that can induce inflammation and osteoclast formation. In this study, we investigated the effect of exendin-4 on LPS-induced osteoclast formation and bone resorption.

Methods and results: We injected LPS with or without exendin-4 daily on C57BL/6mice calvariae for 5 days. After sacrifice, the number of osteoclasts, the percentage of bone resorption area, and the level of C-terminal telopeptide fragments of type I collagen cross-links(CTX) were significantly decreased in LPS and exendin-4 co-administrated mice compared to LPS alone administrated mice. Expression levels of both RANKL and TNF-αmRNA were also reduced in the exendin-4and LPS co-administrated group than LPS administrated group. Then we designed in vitro experiments to check the effects of exendin-4 on osteoclasts, stromal cells, and macrophages. Our in vitro results showed thatexendin-4 showed no direct effects on RANKL-induced osteoclast formation, TNF-α-induced osteoclast formation, cell viability of osteoclast precursors, or LPS-induced RANKL expression in stromal cells. On the other hand, TNF-α mRNA expression was suppressed in the exendin-4 and LPS co-treated macrophages as compared with LPS alone treated groups.

Conclusion: Our results suggested that GLP-1 receptor agonist might inhibit LPS-induced osteoclast formation and bone resorption in vivo through inhibiting the production of LPS-induced TNF-α in macrophages.

P-20
Controlled Transcriptional Regulation of Transgene Expression during Osteogenic Differentiation of Mouse Induced Pluripotent Stem Cells

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Tissue engineering is a new frontier in dentistry with the aim of achieving the regeneration of missing oral tissues, and engineering applications using stem cells in the field of dentistry await the establishment of a stem cell source that allows easy collection by dentists (Egusa et al., J Prosthodont Res, 2012). Induced pluripotent stem (iPS) cells can be generated through reprogramming of somatic cells from different tissues by forced expression of defined exogenous factors. Although iPS cells are expected to be a source for bone tissue engineering (Egusa et al., Stem Cells Dev, 2014, Okawa et al., Stem Cells Int, 2016), a reliable and efficient protocol for iPS cell differentiation into mature osteoblasts has not yet been established. Genetic modification of iPS cells can potentially guide their differentiation toward defined cell lineages and is thus expected to provide an improved protocol to obtain pure osteoblast populations. A nonviral PiggyBac transposon-based gene delivery system has been used for efficient gene delivery to iPS cells. This system can be combined with tetracycline (tet)-controlled transcriptional regulation of transgene expression during iPS cell differentiation (Zhang M, Kondo T, Kamano Y, Egusa H et al., Interface Oral Health Science, Springer, 2016). In this presentation, we introduce genetic modification of mouse iPS cells to control osteogenic differentiation using a PiggyBac transposon DNA vector with a tet-controlled transcriptional regulation system, with an emphasis on benefits over classic gene delivery systems, which may provide a great impact on iPS cell research towards bone bioengineering.
Biomechanical effect on bone healing and remodeling in a mandibular reconstruction case using fibula free flap

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Mandibular reconstruction using fibula free flap (FFF) has become a well-established procedure following substantial bone resection. Nevertheless, some clinical complications remain with delayed or poor union between the grafted fibula bone and native mandible. Whilst the newly established biomechanical conditions following mandibular reconstruction using FFF can be a critical determinant for achieving favorable bone union, little has been known about their association in a time-dependent fashion. This study evaluated the bone healing and remodeling activity in the reconstructed mandible with FFF using longitudinal CT data in vivo, and further quantified its correlation with mechanobiological responses through an in-silico approach.

A 66-year-old male patient received mandibular FFF reconstruction after segmental resection was studied. Post-operative CT scans were taken at 0, 4, 16 and 28 months. Longitudinal change of bone morphologies and mineral densities were measured at three bone union interfaces (two between the fibula and mandibular bones and one between the osteotomized fibulas) to investigate healing and remodeling events. Three-dimensional finite element models were created to quantify mechanobiological responses in the bone at these different time points.

Bone mineral density increased rapidly along the bone interfaces over the first four months. Cortical bridging formed at the osteotomized interface earlier than the other two interfaces with larger bone shape discrepancy between fibula graft and mandibular bone. Bone morphology was found to significantly affect jaw biomechanics in the osteotomized region (R²>0.77). The anatomic position and shape discrepancy at bone union affected the bone healing and remodeling process.

This newly developed analyzing method provides new understanding of healing and remodeling of mandible following the FFF reconstruction, which might be able to establish important mechanobiological insights into patient-specific surgical planning and occlusal rehabilitation.

Activating NOTCH1 Mutation Correlates with NICD Expression and Loss of Myoepithelial Differentiation and Related to High-Grade Revolution and Poor Prognosis in Adenoid Cystic Carcinoma

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Salivary adenoid cystic carcinoma(SACC) is identified as a tumor with biphasic differentiation of epithelial and myoepithelial cells, showing tubular, cribriform and solid growth patterns. The solid subtype is considered as high grade with more aggressiveness and poorer prognosis, however, the molecular mechanism underline its distinct clinicopathologic characteristics remains unknown. In this study, we detected the amount and distribution of the myoepithelial cells in different subtypes of SACC using a panel of markers and found the loss of myoepithelial differentiation in solid subtypes. Then we identified recurrent activating Notch1 mutations in high-grade SACCs which correlated with high level of NICD expression and indicated higher levels of Notch pathway activation in these tumors. Furthermore, we demonstrated Notch pathway activation related to the loss of myoepithelial differentiation in SACC and might contribute to the higher proliferation and worst outcome in high-grade solid SACCs. Targeting the Notch signaling pathway in high-grade SACCs may provide therapeutic benefits.
P-23
Identification and characterization of salivary gland antigen-presenting cells and memory resident T cells

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Immune cells such as dendritic cells (DCs), macrophages and lymphocytes are essential for effective immunity and tolerance. However, the presence and characteristics of immune cells in steady-state salivary glands (SGs) currently remain unknown.

In this study, we identified CD64−CD11c+ classical DCs (cDCs) as well as CD64+ macrophages among CD45+ MHC class II+ antigen-presenting cells in steady-state murine SGs. SG cDCs were divided into CD103+CD11b− cDC1s and CD103−CD11b+ cDC2s. Both cDC subsets markedly expanded in response to the Flt3 ligand (Flt3L) and were differentiated from common DC precursors. Furthermore, the SG CD103+CD11b− cDC2s possess antigen cross-presenting capacity.

CD64+ macrophages were further classified into CD11c+ and CD11c−. CD206, a mannose receptor, and Mer tyrosine kinase, a major macrophage apoptotic cell receptor, were expressed higher in CD11c+ macrophage than CD11c− macrophage, suggesting their different functions.

We also detected resident memory CD4 and CD8 T cells, which express homing receptors, such as CCR4, CCR6, CCR10 and α4β7, in addition to natural killer cells. These results suggest that cDCs (cDC1s and cDC2s), macrophages, resident memory T cells and natural killer cells in SGs contribute to immune surveillances in the tissues.

P-24
The Influence of Cellulose Nanofibers on Mechanical Properties of Denture Base Resin

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The mechanical properties are very important factor for denture base materials. Especially surface wettability of denture base participates in denture retention, stability during oral function significantly. Improvement of wettability of denture base materials, therefore, can improve the denture function, which leads to upgrade of the quality of life (QOL) of aged denture wearers. Cellulose nanofiber (CNF) is the innovative biomass materials and widely used in medical, cosmetic and pharmaceutical filed. We guess that CNF could be used as denture immersing solution to improve surface wettability of denture base resin.

The purpose of this study was to investigate the influence of CNF solution on mechanical properties of the denture base resin. We used two types of the cellulose nanofibers in this study: from bamboo tree (BB) and needle leave tree (NB). Based on different liberation degrees (A-low, B-middle, C-high) and different concentrations (0.05%, 0.1%, 0.2%), we prepare 18 different solutions to immerse the denture base resin. During the first month immersion, the contact angles for each group were measured at 0 day, 7 days, 14 days and 28 days. The group CNF-BB-A (including 0.05%, 0.1%, 0.2%) and CNF-NB-C 0.05% can improve the surface wettability of the denture base resin. Additionally, we observed antibacterial activity of CNF solution using S. Mutans and P. Gingivalis. The results showed no antibacterial property in all solutions.

Within the limitation of this study, our results suggest that the CNF solution may be useful in improving surface wettability of denture base resin.
P-25
Targeted drug delivery system using ultrasound and antibody-conjugated microbubbles enhances therapeutic efficacy in a squamous cell carcinoma model

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Purpose: Ultrasound creates transient permeability of cell membranes in the presence of microbubbles (MBs), and foreign macromolecules were derived into the cells. In the present study, we developed anti-epidermal growth factor receptor (EGFR) antibody-conjugated MBs (EGFR-MBs) and evaluated their capacity to enhance anti-cancer drug toxicity in vitro and in vivo.

Materials & Methods: We prepared EGFR-MBs from anti-EGFR antibody conjugated liposomes and ultrasound contrast gas. Human gingival cell carcinoma Ca9-22 cells were exposed to ultrasound in the presence of bleomycin and EGFR-MBs. We assessed the effect of bleomycin delivery using ultrasound and EGFR-MBs in Ca9-22 cells by WST-8 assay, FACS and Hoechst staining in vitro. Next we elucidated the effect of bleomycin delivery using ultrasound with EGFR-MBs in a murine squamous cell carcinoma model in vivo.

Results: Ultrasound and EGFR-MBs treatment had a strong cytotoxic effect on Ca9-22 cells with low dose bleomycin. Furthermore, bleomycin delivery using ultrasound and EGFR-MBs remarkably increased the number of apoptotic cells in vitro. Interestingly, bleomycin delivery by ultrasound with EGFR-MBs exhibited remarkable antitumor activity in vivo.

Conclusion: Our results show that EGFR-MBs and ultrasound treatment increases the efficacy and specificity of intracellular drug uptake, suggesting this could be a novel drug-targeting modality for oral squamous cell carcinoma chemotherapy treatment.

P-26
Gene Transfection In Vivo with Bone Morphogenetic Protein-2 encoding DNA-Functionalized Calcium Phosphate Nanoparticle-Loaded Collagen Scaffolds

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Background: In the combination of scaffolds immersed in growth factor solutions, the release of growth factors mainly depends on scaffold degradation. To induce bone regeneration, the release of BMP-2 at an appropriate concentration during the stage of tissue regeneration is considered a favorable condition.

Objective: the aim of the present study was to investigate the yield, releasing period, and activity of BMP-2 produced in vivo by gene transfection using biodegradable scaffolds and to compare the influence of scaffold type on BMP-2 release.

Materials and methods: Nanohydroxyapatite-collagen (nHAC) scaffolds cross-linked with 1-ethyl-3-(3-dimethylamino propyl) carbodiimide hydrochloride (EDC) or ascorbic acid/copper chloride, and a collagen scaffold (Terdermis®) were prepared, loaded with BMP-2-encoding plasmid DNA-functionalized calcium phosphate nanoparticles (CaP) or BMP-2 solution, and implanted in rats. The yield, releasing period and activity of released BMP-2 were biochemically and histologically analyzed.

Results and Discussion: The yield of released BMP-2 and its releasing period, respectively, were larger and longer from the scaffolds loaded with CaP than from those incubated with BMP-2 solution. In addition, the alkaline phosphatase activity induced by the CaP-loaded scaffolds was higher. Histological analysis showed that released BMP-2 could be observed on macrophages and foreign body giant cells surrounding the nHAC fragments. The present study demonstrates that gene transfection by nHAC/CaP scaffolds induces a larger yield of BMP-2 for a longer period than by those loaded with BMP-2 solution.
Oral management and infection control at the Perioperative Oral Support Center of Tohoku University Hospital

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Chemotherapy and radiotherapy for cancer treatment sometimes cause oral complications such as oral mucositis and dry mouth. On the other hand, well oral hygiene of patients who undergo medical surgery prevents infection of oral bacteria on surgical wounds, and shorten hospitalization. Thus, oral hygiene management at perioperative period is very important for the results of medical treatment.

Under present circumstances, the Perioperative Oral Support Center of Tohoku University Hospital (POSC) was established in 2015. In this report, we analyzed the medical referral letters of new patients who visited POSC in 2015 and 2016.

Patients were introduced from various special clinics in the hospital. The most common clinics were Oral and Maxillofacial Surgery, Cardiovascular Surgery, Organ Transplantation, Reconstruction and Endoscopic Surgery, Otolaryngology-Head and Neck Surgery, Hematology and Rheumatology, and Cardiovascular Medicine, in order of new patients. This tendency did not change for 2 years.

Comparing year 2015 and 2016, total number of patients increased by 10%. Increased cases aimed at intraoral examination and oral infection control before medical treatment. There was also increasing the number of patients intending to oral examination before starting chemotherapy or prescribing bisphosphonate formulations and anti-RANKL monoclonal antibody drug.

Increasing the new patients of POSC represented the growth of understanding the importance of oral management during perioperative period in medicine. Through the activities of oral management and infection control in POSC, we should strongly promote the integration of dental support system into the medical treatment for the patients who need comprehensive and intensive medical care. Furthermore, we should develop more effective perioperative oral care method based on this result.

Revitalising silver nitrate for caries management

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Silver nitrate has been adopted for medical use as a disinfectant for eye disease and burned wounds. In dentistry, it is an active ingredient of Howe’s solution used to prevent and arrest dental caries. While medical use of silver nitrate as a disinfectant became subsidiary with the discovery of antibiotics, its use in caries treatment also diminished with use of fluoride in caries prevention. Since then, fluoride agents, particularly sodium fluoride, have gained popularity in caries prevention. However, caries is an infection caused by cariogenic bacteria, which demineralise enamel and dentine. Caries can progress and cause pulpal infection, but its progression can be halted through remineralisation. Sodium fluoride promotes remineralisation and silver nitrate has a profound antimicrobial effect. Hence, silver nitrate solution has been reintroduced for use with sodium fluoride varnish to arrest caries as a medical model strategy of caries management. Although the treatment permanently stains carious lesions black, this treatment protocol is simple, painless, non-invasive and low-cost. It is well accepted by many clinicians and patients and therefore appears to be a promising strategy for caries control, particularly for young children, the elderly and patients with severe caries risk or special needs.
P-29
The effects of CPP-ACP on enamel erosion: an in situ study

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Objective: The present study aimed to evaluate the effects of CPP-ACP on enamel erosion using an improved in situ experimental model.

Methods: 40 enamel blocks were fabricated from fresh-extracted human premolars and further embedded in the acrylic resins. All specimens were randomly divided into 2 groups (n=20): experimental group and control group. The enamel surfaces of specimens in experimental group were pretreated with casein phosphopeptide-amorphous calcium phosphate (CPP—ACP) for 3 min before daily in situ erosion, whereas the specimens in control group were pretreated with deionized water for 3 min. Ten healthy volunteers were recruited and a split-mouth design was employed in this in situ study. The specimens in the experimental group were randomly located in the 11 and 16 and the control specimens were in the 21 and 26 areas. All volunteers were instructed to drink 150 ml cola within 5 min by the gargling method before placing appliances intraorally for 2 h. After the in situ erosion, the appliances were remained undisturbed intraorally for 1 h until the next erosive attack. The in situ erosion cycles were performed 4 times daily over 7 d. The surface microhardness of the samples was measured before and after erosion. The data were statistically analyzed using one-way ANOVA. Results were considered statistically significant at a level of P<0.05.

Results: Significant surface softening was observed in all specimens after erosion (P<0.001). The surface microhardness loss in the experimental group and control group were 38.7% and 50.9%, respectively. The specimens in the experimental group were found to have less surface microhardness changes compared with those in the control group. The decrease in surface microhardness was more significant for specimens located in the anterior area than in the posterior area (P<0.001).

Conclusions: Based on this in situ study, short-time consuming of acid beverages would produce significant effects on human enamel. Application of CPP-ACP can partially increase the erosion resistance of tooth.

P-30
Photofunctionalization Enhances Bone-Implant Contact, Dynamics of Interfacial Osteogenesis, Marginal Bone Seal, and Removal Torque Value of Implants: A Dog Jawbone Study

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Objective: Ultraviolet (UV) light treatment of titanium, ie, photo-functionalization, has been extensively reported to enhance the osteoconductivity of titanium in animal and in vitro studies. This is the first study to examine whether photo-functionalization is effective on commercial dental implants in vivo.

Materials & Methods: Dental implants with a micro-roughened surface were placed into dog jawbones. Photo-functionalization was performed by treating implants with UV light for 15 minutes using a photo device immediately before placement. Four weeks after placement, bone-implant integration was evaluated using a removable torque test and static and dynamic histology. Results: Implant surfaces were converted from hydrophobic to super-hydrophilic after photo-functionalization. Removable torque for photo-functionalized implants was significantly higher by 50% than that for untreated implants. Bone to implant contact (BIC) was significantly higher for photo-functionalized implants in all zones examined: marginal, cortical, and bone marrow zones. An intensive mineralized layer was exclusively present in marginal bone at photo-functionalized interface. Dynamic histology identified earlyonset, long-lasting robust bone deposition at photo-functionalized interface. Conclusions: Photo-functionalization enhanced the morphology, quality, and behavior of perimplant osteogenesis, including the increased BIC, expedited robust interfacial bone deposition, and improved marginal bone seal and support.
P-31
Microbiota Profiling at the Mouth of Plastic Bottles after Drinking Straight from Bottles

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Objectives: Oral bacteria have been suspected to grow in the plastic bottles after drinking straight from bottles. To know the bacterial influence on the general health (e.g., food poisoning), as a first step in this study, bacteria at the mouth of bottles after drinking were analyzed quantitively and qualitatively. Methods: After obtaining informed consent, 5 healthy subjects (20-23 years) were asked to drink non-sugar tea (ca. 50 mL) in a plastic bottle (of 300 mL). Both immediately after and one-day after drinking, the mouth of bottles was wiped with sterile cotton swabs. Samples were inoculated onto the blood agar plates, and incubated anaerobically at 37°C for 7 days. Drinks at one-day after drinking were also cultured. Genomic DNA were extracted from individual colonies, and bacterial species were identified by 16S rRNA gene sequencing. Results: The mean amounts of bacteria (CFU/mL) were (2.2 ± 0.6) × 10^4 and (9.4 ± 8.3) × 10^3 at the mouth of bottles immediately after and one-day after drinking, respectively. On the other hand, (2.6 ± 1.5) × 10^6 were recovered from drinks at one-day after drinking. Streptococcus (48.6%) were predominant at the mouth of bottles, followed by Actinomyces (14.5%), Gemella (7.2%), Propionibacterium (5.8%), Staphylococcus (5.1%) and Veillonella (5.1%). In contrast, Streptococcus were overwhelmingly detected in one-day after drinking. Conclusions: These results suggest that the composition at the mouth of plastic bottles was similar to that of human saliva, and that the predominant species survived in a drink one-day after drinking.

P-32
Kaikun® is effective for preventing from trismus derived from treatment of head and neck cancer

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Trismus is characterized by a reduced ability to open the mouth, directly affecting many aspects of quality of life such as chewing, swallowing, speaking and maintaining oral hygiene. Consequently, it can lead to malnutrition, weight loss and difficulty with dental treatments, leading to oral disease. Several studies have shown that trismus is negatively associated with measured health related quality of life.

The Kaikun® is a new devise to train mouth opening. The upper and lower bite parts are inserted into the mouth between the teeth and manually opened by squeezing 2 shell-shaped handles together. The shell-like handles can open only one side of mouth, depending on how it is gripped. The bite part and the handle part move independently, and it is possible to train the mouth opening at an angle that matches the tooth row. The device may be used both by dentate and edentulous patients.

We analyzed an effect of Kaikun® in patients with postoperative trismus. We conducted mouth opening training in each 20 patients with or without Kaikun® who underwent surgical operation or chemoradiotherapy together for head and neck cancer.

The average increase of mouth opening was 5.8 mm in the control group, while it was 15.8 mm with Kaikun®. That results suggest that Kaikun® is effective for preventing from trismus and mouth opening training to the many directions may inhibit the formation of the scar contractures.
P-33
Assessment of Influence of Dental Caries on Body Growth and Development Indices among Children

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Aim: To assess the influence of dental caries on body growth and development indices among the children of Ulaanbaatar city, Mongolia.

Materials/Methods: For the 1st stage of study population 120 children was selected, aged 5 years old from 91st kindergarten, Songinokhairkhan district, Ulaanbaatar city. For the 2nd selection samples were divided into case (31 children, whose dmft was 7 and more) and control (31 children caries free) groups. The body weight and height of all children were measured by anthropometric methods, maximum bite force by occlusal forcemeter GM10, grip force by grip forcemeter. The short-term memory of participants was examined by standard cards.

Results: The average body weight and height of case group was 18.9±1.9 kg and 105.6±2.0 cm, whereas control group were 21.5±2.6 kg and 106.3±2.2 cm, respectively (p<0.001). A weak negative relationship observed between dental caries and body weight (r=0.2; p<0.01) and height (r=0.1; p<0.05) indices. Maximum and mean bite force in anterior teeth of control group was 137,7±41,5N and 74,4±27,8N and of case group was 73,5±46,1N and 36±25,3N, respectively (p<0.01). Posterior teeth results for control group were 321,1±65,2N, 238,5±60,6N, where for cases were 91,5±94,2N and 55,5±59,4N, respectively (p<0.001). Mean grip force was 5,9±2,2 kg for control group and 3,9±2,6 kg for case group (p<0.01 for right hand, p<0.05 for left hand). Results of the short-term memory, 60% of control group and 35% of cases had 30 and more scores (p>0.05), which was evaluated very well.

Conclusions: Dental caries was influencing body growth and development indices of 5 year-old Mongolian children.

P-34
Genomic study of chronic obstructive pulmonary disease in Mongolian patients

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Introduction: Many factors can contribute to the occurrence of Chronic Obstructive Pulmonary Disease (COPD). Recent studies have pointed to the notion that polymorphism of candidate genes may also play a significant role in COPD pathogenesis.

Goal: To investigate the association of polymorphisms in ADRB2, TNF-α, EPHX, SERPINA1, TGFβ, GSTP1, GSTT1, GSTM1 and ACE candidate genes with COPD.

Materials and Methods: We enrolled to this study 150 patients with COPD and 150 healthy persons in control. The genomic DNA was purified of whole blood from participants and used for the further genome analysis. We genotyped 12 polymorphisms in the locus of rs1042713, rs1042714, rs1051740, rs2234922, rs28929474, rs17580, rs1800470, and rs1695 of above mentioned genes using allele specific PCR, PCR-RFLP and multiplex PCR method.

Results: The allele specific genotype and haplotype frequency were analysed. Genotype frequency of the homozygote Gly16 (rs1042713) was more frequent in COPD patients than controls (OR=2.52; 95%CI, 1.49-4.27, p=0.025). Also, haplotype frequency of Gly16+Gln27 was in significant difference among cases and controls (OR=2.72; 95%CI, 1.81-4.57, p=0.0001).

Conclusion: Overall, ADRB2 rs1042713 and rs1042714 polymorphisms are associated with increased susceptibility to the development of COPD in Mongolian patients.
P-35
Oral Cancer in Mongolia: A Retrospective Study

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Objective: This study attempts to quantify and analyze distribution of oral cancer among Mongolians, based on hospital-based data.

Material and methods: A descriptive epidemiological study was carried out on retrospective data provided by the Registration and Statistical Office, National Cancer Center of Mongolia, the only referral center for cancer patients nationwide. The data included demographic characteristics, information of oral premalignant and malignant lesions based on clinical judgment and confirmed with biopsy diagnosis of cases. Participants were divided into 3 age groups: 29-50; 51-70 and 71-95 years. The malignant tumours were classified as squamous cell carcinoma; orofacial cancer, lip cancer and the less frequent morphological types of tumours were categorized as other. The statistical description and analyses were carried out using Stata/SE 14.0 software.

Results: Totally, 69 patients aged 30-93 years old were have reported with oral cancer between 2012-2013 and 2015-2016 years. Mean age of the patients was 65.8±15.0. There were 42 (60.9%) males and 27 (39.1%) females. Out of total reported cases, tongue cancer comprised 65.2% (n=45), oropharyngeal cancer 17.4% (n=12), lip cancer 8.7% (n=6) and others 8.7% (n=6) (premalignant forms of tumours, leukoplakia etc), respectively. Participants aged 51-70 and 71-95 years old were the most vulnerable subgroup for oral cancer 46.4% (n=32) and 37.7% (n=26). Among tongue cancer 40% (n=18) was reported during 2012-2013 and 60% (n=27) was reported between 2015-2016 years, where as oropharyngeal cancer only observed during year of 2015-2016. Among the total squamous cell carcinoma cases 45 (65.2%) well-differentiated consisted 47.8% (n=33), 7 (10.1%) were moderately differentiated and 5 (7.3%) were poorly differentiated.

Conclusion: Leading cancer was tongue cancer, followed by orofacial and lip cancer, consequently. Generation of awareness, adopting best practice and application of preventive measures and control would be beneficial for early cancer detection and better treatment outcome. This is a preliminary study, further continues research is needed.

P-36
Lateral Cephalometric Measurement Standards of Mongolian Children with Normal Occlusion from 6-15 Years of Age

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Objectives: The aim of this study was to analyze craniofacial sagittal and vertical dimensions in subjects with normal occlusions to establish age and gender-specific lateral cephalometric measurement standards for Mongolian children.

Methods: The study group consisted of a sample of 642 untreated subjects with normal occlusions from 6 to 15 year old. Craniofacial anatomic landmarks were identified directly on the digital images. A customized cephalometric analysis was used to measure 18 variables of linear measurement and 18 variables of angular measurement on software program (Winceph 11.0). Student’s t-test was employed to test for gender differences in each age.

Results: Most of the linear measurements, larger craniofacial distances were recorded in males than females.
Also linear measurements were increasing according to age. There were no statistically significant gender differences with regard to most angular measurements at subsequent age groups. Soft tissue analysis revealed flatter profiles in females than in males from the age of 10-11 years onward, while age-dependent changes in the soft tissue profile were similar in both genders.

**Conclusion:** In untreated subjects with normal occlusion craniofacial development of the hard and soft tissues can be considered age- and gender-dependent. Therefore age- and gender-specific differences of linear craniofacial distances should be taken into account for diagnosis and treatment planning in children and adolescents. The present results can be used as reference values for children and adolescents of Mongolian origin.

**P-37**

Ten-year change of social capital status of oral health in local residents

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In the elderly society, it is essential to prevent the senior citizen's frailty in order to extend the healthy life expectancy. For this purpose, it is necessary to construct a social capital for promoting regional oral health that protects people from entering the stage of oral frailty in the whole regions. "Social capital" is the word meaning characteristics of social mechanisms such as "trust", "rule", "network" that can increase social efficiency by activating cooperative behavior among people.

In order to promote regional oral health, we had trained up the volunteers of local residents for promoting oral health in the community. Then we had constructed the dental health check-up program with learning oral activity, with dental volunteers, community dentists, and administration staffs.

In this report, we explored the change of social capital status of oral health from a survey on the oral health activity for 10 years. We conducted a questionnaire survey on residents of rural areas in the northern part of Miyagi Prefecture. Before starting the survey, we had trained the dental volunteers for 10 years. The questionnaires included the question on daily oral health practice, experience of teeth brush instruction, and experiences of brushing others' tooth.

Totally 12 thousand questionnaires were gathered in the 10-year survey period. It reported that there was no marked change of the percentage among the people who received tooth brushing guidance, around 60%. On the other hands, the people who cleaned others' teeth were increased from 32% in year 2006 to 39% in 2016.

By increasing the number of trained dental volunteers in the community, the human resources capable of introducing oral health to the residents would increase. This will lead to enrich the social capital of oral health in regional area of the elderly society.

**P-38**

Preliminary Study on Association between Dental Caries and Socioeconomic Factors in Nalaikh, Rural District of Ulaanbaatar City, Mongolia

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**Objectives:** To describe dental health of children living in rural Nalaikh district of Ulaanbaatar city and to evaluate its association with their parents’ socioeconomic status.

**Methods:** A total of 130 participants, aged 1 to 18 years, were included in the current cross-sectional study. Oral examination for each of them was done by dentists, during two days of joint Mongolia-Japan dental
charity treatment at the Nalaikh Health Center, to detect decayed, missing and filled deciduous and permanent teeth. Based on the dental chart, caries indices were calculated as dmft/DMFT and its component dt/DT. Questionnaires completed by their parents were analyzed. Questionnaire included indicator of demographic characteristics, socioeconomic status and oral health related issues were surveyed. Quartile of income was used as the main socioeconomic status. Multiple linear regression analysis was applied to examine the association between socioeconomic status and caries experience, age and type of teeth were adjusted. The association between the characteristics of the subjects and the number of decayed, filled, and missing permanent teeth was analyzed using Stata/SE 14.0.

**Results:** Among the 130 study subjects, caries prevalence was found to be 93.1% and the mean age was 6.9. Mean dmft and DMFT score of the population was 1.82, 95%CI [1.53; 2.12] and 1.63, 95%CI [1.27; 1.98], respectively. Mean dt and Dt was 1.70, 95%CI [1.41; 1.98] and 1.31, 95%CI [1.02; 1.61]. Parental income was negatively associated with untreated decayed teeth. After adjusted for age and type of teeth, people with highest income had lower dt/Dt compared to those with lowest income (B=-0.9, 95%CI [-1.49, -0.34]). This trend was also observed for dmft/DMFT. Highest dmft/DMFT of >7 was 1 to 6 years old 51.7% (n=30) and 46.6% (n=27) 7 to 12 years old children. Participants response on visiting dental clinic was due to toothache experience 86.1% (n=99) and only 13.9% (n=16) was for preventive purpose.

**Conclusion:** Caries experience was directly associated to parent’s income of the studied children with highest caries prevalence in this rural district. Inequalities in the distribution of dental caries continue affecting children from poorer socioeconomic profiles. There is an urgent need for planning public interventions for oral health promotion, strategies to prevent childhood caries that take into account individual and contextual socioeconomic characteristics in Mongolia.

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**P-39 Nasalance Scores in Normal Mongolian Children**

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**Background:** Approximately 20-38% of children who undergo cleft palate repair develop velopharyngeal insufficiency. It is diagnosed clinically by a constellation of symptoms that includes pathologically incurred nasal resonance hypernasality. Hypernasality is dominant characteristic of speech exhibited by individuals with cleft lip and/or palate. In Mongolia, there are no studies on the development of nasalance scores as well as protocols to be used in clinical speech therapy. Necessity in establishment of the normative nasalance scores based on native Mongolian language and dialect prompted us to conduct present study. Thus, we aimed to evaluate mean normative nasalance scores of Mongolian speaking children.

**Methods:** A total of 2280 healthy children were selected in this cross-sectional study in order to represent all khalkh dialects of Mongolia. Participants from central region, 4 aimags and 3 cities were included. Subjects were divided into 4 groups, aged (i) 4–5, (ii) 6–8, (iii) 9–11 and (iv) 12-13, respectively. Children repeated each of the seven speech stimuli (high pressure consonants and low pressure consonants, nasal consonants and 7 passages), developed by our research team, individually. Nasalance scores were obtained using a Nasometer™ II (model 6400). For statistical analysis used SPSS 20.0 paired-sample t-test, One-way ANOVA and p value calculated for the significance differences (p<0.05).

**Results:** Normative a mean nasalance scores obtained for all passages were 26.3-33.7%. Normative a mean nasalance scores obtained for 4-5 years old were 26.8±5.0%, 6-8 years 32.0±7.3%, 9-11 years 34.0±6.6% and 12-13 years 35.0±8.7%, respectively. There was statistically significant gender dependence for the all passages (p=0.001). A mean normative nasalance score for Mongolian speaking boys were 31.44%–75.45%, while as for girls was 32.71%–76.96 and showed statistically gender significance (p=0.001).

**Conclusion:** This study provides a normative nasalance data for Mongolian speaking children to use as a reference for clinical speech therapy for children with congenital cleft lip and/or palate and it is the first research study of its kind in Mongolia.
Memo