Global Network Initiative for BioDental Education and Research

Hiroshima University Faculty of Dentistry
Organizing Committee

Chair
Motoyuki Sugai, Hiroshima, Japan
Takashi Takata, Hiroshima, Japan
Hiroki Nikawa, Hiroshima, Japan
Hidemi Kurihara, Hiroshima, Japan
Takashi Kanematsu, Hiroshima, Japan
Koichi Kato, Hiroshima, Japan
Masaru Sugiyama, Hiroshima, Japan
Yuji Yoshiko, Hiroshima, Japan
Katsuyuki Kozai, Hiroshima, Japan

Conference Secretariat:
Hiroshima University Faculty of Dentistry
1-2-3 Kasumi, Minami-ku, Hiroshima 734-8553, Japan
E-mail: bimes-bucho-sien@office.hiroshima-u.ac.jp

All rights reserved. No part of this material may be reproduced in any form or by any means without permission in writing from the organizing committee.
Printed in Japan
On behalf of organizing committee members of Hiroshima Conference and Hiroshima University Faculty of Dentistry, it is my great pleasure of extending to you an invitation to participate in 5th Hiroshima Conference on Education and Science in Dentistry with the theme, “Global Network Initiative for BioDental Research and Education” to be held in Hiroshima, Japan on October 12 and 13, 2013.

After eight years since 2006, Hiroshima Conference has become a well-recognized international meeting giving participants valuable opportunities to learn the up-to-date cutting edge dental science and education, to exchange new ideas and information, and to build research or academic ties among participating institutions and their scholars. Together, we have scheduled a forum for young scientists and students who will be leaders of next generation. In addition, we have scheduled a satellite international symposium of food, nutrition and health on October 14, 2013. This is the first international symposium with interdisciplinary theme about food, nutrition and health organized by School of Oral Health, Hiroshima University Faculty of Dentistry in collaboration with Hiroshima Prefectural University and Hiroshima Jogakouin University.

Please enjoy special lectures, symposiums and workshops and I wish you will be a part of this conference and experience memorable days as a speaker, a poster presenter or an audience.

With best regards,

Professor Motyuki Sugai
President of 5th Hiroshima Conference on education and science in dentistry
Dean, Faculty of Dentistry Hiroshima University
Contents

Preface
M. Sugai ........................................................................................................... i

Plenary Lecture
University Mobility
T. Asahara ......................................................... 3

Special Lecture
I. Resolution of Inflammation in Periodontitis: a Potential New Treatment Paradigm
T.E. Van Dyke .......................................................... 7

II. Liver Immunity and Surgery
H. Ohdan ......................................................... 11

III. Latest Facts and Issues about Dental Education in Japan
Y. Murata .......................................................... 17

IV. The G60S Connexin 43 mutation is dominant-negative for gap junction formation and function but activating for the osteoblast lineage
J.E. Aubin ......................................................... 19

Education Session
Reformation, Standardization and Accreditation of Dental Education
From Mutual Recognition Arrangement (MRA) towards Core Competencies of Dental Professions in ASEAN Economic Community (AEC)
W. Krassanai .................................................. 23

New era of Dental Education: Quality assurance of dental education through the accreditation in Korea
J.H. Lee .......................................................... 27

Undergraduate Dental Education in the United Kingdom: Curriculum Design and Regulation.
P.M. Speight and P.M. Farthing ............................................. 31

Dental Curriculum, Accreditation and Licensure: A North American perspective
C.F. Shuler .......................................................... 36

Accreditation system for pharmaceutical education in Japan
K. Ozawa .......................................................... 41

Workshop on Future Dental Education
(supported by Program for Inter-University Collaborative Education)
An Introduction of Comprehensive Model Practice Course at Faculty of Dentistry, Niigata University, Japan
K. Uoshina .......................................................... 44

Development of clinical training program for sophisticated dental education
H. Shimauchi, Y. Takeuchi, T. Tenkumo, and K. Sasaki ......................... 45

Cultivation of Bio-Dentists with Global Competency and Advanced Technology
H. Nakaue and M. Sugai ......................................... 48
Clinical Education of Dental Practice at University of Washington
D.C.N. Chau ................................................................. 51

Science Session

Innovative Technologies for Biomolecular and Cellular Analysis
Mass spectrometry for high-throughput proteome analysis and biomarker discovery
C.H. Chen ................................................................. 61

Surface plasmon resonance for cell-based clinical diagnosis
M. Hale, Y. Yamae and T. Hingan .................................. 65

Microarrays of plasmids and proteins for identifying the determinants of stem cell fates
K. Kato ................................................................. 70

On-chip cellomics technology for studying dynamics of cellular networks
K. Yasuda, F. Nomura, T. Hamada, H. Terazawa and A. Hattori ........................................ 74

Young Investigators' Session

—New Waves in BioDental Research from Hiroshima—
GCF and IFN-γ in mouse periodontitis —Report of Brain-Circulation Program—
S. Matsuda ................................................................. 78

Effects of low-level laser irradiation on human dental pulp cell metabolism
R. Kanimatsu ................................................................. 79

Inhibition of cell-cell fusion during osteoclastogenesis by NHE10-specific monoclonal antibody
Y. Mine, S. Makihira and H. Nikawa .................................. 80

Generation of human induced pluripotent stem (iPS) cells in serum- and feeder-free defined culture from dental pulp cells
S. Yamasaki and T. Okamoto ........................................ 81

Stem Cell Biology and Regenerative Medicine
Dynamics of Linage Fate Determination between Osteoblasts and Adipocytes in Rodent Models
Y. Yoshihito, K. Sakurai, Y. Fujino, T. Minamizaki, H. Yoshioka, Y. Takei, M. Okada and K. Kozai ........................................ 82

Dental Pulp Cells as a Source for iPS Cell Banking
K. Tezuka ................................................................. 88

Linkage between muscle and bone
H. Kaji ................................................................. 91

Poster Session

A. Dental education ......................................................... 103
B. Frontiers of biological science in dentistry .................. 113
C. Latest trends in BioDental engineering ...................... 145
D. Oral health and clinical treatments ......................... 155

Author index
Poster Session

A-1~A-10: Dental Education
B-1~B-32: Frontiers of Biological Science in Dentistry
C-1~C-10: Latest Trends in BioDental Engineering
D-1~D-23: Oral Health and Clinical Treatments

Airlangga University, Indonesia

01-1 [B-1] ................................................................. 113
Antioxidant effect of Nigella sativa extract in various concentration
with DPPH free radical scavenging assay

S. Kurnia, R. Safitri and E.M. Setiawatie

01-2 [B-2] ................................................................. 114
The role of TGF-β1 in alveolar bone resorption with Apical Periodontitis

D.A. Wahyuningrum

01-3 [D-1] ................................................................. 155
Nigella sativa oral rinse as an anti oxidant effect reduced bleeding on probing
and pocket depth

E.M. Setiawatie

01-4 [D-2] ................................................................. 156
Changes in the antegonial angle and depth in the dentate Javanese population

E.R. Astuti

01-5 [B-3] ................................................................. 115
The antifungal effect of Stichopus hermani extract to Candida albicans in vitro

K. Parisilmi, S. Revianti and D. Pringgenies

01-6 [D-3] ................................................................. 157
Relationship between dental caries and salivary neutrophil level with nutrition
in children

R. Indrawati, M.D. Ariani, A. Rizqiawan and K. Suardita

01-7 [B-4] ................................................................. 116
The role of hypoxia to apoptosis on bone marrow mesenchymal stem cells (BMSCs)
culture for salivary gland defect therapy due to ionized radiation

S.W.M. Mulyani

01-8 [B-5] ................................................................. 117
Induction HEMA upregulated expression of NLRP3 in rat dental pulp tissue

W. Saraswati

Chulalongkorn University, Thailand

02-1 [B-6] ................................................................. 118
Interleukin 12 increased RANKL/OPG expression ratio in human PDL cells

B.I.N. Ayuthaya and P. Pavanant
Effects of histomorphometric, bone-to-implant contact and osseointegration on a novel hybrid micro/nano topography-modified dental implant in the mandibular canine-premolar area of the mini-pigs

Stress analysis of mandible ameloblastoma by 3-dimensional precise reconstruction model and rapid prototyping solid model

Evaluation of patient characteristics as potential prognostic factors for dental implant failures by using classification and regression tree analysis

Microstructure characteristics and biocompatibility of laser surface-modified austenitic stainless steels containing micro/nano-porous layer for biomedical applications

Semi-tubular implant surgical guide system for dental implant in posterior regions with leaderguide system
H.H. Lin, K.L. Ou and C.Y. Wu

Tianjin Medical University, China
A multi-center survey: oral healthy behavior and risk factors of dentine hypersensitivity
Q. Kehua G. Ping D. Jiayin and H. Deyu

Wonkwang University, Korea
Effect of connective tissue graft (CTG) on gingival recession before palatal orthodontic movement of buccally erupted canine

Hirosima University, Japan
The functional role of MSX1 in stem cells from human exfoliated deciduous teeth (SHED)

Regulation of the Na⁺-H⁺ exchanger activity associated with bicarbonate secretion from rat salivary ducts
K. Ueno, C. Hirono, Mi. Kitagawa, M. Sugita and Y. Shiba
C-5
15-2

Effects of histomorphometric, bone-to-implant contact and osseointegration on a novel hybrid micro/nano topography-modified dental implant in the mandibular canine-premolar area of the mini-pigs

C.C. Weng1,2,3, P.W. Peng2,3,4, M. Nasir5, K.L. Ou2,3,6,7, and C.H. Yu2,3

1 School of Dentistry, College of Oral Medicine, Taipei Medical University, Taipei 110, Taiwan
2 Research Center for Biomedical Devices and Prototyping Production, Taipei Medical University, Taipei 110, Taiwan
3 Research Center for Biomedical Implants and Microsurgery Devices, Taipei Medical University, Taipei 110, Taiwan
4 School of Dental Technology, College of Oral Medicine, Taipei Medical University, Taipei 110, Taiwan
5 Faculty of Dentistry, Hasanuddin University, Sulawesi Selatan, Indonesia
6 Graduate Institute of Biomedical Materials and Tissue Engineering, College of Oral Medicine, Taipei Medical University, Taipei 110, Taiwan
7 Department of Dentistry, Taipei Medical University-Shuang Ho Hospital, Taipei 235, Taiwan

BACKGROUND: Electrochemical oxidation following a sandblasted and acid-etched (SLA-Ti) treatment has gained much interest as a surface modification for titanium (Ti) implants (SLAffinity-Ti); however, less information is available on the impact for in vivo performances of these SLAffinity-Ti implants.

OBJECTIVES: The present study is to evaluate the osseointegration and biomechanical bone tissue response to SLAffinity-Ti implants possession of micro-and nanoporous oxide layers.

EXPERIMENTAL METHODS: Seventy-two implants belonging to the following groups (12 of each group): a standard machined-Ti (M-Ti) surface, a SLA-Ti surface and a SLAffinity-Ti surface were inserted into the mandibular canine-premolar area of mini-pigs. The histomorphometric and removal torque tests were conducted after 3 and 12 weeks of implantation.

RESULTS: The implants with the SLAffinity-Ti surface caused more peri-implant bone density and bone-to-implant contact than those with the SLA surface. Electrochemical oxidation both increased the torque resistance to removal of SLAffinity-Ti implants. The difference was statistically significant (p<0.001) after 3 weeks of implantation, whereas no statistical difference was observed after 12 weeks of implantation (p>0.005).

CONCLUSION: After 3 weeks of healing, the bone microstructure around SLAffinity-Ti implants appeared significantly more organized, achieving a higher stability in bone. Clinical implications of these results included an early peri-implant formation of bone and an indication for earlier loading protocols.
Stress analysis of mandible ameloblastoma by 3-dimensional precise reconstruction model and rapid prototyping solid model

C.Y. Chen¹,²,³, C.H. Lin⁴, M. Nasir⁵ and K.L. Ou¹,²,³,⁶*

¹ Graduate Institute of Biomedical Materials and Tissue Engineering, College of Oral Medicine, Taipei Medical University, Taipei 110, Taiwan
² Research Center for Biomedical Implants and Microsurgery Devices, Taipei Medical University, Taipei 110, Taiwan
³ Research Center for Biomedical Devices and Prototyping Production, Taipei Medical University, Taipei 110, Taiwan
⁴ School of Dentistry, College of Oral Medicine, Taipei Medical University, Taipei 110, Taiwan
⁵ Faculty of Dentistry, Hasanuddin University, Sulawesi Selatan, Indonesia
⁶ Department of Dentistry, Taipei Medical University-Shuang Ho Hospital, Taipei 235, Taiwan

BACKGROUND: Ameloblastoma is a benign tumor, commonly happened in jaw-bone, and about 1% of oral cancer disease. Although it showed benign on histology, its high recurrent rate was caused by inadequate resect. Oral is a complex mechanical environment and local mechanical effects may play an important role in stimulating tumor cell spreading.

OBJECTIVES: The objective of this present study is using finite element analysis (FEA) to investigate the principal stress and stress distribution of a 3D precise reconstruction model and a rapid prototyping (RP) solid model of an ameloblastoma patient, providing information that would be valuable in dental and biomedical applications.

EXPERIMENTAL METHODS: Stress analysis models were reconstructed from volume computed tomography data (VCT). The interval of which is only 0.625 mm were reconstructed model could be very precise and we could differentiate the scope of tumor. Using FEA program (ANSYS Workbench 12.1) to mesh 3D model and stimulate the occlusion condition as boundary conditions. Moreover, convert 3D model into STL (stereolithography) file to build a solid model with RP machine (ZPrinter 450, Z Corp.) to analyze the mechanical tests was performed.

RESULTS: The ameloblastoma spreading in the middle of mandible left lateral incisor and canine caused the frontal teeth malalignment, so the maximum stress was concentrated on these two teeth middle. However, the ameloblastoma made the cortical bone surrounding the tumor thinner to cause more stress on bone during occlusion. The results of principal stress show significant tension stresses on the tumor that brought mechanotransduction with oncogenic signaling pathway in tumor cell spreading.

CONCLUSION: Our study shows that this could be potentially benefits for understanding the stress properties of mandible ameloblastoma during occlusion. Otherwise, the RP solid model could be a preoperative model to help the surgeon plan and shorten the operative time (and therefore shorten the wound exposure time and decreased blood loss).
Bovine lactoferrin enhances osteogenesis through TGF-β receptor signaling

T. Inubushi1, A. Kosai2, S. Yanagisawa1, C. Chanbora1, M. Miyachi1, S. Yamasaki3, E. Sugiyama3, A. Ishikado4, T. Makino4 and T. Takata1

1 Department of Oral and Maxillofacial Pathobiology, Hiroshima University Institute of Biomedical and Health Sciences, Hiroshima, Japan
2 Hiroshima University School of Dentistry, Hiroshima, Japan
3 Department of Clinical Immunology and Rheumatology, Hiroshima University Hospital, Hiroshima, Japan
4 R&D Department, Sunstar Inc., Takatsuki, Japan

OBJECTIVES: The pleiotropic functions of bovine lactoferrin (bLF) are known but poorly understood. bLF has been reported to stimulate osteoblast proliferation, enhance thymidine incorporation into osteocytes, and reduce apoptosis of osteoblasts. However, the essential effects of bLF on bone cell anabolism and related mechanisms are not well demonstrated.

METHODS: C3H10T1/2, a mouse mesenchymal cell line, and primary osteoblasts were cultured in α-MEM. In vitro study, alkaline phosphatase (ALP) activity, mineralized nodule formation as well as the expression of osteoblast differentiation markers were examined. Western blotting analysis, immunoprecipitation and binding assay were performed to clarify the bLF-induced signal transduction mechanisms. Ex vivo organ cultures of mouse calvaria were also performed.

RESULTS: bLF enhanced ALP activity and the expression of early osteoblastic differentiation markers, Runx2, ALP and Osterix, in C3H10T1/2. bLF also up-regulated ALP activity, mineralized nodule formation and the expression of late osteoblastic differentiation markers, BSP and OCN, in primary osteoblasts. Furthermore, bLF induced Smad-dependent and Smad-independent MAPK activation. Both ALP activity and mineralized nodule formation induced by bLF treatment were eliminated in TGF-β receptor (TβR)-I or p38 kinase inhibitor treated cells. The direct binding of bLF to TβR-II was also observed. In ex vivo experiments, it was revealed that bLF promoted new bone formation and regenerating of bone defects.

CONCLUSION: Our data suggest that bLF is a potent osteogenic factor, which exerts its actions by activating the TGF-β signaling pathway. Our data indicate that bLF has distinct anabolic effects on the development and growth of osseous tissue in mammals. We anticipate that bLF will be a valuable agent for bone regeneration.