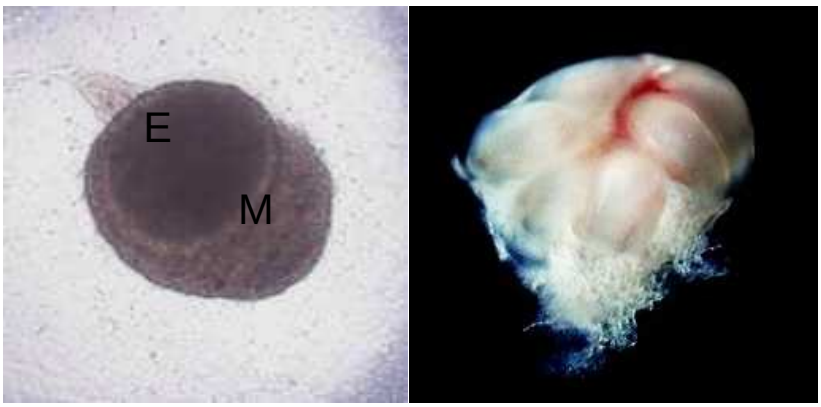
The Joint Meeting of the 3rd Symposium on “Oral Health Science “ and the 3rd symposium on “Dental and Craniofacial Morphogenesis and Tissue Regeneration”

PROGRAM

January 26, 2008

Fukuoka Recent Hotel, Fukuoka, Japan.



PROGRAM

Opening Remark

9:15-9:20 Hiroshi Nakanishi, Project Leader

9:20- 9:30 Akifumi Akamine , Dean of Kyushu University Faculty of Dental Science

Invited Lecutures

<Chair persons: Kazuaki Nonaka & Hidetaka Sakai>

9:30- 10:10 **Invited lecture-1**

"Development of a Bioengineered Organ Germ Method for Future Tooth Regenerative Therapy"

Takashi Tsuji

Faculty of Industrial Science and Technology, Tokyo University of Science, Tissue Engineering Research Center, Tokyo University of Science, Japan

10:10-10:50 **Invited lecture-2**

"BMP-signaling in craniofacial development"

James F. Martin

Texas A&M Health Science Center, Institute of Biosciences and Technology, Huston, TX, USA.

Short break

11:10-11:50 **Invited lecture-3**

Akihiro Umezawa

Department of Reproductive Biology, National Institute for Child Health and Development, Tokyo, Japan.

Lunch

12:00-13:00

<Chair person: Seiji Nakamura>

13:00-13:40 **Invited lecture-4**

13:40-14:20 **Invited lecture-5**

"Anti-Aging Medicine for Dentistry in Japan –Seeking innovative oral health care –"

Ichiro Saito

Department of Pathology, Tsurumi University School of Dental Medicine, Yokohama, Japan.

Short break

Presentations of Annual Research Reports on the Projects

Part 1

<Chair person: Toshio Kukita>

14:40-15:05 "Roles of thymosin beta 4 and nucleolin in the developing tooth germ of the mouse lower first molar"

Ieyoshi Kobayashi, Tamotsu Kiyoshima, Hideaki Sakai

15:05-15:30 "Protogenin, a new member of the immunoglobulin superfamily, is implicated in the development of mouse lower first molar"

Tamotsu Kiyoshima, Ieyoshi Kobayashi, Hideaki Sakai

15:30-15:55 "TGF-β signaling plays a role in osteo-chondroprogenitor cell lineage determination during mandible development "

Kyoko Oka

Section of Pediatric Dentistry, Division of Oral Health, Growth and Development, Kyushu University Hospital

15:55-16:20 "A possible suppressive role of galectin-3 in osteoclastic bone destruction accompanying adjuvant-induced arthritis in rats"

Li, Y., Teramachi, J., Nagata, K., Wu, Z., Kukita, A., Akamine, A., Kukita, T.

16:20-16:45 "Inhibition of the inflammation-induced bone destruction through modulating phagocytes functions by phosphatidylserine-liposomes"

Wu, Z., Ma, H.M., Kukita, T. and Nakanishi, H.

Short break

Part 2

<Chair person: Dr. Yoshihisa Yamashita>

17:00-17:25 “Comparative Studies of the peri-implant epithelium of rat gingivae between platform-switched c and non-switched c implant system”

Ikiru Atsuta

Section of Removable Prosthodontics, Division of Oral Rehabilitation, Faculty of Dental Science Kyushu University, Japan.

17:25-17:50 “An attempt to make a new method of definitive diagnosis in dry mouth

Masafumi Masafumi”

Section of Oral and Maxillofacial Oncology, Division of Maxillofacial Diagnostic and Surgical Sciences, Faculty of Dental Science, Kyushu University, Fukuoka, Japan.

17:50-18:15 Nakamura

18:15-18:40 Shigemura

18:40-19:05 “

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Getting Together Party

<M.C.: Yuzo Ninomiya, Project Leader>

19:20-21:00

Closing Remarks

20:50-21:00 Kiyoshi Koyano, Associate Director of Kyushu University Hospital

Development of a Bioengineered Organ Germ Method for Future Tooth Regenerative Therapy

Takashi Tsuji

Faculty of Industrial Science and Technology, Tokyo University of Science

Tissue Engineering Research Center, Tokyo University of Science, JAPAN.

The ultimate goal of regenerative therapy is to develop fully functioning bioengineered organs that can replace lost or damaged organs after disease, injury or aging. The development of three-dimensionally reconstructed bioengineered organs from dissociated single cells *in vitro* is a goal of this technology. The "tooth" is a good feasibility study model in regenerative medicine because cells are easily obtained and even if extracted from an adult for study in the transplanted model, the process is rarely life-threatening. To bioengineer ectodermal organs such as teeth and whisker follicles, we developed a three-dimensional organ-germ culture method using collagen gel. The bioengineered tooth germ generates a structurally correct tooth following both transplantations under a subrenal capsule *in vivo* and also in *in vitro* organ cultures with a high frequency. By *in situ* hybridization analysis, it was indicated that our current tooth germ model reproduced the interaction between epithelial and mesenchymal cells in early tooth organogenesis. We additionally generated a tooth cavity by extraction of a mandibular incisor in adult mice and find that a complete tooth structure, showing penetration of nerve fibers, can be successfully developed following the engraftment of bioengineered primordium isolated from cultured bioengineered tooth germ. Our model provides a substantial advance in the development of bioengineered organ replacement strategies and regenerative therapies. In this symposium, I would like to discuss why and explain how we are trying with the hurdles of "tooth regenerative therapy" approached from organogenesis.

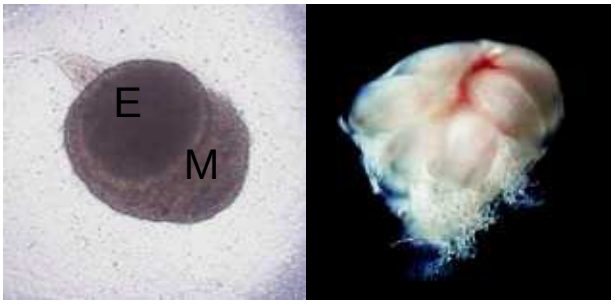

Figure: Representative phase contrast images showing a bioengineered tooth germ (left) and teeth (right) developed in a subrenal capsule for

14 days. E: epithelial cells, M: mesenchymal cells.

BMP-signaling in craniofacial development

James F. Martin

Texas A&M Health Science Center, Institute of Biosciences and Technology, Huston, TX, USA.

The calvarium forms the skull vault that is necessary for brain protection. We investingated Bone morphogenetic prottein4 *(Bmp4)* function in calvarial development using conditional gene targeting in mice. Using a *Bmp4* conditional null allele and the *Wnt1cre* transgene to inactivate *Bmp4* in cranial neural crest (CNC), we found that *Bmp4* deficient embryos had parietal foramina (PFM, OMIM #168500), a defect that involves failed fontanelle closure. *Bmp4* was required to maintain cell proliferation of undifferentiated head mesenchyme. *Msx1* and *Msx2* expression was diminished while *Twist1* expression was unchanged in *Bmp4* mutant embryos. We investigated the genetic relationship between Twist and Bmp4-signaling using a conditional null allele of *Twist1*. Our data indicate a strong gentic interaction between *Twist1* and *Bmp4* indicating that *Twist 1* is a component of the Bmp-signaling pathway.

Anti-Aging Medicine for Dentistry in Japan

– Seeking innovative oral health care –

Ichiro Saito

Department of Pathology, Tsurumi University School of Dental Medicine, Yokohama, JAPAN

Anti-aging medicine is defined as the medicine which makes maintaining health and youth possible while growing older. The aim of this innovative medicine is not simply to extend the life span, but to prevent age-associated physical and mental decline and maintain a high quality of life thus enabling continued social productivity. Instruction on health enhancement and therapy based on anti-aging health care, namely anti-aging medicine, is a new preventive method and a concrete effort to achieve the Ministry of Health, Labor and Welfare's goal of its "Healthy Japan 21" campaign to promote better health in the 21st century. It is also hoped that evidence-based anti-aging dental medicine will be implemented in the dental medicine field.

In the year 2050 almost 40% of Japan's population will be over the age of 65 years. The decline in the incidence of dental caries and periodontal disease means that the time for a transformation in conventional dental medicine is imminent and it will be essential to introduce anti-aging medicine to the dental field in order to create a framework for innovative oral health care.

Saliva has growth factors and antibacterial agents important for biological homeostasis, and various other substances vital for maintaining general health. It is therefore an essential theme for the implementation of anti-aging medicine and various methods are proposed to stimulate salivary secretion. Initial evidence suggests the possibility of clinical application of anti-oxidant supplements to treat oxidative-stress related aging diseases, including age-related dry mouth disorders.

The dentistry field also has a deep involvement in heavy-metal contamination. It is becoming evident the influence on aging which dental materials used in dental treatment and dentures have. The medical field is also hoping that dentists will make active efforts to diagnose and improve these conditions. It is clear that the anti-aging medicine region in which dentistry is involved is very diverse. Close cooperation between the dentistry and medical fields will make it possible to implement the above methods thus resulting in a high level of anti-aging medicine.