

歯と骨の分子疾患科学の国際研究拠点 ーデント・メドミクスofインテリジェンスハブー

第3回 リトリート



【日程】

2011年

2月1日(火)～2日(水)

【場所】

オークラフロンティアホテルつくば
〒305-0031

茨城県つくば市吾妻1-1364-1
(TEL:029-852-1112)

Tokyo Medical & Dental University
Global Center of Excellence Program
**International Research Center for
Molecular Science
in Tooth and Bone Diseases
Third Retreat Camp**

Feb.1-2,2011
Okura Frontier Hotel Tsukuba
1-1364-1 agatsuma Tsukuba Ibaraki
Tel: 029-852-1112



日 程

2月1日(火曜日)

10:00	東京医科歯科大学集合
10:30	大学出発 (バス)
11:30	ホテル到着
11:30-12:30	昼食
12:50-	開会の挨拶 野田教授
13:00-14:00	特別講演1 Dr.Irma Thesleff (University of Helsinki)
14:00-15:00	特別講演2 Dr. Adam Engler (University of California)
15:00-15:15	休憩
15:15-15:45	特別講演3 山下 晃弘先生 (University of Calgary)
15:45-17:45	シャベロンによる講演 一人25分 4名
17:45-18:00	チェックイン
18:00-18:15	ポスター準備
18:15-19:00	夕食
19:00-20:00	セッション2 (ポスター)
20:00-22:00	Dr. Thesleff, Dr. Engler, 山下先生、 シャベロンとのラウンドディスカッション
22:00-	ポスター片付け 就寝

2月2日(水曜日)

7:00-8:00	朝食
8:00-8:30	荷造り チェックアウト
8:30-11:30	シャベロンによる講演 6名
11:30-12:30	昼食
13:00-16:00	産業技術総合研究所つくばセンター 講演、見学 糖鎖医工学研究センター 成松 久 センター長
17:30 ごろ	大学到着 解散

Schedule

Tuesday Feb 1st, 2011

10:00 am	Gather at Main gate, Hongo street, TMDU
10 : 30am	Departure from TMDU by bus
11:30 am	Arrive at the Okura Frontier Hotel
11:30-12:30 pm	Lunch
12:50am	Opening speech by Prof. Noda
13:00-14:00 pm	Presentation by Dr. Irma Thesleff (University of Helsinki)
14:00-15:00 pm	Presentation2 by Dr. Adam J Engler (University of California)
15:00-15:15 pm	Break
15:15-15:45 pm	Presentation by Dr. Yamashita Akihiro (University of Calgary)
15:45-17:45 pm	Presentation by Chaperones
17 : 45-18 : 00	Check-in for the hotel
18 : 00-18 : 15	Start Poster Presentation Session
18:15-19:00 pm	Dinner
19:00-20:00 pm	Poster Presentation Session2
20:00-22:00 pm	Round Discussion with Dr.Thesleff, Dr. Engler, Dr. Yamashita and Chaperones
22:00 pm	End of the Poster Session (Remove your own Poster)

Wednesday Feb 2nd, 2011

7:00-8:00 am	Breakfast
8:00-8:30 am	Check out
8:30-11:30 am	Presentation by Chaperones
11:30-12:30 pm	Lunch
13:00-16:00 pm	Visiting The National Institute of Advanced Industrial Science and Technology (AIST)
17:30 pm	Arrive TMDU

事業推進担当者



Masaki Noda, M.D., Ph.D.

(野田政樹)

GCOE Program Leader, Professor
Department of Molecular Pharmacology
<http://www.tmd.ac.jp/mri/mph/index.html>



Junji Tagami D.D.S., Ph.D.

(田上順次)

Professor
Department of Cariology and Operative Dentistry
<http://www.tmd.ac.jp/grad/ope/ope-J.htm>



Hiroshi Takayanagi, M.D., Ph.D.

(高柳広)

Department of Cell Signaling
<http://www.tmd.ac.jp/grad/csi/csi-J.htm>



Ikuo Morita, Ph.D.

(森田育男)

Professor
Department of Cellular Physiological Chemistry
<http://www.tmd.ac.jp/dent/cell/cell-J.htm>



Ken Omura, D.D.S., Ph.D.

(小村健)

Professor
Department of Oral and Maxillofacial Surgery
<http://www.tmd.ac.jp/dent/os2/os2-J.htm>



Shohei Kasugai, D.D.S., Ph.D.

(春日井昇平)

Professor
Department of Oral Implantology & Regenerative Dental Medicine
<http://www.tmd.ac.jp/grad/mfc/mfc-J.htm>



Hideaki Suda, D.D.S., Ph.D.

(須田英明)

Professor
Department of Pulp Biology and Endodontics
<http://www.tmd.ac.jp/dent/endo/endo-J.htm>



Yuichi Izumi, D.D.S., Ph.D.

(和泉雄一)

Professor
Department of Periodontology
<http://www.tmd.ac.jp/dent/peri/peri-J.htm>



Masaki Yanagishita, M.D.

(柳下正樹)

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Department of Hard Tissue Engineering Biochemistry
<http://www.tmd.ac.jp/grad/bch/bch-J.htm>



Akira Yamaguchi, D.D.S., Ph.D.

(山口朗)

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<http://www.tmd.ac.jp/dent/opat/opat-J.htm>



Keiji Moriyama, D.D.S., Ph.D.

(森山啓司)

Professor
Department of Maxillofacial Orthognathics
<http://www.tmd.ac.jp/grad/mort/mort-J.htm>



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(四宮謙一)

Professor
Department of Orthopaedic and Spinal Surgery
<http://www.tmd.ac.jp/med/orth/orth-J.html>



Nobuyuki Miyasaka, M.D., Ph.D.

(宮坂信之)

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Department of Medicine & Rheumatology
<http://www.tmd.ac.jp/grad/rheu/rheu-J.htm>



Takeshi Muneta, M.D., Ph.D.

(宗田大)

Professor
Department of Orthopedic Surgery
<http://www.tmd.ac.jp/med/orth/orth-J.html>



Kazunari Akiyoshi, Ph.D.

(秋吉一成)

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Department of Organic Materials
<http://www.tmd.ac.jp/i-mde/www/org/jpn/index.html>



Johji Inazawa, M.D., Ph.D.

(稲澤譲治)

Professor
Department of Molecular Cytogenetics
<http://www.tmd.ac.jp/mri/cgen/framepage.htm>



Yoshio Miki, M.D., Ph.D.

(三木義男)

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Department of Molecular Genetics
http://www.tmd.ac.jp/mri/mgen/index_j.html



Fumitoshi Ishino, Ph.D.

(石野史敏)

Professor
Department of Epigenetics
<http://www.tmd.ac.jp/mri/epgn/index.html>

**Hiroshi Shibuya, Ph.D.**

(澁谷浩司)

Professor

Department of Molecular Cell Biology

http://www.tmd.ac.jp/mri/mri-mcb/index_j.html**Yoshihiro Ogawa, M.D., Ph.D.**

(小川佳宏)

Professor

Department of Molecular Medicine and Metabolism

<http://www.tmd.ac.jp/mri/prm/index.html>**Masatoshi Hagiwara, M.D., Ph.D.**

(萩原正敏)

Professor

Department of Molecular Medicine and Metabolism

<http://www.tmd.ac.jp/mri/mri-end/index.html>**Nobuhiro Hanada,**

(花田信弘)

Professor

International PI Chaperon、AISS・QAISS

Takuya Notomi, Ph.D.

(納富拓也)

Research Assistant Professor

Department of Molecular Pharmacology

**Alireza Sadr, D.D.S., Ph.D.**

Research Assistant Professor

Department of Cariology and Operative Dentistry

**Masatsugu Oh-hora, M.D., Ph.D.**

(大洞将嗣)

Research Associate Professor

Department of Cell Signaling

**Hiroyuki Nakamura, D.D.S., Ph.D.**

(中村博幸)

Research Assistant Professor

Department of Hard Tissue Engineering

Biochemistry

**Iimura Tadahiro, D.D.S., Ph.D.**

(飯村忠浩)

Research Associate Professor

Department of Oral Pathology

**Naoto Haruyama, D.D.S., Ph.D.**

(春山 直人)

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Department of Maxillofacial Orthognathics

**Hideyuki Iwai, M.D., Ph.D.**

(岩井秀之)

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Department of Medicine & Rheumatology

**Kunikazu Tsuji, M.D., Ph.D.**

(辻邦和)

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Department of Orthopedic Surgery

**Lee Jiyoung, Ph.D.**

(李知英)

Research Assistant Professor

Department of Epigenetics

**Naoki Sawada, M.D., Ph.D.**

(澤田直樹)

Research Assistant Professor

Department of Molecular Medicine and Metabolism

**Patricia Makishi**

Dept. of Cariology and Operative Dentistry

「レジメンメントと象牙質界面における

ナノリーケーゼについて」

**許 ジン**

(Xu Jing)

歯髄生物学

視床下部性神経ペプチドによる

中枢性骨代謝制御機構の解明

Uncovering the molecular mechanism of central control of bone remodeling by hypothalamic neuropeptides

Reena Rodriguez

Dept. of Oral Implantology & Regenerative Dental Medicine

「Epigallocatechin-3-gallate 含有 Gelatin Hydrogel を用いた骨再生に関する研究」

**則武 加奈子**

Kanako Noritake

Dept. of Oral Implantology & Regenerative Dental Medicine

「スーパーGBR膜「ハイドロゲルシート」の開発」



ハオ 佳

(Hao Jia)

インプラント・口腔再生医学 hydeoxyapatiteコーティングインプラント埋入時に Zoledronic Acid を局所投与した際の骨形成に与える影響と細菌接着について

Bacterial adhesion and bone formation effect of Zoledronic Acid immobilized hydroxyapatite implants

Paksinee Kamolratanakul

Dept. of Molecular Pharmacology

「ナノゲル scaffold を用いた EP4 アゴニストと BMP の骨再生能に関する研究」

中川 朋美

Tomomi Nakagawa

Dept. of Molecular Pharmacology

「悪性黒色腫の骨の転移における転写因子 Ciz の役割の解明」

鈴木 尋之

Hiroyuki Suzuki

Dept. of Maxillofacial Orthognathics

「可溶性 fibroblast growth factor receptor2 (FGFR2) の頭蓋冠縫合部早期癒合症に対する治療効果」

Erik Idrus

Dept. of Cell Signaling

「RANKL 刺激による NFATc1 制御遺伝子と microRNA の同定」

Gamaralalage Amodini Rajakaruna

Dept. of Periodontology

「歯周病とパージャーマットの関連の解明」

藤田 浩二

Koji Fujita

Dept. of Orthopaedic and Spinal Surgery

「Vitamin E の骨代謝に対する影響について」

木原 翼

Tasuku Kihara

Oral pathology

骨芽細胞分化と骨再生における CCN3 の役割

The role of CCN3 in osteoblast differentiation and bone regeneration

古田 繭子

Mayuko Furuta

分子細胞遺伝学 (Molecular Cytogenetics)

新たな RNA 創薬に寄与する癌制御性 microRNA の機能的スクリーニング

Exploration of novel tumor-suppressive microRNAs using functional genomics-assisted approach

安藤 彰子

Akiko Ando

バイオイメーキングを用いた歯周組織幹細胞の同定

Identification of periodontal stem cells by bio-imaging approaches

Bharti Pariksha

歯周病学

歯周治療が全身の炎症に与える影響

Effect of Periodontal Treatment on systemic inflammation.

辻 香織

Kaori Tsuji

顎顔面矯正学

Zinc finger 型転写因子 POKEMON の破骨細胞における役割の解明

Investigation of the role of zinc finger transcription factor, POKEMON in osteoclasts

許 レン

XU Ren

整形外科 (Orthopaedic and Spinal Surgery)

視床下部神経ペプチドによる中枢性骨代謝制御機構の解明

Uncovering the molecular mechanism of central control of bone remodeling by hypothalamic neuropeptides

周 夢宇

Zhou Mengyu

歯髄生物学 (Pulp Biology and Endodontics)

歯根形成のメカニズム-SCAP (根尖部幹細胞) からの象牙芽細胞およびセメント芽細胞分化に関与する因子の解明

The mechanisms of root formation- Elucidation of the signaling molecules on odontoblast and cementoblast differentiation from SCAP

Smriti Aryal A. C

分子薬理学 (Molecular Pharmacology)

細胞骨格による骨代謝制御の分子機構 -Nck の骨の細胞機能調節に於ける役割の解明-

Molecular Mechanisms Underlying Cytoskeletal Regulation of Bone Metabolism-Role of Nck Proteins in Bone Cell Function-

Chokechanachaisakul Uraiwan

歯髄生物学 (Pulp Biology and Endodontics)

ラットを用いた歯髄生物学

Rat's pulp biology

Kunawarote Sitthikorn

う蝕制御学

う蝕象牙質に対する接着性能の改良

Improve Bond strength to Caries-affected dentin

Ilnaz Hariri

う蝕制御学

高度に石灰化した接着界面構造の作成と機械的性質の評価

Generation of hyper mineralized adhesive Interface and study on its mechanical properties

AL-BARI MD. ABDUL ALIM

分子情報伝達学 (Cell Signaling)

破骨細胞分化を制御する phosphatidylinositol-3,4,5-trisphosphate 結合タンパク質の同定と機能解析

Identification and analysis of phosphatidylinositol-3,4,5-trisphosphate binding proteins (PIP3BPs) that regulate osteoclast differentiation

古市 祥子

Akiko Furuichi

インプラント・口腔再生医学

酸素ナノバブル水の骨組織における生体活性評価

Evaluation for the biologically activity of oxygen nano bubbles solution (OXNB)



Hamid Nurrohmam

う蝕制御学 (Cariology and Operative Dentistry)
人口口腔装置を用いたバイオフィルムによるう蝕形成後の“
Super Dentin” のナノ構造解析
The effect of collagenolytic inhibitors on the quality
of acid-base resistant zone in dentin



Chui Chanthoeun

歯周病学 (Periodontology)
歯周組織の除菌のための新しい治療様式の開発:LEDと
光感受性色素を用いた抗菌的光線力学療法の効果に関
する基礎的研究
Development of a New Treatment Modality for
Periodontal Disinfection: Basic Study on the Effect
of Antimicrobial Photodynamic Therapy using the
Combination of an LED
light Source and a Photosensitizing Dye



Samir Kumar Pal

口腔病理学 (Oral Pathology)
口腔扁平上皮癌による骨破壊における
Thrombospondin-1の役割
The Role of Thrombospondin-1 (TSP-1) in Bone
Destruction by Oral Squamous Cell Carcinoma



Hoi Chin Hew

遺伝子応用医学
新規プロラインキナーゼC (PKC) アポトーシス標的の分
子Evi-1の同定
Identification of Evi-1 as a novel PKC Apoptosis
Regulatory Target



村松 智輝

Tomoki Muramatsu
分子細胞遺伝学 (Molecular Cytogenetics)
食道扁平上皮癌の発生・進展におけるYAP増幅・発現
亢進の分子病理学的意義
Significance of YAP amplification/overexpression in the
pathogenesis of esophageal squamous cell carcinoma



鈴木 允文

Suzuki Takafumi
歯周病学
骨吸収を引き起こす咬合性外傷の分子機構について解
析する-TRPV4の役割-
Molecular mechanism underlying occlusal trauma,
induced-bone loss Role of TRPV4



宮嶋 大輔

Daisuke Miyajima
顎顔面外科 (分子薬理)
骨代謝における負のMCSFシグナルによる新制御機構の解析
-Dok アダプター分子による破骨細胞制御と骨粗鬆症-
Novel Insights into Negative Molecular Regulation of
MCSF Signaling in Bone Metabolism -Function of Dok
Adaptor Molecules in Osteoclasts and Osteoporosis -



Atukorallaya Devi Sewvandini Atukorala

硬組織構造生物学
咽頭鰓弓および咽頭鰓発生への外胚葉上皮の関わり
Tracing the fate of ectoderm during the pharyngeal
arch development



Kandakar Abu Shameem Md. Saadat

分子発生学
RB/E2F 経路の制御と骨肉腫形成過程におけるDRIL1
の役割
The Role of DRIL1 in the Regulation of RB/E2F
Pathway and Tumorigenesis of Osteosarcoma



関根 由莉奈

高次生命科学
ナノゲル リポソーム複合体ハイブリッドゲルの設計と
医療応用
Design and Application of Hybrid Hydrogels with
Nanogel-coated Liposomes complex

馬 成山

(Ma Chengshan)
整形外科学
骨リモデリングにおける中枢神経制御の経路
A Novel Central-Control Pathway of Bone
Remodeling



妻沼 有香

歯周病学
歯根膜細胞シートのインプラント両方への応用
Application of periodontal ligament cell sheet for
implant therapy.



Bhargava Suhas Srilatha

インプラント・口腔再生医学
Y-TZP ジルコニアの表面処理が骨芽細胞と線維芽細胞
に及ぼす影響
Surface modified Y-TZP Zirconia: its effect on
osteoblasts and fibroblasts in vitro



MD ABDULLA AL MASUD KHAN

硬組織薬理学
TNF α とRANKLアンタゴニストであるW9ペプチドの
骨形成における役割
A Role of TNF- α and RANKL antagonist peptide
W9 on osteogenesis



滝沢 文彦

発生発達病態学
マクロファージToll-like receptor 4 シグナルにおける
細胞内カルシウムおよびTransient Receptor potential
Vanilloid 2の役割の解析
Role of intracellular calcium and Transient Receptor
potential Vanilloid 2 in macrophage Toll-like receptor
4 signaling



白 樺

Bai Hua
Dept. of Molecular Cytogenetics
「ヒト癌におけるオートファジー関連遺伝子
LC3Av1 遺伝子の機能解析」



Bakhsh, Turki Abdulsalam A.

う蝕制御学
コンボジットレジン接着界面の長期的な挙動について、
SS-OCTを用いた定量的評価
SS-OCT as a new tool for long term quantitative
evaluation on the resin-dentin interface in a bonded
restoration



Warunee Pluemsakunthai

インプラント・口腔再生医学

ウサギ頭蓋骨欠損モデルにおける改良 PRF 含有 α TCP の骨再生における有用性の検討The effect of platelet rich fibrin (PRF) preparation with Alpha-tricalcium phosphate (α -TCP) enhance bone regeneration in rabbit calvarium

森田 淳平

顎顔面矯正学

可浴型線維芽細胞成長因子受容体2を用いたアペール症候群の新規治療方法の開発 - アペール症候群表現型の救済 -

The development of novel treatment for Apert syndrome by a soluble form of FGFR2-Rescue of Apert phenotypes

Bijaya Baobam

細菌感染制御学

オートファジーおよび免疫応答における A 群レンサ球菌認識機構の解析

Molecular analysis of recognition mechanisms of Group A Streptococcus in autophagic degradation system and immune responses

山田 梓

歯周病学

ヒト歯根膜幹細胞の骨芽細胞/セメント芽細胞分化を誘導する因子の探索

The search of factors inducing osteoblastic/cementoblastic differentiation in human Periodontal Ligament Stem Cells

南原 弘美

歯周病学

歯周病原細菌による Wnt5a 遺伝子発現機構の解析

The modulation of Wnt5a expression by periodontopathic bacteria

中根 綾子

小児歯科学

概定量的 in situ 蛍光イメージングによる骨細胞の概日リズムの可視化と、成長発達過程におけるその機能解析

Quantitative in situ fluorescent imaging approach for functional dynamics of osteocytes through circadian oscillation during growth and development

Nurmaa Dashzeveg

バイオ情報学

骨肉腫における P53 によって誘導されるアポトーシス関連遺伝子の解析

Discovery of pro-apoptotic genes induced by p53 in osteosarcoma

荻田 真弓

歯周病学

ヒト歯根膜細胞におけるレーザー照射およびサイトカイン刺激による human-beta-defensin (HBDs) 発現の探査

The expression of HBDs by laser irradiation, various cytokines and bacterial components in human PDL cells

山口 佑季

バイオ情報学

哺乳類の特徴的形質における哺乳類特異的遺伝子群の役割
The role of mammalian specific genes in mammalian characteristics

大上 えりか

顎顔面外科学

口腔扁平上皮癌が生産する破骨細胞性骨吸収制御因子の同定

Identification of osteoclastic bone resorption regulatory factors produced by oral squamous cell carcinoma

湯浅 将人

整形外科学

デキサメタゾン併用による Bone morphogenetic protein による骨形成に対する有効性の検討

The efficiency of bone formation by BMP with dexamethasone

宮部 斉重

膠原病・リウマチ内科学

関節リウマチ病態形成における LPA/LPA 受容体、ATX の関与

Pathogenic roles of LPA/LPA receptors and ATX on the rheumatoid arthritis

山田 剛史

整形外科学

骨髄由来間葉系細胞 (MSC) の質 - 骨形成抑制因子の同定 -

The significance of the quality of the human bone marrow mesenchymal cells (hBMMCs) in the bone formation

Rojbani Hisham Khalifa

インプラント・口腔再生医学

ブラックミン (Nigella Sativa) の骨再生における効果の検討

Effect of Nigella Sativa on Bone Formation

チェン康

(Chang Kang)

インプラント・口腔再生医学 歯科用インプラント周囲骨における直流電流装置を用いた骨形成促進作用に関する研究

A direct current device for accelerating bone formation in tissues surrounding a dental implant.

Osama Zakaria

インプラント・口腔再生医学

異なる表面性状を有する歯科用インプラント周囲骨における電氣的刺激を用いた骨形成促進作用に関する研究
Electrical stimulation for accelerating Peri-implant bone formation of different implant surfaces

岩崎 陽平

分子薬理学

骨に対する PTH 作用における CB2 の調節作用の解析
- 骨細胞集団および中枢神経系の骨量調節における連関の解明 -Analysis of regulatory effect of CB2 to the PTH effect to Bone.-
Relevance of Bone Cell Assembly (BCA) and Central Nervous System (CNS) in the maintenance of bone-

長谷川 久紀

膠原病・リウマチ内科学

関節リウマチ (RA) の新規治療標的となる microRNA の探究
Identification of microRNA as a new therapeutic target for rheumatoid arthritis.

福田 真

膠原病・リウマチ内科学

関節リウマチ病態形成における FROUNT の関与
Pathogenic roles of FROUNT on Rheumatoid Arthritis

佐藤 潔

顎口腔外科学

口腔扁平上皮癌の顎骨浸潤における癌関連線維芽細胞の役割

Roles of carcinoma-associated fibroblasts in bone invasion by oral squamous cell carcinoma

Marwa Madi

インプラント・口腔再生医学

インプラント周囲炎を誘発させた状態における、HA 薄膜スバッタリングインプラントと、他の表面性状インプラントの比較

Experimental periimplantitis at HA sputtered coated implants in comparison to other surface treatments

渡辺 千穂

顎顔面矯正学

骨代謝における RNA stability の機能解析

Functional analysis of RNA stability in bone metabolism

細矢 匡

膠原病・リウマチ内科学

TEAM1-TREM1-Ligand 相互作用修飾による自己免疫疾患の新規治療法の開発

Development of new treatment of autoimmune diseases by modifying interaction between TREM1 and TREM-Ligand



徐 成

(Cheng Xu)

整形外科科学

骨形成における microRNA の役割

Role of microRNA in bone formation

木村 直樹

膠原病・リウマチ内科学

腫瘍による筋炎発症のメカニズムの解析

Analysis of cancer-associated autoimmune myositis



Prasansuttiporn Taweesak

う蝕制御学

次亜塩素酸ナトリウム処置後象牙質に対する rosmarinic acid の接着強さ及び耐久性への影響

Effect of rosmarinic acid on bond strength and bond longevity to NaOCL-treated dentin.



Adorno Quevedo Carlos Gabriel

歯髄生物学

ラット歯髄の慢性炎症後にみられるリンパ管新生

Lymphangiogenesis in the rat dental pulp following induced chronic inflammation

安岡 潤一

高次生命科学

カチオン性ナノゲルによる新規核酸デリバリーシステム
Novel nucleic acid Delivery Systems by Cationic Nanogel

鈴木 晶子

膠原病・リウマチ内科学

マウス膠原病モデルの病態における体液調整因子の働きを明らかにする。

The role of circulating plasma volume regulation factors in murine arthritis and myositis model



土戸 優志

高次生命科学

新規ナノゲルによるタンパク質デリバリー

Protein Delivery by Novel Nanogel



宮原 宇将

インプラント・口腔再生医学

ナノゲルを用いた骨再生に関する研究

A research on bone regeneration by using Nanogel



Thitthaweerat Suppasorn

う蝕制御学

次亜塩素酸ナトリウムとロスマリン酸の失活歯への接着強さと長期接着耐久性に及ぼす影響

Influence of NaOCl and rosmarinic acid on bond strength and long-term bond durability in endodontically treated tooth

Md.Sofiqul Islam

う蝕制御学

フラボノイドによる、象牙質コラーゲン保護と脱灰象牙質の再石灰効果 - 新しい根面蝕歯 - 治療アプローチ

Flavonoid Reserves Dentin Collagen and Promotes human Root Dentin Lesion Re-mineralization in vitro



Gerardo Jose Joves Mendez

う蝕制御学

塩化カルシウム・フッ素含有ボンディングシステムを用いた歯質接着界面の強化

Reinforcement of adhesive interface using a CaCl₂/fluoride-incorporated bonding system

芦垣 紀彦

歯周病学

歯周病原細菌が慢性腎不全を悪化させる病因の解析

Periodontal bacteria aggravate chronic renal failure by subtotal nephrectomy in mice



Paveenarat Aukkarasongsup

顎顔面矯正学

低酸素状態下のマウス歯根幕細胞におけるペリオスチン遺伝子発現制御メカニズムの解析: 低酸素応答領域の同定と HIF-1 経路関わり

Analysis of periostin gene expression in mouse periodontal ligament cells under hypoxia: identification of HRE and HIF-1 pathway

渡辺 高

顎顔面外科学

in situ 蛍光イメージング解析による、骨の分化・再生における Runx2 タンパク細胞内動態の新規調節機構の解析

Investigation of novel subcellular dynamics of Runx2 during bone differentiation and regeneration by in situ fluorescent imaging analysis



坂野 若詠

う蝕制御学

新規象牙質接着システムの開発及び評価について

Developing resin composite restoration with
adhesive system

Rumana Khanom

口腔病理学

シグナル分子としてのセラチン 17 が癌の骨浸潤に果たす
役割の解析The functional role of lentin 17 as a signaling
molecule in bone invasion of oral cancer

Duarte Puerto Carolina Lizeth

顎顔面矯正学

磁気制御された Relaxin と BMP-2 ナノ粒子を用いた
骨縫合の拡大Sutural Expansion Assisted With Magnetically Controlled Site
Specific Relaxin and BMP-2 Nanoparticles

于 淼

(Yu Miao)

インプラント・口腔再生医学

尾部懸垂マウスを用いた、骨再生におけるメカニカルスト
レスの関与に関する研究The role of mechanical stress in bone regeneration
using tail suspension mice

上園 将慶顎顔面矯正学 低侵襲かつ早期に骨接合する新規矯正用
デバイスの開発Development of minimally invasive and rapidly
osseointegratable orthodontic devices

Amir Nazari

う蝕制御学

う蝕脱灰象牙質を高度石灰化組織へと変化させるため
の再石灰化技術の創造Developing a Dentin Remineralising Method (DRM)
to Transform Carious Demineralised Dentin into
Hypermineralised Substrate

Gombo Bolortuya

Dept. of Pulp Biology and Endodontics

「インテグリン発現を評価することによる象牙芽細胞の
成熟とシグナル伝達に対する低出力レーザー療法の効果」

伊達 佑生

Yuki Date

Dept. of Oral Implantology & Regenerative Dental
Medicine

「歯根発生に関する因子の同定」



大城 暁子

健康推進歯学

FDC-SP の口腔内組織での機能

The roles of FDC-SP in oral tissues

Aslam Al Mehdi

Dept. of Periodontology

「歯周疾患は動脈疾患の進行に重要な
リスクファクターとなる」

松本 力

Tsutomu Matsumoto

口腔病理学

矯正の歯の移動における骨細胞の役割

The role of osteocyte in orthodontic tooth movement



Wayakanon Praween

分子細胞機能学 (Cellular Physiological Chemistry)

アニユラーギャップジャンクションの形成機構

The Mechanisms of Annular Gap Junction
Formation

青井 陽子

Yoko Aoi

Dept. of Cellular Physiological Chemistry

「低酸素下におけるサイトカイン産生変動機序～
メチル化の関与」

下田 麻子

Asako Shimoda

有機材料 (Organic materials)

ナノゲル架橋ハイドロゲルによるタンパク質デリバリー
Design of Nanogel-assembled hydrogel for protein
delivery

高橋 治子

Haruko Takahashi

有機材料 (Organic materials)

Polysaccharide nano-ball を用いた新規ナノキャリアの開発

Design of Functional Polysaccharide nano-ball as new nanocarrier



Tooth organogenesis and regeneration

Irma Thesleff

Institute of Biotechnology, University of Helsinki, Finland



The process of tooth development is understood in great detail at the level of cells and genes. Dozens of important genes and molecules are known which regulate the initiation and morphogenesis of teeth as well as the formation of the dental hard tissues. Of special significance for organogenesis are interactions between the two key tissues forming the teeth, the epithelium and mesenchyme, and the molecules associated with the signal pathways regulating communication between the epithelial and mesenchymal tissues. The signal molecules of the conserved families, TGFbeta, FGF, Wnt, Hedgehog and TNF (in particular Ectodysplasin, Eda) regulate the numbers, shapes and sizes of teeth. Recent work has indicated that inhibitors with regulate signalling activity, and it is thought that subtle variations in signaling networks have contributed to the differences in the dentitions and tooth morphologies between vertebrate species.

The capacity to regenerate teeth has been largely lost during evolution, and it has been suggested that this is also associated with variation in signal activities, in particular in the Wnt signal pathway. Stem cells have been discovered in teeth, and in the mouse dentition they have been located in a niche in the continuous growing incisors. This bears anatomical similarities to the stem cell niches in other epithelial organs, in particular in hairs and intestine. The maintenance and differentiation of these stem cells is regulated by epithelial-mesenchymal interactions and the same conserved signal molecules as tooth morphogenesis. More thorough understanding of the molecular signatures of the stem cells and the epithelial and mesenchymal tissues and their interactions will be crucial for successful bioengineering of teeth in the future.

For more information: Thesleff, I, Tummers, M.: Tooth organogenesis and regeneration. In: StemBook, 2009, <http://www.stembook.org>

CURRICULUM VITAE

Education and Training

Graduation from Dental School (DDS)	
University of Helsinki	1972
Doctor of Odontology (Dr.Odont)	
University of Helsinki	1975
Docent (Lecturer) in Developmental Biology	
University of Helsinki	1980
Specialist's rights in orthodontics	1983

Previous professional appointments

Research Associate, the Academy of Finland	1973-1976
Instructor, Dept. of Pedodontics and Orthodontics, University of Helsinki	1976-1978
Visiting Associate, Laboratory of Developmental Biology and Anomalies, NIDR, Bethesda, MD, USA	1978-1979
Instructor, Dept. Pedodontics and Orthodontics, Univ. Helsinki	1979-1983
Scientist, Academy of Finland	1983-1990
Professor and Chairman, Department of Pedodontics and Orthodontics, University of Helsinki	1990-2004

Research awards and honors

Pohjola Prize, Finnish Dental Society and Finnish Dental Association	1987
Distinguished Scientist Award in Craniofacial Biology, Int.Assoc.Dent.Res.(IADR)	1993
Finnish Academy of Science and Letters (Suom.Tiedeakat.), invited member	1994
Thuréusprize, Umeå university	1995
City of Helsinki Science Award	1997
Honorary Doctor in Odontology, University of Göteborg	1997
International Prize, Swedish Dental Society	1997
Academy Professor, Academy of Finland	1998-2003
Anders Jahre Prize in Medicine, Oslo University	1999
Acta Odontologica Scandinavica Prize for "Excellent contribution to dental research"	2000
EMBO, invited member	2000
Honorary Doctor in Odontology, University of Copenhagen	2002
Honorary Doctor in Science, McGill University, Montreal	2004
Professor of the Year, Finnish Association of University Professors	2005
Sheldon Friel Memorial Lecturer, European Orthodontic Society	2005
Finnish Society of Sciences and Letters (Suom.Tiedeseura), invited member	2005
Honorary Doctor, Katholieke Universiteit Leuven, Belgium	2005

Honorary Professor in Craniofacial and Dental Genetics, University of Copenhagen	2005-2010
William J. Gies Award for best paper in J.Dent.Res., IADR/AADR	2006
Chair, Gordon Conference on "Craniofacial Morphogenesis & Tissue Regeneration"	2008
President, European Orthodontic Society	2008-2009
Honorary Doctor, University of Debrecen, Hungary	2008
Isaac Schour Memorial Award, IADR	2008
Honorary Doctor, University of Oslo	2008
AAAS Fellow	2009
Valkhof Chair (Visiting Professor), Radboud University Nijmegen, The Netherlands	2009
Apollonia Prize, Finnish Dental Society	2009
Paul Goldhaber Award, Harvard School of Dental Medicine	2010
Honorary Doctor, Karolinska Institutet, Stockholm	2010

Major research grants

The Academy of Finland, yearly project and program grants	1982-2001	2008-2011
National Institutes of Health, Dental Research grant 1 ROI DE09399		1990-1993
University of Helsinki, Biocentrum Helsinki grant		1994-2009
Sigrid Jusélius Foundation	1989-1992	1996-2008
Human Frontiers Science Program (with Paul Sharpe & J.V. Ruch)		1995-1998
Center of Excellence grant (Dev.Biol.Program), University of Helsinki		1997-2001
National Institutes of Health, NIDCR (with R.D ´ Souza)		1999-2003
Center of Excellence funding, Academy of Finland		2002-2007
Sigrid Juselius Foundation, major 5-year grant		2008-2013

Scientific expert functions

Supervisor of doctoral thesis works:	20 times
Opponent of doctoral thesis works:	13 times
External reviewer for:	
professor :	9 times
promotion to professorship:	25 times
doctoral thesis:	23 times
Member of International Scientific Advisory Board:	6
Member of International Scientific Evaluation Committees:	12
Reviewer of grant applications:	22 international organizations
Member of the Editorial Board:	12 international scientific journals
Referee: for over 30 international scientific journals	

Participation in Scientific Meetings

Invited lectures in 125 international conferences
61 seminars in foreign universities/research institutions

Selected publications 1990-2008 (out of a list of over 270)

Vainio, S., Karavanova, I., Jowett, A., Thesleff, I.
Identification of BMP-4 as a signal mediating secondary induction between epithelial and mesenchymal tissues during early tooth development. *Cell* 75: 45-58, 1993.

Jowett, A.K., Vainio, S., Ferguson, M.W.J., Sharpe, P.T., Thesleff, I. Epithelial-mesenchymal interactions are required for *msx 1* and *msx 2* gene expression in the developing murine molar tooth. *Development* 117: 461-470, 1993.

Mitsiadis, T., Muramatsu, T., Muramatsu, H., Thesleff, I. Midkine (MK), a heparin-binding growth/differentiation factor, is regulated by retinoic acid and epithelial-mesenchymal interactions in the developing mouse tooth, and affects cell proliferation and morphogenesis. *J Cell Biol.* 129: 267-281, 1995

Mitsiadis, T.A., Lardelli, M., Lendahl, U., Thesleff, I. Expression of Notch 1, 2 and 3 is regulated by epithelial-mesenchymal interactions and retinoic acid in the developing mouse tooth and associated with determination of ameloblast cell fate. *J. Cell Biol.* 130: 407-418, 1995.

Jernvall, J., Åberg, T., Kettunen, P., Keränen, S., Thesleff, I. The life history of an embryonic signaling center: BMP-4 induces p21 and is associated with apoptosis in the mouse tooth enamel knot. *Development* 125:161-169, 1998

Kim, H-J., Rice, D.P.C., Kettunen, P.J., Thesleff, I. FGF-, BMP- and Shh-mediated signalling pathways in the regulation of cranial suture morphogenesis and calvarial bone development. *Development* 125:1241-1251, 1998

D ´ Souza, R.N., Åberg, T., Gaikwad, J., Cavender, A., Owen, M., Karsenty, G., Thesleff, I. *Cbfa 1* is required for epithelial-mesenchymal interactions regulating tooth development in mice. *Development* 126:2911-2920, 1999

Mikkola, M., Pispä, J., Pekkanen, M., Paulin, L., Nieminen, P., Kere, J., Thesleff, I. Ectodysplasin, a protein required for epithelial morphogenesis, is a novel TNF homologue and promotes cell-matrix adhesion. *Mech. Dev.* 88:133-146, 1999

Harada, H., Kettunen, P., Jung, H-S., Mustonen, T., Wang, Y.A., Thesleff, I.

Localization of putative stem cells in dental epithelium and their association Notch and FGF signaling. *J. Cell Biol.* 147:105-120, 1999

Pispä, J., Jung, H-S., Jernvall, J., Kettunen, P., Mustonen, T., Kere, J., Thesleff, I.

Cusp patterning defect in Tabby mice teeth and its partial rescue by FGF. *Dev. Biol.* 216:521-534, 1999

Rice, P., Åberg, T., Chan, Y-S., Kettunen, P., Pakarinen, L., Maxson, R.E., Thesleff, I.

Integration of FGF and TWIST in calvarial bone and suture development. *Development* 127:1845-1855, 2000

Jernvall, J., Keränen, S.V.E., Thesleff, I. Evolutionary modification of development in mammalian teeth: Quantifying gene expression patterns and topography. *Proc. Nat. Acad. Sci. USA* 97:14444-14448, 2000

Jernvall, J., Thesleff, I. Reiterative signaling and patterning in mammalian tooth morphogenesis. *Mech. Dev.* 92: 19-29, 2000.

Laurikkala, J., Mikkola, M., Mustonen, T., Åberg, T., Koppinen, P., Pispä, J., Nieminen, P., Galceran, J., Grosschedl, R., Thesleff, I. TNF signaling via the ligand-receptor pair ectodysplasin and edar controls the function of epithelial signaling centers and is regulated by Wnt and activin during organogenesis. *Dev.Biol.* 229: 443-455, 2001

Laurikkala J, Pispä, J., Jung H-S, Nieminen P, Mikkola M, Wang X, Saarialho-Kere U., Galceran, J., Grosschedl, R., Thesleff I. Regulation of hair follicle development by the TNF signal ectodysplasin and its receptor Edar. *Development* 129:2541-2553, 2002

Mustonen, T., Tummers, M., Mikami, T., Itoh, N., Zhang, N., Gridley, T., Thesleff, I. Lunatic fringe, FGF, and BMP regulate the Notch pathway during epithelial morphogenesis of teeth. *Dev. Biol.* 248:281-293, 2002

Tummers, M. and Thesleff, I: Root or crown: a developmental choice orchestrated by the differential regulation of the epithelial stem cell niche in the tooth of two rodent species. *Development* 130:1049-1057, 2003.

Mustonen, T. Pummila, M., Kangas, A., Mikkola, M. Pakkasjärvi, L., Pispä, J., Jaatinen, R., Thesleff, I.: Ectodysplasin-A1 stimulates the development of ectodermal organs. *Dev. Biol.* 253: 123-136, 2003

Pispa, J., Thesleff, I.: Mechanisms of ectodermal organogenesis. *Dev. Biol.* 262: 195-205, 2003

Laurikkala, J., Kassai, Y., Pakkasjärvi, L., Thesleff, I., Itoh, N.: Identification of a secreted BMP antagonist, ectodin, integrating BMP, FGF and SHH signals from the tooth enamel knot. *Dev. Biol.* 264: 91-105, 2003

Lammi, L., Arte, S., Somer, M., Järvinen, H., Lahermo, P., Thesleff, I., Pirinen, S., Nieminen, P.: Mutations in *AXIN2* cause familial tooth agenesis and predispose to colorectal cancer. *Am. J. Hum. Genet.* 74: 1043-50, 2004

Åberg, T., Wang, X-P., Kim, J-H., Yamashiro, T., Bei, M., Rice, R., Ryoo, H-M., Thesleff, I.: *Runx2* mediates FGF signalling from epithelium to mesenchyme during tooth morphogenesis. *Dev. Biol.* 270: 76-93, 2004

Wang, X-P., Suomalainen, M., Jorgez, C.j., Matzuk, M.M., Werner, S., and Thesleff, I.: Follistatin regulates enamel patterning in mouse incisors by asymmetrically inhibiting BMP signalling and ameloblast differentiation. *Dev. Cell* 7: 719-730, 2004

Kangas, A.T., Evans, A.R., Thesleff, I., Jernvall, J.: Non-independence of mammalian dental characters. *Nature* 432: 211-214, 2004

Kassai, Y., Munne, P., Hotta, Y., Penttilä, E., Kavanagh, K., Ohbayashi, N., Takada, S., Thesleff, I., Jernvall, J., Itoh, N.: Regulation of mammalian cusp patterning by ectodin. *Science* 309: 2067-2070, 2005.

Laurikkala, J., Mikkola, M.L., James, M., Tummers, M., Mills, A., Thesleff, I.: P63 regulates multiple signalling pathways required for ectodermal organogenesis and differentiation. *Development* 133: 1553-1563, 2006.

Järvinen, E., Salazar-Ciudad, I., Birchmeier, W., Taketo, M.M., Jernvall, J., Thesleff, I. Continuous tooth generation in mouse is induced by activated epithelial Wnt/ β catenin signalling. *Proc. Natl. Acad. Sci USA* 103: 18627-18632, 2006.

Pummila, M., Fliniaux, I., Jaatinen, R., James, M., Laurikkala, J., Schneider, P., Thesleff, I., Mikkola, M.L. Ectodysplasin has a dual role in ectodermal organogenesis: inhibition of BMP activity and induction of Shh expression. *Development* 134: 117-125, 2007.

Wang, X-P., Suomalainen, M., Felszeghy, S., Zelarayan, L.C., Alonso, M.T., Plikus, M.V., Maas, R., Chuong, C-M., Schimmang, T., Thesleff, I. An integrated gene regulatory

network controls epithelial stem cell proliferation in teeth. *PLoS Biology* 5: 1324-1333, 2007

Närhi, K., Järvinen, E., Birchmeier, W., Taketo, M., M., Mikkola, M.M., Thesleff, I. Sustained epithelial β -catenin activity induces precocious hair development but disrupts hair follicle down-growth and hair shaft formation. *Development* 135:1019-1028, 2008

Main Research area:

Molecular regulation of the development of teeth and other ectodermal organs (hair, glands) and craniofacial bones. Use of mouse models, analysis of stem cells and signaling pathways.

"Touchy-Feely" Stem Cells: Lessons for Regenerative Medicine from Matrix Biology

Adam J Engler

Dept. of Bioengineering

University of California, San Diego; La Jolla, CA USA



Mesenchymal stem cells (MSCs) are responsive to the physical properties of their adjacent extracellular niche, e.g. stiffness, which varies dramatically during development and between tissues and drives stiffness-based differentiation into muscle and bone. MSCs have also recently been used to repair myocardial function post-infarct, but this treatment has had limited success, in part due to MSC calcification within the heart wall from a stiffening 3-fold from the infarct scar. Using biopolymers which mimic developmental changes, e.g. myocardial matrix stiffening between days E2 to E13, we have recently been able to control cell differentiation versus static gels in this environment and this can play a protective role in regenerate myocardial strategies. Infarction can also induce distinct stiffness gradients, $\sim 8.7 \pm 1.5$ kPa/mm, which could drive MSC migration. Surprisingly, MSCs appear to undergo directed migration up stiffness gradients, or “durotaxis,” in physiological gradients as shallow as 1.0 ± 0.1 kPa/mm, indicating a ‘differentiation hierarchy’ since when given the choice MSCs will durotax into the stiffest regions of the niche and then differentiate based on niche elasticity. Developing increasingly biomimetic systems represents a new approach to tissue engineering that may better our understanding of regeneration.

ACADEMIC APPOINTMENTS AND AFFILIATIONS

University of California, San Diego; San Diego, CA 2008 - present

Assistant Professor, Department of Bioengineering

Member, UCSD Stem Cell Institute

Member, Material Science Graduate Program

Member, Biomedical Sciences Graduate Program

Research Areas: 1) Extracellular matrix regulation of embryonic and mesenchymal stem cell differentiation

2) Developmental biology and mechanics of myocardium

3) Cell adhesion to 3-dimensional fibronectin matrix

EDUCATION AND RESEARCH TRAINING

Postdoctoral Princeton University; Princeton, NJ 2006 - 2008

Fellowship Dept. of Molecular Biology
Research Area: Fibronectin's influence on embryonic stem cells and cell adhesion
Advisor: Jean E. Schwarzbauer, Ph.D.

Ph.D. University of Pennsylvania; Philadelphia, PA 2006
Biophysical Engineering Lab
Dissertation Title: Mechanochemical Signaling Directs Cell State: A Mechanics of Materials Foundation for Cell Biology
Advisor: Dennis E. Discher, Ph.D.

B.S.E. University of Pennsylvania; Philadelphia, PA 2002
Major: Bioengineering Minor: Mathematics

SELECTED HONORS AND FELLOWSHIPS

- NIH New Innovator Award (2009)
- Rita Schaffer Young Investigator Award, Biomedical Engineering Society (2008)
- Rupert Timpl Award, International Society for Matrix Biology (2008)
- National Research Service Award, National Cancer Institute/Princeton (2006-2008)
- John A. Goff Prize, University of Pennsylvania (2006)
- Graduate Research Symposium Award, University of Pennsylvania (2006)
- Graduate Student Award, International Society of Biorheology (2005)
- Graduate Student Award, Biomedical Engineering Society (2004)
- Ashton Foundation Predoctoral Fellowship (2002-2006)
- National Science Foundation - REU Fellowship (2001)

PROFESSIONAL SOCIETY MEMBERSHIPS

- American Society for Cell Biology (2002-present)
- American Society for Matrix Biology (2008-present)
Adam J. Engler Page 2 of 7
December 2010
- American Society for Mechanical Engineering (2002-2007, 2010-present)
- Biomedical Engineering Society (2002-present)
- Biophysical Society (2002-present)
- International Society for Stem Cell Research (2008-present)
- Tissue Engineering and Regenerative Medicine International Society (2009-present)

PUBLICATIONS

REFEREED JOURNAL PUBLICATIONS

1. LoPresti, C., Forster, S., Massignani, M., Warren, N., Madsen, J., Armes, S., Vasilev, C., Hobbs, J., Chirasatitsin, S., Engler, A.J., Battaglia, G. "Wet nano-scale imaging and testing of polymersomes" (submitted)
2. LoPresti, C., Massignani, M., Fernyhough, C., Blanz, A., Ryan, A., Madsen, J., Warren, N., Armes, S., Chirasatitsin, S., Engler, A.J., and Battaglia, G. "Controlling Polymersomes Surface Topology at the Nanoscale by Membrane Confined Polymer/Polymer Phase Separation" ACS Nano (in press)
3. Tse, J.R. and Engler, A.J. "Stiffness Gradients Mimicking In Vivo Tissue Variation Regulate Mesenchymal Stem Cell Fate" PLoS One (in press; DOI: 10.1371/journal.pone.0015978)
4. Young, J.L., and Engler, A.J. "Hydrogels with Time-Dependent Mechanical Properties Enhance Cardiomyocyte Differentiation In Vitro" Biomaterials, 2011. 32(4): 1002-1009.
5. Flores-Merino, M.V., Chirasatitsin, S., LoPresti, C., Reilly, G.C., Battaglia, G., and Engler, A.J. "Nanoscale Mechanical Anisotropy in Hydrogel Surfaces" Soft Matter, 2010. 6(18): 4466-4470.
6. Tse, J.R. and Engler, A.J. "Preparation of Hydrogel Substrates with Tunable Mechanical Properties" Curr Protoc Cell Biol, 2010. Chapter 10: Unit 10.16: 1-16.
7. Chirasatitsin, S. and Engler, A.J. "Detecting Cell-Adhesive Sites in Extracellular Matrix using Force Spectroscopy Mapping" J Phys: Condensed Matter, 2010. 22(19): 194102
8. Reilly, G.C. and Engler, A.J. "Intrinsic Extracellular Matrix Properties Regulate Stem Cell Differentiation" J Biomechanics, 2010. 43(1): 55-62.
9. Engler, A.J., Humbert, P.O., Wehrle-Haller, B., and Weaver, V.M. "Multiscale Modeling of Form and

- Function" *Science*, 2009. 208: 208-212.
10. Sen, S., Engler, A.J., Discher, D.E. "Matrix Strains Induced by Cells: Computing How Far Cells Can Feel" *Cell and Mol Bioeng*, 2009. 2(1): 39-48.
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In vitro cartilage differentiation reveals the risk of oncogenic transformation in human induced pluripotent stem cells.

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Abstract

Induced pluripotent stem cells (iPSCs) are attractive cells for regenerative medicine. However, iPSCs may have the risk of oncogenic transformation due to the use of proto-oncogenes in reprogramming, in addition to the use of viral vectors and random genomic integrations. Indeed, an incident of tumor formation was observed in mouse iPSC-derived chimeras. In this regard, chimera formation is a useful approach for oncogenic potential in mouse iPSCs. Unfortunately, this risk remains unclear for human iPSCs, as a useful indicator has been lacking. What is needed is a useful indicator for evaluating the risk of oncogenic transformation in human iPSCs. Here, we demonstrate how we have discovered a new way to reveal the oncogenic risk of human iPSCs using in vitro cartilage tissue engineering.

In this study, we initially used the human ESC line, H9 and iPSC line, BJ-EOS-4YA, which are derived from the 4 Yamanaka reprogramming factors, Oct3/4, Sox2, c-Myc and KLF4. Following micro-mass chondrogenic differentiation, both human ESCs and iPSCs displayed similar cell morphology. Following 6 weeks of culture, although cartilage specific histological staining and gene expression was present in cartilage derived from both cell types, upon closer inspection the presence of mucous glands/adenocarcinoma-like cysts was detected within iPSC-derived cartilage. The pro-oncogenic/pluripotency genes, c-Myc and Lin28, were up-regulated in iPSCs in comparison to ESCs. These results indicate that certain human iPSCs may have pro-oncogenic/adenocarcinoma potential and reveal their risks following differentiation into cartilage.

Considering the aforementioned observations, cartilage tissue engineering can be an excellent model for testing human iPSC cell lines in vitro, without the need for transplantation into animals. There are several variations between iPSC lines owing to genomic insertional mutagenesis. Since safety is a foremost issue in human iPSC application, cartilage tissue engineering may provide a useful approach for evaluation of their safety.

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歯と骨の分子疾患科学の国際教育研究拠点
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第3回 リトリート

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