第 35 回生理研コンファレンス・統合脳国際シンポジウム

Recent Advances in Cortical and Hippocampal Microcircuits
大脳皮質・海馬の局所神経回路研究

第 35 回生理研コンファレンス・統合脳国際シンポジウム「大脳皮質・海馬の局所神経回路研究」は，2006 年 7 月 24 日−26 日の 3 日間に，自然科学研究機構・岡崎コンファレンスセンターにおいて開催された。大脳皮質の神経回路構築の解析は，現在，大きな飛躍の時を迎えていると言っても過言ではない。今まで未知であった多くの事実が分子脳科学や多電極記録法等のシンポは目覚ましく，多くの新しい事実が次々と報告されている。その中でも，リーディング的存在の研究者達（Edward M Callaway 博士 (Salk Institute, USA), Sacha B Nelson 博士 (Brandis Univ., USA), Gabor Tamas 博士 (Szeged Univ., Hungary), Jackie Schiller 博士 (Technion, Israel), Takao K Hensch 博士 (RIKEN-BSI, Harvard Univ. USA)）にご参加頂き，最新の成果を発表していただいた。さらに，日本の大脳皮質神経回路研究の諸先生方にも，秀でた研究を発表していただき，トータルで 18 演題の口頭発表について活発な質疑応答が交わされた。さらに，ポスター発表にも 31 演題が集まり，日本の若き神経科学研究者や院生達も，第一線を走っておられる研究者と直接ディスカッションする機会を得た事で，大いに刺激を受けた事であろう。総数 124 名（うち，外国人 14 名）の参加者同士の交流も深まり，多くの意味で非常に有意義であった。打ち解けた雰囲気の中で実り多いディスカッションが行われ，非常に楽しい会合となった。

Monday, July 24

Opening Remarks　Yumiko Yoshimura

Session 1: Physiological network connectivity in hippocampal microcircuitry

1. Yuji Ikegaya (Univ. of Tokyo, Tokyo)
   Spontaneous activity and ongoing plasticity of CA3 recurrent networks

2. Adi Cymerblit and Yitzhak Schiller (Technion, Israel)
   Network dynamics during the development and maintenance of seizures in pilocarpine and picrotoxin treated rats

Session 2: Anatomical network connectivity in hippocampal microcircuitry

3. Ryuichi Shigemoto (NIPS, Okazaki)
   Asymmetrical organization of glutamate receptors in left and right hippocampal synapses
4. Shozo Jinno, Thomas Klausberger, Laszlo F. Marton, Yannis Dalezios, Pablo Fuentealba, Wai Yee Suen, Eric A. Bushong, Darrell Henze, György Buzsáki and Peter Somogyi (Oxford Univ., UK: Hungarian University of Transylvania, Hungary: University of Crete, Greece: Institute of Applied and Computational Mathematics. Greece: The State University of New Jersey, USA)
   Novel long-range GABAergic projections in the hippocampal formation and beyond

Session 3: Network connectivity in cortical microcircuitry

5. Gábor Tamás, János Szabadics, Szabolcs Oláh, Gergely Komlósi, Pál Barzó, Gábor Molnár (Univ. of Seged, Hungary)
   Single spike triggered event sequences in networks of the human cerebral cortex in vitro
6. Yasuo Kawaguchi (NIPS, Okazaki)
   Layer V pyramidal cell diversity and their synaptic connections

Tuesday, July 25

Session 4: Plasticity in the visual cortex

7. Yumiko Yoshimura (Nagoya Univ., Nagoya)
   Functional roles of T-type Ca^{2+} channels in visual cortical plasticity
8. Takao K Hensch (RIKEN-BSI, Wako)
   GABA circuit control of critical period plasticity in visual cortex

Session 5: Microcircuitry in vivo

9. Victoria M Puig, Mika Ushimaru, Yoshiyuki Kubota, Akiya Watakabe, Tetsuo Yamamori, Yuchio Yanagawa, Yasuo Kawaguchi (NIPS & NIBB, Okazaki, Gunma Univ., MIT, USA)
   Cortico-striatal, cortico-raphe and fast-spiking cell activity in the rat frontal cortex during cortical oscillations in vivo: modulation by serotonin
10. Ichiro Fujita (Osaka Univ., Osaka)
    Functional and Anatomical Architecture of the Inferior Temporal Cortex

Session 6: Microcircuitry of inhibitory neurons

11. Edward Callaway, Takuma Mori, Xiangmin Xu, Ian Wickersham, and David Lyon (Salk Inst, USA)
    Unraveling cell type and fine-scale specificity of cortical connections
12. Yukio Komatsu (Nagoya Univ., Nagoya)
    A new form of inhibitory synaptic actions between nearby pyramidal neurons in visual cortex
13. Fumitaka Kimura (Osaka Univ., Osaka)
    Cholinergic control of cortical network and thalamocortical transmission

Wednesday, July 26

Session 7: Anatomical aspects of cortical microcircuitry

14. Kathleen Rockland (RIKEN-BSI, Wako)
    Cortical projection neurons: phenotypes and input maps
15. Takaichi Fukuda (Kyushu Univ, Fukuoka)
    Dendritic network of cortical interneurons linked by gap junctions

Session 8: Synaptic integration along dendrite

16. Jackie Schiller (Technion, israel)
    Synaptic integration and plasticity within non-linear dendritic subunits

Session 9: New aspects in cortical microcircuitry analysis

17. Yoshiyuki Kubota, Fuyuki Karube, Yasuo Kawaguchi (NIPS, Okazaki)
    Dendritic dimensions of cortical GABAergic nonpyramidal cells
18. Sacha B Nelson (Brandeis Univ., USA)
    Physiological Genomics of Cortical Circuits in Health and Disease

Closing Remarks Yoshiyuki Kubota

Poster

Poster I Anatomical and Physiological Analysis of Local Circuits in Neocortex

P-1. Quantification of excitatory and inhibitory synapses onto parvalbumin- and calretinin-positive GABAergic neurons in the rat cerebral cortex.
Akio Sekigawa, Yoshiyuki Kubota, Yasuo Kawaguchi
Div. Cerebral Circuitry, NIPS, Okazaki, Dept. Physiol. Sci. Grad. Univ. Advanced Studies, Okazaki

P-2. Cortical interneuron organization analysis by in vivo Venus labeling of GABAergic cells in BAC transgenic rats
Yasuharu Hirai[1,2], Masakazu Uematsu[2,3], Satoe Ebihara[2], Kuniya Abe[4], Sachiko Yosida[3], Megumi Kato[2], Masumi Hirabayashi[2], Yuchio Yanagawa[5,6] and Yasuo Kawaguchi[1,2]
[1]Grad. Univ. Advanced Studies, Okazaki, Japan, [2]NIPS, Okazaki, Japan, [3]Toyohashi Univ. Tech., Toyohashi, Japan, [4]RIKEN, Tsukuba, Japan, [5]Gunma Univ., Gunma, Japan, [6]SORST

P-3. Regional, cell type, and layer-specific differences in cholinergic inhibition of neocortical neurons
Allan T. Gulledge[1,2], Susannah Park[2], Greg J. Stuart[2] & Yasuo Kawaguchi[1],
[1]Division of Cerebral Circuitry, National Institute for Physiological Sciences, Okazaki, Japan, [2]Divison of Neuroscience, JCSMR, Australian National University, Canberra, Australia

P-4. Laminar sources of synaptic input to layer 1 neurons in rat visual cortex
Takuma Mori, Edward M. Callaway
Systems Neurobiology Laboratories, Salk Inst., La Jolla, CA, USA

P-5. Fluorescence activated cell sorting and expression-profiling of parvalbumin-positive GABAergic neocortical interneurons from mouse barrel cortex.
Ethan M. Goldberg, Hyo-Young Jeong, and Bernardo Rudy.
NYU School of Medicine, Department of Physiology & Neuroscience, New York, U.S.A.

P-6. How is γ frequency rhythmic firing of neocortical regular spiking neurons shaped by recurrent inputs?
Kenji Morita[1], Rita Kalra[2], Kazuyuki Aihara[3], and Hugh P. C. Robinson[2]
[1]RIKEN Brain Science Institute, [2]Department of Physiology, Development, and Neuroscience, University of Cambridge, [3]Institute of Industrial Science, University of Tokyo, and ERATO, JST

P-7. Multisite recordings on the signal propagation pattern in local circuit of the visual cortex
Makoto Osanai, Yusuke Takeno, Ryousuke Hasui, Tetsuya Yagi
Graduate School of Engineering, Osaka University

P-8. Synaptic connection patterns between pyramidal cell subtypes in layer V of rat frontal cortex
Mieko Morishima, Yasuo Kawaguchi
Division of Cerebral Circuitry, National Institute for Physiological Sciences

P-9. Target-dependent diversity of intrinsic membrane properties in rat frontal Layer 5 pyramidal cells
Takeshi Otsuka, Mieko Morishima, and Yasuo Kawaguchi
Div. Cerebral Circuitry & Structure, NIPS, Okazaki

P-10. A distinctive layer 5 pyramidal neuron in monkey association cortex, morphologically identified by EGFP – adenovirus infection
Marie Wintzer, Kathleen S. Rockland
Lab for Cortical Organization and Systematics, RIKEN BSI, Wako, Japan

P-11. Classification of layer 6 neurons by in situ hybridization
Akiya Watakabe[1], Noritaka Ichinohe[2], Sonoko Ohsawa[1], Tsutomu Hashikawa[3], Kathleen S. Rockland[2], and Tetsuo Yamamori[1]
[1]Div of Brain Biol., National Institute for Basic Biology, [2]Lab for Cortical Organization and Systematics, RIKEN BSI, [3]Lab for Neural Architecture, RIKEN BSI

Poster II　Physiological Analysis *in vivo*

P-12. Burst spikes encode multiple quantities in a time-compressive manner
Toshiyuki Ishii[1,2], Tomonori Manabe[1] and Toshihiko Hosoya[1]
[1]RIKEN Brain Science Institute, [2]Toho University

P-13. Direction selectivity and arrangement of neurons in single barrel columns in the rat somatosensory cortex examined with *in vivo* two-photon calcium imaging
[1]Koji Ikezoe, [2]Yoshiya Mori, [3,4]Kazuo Kitamura, [2,4]Hiroshi Tamura, [2,4]Ichiro Fujita
[1]Grad. Sch. Engineering Science, [2]Grad. Sch. Frontier Biosciences, [3]Grad. Sch. Medicine, Osaka University, Osaka, Japan, [4]CREST, JST, Saitama, Japan

P-14. Spatiotemporal dynamics of surround suppression in cat V1: spatial-frequency dependency
Ayako Ishikawa, Satoshi Shimegi, Hiroyuki Kida, Hiroshi Sakamoto, Hiromichi Sato
Grad. Sch. Front. Biosci. & Grad. Sch. Med., Osaka Univ., Japan

P-15. Spatiotemporal dynamics of surround suppression in cat V1: stimulus-size and orientation-contrast
Satoshi Shimegi, Hiroyuki Kida, Ayako Ishikawa, Hiroshi Sakamoto, Hiromichi Sato
Grad. Sch. Med., & Grad. Sch. Front. Biosci., Osaka Univ., Japan

P-16. Clustering of color-selective cells in macaque area V4: analysis with multiple single-unit recordings
Yasuyo Kotake, Hiroshi Morimoto, Hiroshi Tamura, Ichiro Fujita
Grad. Sch. Frontier Biosciences, Grad. Sch. Engineering Science, Osaka Univ., CREST, JST, Japan

P-17. Inter-spike interval statistics and visual stimulus discrimination capability of neurons in the monkey inferior temporal cortex

Shunta Tate, Hiroshi Tamura, Ichiro Fujita

Lab Cognitive Neurosci., Grad Sch Frontier Biosciences, Osaka University, Osaka, Japan, Japan Society for the Promotion of Science, Tokyo, Japan

Poster III　Development and Plasticity in Neocortex

P-18. Postnatal changes in the colocalization of VGluT1 and VGluT2 immunoreactivities at single axon terminals of the mouse neocortex

Kouichi Nakamura[1,2], Akiya Watakabe[3], Hiroyuki Hioki[1], Fumino Fujiyama[1], Yasuyo Tanaka[1], Tetsuo Yamamori[3], Takeshi Kaneko[1,2]

[1]Department of Morphological Brain Science, Graduate School of Medicine, Kyoto University, [2]CREST, JST, [3]Division of Brain Biology, National Institute for Basic Biology

P-19. Activity-dependent development of interhemispheric connections in mouse visual cortex

Hidenobu Mizuno, Tomoo Hirano, Yoshiaki Tagawa

Dept. Biophys., Kyoto Univ. Grad. Sch. Sci., Kyoto, Japan; CREST, JST, Kawaguchi, Japan

P-20. Transient layer-specific zinc-positive neurons in the developing rat somatosensory cortical system

Noritaka Ichinohe, Daniel Potapov, Kathleen S Rockland

Laboratory for Cortical Organization and Systematics, Brain Science Institute, RIKEN, Wako, Japan

P-21. Layer and area specific gene expression profiling in developing rat cerebral cortex

Toshio Miyashita, Marie Wintzer, *Tomokazu Konishi, Noritaka Ichinohe, Kathleen S. Rockland.

Lab. for Cortical Organization and Systematics, Brain Science Institute, RIKEN. *Faculty of Bioresource Sciences, Akita Prefectural University

P-22. Truncated TrkB-T1 regulates the morphology of neocortical layer I astrocytes in adult rat brain slices

Koji Ohira[1,2], Nobuo Funatsu[1], Koichi J Homma[3], Yoshinori Sahara[1], Motoharu Hayashi[4], and Shun Nakamura[1,2]

[1]Department of Biochemistry and Cellular Biology, National Institute of Neuroscience, National Center of Neurology and Psychiatry, Tokyo, Japan. [2]Core Research for Evolutional Science and Technology (CREST), Japan Science and Technology Agency, Saitama, Japan. [3]Department of Molecular Pathology, Faculty of Pharmaceutical Sciences, Teikyo University, Kanagawa, Japan. [4]Department of Cellular and Molecular Biology, Primate Research Institute, Kyoto University, Aichi, Japan.

P-23. Dynamic role of inhibitory circuits in visual cortical plasticity.

Y. Yazaki-Sugiyama, K. Siu*, T. Fukai*, T. K. Hensch;

Lab for Neuronal Circuit Development, *Neural Circuit Theory, RIKEN BSI, Wako, JAPAN

Poster IV　New Techniques in Cortical Microcircuitry Analysis

P-24. Efficient Gene Transduction in Neurons with Lentivirus by Improved Neuron-Specific Promoters

Hiroyuki Hioki[1,], Hiroshi Kameda[1], Hisashi Nakamura[1], Taro Okunomiya[1], Kohei Ohira[1], Kouichi Nakamura[1,2], Masako Kuroda[1], Takahiro Furuta[1], Takeshi Kaneko[1,2]

[1]Department of Morphological Brain Science, Graduate School of Medicine, Kyoto University, Kyoto, Japan. [2]Core Research for Evolutional Science and Technology, Japan Science and Technology Agency (CREST), Kawaguchi, Japan

P-25. Development of dendrite-targeting signals using lentivirus vectors with neuron-specific promoter

Hiroshi Kameda[1], Hiroyuki Hioki[1], Takahiro Furuta[1], Koji Ohira[1], Wakoto Matsuda[1], Kouichi Nakamura[1,2], Takeshi Kaneko[1,2]

[1]Department of Morphological Brain Science, Graduate School of Medicine, Kyoto University, Kyoto, Japan, [2]CREST, JST

P-26. Golgi-like Visualization of cortical neurons by virus vectors.

Ryohei Tomioka and Kathleen S. Rockland

Lab for Cortical Organization and Systematics, RIKEN BSI

P-27. A Novel Genetic Method for Reversibly Inactivating Mammalian Neurons In Vivo

Yoshiaki Yamaguchi[1], Elaine M. Tan[1,3], Gregory D. Horwitz[2], Thomas D. Albright[2] and Edward M. Callaway[1]

[1]Systems Neurobiology Laboratories, [2]Vision Center Laboratory, The Salk Institute, La Jolla, USA, [3]Neurosciences Graduate Program, UCSD, La Jolla, USA,

Poster V　Physiological Analysis in Hippocampus

P-28. The effects of body temperature on hippocampal neural activity: control of membrane potential through TRPV4 activation

Koji Shibasaki[1,2], Makoto Suzuki[3], Atsuko Mizuno[3], Makoto Tominaga[1,2]

[1]Section of Cell Signaling, Okazaki Institute for Integrative Bioscience, [2]Department of Physiological Sciences, The Graduated University for Advanced Studies, [3]Department of Pharmacology, Jichi Medical University

Poster VI　Anatomical Analysis in Basal Ganglia

P-29. Difference in Organization of Corticostriatal and Thalamostriatal Synapses between Patch and Matrix Compartments of Rat Neostriatum.

Fumino Fujiyama[1], Tomo Unzai[1], Kouichi Nakamura[1,3], Sakashi Nomura[2], and Takeshi Kaneko[1,3]

[1]Department of Morphological Brain Science, Graduate School of Medicine, Kyoto University, [2]Department of Physical Therapy, School of Health Sciences, Faculty of Medicine, Kyoto University, Kyoto, JAPAN and [3]CREST, JST.

P-30. Axonal arborization of midbrain dopaminergic neurons: single-cell study

Wakoto Matsuda[1], Takahiro Furuta[1], Koichi Nakamura[1,2], Takeshi Kaneko[1,2]

[1]Department of Morphological Brain Science, Graduate School of Medicine, Kyoto University[2] CREST

P-31. Single cell tracing of thalamostriatal projection neurons with reference to patch and matrix compartments of rat striatum

Tomo Unzai[1], Fumino Fujiyama[1], Takeshi Kaneko[1,2]

[1]Department of Morphological Brain Science, Graduate School of Medicine, Kyoto University, Kyoto, Japan, [2]CREST, Japan

第 36 回生理研コンファレンス

第 36 回生理研コンファレンスは，日本学術振興会平成 18 年国際学術集会助成事業として，第 3 回ニールス・ステンセン記念国際唾液腺シンポジウムおよび生理研研究会と合同で 2006 年 10 月 20 日から 23 日の会期で自然科学研究機構　岡崎コンファレンスセンターにて開催された。

本会は対象を唾液腺に限定し，形態学，生理学，生化学，薬理学，病理学，細胞生理学の研究者達の成果のすりあわせを同じテーブルで行い，新しい概念を模索し臨床応用へ連結する芽を育むことを目的とした。14 ヶ国から 50 名，国内から 70 名の唾液腺分野の第一線研究者が集い講演 40 題，ポスター60 題が発表された。

A. 唾液による化学診断と分泌蛋白のプロテオミクス：唾液を臨床データとして取扱うための重要な合意として，唾液分泌速度と唾液中の基質濃度の関係図を作成し，この相関から評価すべきことが議論された。分泌蛋白/ペプチドの分析がこの5年間のマススペクトロスコピーの技術革新で本格的に稼働し始めた。分泌蛋白は細胞内分泌顆粒内で貯蔵され，細胞から分泌され，導管を通る間にも修飾をうけ，さらに口腔内でも修飾を受けることが議論され，数多くのフラグメントについても将来の研究課題として残された。

B. 唾液機能を付与するための遺伝子治療：喉頭がん，咽頭がんなどの放射線治療により唾液腺の腺房など分泌終末の機能が失われる。腺房の機能を導管に肩代わりさせ，水分分泌機能を加えるプロジェクトが本年アメリカ公衆衛生院 (NIH) で開始された。基礎研究が具体的な臨床応用に発展した希有の例であり，聴衆を大きく勇気づけた。

C. 環境変化に応じた唾液分泌調節の神経機構：従来あまり問題にされていなかった唾液腺からの求心性信号の存在が確定され，これがどのように中枢に作用し，唾液分泌を統御するか次に探索することとなった。唾液減少症に用いられるピロカルピンが脳室周囲系を刺激し「口渇」を誘導することが示された。このため，体液量調節の観点から，本薬の唾液分泌作用との関連が複雑になることが指摘され，本薬を含む研究の問題点が明らかになった。

D. 唾液腺構造分化と機能発現：唾液腺が発達段階で枝をはり，管腔を形成する。唾液腺での幹細胞を探索し，これを唾液腺機能不全患者に自己移植し機能を回復させてゆくことは唾液腺分野の組織工学者の目標である。本会では幹細胞の探索の成果，接着分子の細胞内骨格の制御が討議された。

E. 分泌顆粒の機能形態：分泌顆粒が均一ではなく下部構造をもつことは既に報告されてきたが，今回，グリコーゲンの沈着が幼少期の唾液腺分泌顆粒の傍らに発見され，顆粒の成熟との関係が注目された。また顆粒のアクアポリン6は陰イオン輸送を介し分泌顆粒内物質の濃縮を制御することが議論された。

F. 経／傍細胞輸送調節：細胞からの水分分泌と細胞の間を通過する傍細胞輸送による水分分泌について，アクアポリン5を浸透圧受容体としてその信号により傍細胞経路が開閉する説が初めて国際学会で高く評価され，具体的な実験プランも直接研究者間で相談された。

G. 分泌開始を誘導する細胞内信号系：Ca 信号系について12年前に岡崎で開催された唾液腺ワークショップからの研究史が総括され，細胞内 Ca ストアの実態として連結した小胞体のアイデアが提出，今後細胞内信号系の実態を微細形態学で観測する手法が話し合われた。

生理学研究所は2007年創立30周年を迎えるが，これまで岡崎市民には大きな支援を受けてきた。今回その恩返しと基礎研究を市民に理解していただくため，市民公開講座と市民公開演奏会を開催し，歴史的な学問の基盤と国際的な広がりを体感していただいた。会場の岡崎コンファレンスホールにシンポジウム参加者と岡崎市民，岡崎 3 研究所の職員，高校生ら約200名が参加し，講演とリュートの演奏を味わった。

20 October Friday　　CITIZEN FORUM

Opening Lecture: Alessandro Riva (Cagliari) The work of Fabricius ab Aquapendente (Harvey's Teacher) in the light of the recently restored Tabulae Pictae: its influence in the development of modern anatomy in Europe and in Japan.

Lute Concert: Terrell Stone (Music Conservatory of Vicenza, Italy) Lute music from the court of Francis I and Padovan lute music.

21 October Saturday　　SCIENCE SESSION

O. Opening of Science Session

Talk: Alessandro Riva (Cagliari) Stensen and early history of glands and exocrine secretion.

A. Diagnostics using saliva and Proteomics of Saliva

Talk: Masataka Murakami (Okazaki), Naoki Shinozuka (Sapporo) Clinical examination using saliva: Influence of fluid secretion on the concentration of substrate in saliva: How to overcome the problem for *in vivo* application.

Talk: Anders Bennick (Toronto) Extraoral functions of salivary proteins.

Talk: Josie A Beeley (Glasgow) Human salivary proteins- A fascinating complex of polymorphic and polyfunctional proteins.

Poster: Tiziana Cabras (Cagliari) A proteomic study of saliva from celiac patients.

Poster: Rosanna Inzitari (Rome) Salivary acidic proline-rich proteins in preterm newborns.

Poster: Tomoya Hayashi (Nantan, Kyoto) Oxidative modification of serum albumin via paracellular route of rat submandibular gland.

Poster: Marco Piludu (Cagliari) A preliminary study on salivary protein expression in diabetic patients.

Poster: Naoki Shinozuka (Sapporo) Clinical examination using saliva: an *in vivo* application to human adults.

Talk: Massimo Castagnola (Rome) How the technique works and how the researcher can take a profit from the MS strategies.

Talk: Francisco ML Amado (Aveiro) Salivary glands and saliva composition: a proteomic approach.

Talk: Irene Messana (Cagliari) Salivary peptides as potential substrates of type2 transglutaminase.

Talk: Massimo Castagnola (Rome) Pre-secretory Post-translational modifications common to different families of human salivary proteins.

Talk: Chenjuan Yao (Tokushima) Tissue kallikrein mK13 is a candidate of the processing enzyme for pro-IL-1b in the mouse submandibular gland.

Poster: Rui Vitorino (Aveiro) Protein content comparison of mouse subamndibular and parotid salivary glands.

Poster: Chiara Fanali (Rome) Characterization of different proline-rich peptides from pig parotid glands.

Poster: Joanna Anton Monteiro, Massimo Castagnola (Rome) Tyrosine sulfation of Histatin 1. A post-translational modification specific of submandibular glands.

Poster: Hiroko Inoue (Kita-Kyushu) Different roles of salivary mucins in viscosity and spinnbarkeit of human saliva.

Poster: Takahiro Hayasaka, Mitsutoshi Setoh (Okazaki) MALDI based Mass Imaging revealed abnormal distribution of phospholipids in cancer.

B. Therapeutics by modulation of salivary gland

Video: Bruce Baum (Bethesda) Clinical applications of gene transfer to salivary glands.

Talk: Takayoshi Sakai (Osaka) Morphogenesis and cleft formation of salivary gland epithelia: Exploration of new functional regulators.

Poster: Naozumi Ishimaru (Tokushima) A novel role of RbAp48 for tissue-specific apoptosis in the salivary glands depending on estrogen deficiency.

Poster: Masatake Asano (Tokyo) Ionomycin inhibit the soluble protein transport between ER and Golgi.

Poster: Wei Muxin (Nanjing) Investigation on the influences of Chinese herbs on salivary secretion in rat submandibular gland.

Poster: Hideaki Kagami (Tokyo) Possible involvement of clusterin in the regeneration process of rat submandibular gland.

Poster: Wei Muxin (Nanjing) Effect of Dan Di Qiong Yu granule on salivary gland of Sjogren syndrome mice.

Poster: Tomoko Nashida (Niigata) Relation of proteoglycan to sorting amylase into secretory granules/vesicles.

Poster: Hiromi Shimomura (Niigata) Activation of cAMP-dependent protein kinase by cGMP in the rat parotid acinar cells.

C. Neural control of salivary secretion in response to environmental change

Talk: Kiyotoshi Inenaga (Kokura) Pilocarpine induces salivary secretion and thirst in rats.

Talk: Ryuuji Matsuo (Okayama) Electrophysiological analysis of the afferent activity from the submandibular salivary gland in the rat.

Talk: Xuefei Li (Tokushima) Effects of autonomic denervation and administration of SNI-2011 on the expression of AQPs in the rat salivary gland.

Talk: Jörgen Ekström (Göteborg) Neural- and hormonal-induced protein synthesis and mitotic activity and the dependence on NO-generation.

Poster: Kentaro Ono (Kita-Kyushu) Relationship of chewing-stimulated whole saliva flow rate and salivary gland size in humans.

Poster: Ken'ichi Ishizuka (Niigata) Cardiac-related activity in superior salivatory nucleus neurons in anaesthetized rats.

Talk: Yoshihiro Mitoh (Okayama) Electrophysiological study on the descending excitatory synaptic inputs to the superior salivatory nucleus in the rat.

Talk: David K Ann (Los Angeles) Functions, regulation and mechanisms of action of SUMOylation in salivary cells.

Poster: Akihito Fujii (Okayama) Electrophysiological study of the inhibitory inputs from the forebrain and brainstem to the superior salivatory nucleus in rats.

Poster: Miyuki Kobashi (Okayama) Role of the feeding center for submandibular salivary secretion during feeding behavior in the rat.

Poster: Nina Khosravani (Göteborg) The facial nerve and its influence on the parotid gland.

Poster: Hülay Çevik Aras (Göteborg) Melatonin-evoked protein secretion from the rat parotid gland *in vivo*.

Poster: Hajime Ishibashi (Matsudo) Induction of general anesthesia with propofol increases salivary flow.

Poster: Minoru Matsui (Tokyo) Salivary secretion by MR3-KO mice.

22 October Sunday

D. Structural differentiation and functional expression of salivary gland

Talk: Yohki Hieda (Osaka) Regulation of epithelial tube formation in developing mouse submandibular gland.

Talk: Matthew Hoffman (Bethesda) FGF10 regulates branching morphogenesis during salivary gland development.

Talk: Tetsuya Akamatsu (Tokushima) Involvement of a subtilisin-like proprotein convertase, PACE4, in branching morphogenesis and AQP5 expression in the rat embryonic submandibular gland.

Poster: Kenichiro Kikuchi (Tokyo) Freeze fracture studies of tight junctions in mouse salivary glands and cultured salivary cell lines.

Poster: Masanori Kashimata (Gifu) Shared or non-overlapping intracellular signaling pathways activated by EGFR or FGFR differentially regulate branching morphogenesis in fetal mouse submandibular glands.

Poster: Yuuichi Kadoya (Sagamihara) Cellular aspect of salivary gland branching morphogenesis.

Poster: Nunuk Purwanti (Tokushima) The expression of cellular markers of duct/acini and side population dynamics in the duct-ligated mouse submandibular gland.

Poster: Shinya Yamamoto, Satoshi Fukumoto (Fukuoka) Role of PDGF in salivary gland morphogenesis.

Poster: Wataru Masuda (Kita-Kyushu) The change of the subcellular localization of CD38 in the rat sublingual gland during saliva secretion.

D. Structural differentiation and functional expression of salivary gland

Talk: Arthur Hand (Farmington) Submandibular and sublingual glands in Nkx2-3 mutant mice.

Talk: Shoichi Iseki (Kanazawa) A novel mouse protein differentially regulated by androgens in the submandibular and lacrimal glands.

Talk: Kenjji Mishima (Yokohama) Identification and therapeutic potential of salivary gland side population cells.

Poster: Osamu Amano (Sakado, Saitama) Heat shock protein 27kDa (Hsp27) regulates differentiation and regeneration of acinar cells of the rat submandibular gland.

Poster: Sachiko Matsuura (Shiojiri, Nagano) Temporary accumulation of glycogen in the epithelial cells during developmental differentiation of the mouse submandibular gland revealed by the high-pressure freezing/freeze substitution-TEM.

Poster: Miwako Matsuki (Matsudo) Effects of actin-related drugs on exocytosis in parotid acinar cells.

Poster: Sadamitsu Hashimoto (Chiba) Control of paracellular transport and its morphological evidence in perfused rat submandibular gland.

Poster: Atsuko Sato (Fukuoka) Localization of G proteins in the main excretory duct of the rat submandibular gland with special reference to the MED tuft cell and the taste bud type II cell.

E. Functional morphology of secretory granules

Talk: Bernard Tandler (Cleaveland) Ultrastructure of the ovine parotid gland.

Talk: Alessandro Riva (Cagliari) A morphometric study by HRSEM of the secretory responses of human salivary glands stimulated *in vitro* by various secretagogues.

Talk: Hiroshi Sugiya, Miwako Matsuki (Matsudo) Expresssion and function of aquaporin-6 in the rat salivary glands.

Talk: David Giovannucci (Toledo, Ohio) Analysis of secretory dynamics in mouse parotid acinar cells reveals multiple pathways for secretory granule fusion.

Poster: Akane Imai (Niigata) Roles of Rab27 and its effectors in isoproterenol-induced amylase release from rat parotid acinar cells.

Poster: Matthew J Betzenhauser (Rochester) Subtype-specific regulation of inositol (1,4,5)- trisphosphate receptors by protein kinase A

Poster: Tomomi Nemoto (Okazaki) Exocytosis and fluid secretion in exocrine glands studied by two-photon microscopy.

Poster: Akiko Shitara (Ishikari-Tobetsu) Multi-photon imaging of cellular heterogeneity in the sensitivity of Ca^{2+} responses in rat parotid ducts.

Poster: Raffaella Isola (Cagliari) Morphological changes induced by histatins in *Candida albicans*: A microscopic and submicroscopic comparison.

Poster: Hideaki Tamaki (Sagamihara) Sequential appearance of Golgi proteins during *de novo* formation of the Golgi apparatus in parotid acinar cell.

Poster: Yosuke Tojyo (Ishikari-Tobetsu) Comparison of cluster formation of GFP-IP3 receptors in HSY, a human salivary cell line, and COS-7 cells.

Poster: Konosuke Kumakura (Tokyo) Possible Involvement of Myosin-ATPase in the spatio-temporal regulation of exocytosis in adrenal chromaffin cells.

F. Control for fluid/electrolyte transport via trans-/paracellular routes

Talk: James Melvin (Rochester) The ion and fluid secretion mechanism.

Talk: R James Turner (Bethesda) Structural and functional significance of the dimerization of the secretory Na-K-2Cl cotransporter (NKCC1).

Talk: Jun Yamazaki (Fukuoka) Localization and function of CLCA in rat submandibular glands.

Poster: Yusuke Imai (Otsu) Bond graph expression on an epithelial transport system.

Poster: Martin C Steward (Manchester) A modular approach to computational modelling of epithelial electrolyte transport.

Poster: Varga Gabor (Budapest) Bicarbonate secretion by cultured salivary gland cells

Poster: Chikara Hirono (Hiroshima) Regulation of Cl secretion by muscarinic cholinergic and adrenergic stimulation in acinar cells of rat salivary gland.

Poster: Yoshiro Sohma (Takatsuki) Voltage-dependent transient activity of Na^+/H^+ exchanger.

23 October Monday

F. Control for fluid/electrolyte transport via trans-/paracellular routes (continued)

Talk: A E Hill (Cambridge) A feedback control model of fluid transport in salivary gland.

Talk: Anil G Menon (Cincinnati) Evidence for interaction between transcellular and paracellular water transport pathways: signaling between Aquaporin-5 and the tight junction complex in mouse salivary glands.

Talk: Junko Yoshigaki (Matsudo) Change of claudin expression in primary cultured parotid acinar cells.

Poster: Christine Delporte (Brussels) Impaired aquaporin-5 distribution in salivary glands from a Sjögren's syndrome mouse model.

Poster: Mileva R Karabasil (Tokushima) Molecular and cellular analyses of mutant AQP5 which occurred naturally in Sprague-Dawley rats.

Poster: Retsu Mitsui (Matsudo) Regulation of intercellular junctions in polarized salivary cells.

Poster: Tetsuji Nakamoto (Rochester) The use of gene disruptions and isolated, perfused glands to examine mouse submandibular function.

Poster: Yoshiteru Seo (Mibu, Tochigi) Water permeability as measured by NMR in salivary gland cells.

G. Stimulus-Secretion Coupling for starting electrolyte transport

Talk: James W Putney Jr (Research Triangle Park) Calcium signaling mechanisms in salivary gland cells and other epithelial cells.

Talk: Akihiko Tanimura (Ishikari-Tobetsu) Monitoring IP_3 and Ca^{2+} dynamics in salivary and other cell lines.

Talk: David I Yule (Rochester) Intracellular calcium signaling: mechanistic insight from analysis of distinct signals in parotid and pancreas.

Talk: Jason Bruce (Manchester) Regulation of the plasma membrane Ca^{2+}-ATPase in parotid acinar cells.

Poster: Philip Poronnik (St Lucia, Queensland) Muscarinic receptor mobilization of plasma membrane Ca^{2+}-ATPase in epithelial cells: Role of the NHERF2 PDZ scaffold.

Poster: Jenny Ekberg (St Lucia, Queensland) Regulation of KCNQ2/3 by the ubiquitin ligase Nedd4-2.

Poster: Keitaro Satoh (Matsudo) Secretagogues stimulate phosphorylation of MARCKS in parotid acinar cell.

Talk: Shumuel Muallem (Dallas) Regulation of TRPC channels by STIM1.

Talk: Min Goo Lee (Seoul) Shank2 as a key regulator of epithelial transport in apical membrane.

Talk: David I Cook (Sydney) The regulation of the epithelial Na^+ channels by UTP.

Talk: Anuwat Dinudom (Sydney) Signaling pathways regulating Na^+ transport in salivary ducts.

Poster: Hideyo Yoshida (Takatsuki) Ca^{2+} influx induced by ionomycin under a high $[K^+]$ in rat submandibular acinar cells.

Poster: Il-Ha Lee (Sydney) Regulation of the epithelial sodium channel by caveolin.

Poster: Xibao Liu (Bethesda) The role of TRP channel in the salivary gland fluid secretion.

総合研究大学院大学・生理学研究所　国際シンポジウム
（第 37 回生理研コンファレンス）

総合研究大学院大学・生理学研究所　国際シンポジウム「膜電位―化学シグナルの新展開：多様性とメカニズム Electro-Chemical Signaling by Membrane Proteins: Biodiversity & Principle」は，自然科学研究機構・岡崎コンファレンスセンターにおいて平成 19 年 3 月 14－16 日の 3 日間で開催された。電気情報を化学情報に転換する機構は，エネルギーの産生，神経情報伝達，活性酸素の代謝をはじめとする生命秩序の維持に本質的役割を担っている。ここ数年，イオンチャネルやトランスポーターを始めとする膜蛋白の詳細な動作原理が明らかになり，またゲノム情報との連携により新しい膜蛋白分子群が発見され，細胞膜での電気化学連関機構について新しい研究展開がみられている。膜蛋白に関して生理学，構造生物学，細胞生物学，ゲノム科学の複数の分野での研究者を集め，電気化学連関機構に関わる膜蛋白質を中心として学際的融合的な研究・教育の発展を目指した。15 名の研究者が口演し，事前登録者 150 名を含む約 200 名が参加した（うち企業から 5 名）。岡崎統合バイオサイエンスセンターと阪大蛋白研との連携研究である膜蛋白質研究国際フロンティア形成の国際シンポジウムも兼ねており，意図したとおり幅の広い研究領域からの参加となり質問や議論も分野の垣根を越えたものであった。ひとつのハイライトは電位センサーの動きに関するセッションで，ここ数年 Nature 誌などで熱い議論が続いてきた電位センサーの動作原理について白熱した議論が交わされた。1 日目，2 日目のポスターセッションでは 40 件ものポスター発表が行われ，また，アメリカナショナルアカデミーの会員でもある Francisco Bezanilla（シカゴ大学）と Gunnar von Heijne（ストックホルム大学）による特別教育講演も行われた。すべてのセッションで活発な議論が交わされ，特に学生からの質問が多くなされたのは総研大国際シンポジウムとしても大きな成果であった。

Wednesday, March 14th

Opening remark

1. Kenjiro Yoshimura (Tsukuba University)
   Mechanosensitive channel responds to and resists the membrane stretch
2. Yoshinori Fujiyoshi (Kyoto University)

Significance of multifunctional channels

3. Special Lecture 1:Francisco Bezanilla (University of Chicago)
   The operation of the voltage sensor
4. Ehud Y. Isacoff (University of California at Berkeley)
   Sensing voltage
5. Peter Larsson (Oregon Health & Science University)
   Mechanisms of voltage activation in hyperpolarization-activated cyclic nucleotide-gated (HCN) channels
   Poster session
6. Jianmin Cui (Washington University)
   Interaction between the Voltage-Sensor and Cytosolic Domain in BK Channels
7. Ming Zhou (Columbia University)
   Functional Coupling between Voltage-Dependent Potassium Channel and Aldo-keto Reductase

Thursday, March 15th

8. Hideki Kandori (Nagoya Institute of Technology)
   Mechanism of light-driven proton and chloride-ion pumps
9. Takeshi Murata (JST ERATO Iwata project)
   Ion transport mechanism of V-ATPase
10. Tomitake Tsukihara (Institute for Protein Research, Osaka University)
    Proton pumping coupled with dioxygen reduction of cytochrome c oxidase
11. Special Lecture2: Gunnar von Heijne (Stockholm University)
    Membrane protein assembly
12. Andy Spencer (University of Alberta)
    Potassium channel diversity in lower metazoans - relating structure to voltage sensitivity and physiological function
13. Yasushi Okamura (Okazaki Institute for Integrative Bioscience, NIPS, NINS)
    Biodiversity of voltage sensor domain proteins
14. Yoshihiro Kubo (NIPS, NINS)
    Voltage and [ATP]- dependent "gating" of ATP receptor channel $P2X_2$
    Poster session

Friday, March 16th

15. Thomas DeCoursey (Rush University Medical Center)
    pH- and voltage-dependent gating enables voltage-gated proton channels to perform their physiological functions
16. Ai-Sun Tseng (Forsyth institute and Harvard School of Dental Medicine)
    Biophysical control of tail regeneration in Xenopus
17. Paul Kemp (Cardiff School of Biosciences)
    Potassium channel protein partners: gas sensing in the nervous system
18. Makoto Tominaga (Okazaki Institute for Integrative Bioscience, NIPS, NINS)
    Thermosensitive TRP channels: their structure- function relationship and physiological significance
19. Gisela Wilson (University of Michigan)
    EAG potassium channels: new functions for voltage-sensing

Closing remark