

# 【 国際シンポジウム 】

## COE 国際シンポジウム (第 31 回生理研国際シンポジウム)

第 31 回生理研国際シンポジウムは“感覚運動機能研究への多様なアプローチ--新しい研究パラダイムによる最新の展開--”と題して 2004 年 3 月 16-18 日の 3 日間、岡崎コンファレンスセンターにおいて開催された。今回のシンポジウムは脳による運動制御について、脊髄・脳幹レベルから大脳皮質、大脳基底核、小脳といった様々な領域の機能やその損傷時の機能代償機構などについて、その神経回路の分子の構築から神経活動による情報の符号化、さらにはコンピューターモデリングによる計算論的研究まで、まさしく *multidisciplinary* な研究手法を有する研究者同士の活発な交流を目指して企画された。そしてこの分野の世界的に第一線で活躍する研究者（国内 16 名、海外より 20 名）を招聘し、講演していただいた。これらの講演は 3 日間にわたり行われたが、それに加えてポスターセッションも行い、ここでも国内外より 84 題のポスター発表が行われた。最終的な参加者は総勢 220 名（国内 194 名、海外より 26 名）で、この分野の国際会議としては質・量ともに近年例のない大規模なものとなった。今回顕著だったことは多くの若手研究者の参加をみたことで、様々な研究手法を融合することで、脳による運動制御の研究が今後新たな展開を見せることを十分に期待させるものであった。



### Tuesday, March 16, 2004

Opening Remarks & Welcome Address

#### Session 1 (Chaired by Hans Hultborn)

##### 1. Sten Grillner (Stockholm)

The “Vertebrate Motor Infrastructure”- a “toolbox” of networks & the intrinsic function of one model network.

##### 2. Joseph Fetcho (Stony Brook)

Optical and genetic approaches toward understanding motor system function and dysfunction.

##### 3. Yoichi Oda (Osaka)

Functional organization of segmentally homologous reticulospinal neurons in the teleost hindbrain.

#### Session 2 (Chaired by Sten Grillner)

##### 4. Ole Kiehn (Stockholm)

Physiological and genetic approaches to locomotor circuits in mammals.

5. Hans Hultborn (Copenhagen)

Key mechanisms for setting the input-output gain across the motoneuron pool.

**Session 3 (Chaired by Peter Strick)**

6. Bror Alstermark (Umeå)

Functional role of direct (monosynaptic) versus indirect (disynaptic) cortico-motoneuronal pathways in the Macaque monkey.

7. Eberhard Fetz (Seattle)

Contrasting roles of primate cortical and spinal neurons in preparation and execution of voluntary movements.

8. Stephen Scott (Kingston)

Neural correlates of limb mechanics and mechanical loads in primary motor cortex.

**Session 4 (Chaired by Eberhard Fetz)**

9. Peter Strick (Pittsburgh)

"Muscle" and "Movement" Representation in the Motor Cortex: New Anatomical and Physiological Perspectives.

10. Masahiko Takada (Tokyo)

Organization of multisynaptic pathways linking the prefrontal cortex and the primary motor cortex.

11. Roger Lemon (London)

Interactions between premotor and motor cortex in the primate: role in visual control of grasp

**Wednesday, March 17, 2004**

**Session 5 (Chaired by Roger Lemon)**

12. Atsushi Iriki (Tokyo)

Reorganization of visuo-somatosensory integration in the intraparietal cortex induced by tool-use training in monkeys.

13. Jun Tanji (Sendai)

Pre-SMA versus SMA: from a perspective of motor selection based on visual instructions.

14. Kiyoshi Kurata (Hirosaki)

Dynamic visuo-motor transformation in the ventral premotor cortex of monkeys.

**Session 6 (Chaired by Daniel Wolpert)**

15. Andrew Schwartz (Pittsburgh)

Useful signals from motor cortex.

16. Reza Shadmehr (Baltimore)

Learning dynamics of reaching.

17. Mitsuo Kawato (Kyoto)

Computational Learning Mechanisms for Impedance Control and Internal Model Acquisition.

**Session 7 (Chaired by Tadashi Isa)**

18. Daniel Wolpert (London)

Uncertainty in sensorimotor control.

19. William Hall (Durham)

Exploring the superior colliculus In Vitro.

20. Shigeto Sasaki (Tokyo)

Neural mechanisms of controlling velocity guided orienting in behaving cats.

**Session 8 (Chaired by William Hall)**

21. Adonis Moschovakis (Cretè)

Space representation in the superior colliculus and its use in motor control.

22. Yoshikazu Shinoda (Tokyo)

Initiation and suppression of saccades by the frontal eye field (FEF) in the monkey.

23. Martin Paré (Kingston)

Neural basis of controlled and ballistic movement processing.

**Session 9 (Chaired by Adonis Moschovakis)**

24. Kikuro Fukushima (Sapporo)

Discharge characteristics of pursuit neurons in the caudal frontal eye fields during vergence eye movements in monkeys.

25. Kenji Kawano (Kyoto)

Preparatory modulation of the gain of visuo-motor transmission for smooth pursuit.

**Thursday, March 18, 2004**

**Session 10 (Chaired by Andrew Schwartz)**

26. Tadashi Isa (Okazaki)

Dynamic modulation of local circuit in the superior colliculus during saccadic eye movements.

27. Shigeru Kitazawa (Tokyo)

Optimization of goal-directed movements: a random walk hypothesis in the cerebellum.

28. Randy Flanagan (Kingston)

Prediction and control in skilled manipulation.

**Session 11 (Chaired by Okihide Hikosaka)**

29. Tomoo Hirano (Kyoto)

Cerebellar control of eye movement in mutant mice.

30. Soichi Nagao (Tochigi)

Role of cerebellar LTD in reflex eye movement learning control.

31. Hitoshi Kita (Memphis)

The role of the globus pallidus external segment in the basal ganglia circuitry.

32. Toshihiko Aosaki (Tokyo)

Cell assemblies in the striatum.

**Session 12 (Chaired by Jun Tanji)**

33. Atsushi Nambu (Okazaki)

Dynamic model of the basal ganglia functions and Parkinson's disease.

34. Hagai Bergman (Jerusalem)

Teaching signals and information processing in the basal ganglia of normal and parkinsonian primates.

35. Okihide Hikosaka (Bethesda)

Motivational control of saccadic eye movement.

**Session 13 (Chaired by Hagai Bergman)**

36. Kenji Doya (Kyoto)

Competition and Cooperation of Multiple Learning Modules.

37. Minoru Kimura (Kyoto)

Encoding Motivation and Outcome of Decision by Dopamine Neurons.

**Closing remark; Atsushi Nambu (NIPS)**

**Poster Session16-18 March,2004**

P-1. Satoe Ichihara (Kyoto University)

Reward-period activity in primate dorsolateral prefrontal and orbitofrontal neurons is affected by reward schedules

P-2. Y. Watanabe (Kyoto University)

Task-related Activity in Primate Mediodorsal Nucleus of the Thalamus Represents Either Visual or Motor Information during Oculomotor Delayed-Response Performances

P-3. Takayuki Hosokawa (Kyoto University)

Cue activities correspond with reward activities in the macaque orbitofrontal cortex

P-4. Masato Inoue (Kyoto University)

Ventrolateral prefrontal neurons holding both object and order information

P-5. Nobuhiko Hatanaka (NIPS)

Input-output organization of jaw movement-related areas in monkey frontal lobe

P-6. Oshio K (Kinki University)

Delay period activity of dorsolateral prefrontal cortex during duration-discrimination task

P-7. Shigehiro Miyachi (Tokyo Metropolitan Institute for Neuroscience)

Multisynaptic inputs from prefrontal cortex to primary motor cortex as visualized by retrograde transneuronal infection of rabies virus

P-8. Itaru Yamane (Tokyo Metropolitan Institute for Neuroscience)

Neuronal activity of the supplementary motor area in relation to bilateral hand movements

P-9. Naosugi Yumoto (Tokyo Metropolitan Institute for Neuroscience)

Prefrontal activity in relation to time coding

P-10. Masashi Koizumi (Tamagawa University)

Macaque Lateral Prefrontal Neurons Related to Speed of Discrimination during Go/no-go Task

P-11. Gemba, H. (Kansai Medical University)

Speed-control Activities of the Posterior Parietal Cortex for Horizontal Rotation Movements of the Neck

P-12. Akira Murata (Kinki University)

Self generated action monitoring by mirror neurons in area PF

P-13. IJICHI, Y (Shiga University of Medical Science)

Activity of the lateral cerebellar nucleus neurons receiving input from the prefrontal and premotor cortical areas

P-14. Aumann T.D. (University of Melbourne)

Oscillatory responses evoked in the motor system are increased following paired conditioning stimulation in cerebellar nuclei and primary motor cortex in behaving monkeys

P-15. Martin Voss (Institute of Neurology, London University)

Role of Primary Motor Cortex in Predictive Motor Control

P-16. Rathelot, J-A (University of Pittsburgh)

Representation of single digit muscle in the primary motor cortex (M1)

P-17. Katsumi Nakajima (Kinki University)

Primary motor cortex (M1) and supplementary motor area (SMA) contribute to the elaboration and control of bipedal locomotion in Japanese monkeys (*M. fuscata*)

P-18. Futoshi Mori (University of Yamaguchi)

Involvement of multiple brain regions in the elaboration of bipedal locomotion in *M. fuscata*: a PET study

- P-19. Yuko Nishimura (NIPS)  
Change in activation of primary and premotor cortices during reaching and prehension task after recovery from lesion of corticospinal tract at the cervical spinal cord in monkeys; a PET study
- P-20. K. Nakao (Kansai Medical University)  
Is Readiness Potential Related to Movement Initiation?
- P-21. Brochier, T. (Institute of Neurology, London University)  
Differential relation of single unit activity in primary motor cortex and F5 premotor cortex to hand movements: results from simultaneous multiple electrode recordings in both areas
- P-22. Eizo Miyashita (TITEC)  
Movement Dynamics are encoded by primary motor cortical neurons
- P-23. Masaki Isoda (Tohoku University)  
Participation of Multiple Cortical Areas in Oculomotor Sequencing
- P-24. N. Higo (AIST)  
Rehabilitative training after brain injury induced GAP-43 mRNA expression in the monkey brain: a molecular basis of motor recovery
- P-25. S. Kakei (Tohoku University)  
Agonist selection for wrist motor control
- P-26. Satoshi Tanaka (The Graduate University for Advanced Studies)  
Functional Specificity of the Rostral Part of Brodmann Area 6 in Verbal and Spatial Mental-Operation Tasks: a Low-Frequency Repetitive Transcranial Magnetic Stimulation Study
- P-27. Tomohiko Takei (Kyoto University)  
Adaptive control of human cortico-spinal excitability for involuntary movements evoked by transcranial magnetic stimulation
- P-28. Yutaka Oouchida (Kyoto University)  
Hand movements in parietal cortex and area 44
- P-29. Nobuhiro Hagura (Kyoto University)  
Integration and segregation of multisensory inputs when humans perceive limb movements
- P-30. Tokuro Nakashima (Kyoto University)  
Motor execution and kinesthetic processing are tightly coupled in multiple motor homunculi of human motor system: An fMRI study
- P-31. Hirotaka Onoe (Tokyo Metropolitan Institute for Neuroscience)  
Neural responses during the continuous performance of Advanced Trail Making Test: PET study with healthy volunteers
- P-32. Yu Aramaki (NIPS)  
Neural correlates of spontaneous phase transition in bimanual finger tapping
- P-33. Satoshi Shibuya (Juntendo University)  
Effects of reminder knowledge of results about movement timing on motor skill learning
- P-34. Yukari Ohki (Kyorin University)  
TMS can induce bilateral motor responses during bimanual coordinated movements in humans
- P-35. David W. Franklin (ATR Computational Neuroscience Laboratories)  
Feedback is Incorporated into the Feedforward Command on the Subsequent Trial during Motor Adaptation
- P-36. Fredrik Bissmarck (ATR Computational Neuroscience Laboratories)  
Learning and control of real-time procedural movement

P-37. Rieko Osu (ATR Computational Neuroscience Laboratories)

Simultaneous Learning and Switching for Two Opposing Viscous Force Fields

P-38. Naohiko Iguchi (University of Electro-Communications)

The minimum end-point variance trajectories depends on the power parameter of the fluctuation of the motor command

P-39. Kiyoji Matsuyama (Sapporo Medical University)

Commissural interneuronal system in the cat lumbar spinal cord: axonal projection pattern and cell morphology

P-40. Noritaka Kawashima (Research Institute of National Rehabilitation Center)

Effect of interlimb coordination on locomotor-like muscle activity in spinal cord injured persons

P-41. Daichi Nozaki (Research Institute of National Rehabilitation Center)

Muscle activity determined on the basis of cosine tuning with a nontrivial preferred direction during isometric force exertion by the lower limb

P-42. Daichi Nozaki (Research Institute of National Rehabilitation Center)

Sustained muscle contractions maintained by autonomous neuronal activity within the human spinal cord

P-43. Seki, K (NIPS)

Presynaptic inhibition in awake, behaving monkey

P-44. Lorenzo Cangiano (Karolinska Institute)

Mechanisms of burst generation in a spinal locomotor system deprived of crossed inhibition

P-45. J. Ogawa (Kyorin University)

Pyramidal effects on forelimb motoneurons in rats: disynaptic EPSPs mediated via reticulospinal neurones and polysynaptic EPSPs via segmental interneurons

P-46. Shin-ichi Higashijima (CIB, ONRI)

Engrailed-1 expression marks a primitive class of inhibitory spinal interneuron

P-47. T. Komiyama (Chiba University)

Common interneurons in reflex pathways from cutaneous afferents innervating different foot regions in humans

P-48. Hisataka Tanaka (NIPS)

In vivo measurement of the conduction velocity of the central neural pathways in the PLP transgenic mice

P-49. Yutaka Fujito (Sapporo Medical University)

Formation of new corticorubral synapses after cross-innervation of distal forelimb muscles in the cat

P-50. Kaoru Takakusaki (Asahikawa Medical College)

Orexinergic projections to the midbrain mediate alternation of behavioral states from locomotion to cataplexy

P-51. Dai Yanagihara (Toyohashi University of Technology)

Behavioral deficits in mGluR1 mutant mice: locomotion and fear-conditioned bradycardia

P-52. Hiroshi Aizawa (Hirosaki University)

LATER model with two threshold levels explains bimodal saccadic reaction time distribution in cue gap saccade task with NoGo trials

P-53. Hiromitsu Tabata (National Institute of Advanced Industrial Science and Technology)

Preparation of smooth pursuit eye movements based on target motion probability

P-54. Yoshiko Kojima (University of Tsukuba)

Motor learning facilitation for saccades occurs predominantly in the learned component

P-55. Takeshi Kanda (University of Tsukuba)

Saccadic pause of pontine omnipause neurons is caused by glycinergic inhibition

- P-56. Mayu Takahashi (Tokyo Medical and Dental University)  
Excitatory and Inhibitory Inputs and their Pathways from the Superior Colliculus to Inhibitory Burst Neurons
- P-57. Yoshiko Izawa (Tokyo Medical and Dental University)  
Two types of suppression of visually- and memory-guided saccades induced by electrical stimulation of the frontal eye field in the monkey
- P-58. Yuriko Sugiuchi (Tokyo Medical and Dental University)  
Vestibular projection to the periarculate cortex in relation to pursuit eye movement in the monkey
- P-59. Masayuki Watanabe (NIPS)  
Injection of nicotine into the superior colliculus affects saccadic eye movements in macaque monkeys
- P-60. Tomoya Sakatani (NIPS)  
Saccadic eye movements in mice
- P-61. Nikolay I. Nikitin (NIPS)  
Release from GABAergic inhibition unmasks visual inputs to deeper layer neurons in the superior colliculus in macaque monkeys
- P-62. Yasushi Kobayashi (Osaka University)  
Contribution of pedunculo-pontine tegmental nucleus neurons to performance of visually guided saccade tasks
- P-63. Satoshi Matsuo (Tottori University)  
Further evidence for gaze-feedback to the cat superior colliculus: discharges reflect gaze trajectory perturbations
- P-64. Masaki Tanaka (Hokkaido University)  
Neural correlates to eye movements in the central thalamus of monkeys
- P-65. Horaguchi, T. (University of Tsukuba)  
Different types of memories for generating memory-guided saccades in different stages of learning
- P-66. Toda, H. (Niigata University)  
GABAergic contribution to visually-elicited and programmed convergence eye movements
- P-67. Thongchai Sooksawat (NIPS)  
Characteristics of cholinergic responses in neurons in the intermediate layer of rat superior colliculus
- P-68. Toshiaki Endo (NIPS)  
Hyperpolarization-activated cation current and its modification of dendritic spike initiation in projection neurons of the rat superficial superior colliculus
- P-69. Kaoru Isa (NIPS)  
Morphological and electrophysiological properties of GABAergic neurons in the intermediate gray layer of superior colliculus in GAD67-GFP knock-in mice.
- P-70. Fengxia Lee (NIPS)  
Presynaptic M1 and M3 type muscarinic acetylcholine receptors suppress GABAergic synaptic transmission in the intermediate gray layers of mouse superior colliculus
- P-71. Petropavlovskaya E (Tokyo Metropolitan Institute for Neuroscience)  
Characteristics of Head Orienting To Moving Visual Stimulus in Cats
- P-72. Toshihiro Kitama (University of Yamanashi)  
Effect of static side-down tilt on optokinetic nystagmus and optokinetic after-nystagmus in cats
- P-73. Tomonori Takazawa (Gunma University)  
Classification of Neuron Types in the Rat Medial Vestibular Nucleus

P-74. Yasuhiko Saito (Gunma University)

Spontaneous discharge properties of neurons in the rat medial vestibular nucleus

P-75. S. Fujiwara (Yamagata University)

Vestibular control of quadrupedal standing on a pitching platform in freely moving rats

P-76. K. Masuda (Yamagata University)

Postural control of air righting movements

P-77. Yoshihisa Tachibana (NIPS)

Downregulation of Metabotropic Glutamate Receptor 1 $\alpha$  in the Globus Pallidus of Parkinsonian Monkeys

P-78. Hiroyuki Nakahara (RIKEN Brain Science Institute)

Dopamine Neurons Can Represent Context-Dependent Prediction Error

P-79. Masami Miura (Tokyo Metropolitan Institute of Gerontology)

Fast-spiking interneurons form a modular architecture in the striatum

P-80. Hideo Tsukada (Hamamatsu Photonics)

PET Imaging of Gene Expression in Primate Model of Parkinson' Disease

P-81. Nobukatsu Sawamoto (Kyoto University)

Cognitive slowing associated with striatal hypofunctioning in Parkinson's disease

P-82. Psyche H. Lee (Duke University)

Excitatory and Inhibitory Circuitry in the Superficial Gray Layer of the Superior Colliculus.

P-83. S.Perfiliev (Göteborg University)

Automatic redirection of reaching induced by indifferent moving visual stimuli.