

## COE 国際シンポジウム (第28回生理研国際シンポジウム)

本シンポジウムは姿勢と歩行運動の高次制御機序を解明することを目的とし、森茂美(生体調節系, 生体システム研究部門)を総括選任者, Wiesendanger 教授(フライブルグ大, スイス)および Stuart 教授(アリゾナ大, アメリカ)を国際諮問委員として開催した。会議にはアメリカ, カナダ, イギリス, フランス, スウェーデンなど14カ国からそれぞれの国を代表する先導的な研究者が参加するとともに, 我が国からも運動制御の研究分野における先導的研究者と次世代を担う若年研究者が参加し, それぞれ研究成果を講演するとともに全体討論に積極的に参加した。シンポジウムでは 1. Brainstem and Spinal Cord: Cellular / Systems Approaches, 2. Adaptive Brainstem and Spinal Mechanisms, 3. Rhythm Generation and Sensorimotor Brainstem Interactions, 4. Brainstem-Cerebellar Interactions, 5. Eye-Head-Neck Coordination, 6. Higher Nervous Mechanisms: Basal Ganglia, Sensorimotor Cortex, and Frontal Lobe, の6主題で最も基本的神経回路が内在する脊髄レベルから脳幹, 小脳, 基底核, 大脳レ

ベルまでの最新の研究成果を国内外の第一線研究者によって発表して頂きさらに討論した。また会議の早朝には Shik (イスラエル), Strick (アメリカ), Wiesendanger (スイス) 教授による Keynote Lecture が行われた。これらの研究発表・討論から20世紀に出された主要な研究成果を総括するとともに, それらを21世紀の研究者に広く理解して頂くことを目的として講演者が研究成果をミニレビューとしてまとめ, 国際的な専門誌に出版することの必要性が論じられた。幸いにも研究成果を Progress in Brain Research Series に出版することについて Elsevier 出版社(オランダ)の同意を得ることができた。諸外国では動物実験の制約などから脳研究に対するシステムアプローチ的研究がやや停滞している。本会議に参加した数多くの外国人研究者がこの研究分野における日本人研究者の高いレベルでの研究成果を再認識したことは今後の国際間における研究交流を進める上で本シンポジウムの大きな成果であったと考えられる。

### COE international symposium: The 28th SEIRIKEN International Symposium Higher Nervous Control of Posture and Locomotion: Parallel and Centralized Control Mechanisms

March 18-22, 2001, NIPS Conference Center  
NIPS, Japan

March 19 Monday

Opening Remarks Shigemi Mori (NIPS)

Welcoming Address Kazuo Sasaki (Director-General, NIPS)

- 1) Mark Shik (Tel Aviv Univ.) How the mesencephalic "Locomotor Region" recruits hindbrain neurons
- 2) Douglas Stuart (Univ. Arizona), Historical perspective: Integration of posture and locomotion: significance of the contributions of Sherrington, Hess, and Bernstein
- 3) Sten Grillner (Karolinska Institute) The intrinsic function of a neuronal network: From ion channels to motor behavior
- 4) Francois Clarac (Univ. Marseilles) Comparative aspects of the development of posture and locomotion in mammals: The neonatal rat
- 5) Norio Kudo (Tsukuba Univ.) Developmental changes in the spatial pattern of rhythmic motor activity in the rat fetus
- 6) Hans Hultborn (Univ. Copenhagen) Resetting as a tool to analyze the locomotor network in the mammalian spinal cord
- 7) Takashi Yamaguchi (Yamagata Univ.) Neuronal organization of cat forelimb CPG
- 8) Larry Jordan (Univ. Manitoba) Examining the role of 5-HT in the control of spinal locomotor neurons: Release, receptor

distribution, and the effects of antagonists

- 9) Keir Pearson (Univ. Alberta) Functional role of feedback from muscle afferents in the generation of motor activity in walking cats
- 10) Kiyoji Matsuyama (Sapporo Med. Univ.) Locomotor role of the reticulospinal-spinal interneuronal system
- 11) Peter Kirkwood (Univ. College London) Respiratory inputs, non-respiratory inputs and plateau potentials in hindlimb motoneurons of female cats: Modulation by oestrogen and implications for functional heterogeneity in nucleus retroambiguus.
- 12) Saburo Kawaguchi (Kyoto Univ.) Functional recovery from spinal cord injury: Effects of a repair graft in the neonate
- 13) Marion Murray (MCP Hahnemann Univ.) Some functions develop and some do not after transplantation into spinal cord transection sites in neonatal rats
- 14) Alan Tessler (MCP Hahnemann Univ.) Some functions recover and some do not after intraspinal transplantation in adult rats
- 15) Serge Rossignol (Univ. Montreal) Determinants of locomotor recovery after spinal injury in the cat

March 20 Tuesday

- 16) Peter L. Strick (Univ. Pittsburgh) New concepts about basal ganglia and cerebellar "loops" with the cerebral cortex
- 17) Yoshio Nakamura (Tokyo Medical and Dental Univ.) Brainstem rhythm generation for ingestive movements
- 18) Kazuhisa Ezure (Tokyo Metropolitan Institute for Neuroscience) Central control of respiration by brainstem neural networks
- 19) Edgar Garcia-Rill (Univ. Arkansas) Arousal mechanisms related to posture and locomotion: I. Descending modulation
- 20) Robert Skinner (Univ. Arkansas) Arousal mechanisms related to posture and locomotion: II. Ascending modulation
- 21) Tadashi Isa (NIPS) Saccade initiation and vigilance: Regulation by the brainstem cholinergic system.
- 22) Ryuichi Shigemoto (NIPS) Cerebellar ataxia in patients with Hodgkin's disease: Role of a metabotropic glutamate receptor
- 23) Vlastislav Bracha (Iowa State Univ.) Cerebellar involvement in eyeblink conditioning in humans
- 24) Shigemi Mori (NIPS) Fastigial control of multiple body segments for the integration of posture and locomotion
- 25) James Bloedel (Iowa State Univ.) The task- and condition-dependent nature of the cerebellum's contribution to motor learning is reflected in the modulation of cerebellar neurons
- 26) Thomas Thach (Washington Univ.) Cerebellar control of simple vs. compound movements
- 27) Barry Peterson (Univ. Arkansas) Neural control of head movements
- 28) Kikuro Fukushima (Hokkaido Univ.) Role of the frontal eye fields in smooth gaze tracking
- 29) Yoshio Uchino (Tokyo Medical and Dental Univ.) The role of cross-striolar and commissural inhibition in the vestibulocollic reflex
- 30) Yoshikazu Shinoda (Tokyo Medical and Dental Univ.) The neural control of gaze: Organization from the superior colliculus to ocular and neck motoneurons
- 31) Alexej Glantyn (CNRS/College de France) Control of orienting movements: Role of multiple tectal projections to the lower brain stem
- 32) Shigeto Sasaki (Tokyo Metropolitan Institute for Neuroscience) Velocity and position guided orienting in the unrestrained cats

March 21 Wednesday

- 33) Mario Wiesendanger (Univ. Berne) Hands: The quest to understand dexterity
- 34) George Stelmach (Arizona State Univ.) Coordination among multiple body segments involved in trunk-assisted

prehension

- 35) Roger Lemon (Univ. College London) Pathways for corticospinal control of motoneurons in different primate species.
  - 36) Eric Rouiller (Univ. Fribourg) Recovery of manual dexterity following lesion of the corticospinal system in the adult monkey
  - 37) Jun Tanji (Tohoku Univ.) Regional specialization within the premotor cortex of the non-human primate
  - 38) Jiping He (Arizona State Univ.) Cortical control of arm movement: Adaptation and learning by cortical neurons
  - 39) Fraser Wilson (Univ. Arizona) Spatially-directed responses and neuronal activity in freely moving monkeys
  - 40) Okihide Hikosaka (Juntendo Univ.) Neural control of voluntary saccades: Role of the basal ganglia
  - 41) Atsushi Nambu (Tokyo Metropolitan Institute for Neuroscience) Cortico-basal ganglia loop and Parkinson's disease
  - 42) Kaoru Takakusaki (Aasahikawa Medical College) Basal ganglia-brainstem systems that control postural muscle tone and locomotion in cats
  - 43) Trevor Drew (Univ. Montreal) Cortical and brainstem contributions to the control of locomotion
  - 44) Hiroshi Shibasaki (Kyoto Univ.) Neural control mechanisms for normal vs. disordered gait
  - 45) Gert Holstege (Univ. Groningen) The emotional motor system
  - 46) Paul Cordo (Oregon Health Sci. Univ.) Control of multijoint movement in a natural motor behavior
  - 47) Victor Gurfinkel (Oregon Health Sci. Univ.) Coexistence of stability and mobility in a natural motor behavior
  - 48) Jean Massion (Univ. Marseilles) Posture and movement: co-ordination and control
- Concluding remarks Douglas Stuart (Univ. Arizona), What have we learned in Okazaki?  
Closing remarks Shigemi Mori (NIPS)

Poster Presentations (March 20 Tuesday)

- P-1 Tetsuro Yamamoto (Mie Univ.)  
Mode of cerebellar activation of the motor cortical areas: Phylogenetic comparisons among mammals
- P-2 Satoru Kondo (NIPS)  
Inhibitory postsynaptic currents in the frontal cortex of the rat
- P-3 Md. Kadrul Huda (Gifu Univ.)  
Thalamocortical excitation of cat motor cortical neurons: Inhibitory modulation by dopamine
- P-4 Alstermark Bror (NIPS)  
C3-C4 propriospinal neurons mediate disynaptic pyramidal excitation to forelimb motoneurons in *Macaca Fuscata*
- P-5 Yuka Inoue (NIPS)  
Functions of the pedunculo-pontine tegmental nucleus: Reward-influenced modulation of a saccade task in the monkey
- P-6 Yasushi Kobayashi (NIPS)  
The performance of visually guided saccade tasks in monkeys: Contribution of pedunculo-pontine tegmental nucleus neurons
- P-7 Tetsu Okumura (NIPS)  
Microperfusion into the rat striatum: rotation movements and brain c-fos expression induced by carbachol
- P-8 Izumi Sugihara (Tokyo Med. Dent. Univ.)  
Cerebellar projection patterns of single climbing vs. mossy fibers
- P-9 Katsumi Nakajima (NIPS)  
Locomotor-driving signals to lumbosacral neurons: Role of CLR-activated reticulospinal cells
- P-10 Hiroshi Nishimaru (Tsukuba Univ.)  
Rhythmic, locomotor-like activity in the spinal cord of the neonatal mouse

- P-11 Arpad Dobolyi (NIPS & NIH)  
Acetylcholinesterase-positive neurons in the lumbar spinal cord of the developing and adult rat
- P-12 Julita Czarkowska-Bauch (Nencki Institute)  
BDNR and NT-4 immunoreactivity increase in spinal cord fibers following locomotor training in the adult rat
- P-13 Malgorzata Skup (Nencki Institute)  
Identification of spinal cells responding with an increased expression of Trk-B receptor protein to locomotor training in adult rats
- P-14 Yasunobu Itoh (Akita Univ.)  
Adult dorsal root regeneration into the adult spinal cord: Enhancement by neurotrophic factors
- P-15 Riyi Shi (Purdue Univ.)  
Polyethylene glycol repairs mammalian spinal cord axons after mechanical injury
- P-16 Giito Izuta (Yamagata Univ.)  
Postural control on stable and unstable support surfaces: Use of different self-paced movement strategies
- P-17 Mihai Tarata (Bucharest Univ.)  
A new technique for measuring muscle activity: The accelerometer MMG
- P-18 Carol Boliek (Univ.Arizona)  
Postural control and speech breathing in young children with neuromotor disorders
- P-19 Naomi Wada (Yamaguchi Univ.)  
Trunk movement in the cat: Level vs. upslope treadmill walking
- P-20 Atsumichi Tachibana (NIPS)  
Longitudinal study of the acquisition of operant-trained upright posture and bipedal locomotion by *M. Fuscata*
- P-21 Futoshi Mori (NIPS)  
Cerebral glucose metabolism during the bipedal locomotion of the Japanese monkey, *M. Fuscata*: A PET study