CONTENTS

PREFACE ................................................................................................................................. Ken Itoh I
Chairman's Address .................................................................................................................. Kei Satoh III

Symposium-I
Prandial increases of leptin and orexin in the brain modulate spatial learning and memory .................................................. Yutaka Oomura, Shuji Aou, Kouji Fukunaga, Sigeki Moriguchi, and Kazuo Sasaki S1
Transient neural energetics by fMRI for brief and long stimuli ............................................................ Peter Herman, Basavaraju G. Sanganahalli, Daniel Coman, Hal Blumenfeld, and Fahmee Hyder S11
A new imaging method of glucose transport in live cells ...................................................................... Katsuya Yamada, Toshihiro Yamamoto, Seiji Watanabe, Yuji Nishiyuki, Tadashi Teshima, Hideaki Matsuoka, and Seiko Suga S23
Genetic dissection of age-related memory impairment in Drosophila .................................................. Daisuke Yamazaki, Junjiro Horiuchi, and Minoru Saitoe S26
Roles of DEC1 and DEC2 in the core loop of the circadian clock, and clock outputs to metabolism ........................................... Yukio Kato, Mitsuhide Noshiro, Katsumi Fujimoto, and Takeshi Kawamoto S34
Vascular endothelial growth factor (VEGF) expression is negatively regulated by basic-helix-loop-helix (bHLH) transcription factor DEC2 ........................................................................... Hiroshi Kijima, Fuyuki Sato, Ujjal Kumar Bhawal, Takeshi Kawamoto, Katsumi Fujimoto, Tadaatsu Imaizumi, Tadanobu Imanaka, Jun Kondo, Satoru Koyanagi, Mitsuhide Noshiro, Hidemi Yoshida, and Yukio Kato S43

Symposium-II
Inactivation of voltage-gated Ca\(^{2+}\) channels and cone-rod dystrophy CORD7 ........................................... Minoru Wakamori, Yoshitsugu Uriu, Takaumi Miki, Shigeki Kiyonaka, and Yasuo Mori S33

Symposium-III
Role of Nrf2 in the neurotrophic action of the electrophiles ........................................................................ Ken Itoh, Kunio Kosaka, Junsei Mimura, and Takumi Sato S63
Oxidative damage in brain genome and neuroprotection ...................................................................... Yusaku Nakabeppu, Zijing Sheng, and Sugako Oka S70
Pathology of neuro-glial α-synucleinopathy  ......................................................... Koichi Wakabayashi, Yasuo Miki, Kunikazu Tanji, and Fumiaki Mori  S80

Nubopathies: NUB1-related neurodegenerative diseases  ............................................ Kunikazu Tanji, Fumiaki Mori, Koichi Wakabayashi, and Tetsu Kamitani  S89

Luncheon Seminar
Current concepts in Alzheimer's disease .......................................................................... Steven Younkin  S97

Symposium-IV

Cerebral amyloid angiopathy and Alzheimer’s disease ...................................................... Jorge Ghiso, Yasushi Tomidokoro, Tamas Revesz, Blas Frangione, and Agueda Rostagno  S111


Plasma antibodies to AB40 and AB42 in patients with Alzheimer’s disease and normal controls ............................................................................................................................ Mikio Shoji  S135

Symposium-V
Novel rat middle cerebral artery occlusion model: Trans-femoral artery approach combined with preservation of the external carotid artery ........................................... Norihito Shimamura, and Hiroki Ohkuma  S142

Edaravone and Nrf2-inducers as neuroprotective agents in human astrocytes exposed to hypoxia/reoxygenation ................................................................. Hidemi Yoshida, Junsei Mimura, Tadaatsu Imaizumi, Tomoh Matsumiya, Akira Ishikawa, Norifumi Metoki, Kunikazu Tanji, Ken Ota, Kunio Kosaka, Ken Itoh, and Kei Satoh  S147

New avenues in the pathogenesis of subarachnoid hemorrhage ..................................... Julian Cahill, and John H. Zhang  S157

Special Seminar
Molecular mechanism of sleep-wake regulation ............................................................ Yoshihiro Urade  S164
Poster

Modulation of neuronal activities by interactions between neurons and glial cells ........................................... Yoshihiko Yamazaki, Yasukazu Hozumi, Kenya Kaneko, Hiroki Fujiwara, Hiroshi Kato, and Satoshi Fujii S174

Cerebrovascular dynamics in response to neural stimulation ................................................................. Kazuto Masamoto, Takayuki Obata, and Iwao Kanno S181

Synthesis of 2-NBDLG, the antipode of fluorescent D-glucose tracer 2-NBDG ................................................. Toshihiro Yamamoto, Yuji Nishiuichi, Tadashi Teshima, Seiji Watanabe, Sechiko Suga, Hideaki Matsuoka, and Katsuya Yamada S187

Neurovascular coupling studies in awake-behaving mice ................................................................. Hiroyuki Takuwa, Kazuto Masamoto, Takayuki Obata, Iwao Kanno S192

Effect of a free radical scavenger, edaravone, on free radical reactions – Related signal transduction and cerebral vasospasm in the rabbit subarachnoid hemorrhage model – ......................................................... Akira Munakata S197

15-Deoxy-Δ12,14-prostaglandin J2 modifies the stability of nuclear TDP-43 protein through its direct binding: Implication for the pathogenesis of TDP-43 proteinopathy ................................................................. Hai-xin Zhang, Kunikazu Tanji, Hitomi Yoshida, Makoto Hayakari, Fumiaki Mori, and Koichi Wakabayashi S204

Cystatin C immunoreactivity and neuronal degeneration in amyotrophic lateral sclerosis ................................................................. Fumiaki Mori, Kunikazu Tanji, Yasuo Miki, and Koichi Wakabayashi S211

Immunization with nontoxic mutant staphylococcal enterotoxin a protects against enterotoxin-induced emesis in house musk shrews ........................................................ Dong-Liang Hu, Katsuhiko Omoe, Hiroshi Sashinami, Kunihiro Shinagawa, and Akio Nakane S215

Innate immunity is up-regulated by a virulence factor p60 derived from Listeria monocytogenes ................................................................. Hiroshi Sashinami, Dong-Liang Hu, Sheng-Jun Li, Toshihito Mitsui, Ken-ichi Hakamada, Yoh Ishiguro, Shinsaku Fukuda, and Akio Nakane S224

Mouse peptidoglycan recognition protein (PGRP)-S: the role in bacterial infection ................................................................. Arihiro Osanai, Sheng-Jun Li, and Akio Nakane S232

The role of interleukin-17 in the protective effect of an immunization with clumping factor A against Staphylococcus aureus infection ................................................................. Kouji Narita, Dong-Liang Hu, and Akio Nakane S238

Cellular and subcellular localizations of nonheme ferric and ferrous iron in the rat brain: a light and electron microscopic study by the perfusion-Perls and -Turnbull methods ................................................................. Reiko Meguro, Yoshiya Asano, Saori Odagiri, Chengtai Li, Kazuhiko Shoumura, and Noritaka Ichinohe S245

Alteration of peptides in rat brain treated with angiotensin-converting enzyme Inhibitor, captopril ................................................................. Ayumi Maruyama, Satiko Kanazawa, Rituko Shimoyama, Kazuhiro Hosoi, and Makoto Hayakari S252
Involvement of P2X$_2$ and P2X$_3$ receptors in dorsal root ganglion neurons of streptozotocin-induced diabetic neuropathy

Keisuke Migita, Kenji Honda,
Junko Yamada, Yukio Takano,
and Shinya Ueno

Pyroglutamate formation at the N-termini of ABri molecules in familial British dementia is not restricted to the central nervous system

Yasushi Tomidokoro, Akira Tamaoka,
Janice L. Holton, Tammaryn Lashley,
Bias Frangione, Tamas Revesz,
Agueda Rostagno, and Jorge Ghiso

Keywords
PREFACE

In developed countries, over 20% of the total population is over the age of 60. As such, the treatment and prevention of neurodegenerative diseases, such as Alzheimer’s and Parkinson’s diseases, are important issues to be overcome in the 21st century. However, efficient therapeutic strategies to prevent, retard and treat these diseases remain to be explored.

Aerobic energy metabolism utilizes glucose and oxygen to satisfy all the energy needs of the adult brain. Despite the small size of the brain (2% of body weight), it is the largest consumer of total body oxygen (20%) and glucose (25%), utilizing 15% of the total cardiac output. Because of this high demand for energy, neurons are highly susceptible to a temporal lack of oxygen and glucose. Moreover, aerobic energy metabolism inevitably generates reactive oxygen species as byproducts that cause oxidative stress. In addition, normal brain activity transiently increases the local blood flow to specific areas of the brain to satisfy the energy demand. The brain possesses highly organized stress response mechanisms to cope with years of altering metabolic demand with age.

This volume is a compendium of reports from the 11th Meeting of the Hirosaki International Forum of Medical Science. The theme of the meeting was “Emerging Frontiers in Brain Research”, with the subtitle of “Crossroads of metabolic regulation, stress response and disease”. This symposium aimed to translate the mechanisms of metabolic regulation and stress response into an understanding of the various brain diseases, including neurodegenerative diseases such as Parkinson’s and Alzheimer’s diseases, brain injury and stroke, as well as to enhance the understanding of normal brain activity. Distinguished guests from around the world were invited to the conference, which successfully provided opportunities to exchange knowledge of recent developments in these fields.

We hope that this compendium of manuscripts provides a current source of information on the metabolic regulation, stress response and diseases of the brain. We would like to thank the authors for their contributions to this publication and for their efforts in advancing knowledge of their fields.

Finally, we would like to especially thank the Alumni Association of Hirosaki University Graduate School of Medicine, the Aomori Association for Promotion of Medical Science for continuous financial support and the Hirosaki University Press for support of this volume.

Ken Itoh, M.D. and Ph.D.
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Chairman’s Address

The 11th meeting of the Hirosaki International Forum of Medical Science was held on March 27-28, 2009, with the theme of “Emerging Frontiers in Brain Research —Crossroads of metabolic regulation, stress response and disease”. Indeed the meeting turned out to be an occasion in which we soaked ourselves in genuine scientific discussion. We also enjoyed the friendship with the distinguished guest speakers from abroad and all over Japan. Science united us even with people we saw each other for the first time in the meeting.

This volume reminds us of that wonderful occasion and the importance of exchanging recent scientific notions. I believe it would also provide the insight in the recent advance in scientific studies on the brain. I also hope this volume would help promote the research, particularly on brain science, by further stimulating highly motivated young scientists here in Hirosaki. I herewith thank all the contributors to the meeting and to this volume. Also the cooperation of the Hirosaki University Press is greatly acknowledged.

Kei Satoh
Chairman, The 11th Meeting of Hirosaki International Forum of Medical Science
Dean, Hirosaki University Graduate School of Medicine