

Human and mouse single-nucleus transcriptomics reveal TREM2-dependent and TREM2-independent cellular responses in Alzheimer's disease



Free Webinar
On Demand

REGISTER HERE

Sponsored by:



Provided by:



WILEY

Preface

The 12th International Conference on Brain Energy Metabolism (ICBEM): “Energy Metabolism and Neuron–Glia Interactions in Brain: From Molecular Mechanisms to Novel Therapeutic Approaches”



Albert C. H. Yu,¹ Arne Schousboe,² and Mary C. McKenna ³*

¹Neuroscience Research Institute, Key Laboratory for Neuroscience (Ministry of Education), Key Laboratory for Neuroscience (Ministry of Public Health), Department of Neurobiology, School of Basic Medical Sciences, Health Science Center, Peking University, Beijing, China

²Department of Drug Design & Pharmacology, Faculty of Health and Medical Sciences, University of Copenhagen, Denmark

³Department of Pediatrics and Program in Neuroscience, University of Maryland School of Medicine, Baltimore, Maryland



The 12th International Conference on Brain Energy Metabolism (ICBEM), “Energy Metabolism and Neuron–Glia Interactions in Brain: From Molecular Mechanisms to Novel Therapeutic Approaches,” was held in Hong Kong on May 25 to 28, 2016. The conference was hosted by Professor Albert Cheng-Hoi Yu in the amazing facilities of the Hong Kong Science Park in Pak Shek Kok, New Territories. Previous meetings in this highly successful ICBEM series were also held in beautiful surroundings, the first in Carcassonne, France, in 1993; followed by Blaubeuren, Germany, 1995; Waterville Valley, New Hampshire, 1997; Oxford, United Kingdom, 1999; Trondheim, Norway, 2001; Heraklion, Crete, 2004;

Lausanne, Switzerland, 2006; Beijing, China, 2008; Budapest, Hungary, 2010; Monterey, California, 2012; and Helsingør, Denmark, 2014.

The conference was attended by 162 students, postdocs, and investigators from 16 countries in Europe, North and South America, Asia, and Australia. Travel awards were provided from conference funds from the International Society for Neurochemistry (ISN) for 20 graduate students and postdoctoral fellows from 10 countries. The travel awardees were from Australia, Canada, Chile, China, Denmark, Germany, Russia, Switzerland, and the United States. The organizers were particularly pleased that 45 of the total attendees were students.

The conference began on May 25 with an amazing lion dance performance during the opening reception and a preconference lecture by Arne Schousboe from the University of Copenhagen. Ursula Sonnewald from the Norwegian University of Science and Technology presented a very timely and riveting opening keynote lecture on “Where do all the carbons go? Balancing glutamate synthesis and degradation in brain,” which gave attendees the most up-to-date understanding of how the brain balances the key processes of anaplerosis and cataplerosis by

*Correspondence to: Mary C. McKenna, PhD, Department of Pediatrics, University of Maryland School of Medicine, 655 West Baltimore Street, Room 13-019, Baltimore, MD 21201. E-mail: mcmckenna@umaryland.edu

Received 7 July 2017; Accepted 10 July 2017

Published online in Wiley Online Library (wileyonlinelibrary.com). DOI: 10.1002/jnr.24128

the leading expert in this area. Day 2 began with a keynote lecture from Vladimir Pappas on “Vesicular glutamate release from astrocytes at the interface of signaling and metabolism.” Both of the keynote lectures generated interactive discussion that continued throughout the meeting. The lectures were followed by timely sessions on neuron–astrocyte interactions and neurovascular coupling and glycogen as a dynamic molecule in CNS and PNS function that featured interesting talks on capillary pericytes influencing blood flow, the role of Ca^{2+} in astrocyte communication and the relationship of metabolism, glycogen mobilization, and neuronal function. The exciting session on “Shining a light on metabolism” featured the capabilities of FRET sensors and optogenetic analysis for studying neurometabolic coupling and lactate dynamics in the brain. The session on “Regulation of mitochondrial metabolism: New insights and mechanisms” included a novel perspective on metabolic regulation including the importance of succinylation and acetylation in modulating metabolism, the complex compartmentation of lipid metabolism in the brain, and an uncoupling channel in ATP synthase that is the mitochondrial permeability transition pore.

Day 3 began with a session on “Compartmentation of bioenergetics processes to support brain function,” which featured interesting talks on reciprocal regulation on mitochondrial dynamics and calcium signaling in astrocytic processes, novel studies on nuclear transport of glutamate, and exquisite images of the anatomy of astrocytic processes in the PNS. The student “Data Blitz” session had compelling talks by outstanding students throughout the world. The Journal of Neuroscience Research Oral Presentation Prize for best presentation was awarded to Courtney Sobieski from Washington University in St. Louis, and Louis-Philippe Bernier from Vancouver, Canada, was awarded the second place prize. The committee and ICBEM attendees thought that all of these presentations by students and postdocs were really outstanding. These investigators also presented posters to allow more interaction with conference participants. The program committee was very impressed by the quality of the student and postdoc abstracts, which made the selection process for the oral presentations and travel awards highly competitive. The junior investigators presented a broad range of topics including the effect of metabolic stress on microglial phenotype; regulation of acetate metabolism; role of oligodendroglial NMDA receptors in regulating axonal energy metabolism; altered metabolic function of astrocytes in the aging brain; imaging the postnatal codevelopment of neural, metabolic, and hemodynamic activity; failure in energy metabolism; and antioxidant uptake in pathological conditions. All posters were presented at poster sessions, and the posters were on display for the entire meeting, which enabled interactive discussions among conferees throughout the meeting. Journal of Neuroscience Research Poster Prizes were awarded to Feng Jiang from Beijing, China, and Jens V. Andersen from Copenhagen, Denmark.

Day 3 also included a session on ionic signaling and integrative function of astroglia that included talks on sodium signaling controlling homeostatic cascades and neuro–metabolic coupling in the brain; signal integration in neural networks with astroglia; and membrane trafficking of GLT1 in astrocytes. Session VII on astrocyte gliotransmission and metabolism was a timely update on astrocyte vesicle dynamics, interdependence of glucose and glutamate metabolism, and how Tau disrupts mitochondrial dynamics and mitophagy.

The session on “Use of anaplerotic substrates for brain metabolic disorders” organized by Gerry Dienel underscored how basic studies of brain metabolism could lead to clinical treatments that improve patient outcomes. Fanny Mochel presented data from her years of working with patients showing the efficacy of triheptanoin in the treatment of pyruvate carboxylase deficiency, GLUT1 deficiency, and Huntington disease. The potential of this drug for treating epilepsy, amyotrophic lateral sclerosis, and Rett syndrome were also presented. The meeting ended with a session on “metabolism in ageing and neurodegenerative disorders” that included talks on mitochondrial dynamics in white matter stroke and a very thought-provoking talk on how environmental nanoparticles change cellular bioenergetics. The sessions, which covered a wide range of topics, included 29 long talks, 3 of which were presented by young investigators. Many noted investigators in the fields of brain energy metabolism and neurodegeneration chaired the scientific sessions.

Conference attendees enjoyed the scientific sessions as well as the ambiance and unique culture of Hong Kong. Participants really enjoyed the tour of Hong Kong and the surrounding areas prior to the start of the conference. Many of the participants enjoyed the unique experience of hiking in the hills above Hong Kong at the end of the meeting.

We thank the members of the program committee—Arne Schousboe (Chair, Copenhagen, Denmark), Felipe Barros, (Valdivia, Chile), Kevin Behar (New Haven, Connecticut), Gerald Dienel (Little Rock, Arkansas), Joao Duarte (Lausanne, Switzerland), Johannes Hirrlinger (Leipzig, Germany), Mary C. McKenna (Baltimore, Maryland), Bruce Ransom (Seattle, Washington), Caroline Rae (Sydney, Australia), Michael Robinson (Philadelphia, Pennsylvania), Bill Shuttleworth, (Albuquerque, New Mexico), Alexei Verkhratsky (Manchester, United Kingdom), Helle Waagepetersen (Copenhagen, Denmark), and Albert C.H. Yu (Beijing and Hong Kong, China)—for putting together such an outstanding program.

We also thank the members of the local organizing committee—Ken K.L. Yung (Chair, Hong Kong), Xiao-Qian Chen (Wuhan), Lung-Sen Kao (Taipei), Emily H.Y. Lee (Taipei), Qiang Li (Shanghai), Ying Li (Hong Kong), Hiroshi Nakanishi (Fukuoka, Japan), Kwok-Fai So (Hong Kong), Albert C.H. Yu (Beijing and Hong Kong), and Wing-Ho Yung (Hong Kong)—for their enthusiasm, their excellent organization, and their spirit

of warmth and hospitality that made all the attendees feel welcome in exotic Hong Kong.

We would like to express our thanks for financial support from the ISN Conference Committee, the Innovation and Technology Commission of the Government of the Hong Kong Special Administrative Region of the People's Republic of China, Hong Kong Science and Technology Park, the Croucher Foundation, Ultragenyx Pharmaceutical, the Journal of Neuroscience Research, Thorlabs, Hai Kang Life Corporation Limited, Ms. Sophia Dan Yang Wing-man, Certizen Limited, Lee's Pharmaceutical (HK) Limited, and Wiley-Blackwell, USA, without which this conference would not have been possible.

This special issue, edited by Arne Schousboe, Albert Yu, and Mary McKenna, contains 19 peer-reviewed manuscripts from invited speakers who participated in this conference.

All of the participants are looking forward to the 13th ICBEM, "How Metabolism Dictates Neurotransmission, Function and Behavior," organized by L. Felipe Barros, which will be held March 7 to 10, 2018, in beautiful Valdivia, Chile (<http://cecs.cl/icbem>). We hope to see everyone there for another highly stimulating and interactive meeting.

Albert C. H. Yu Arne Schousboe Mary C. McKenna