

Neurotransmitter-Gated Ion-Channels In Health and Disease

Organizers: Dr. Derek Bowie (Chair, McGill, Montréal, Canada) and Dr. Katherine Roche (co-Chair, NIH, USA)

Date: Thursday 1st August 2019 to Friday 2nd August 2019

Venue: McGill University Campus, New Chancellor Day Hall

Description: (up to 250 words) including a brief scientific background, the current state of the topics, and why the content would be of high interest to neurochemists. If the content/topic has been funded by ISN as satellite of a recent (2013-2017) ISN meeting, then we request a rationale why the proposed satellite should be supported again.

Neurotransmitter-gated ion-channels are critical for the normal hardwiring of neuronal circuits but also fine tune synaptic strength during periods of sustained patterned activity and altered homeostasis. Ionotropic glutamate and nicotinic acetylcholine receptors transmit the vast majority of fast excitatory signaling in the developing and adult CNS whereas almost all inhibitory neurotransmission is mediated by GABA_A and glycine receptors. The study of neurotransmitter-gated ion-channels has undergone unprecedented advances in recent years with the convergence of several scientific disciplines on this important research topic. Structural biology has emerged as a leading approach to understand ion-channel function and drug action and recent advances in genetics has permitted different families of neurotransmitter-gated ion-channels to be assigned to distinct roles in neuronal health and disease. The 2-day satellite conference on “Neurotransmitter-gated ion-channels in health and disease” will bring together a unique group of leading researchers from across the globe to showcase the most recent advances in the study of excitatory and inhibitory receptor synapses. The first day of the conference will focus on the complexity of the ion-channel signaling complex and how structural studies have brought new advances in drug design and therapy. The conference’s second day will examine the emerging roles of neurotransmitter-gated ion-channels in plasticity mechanisms and their involvement in neuronal circuits and CNS disease. Together, the proposed 2-day satellite conference will provide a comprehensive overview of neurotransmitter-gated ion-channels for neurochemists that examines their role in neurological disease and the latest advances in effective therapies.

DAY 1

0845-0900: Welcome address, Drs. Derek Bowie (McGill, Canada) & Katherine Roche (NIH, USA)

Theme 1: Neurotransmitter receptor structure

0900-0930: Pierre-Jean Corringer (Pasteur Institut, Paris, France)

Gating transition of pentameric ligand-gated ion channels in detergents and lipids

0930-1000: Sasha Sobolevsky (Columbia University, New York, USA)

Structural bases of AMPA receptor function and inhibition

1000-1030: Radu Aricescu (MRC Laboratory of Molecular Biology, Cambridge, UK)

Structural Insights into GABA_A Receptor Gating Mechanisms

1030-1045: Coffee break

Theme 2: Ion-channel function and regulation

1045-1115: Derek Bowie (McGill University, Montreal, Quebec, Canada)

Structural underpinnings of ionotropic glutamate receptor activation

1115-1145: Trevor Smart (University College London, London, UK)

Inhibitory GABA_A Receptor modulation by neurosteroids

1145-1215: Claudio Grosman (nAChRs, University of Illinois, USA)

Complex gating mechanisms of pentameric ligand-gated ion-channels

1215-1330: Lunch & Posters

Trainee Talks I

1330-1345: Trainee Talk 1

1345-1400: Trainee Talk 2

Theme 3: Auxiliary subunits & Signaling Complexes

1400-1430: Andres Maricq (University of Utah, Utah, USA)

NRAP-1 as a presynaptically released NMDA Receptor Auxiliary Protein

1430-1500: David Bredt (Janssen Pharmaceuticals, California, USA)

NACHO mediates nicotinic acetylcholine receptor function in the CNS

1500-1530: Katherine Roche (NINDS, National Institutes of Health, Maryland, USA)

Phosphorylation events controlling glutamate receptor activity at central synapses

1530-1600: Elva Diaz (UC Davis, California, USA)

SynDIG4/Prmt1 regulation of extra synaptic GluA1-containing AMPARs and synaptic plasticity

1600-1615: Coffee break

Theme 4: Drug Design & Novel Therapeutic Targets

1615-1645: Jesse Hanson (Genentech, California, USA)

NMDAR positive allosteric modulators: normalization of circuit function and cognition in disease models

1645-1715: Kristian Strømgaard (University of Copenhagen, Denmark)

Targeting auxiliary proteins to regulate excitatory and inhibitory transmission

1715-1745: Melanie Tallent (Lifesplice Pharma, Pennsylvania, USA)

Directing alternative splicing of ion channels to treat neurological diseases

1900-2100: Speaker's Dinner (local restaurant)

DAY 2

Theme 5: Synaptic Plasticity Mechanisms

0900-0930: Roger Nicoll (UC San Francisco, California, USA)

Synaptic plasticity mechanisms and beyond

0930-1000: Melanie Woodin (University of Toronto, Ontario, Canada)

Emerging Mechanisms Underlying Dynamics of GABAergic Synapses

1000-1030: Josef Kittler (GABAergic, UCL, London, UK)

Molecular organization of GABAergic synapses

1030-1045: Coffee break

Theme 6: Genetics

1045-1115: Stephen Traynelis (Emory University, Georgia, USA)

Human glutamate receptor mutations and neurological disease

1115-1145: Steve Petrou (University of Melbourne, Australia)

The building blocks of epilepsy genetics

1145-1215: Steve Scherer (SickKids Hospital, Toronto, Ontario, Canada)

Genome wide association studies of psychiatric disorders

1215-1330: Lunch & Posters

Trainee Talks I

1330-1345: Trainee Talk 3

1345-1400: Trainee Talk 4

Theme 7: Brain Circuits & Homeostasis

1400-1430: Jakob von Engelhardt (University of Mainz, Germany)

The role of CKAMP44 in neuronal circuits

1430-1500: Charles Bourque (CRN, McGill University, Montreal, Quebec, Canada)

Trp channels and the mechanisms of osmoregulation

1500-1530: Brian MacVicar (University of British Columbia, Vancouver, Canada)

Glia and brain circuits

1530-1600: Julie Kauer (Brown University, USA)

Synaptic plasticity and drug addiction mechanisms

1600-1615: Coffee break

Theme 8: Health and Disease

1615-1645: Michela Fagiolini (Harvard University, Massachusetts, USA)

Targeting NMDA receptors to treat Rett's syndrome

1645-1715: Jean-Pierre Julien (Laval University, Quebec, Canada)

Pathways to motor neuron degeneration in mouse models of motor neuron disease

1715-1745: Lynn Raymond (Huntington's, UBC, Canada)

Aberrant NMDA receptor signaling in Huntington disease

1745-1800: Farewells, Drs. Bowie & Roche