

NEUROSCIENCE NEWSLETTER

PROGRAM NEWS

NEW PIN STUDENTS:

We would like to welcome the following students to the Neuroscience Program:

Student's Name	Degree	Supervisor	Department
Lina Chiucciariello	MSc	Usoa Busto	Pharmacology
Beverly Francis	MSc	Howard Mount	Physiology
Sabiha Gardezi	MSc	Elise Stanley	Physiology
Hiroyuki Jinno	MSc	Freda Miller	Physiology
Kristin Johnson	MSc	Martin Wojtowicz	Physiology
Liam Kaufman Simpkins	MSc	Sandra Black	IMS
Greer Kirshenbaum	MSc	John Roder	IMS
Vladyslav Kushnir	MSc	Usoa Busto	Pharmacology
Alonso Martinez Canabal	PhD	Paul Frankland	IMS
Patrick McCormick	PhD	Philip Seeman	IMS
Saba Mir	MSc	John Peever	Cell & Sys Bio
Andreea Moraru	MSc	Isabelle Aubert	Lab. Med. Path.
Won Hyung A. Ryu	MSc	Deirdre Dawson	Rehab. Sci.
Jessica Sturgess	MSc	D. van der Kooy	Med. Biophysics

GRADUATING STUDENTS:

We would like to congratulate the following PIN graduates:

Student's Name	Degree	Supervisor	Department
Glad Bejat	MSc	Barry Sessle	Dentistry
<u>Thesis title:</u> "Sensory modulation of rat licking behaviour"			
Ryan Brydges	MSc	Adam Dubrowski	IMS
<u>Thesis title:</u> "Sensorimotor integration: Prehensile movements in conditions of visuo-proprioceptive conflict"			
Martha McCall	MSc	Deirdre Dawson	Rehab. Science
<u>Thesis title:</u> "A Modified Constraint Induced Movement Therapy Program with the Geriatric Sub Acute Stroke Population"			

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Program Committee Members

J.O. Dostrovsky / PHYSIOLOGY (Dir.)	J. Peever/CELL AND SYSTEMS BIOLOGY.
W.M. Burnham / PHARMACOLOGY	Nag / LAB. MED. PATHOBIOLOG.
P. Carlen / INST. MED. SCIENCE	J. Roder / MOL. MED. GENETICS
L.F.De Nil / SPEECH LANG. PATHOL.	B.J. Sessle / DENTISTRY
M. Fehlings / KREMBIL NEURO. CENTRE, UHN	M. Shoichet / INST. BIOMAT. & BIOMED. ENG.
Z. Jia / PHYSIOLOGY	E. Stanley / CELL. & MOL. BIO. DIV., TWRI
N. Kabani / MEDICAL BIOPHYSICS	W. Trimble / BIOCHEMISTRY
M. Lewis / HUMAN DEVELOPMENT AND APPLIED PSYCHOLOGY	J.W. Wells / PHARMACY
W. McIlroy / REHAB. SCI.	J.S. Yeomans / PSYCHOLOGY

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e-mail: p.neuroscience@utoronto.ca

<http://www.utoronto.ca/neurosci>

Office Hours: Wednesdays - 1:15pm-5:00pm;

Thursdays - 8:45am-5:00pm; Fridays - 8:45am-5:00pm

Jennie Yum MSc Michael Tymianski IMS
Thesis title: "Role of the PDZ-binding motif of TRPM7 in mediating calcium-dependent cellular degeneration induced by chemical anoxia"

UPCOMING PIN DISTINGUISHED LECTURES

The Sixth Sackler Distinguished Visiting Neuroscientist

Thursday, October 26, 2006 4pm

JACK FELDMAN, PhD, Department of Neurobiology, UCLA School of Medicine

"Looking for inspiration: New perspectives on the generation of respiratory rhythm"

Medical Sciences Building, Rm 3154

Thursday, December 7, 2006 4pm

JEROME SIEGEL, Department of Psychiatry, University of California at Los Angeles

Title: TBA

Medical Sciences Building, Rm 3153

Wednesday, December 13, 2006 3pm

DAVID SWEATT, Department of Neuroscience, Baylor College of Medicine, Houston, Texas
Title: TBA
Mount Sinai Hospital, 18th Floor Auditorium

PIN STUDENT HONOURS AND AWARDS

Rob Bonin (PhD Candidate, Orser lab) was awarded a K.M. Hunter Graduate Scholarship from the Faculty of Medicine, University of Toronto. The award is worth \$20,000 and begins in September 2006. The committee unanimously recommended Rob as the top candidate. Many congratulations to Rob!

Natalya Shulyakova (MSc, Mills lab) won a Microscopy Society of Canada GT Simon Award to travel to the Microscopy Society of America 2006 meeting in Chicago (this August) where she gave an invited talk. She was previously awarded an MSA scholarship in 2005 as an undergraduate.

From Physiolink, September 8, 2006

ANDP FORUM for Students and Postdoctoral Trainees.

“Strategies for Successful Transition to a Neuroscience Career” - Monday, October 16, 2006, 11:30 AM - 1:00 PM, Georgia World Congress Center, Room: A409

Brief highlights from the recent ANDP survey on our Nation's Neuroscience graduate students and postdoctoral fellows will be presented, followed by discussion with our panelists on how to steer training to impact your career. More information on trainee outcomes can be found in our survey report at <http://www.andp.org>. Students and postdocs are encouraged to bring questions for our panel!

Moderator: Alison K. Hall, Ph.D. Case Western Reserve Univ.
ANDP Survey Highlights: Edward Stricker, Ph.D. University Professor, Dept. Neuroscience, University of Pittsburgh
Panelists: Nancy Ip, Ph.D. Director Biotechnology Research Institute Hong Kong University of Science and Technology (previously at Lifecodes Corp., and Regeneron Pharmaceuticals Inc.)
Thomas Carew, Ph.D. Professor and Chair, Neurobiology and Behavior University of California, Irvine
Karl Johnson, Ph.D. Assistant Professor, Biology and Neuroscience, Pomona College

ANDP/SfN STUDENT HOSPITALITY SUITE. The suite is located in the Georgia World Congress Center room B213 and is open each day of the SfN meeting from October 14 – 18. Please urge your students to take advantage of this quiet place to relax and socialize with other students. Details may be found at <http://www.andp.org/meetings/2006/hospitality.htm>.

NOTICE TO GRADUATING STUDENTS

Please notify the PIN office upon your graduation to ensure that you will receive the notation "completed Collaborative Program in Neuroscience" on your degree transcript as well as a separate certificate suitable for framing from the PIN office to indicate that you have completed the program's requirements. Please let the office know the address you wish your certificate sent to and please also send us your thesis title. If you have transferred from a Master's degree to a Ph.D., please notify the PIN office.

OTHER U of T NEUROSCIENCE NEWS

Tanenbaum symposium

This year's Tanenbaum symposium will focus on cognitive/mental health neuroscience.

The symposium will be held on Friday, November 10, 2006, at the Health Sciences Building, 155 College Street, Rm 610, from 1:30 to 4:00 pm, followed by a reception.

The guest speaker will be Professor Trevor Robbins of Cambridge University. The three Tanenbaum chairs in this focus will also present: Profs. Endel Tulving, Phil Seeman and Terry Picton.

This will also be an occasion to celebrate the beginning of the University of Toronto Centre for Neuroscience.

Please mark this date in your calendar.

Conference Announcement

Call for Abstracts

‘Advances in Neurorehabilitation’

<http://toronto-fes.ibme.utoronto.ca/ANR/index.htm>

June 16-19, 2007

Toronto, Canada

Part of the Festival of International Conferences on Caregiving, Disability, Aging and Technology
<http://www.ficcdat.com>

Overview: New understanding and technological advances are leading a revolution in therapeutic approaches to repair and / or minimize disability and maximize function and well-being following brain and/or spinal cord injury. The conference will explore the physiologic principles that underpin these new therapies. Researchers and clinicians will highlight state-of-the-art rehabilitation techniques and novel therapies focused on optimizing physical and cognitive abilities. The conference will also focus on new technologies to better assess changes in central nervous system function and human behaviour.

Keynote speakers:

Dr. Pamela Duncan, United States
Dr. Gert Kwakkel, The Netherlands
Dr. Randolph Nudo, United States

Dr. John Steeves, Canada

Call for Abstracts: Online submission deadline - November 6, 2006
(details on website)

Online Registration: Early bird registration - February 1, 2007 (details
on website)

Supporting organizations:
Toronto Rehabilitation Institute
Department of Physical Therapy, University of Toronto
Ontario Neurotrauma Foundation
Canadian Stroke Network
Heart and Stroke Foundation of Ontario Centre for Stroke Recovery

OTHER NEUROSCIENCE NEWS

Society for Neuroscience Annual Meeting
Atlanta, Georgia
Minisymposium: *Theoretical Neuroscience: Modeling cells, circuits*
and behaviour
Sunday, October 15, 2006 8:30-11am
Chaired by Dr. Frances Skinner, Toronto Western Research
Institute, Department of Physiology and Program in Neuroscience,
University of Toronto

Huge strides and advances in technology are being made these days allowing us to peer inside cells and to measure microscopic details within them – a wealth of data about the brain and nervous system is being uncovered. However, with these advances, it is becoming increasingly clear that we also need to devote energy toward understanding the data in a framework beyond the scales in which they exist. For example, how do events that occur at the cellular level affect brain circuitry and in turn shape behavior? Enter modeling and theory. In other fields such as physics and chemistry, mathematics has been used as the language for describing elements and systems for centuries. As neuroscience (and biology in general) becomes more quantitative, we need to use mathematical language here also.

The behavior of neuronal systems needs to be formulated in a mathematical manner to define relationships between measured quantities, and to relate the various levels of description in the nervous system - for example, from a single cell to cellular networks. Mathematics is especially important when we want to describe how various measured quantities (such as membrane potential and neuronal firing patterns) evolve with time. This formulation is done using differential equations. Mathematical formulations are needed to understand normal and pathological brain activities, such as those that underlie epilepsy and Parkinson's, as they are characterized by changes over time.

An example of the use of differential equations in neuroscience is the theory underlying the action potential developed by Hodgkin and Huxley. The action potential is an electrical pulse that represents the fundamental signaling unit in the brain. Its formulation in mathematical language as represented by differential equations has allowed us to move beyond pure description in deciphering the workings of the brain. In the 1950's, it was not possible to solve the differential equations. However, by using the assumption of traveling

electrical pulses (the action potentials) Hodgkin and Huxley were able to reduce their equations to a simpler form that could be solved. They were then able to compute the speed of the pulse, and this compared favorably with later experimental observations. This demonstrates how using mathematics allows one to derive more from a model than what one puts into it.

In 1980, theoretical analyses were applied to the mathematical models describing action potentials to predict that with identical parameters in the model, electrical pulses or not could be produced – akin to the sudden stopping of the beating heart. The underlying mathematics is similar. This was shown to occur in real neurons, demonstrating that the same neuronal system can produce multiple outputs. This biologically unexpected but mathematically explainable finding underlies many of the present ideas of how memories might be stored in our brains. As experimental data accumulates, theoretical insights are needed today even more than ever. However, they are difficult to attain because non-casual interactions with the neurobiology are required to develop and design the models in the first place, and a firm grasp of the theory is required to determine possible analyses.

When we have a model that describes a biological system, what can we do with it? It would be the best if we could solve the model exactly and get a formula as a solution. In most cases, however, this is impossible because the equations are too difficult to solve. Therefore, we can use two complementary approaches. One approach is to use numerical simulations to get a solution. The main advantage of this approach is that we can solve complicated equations without any approximation. The drawback is that models of neurobiological systems have many parameters that describe them, many of these parameters are difficult or impossible to measure, and the system behavior can be very sensitive to the parameter values. Therefore, it is difficult to derive conclusions and obtain insights from simulations alone.

A second approach is to carry out theoretical analyses. Theory enables us to get approximate solutions, to define the various behavioral regimes of the system, to obtain mechanistic explanations to various dynamical behaviors, and to describe the effects of various parameters on the system. However, it is only possible to do analyses for models that are simple enough and then, only in certain limits. Often, however, the conclusions are valid beyond theoretical limits. Therefore, in general, both theory and simulations are needed to examine the mathematical models.

In this minisymposium we offer a sampling of ongoing work. We present six talks in which theory, simulations and experiments have come together to produce a whole that is greater than the sum of its parts. The work encompasses modeling of individual neurons, circuits and morphological details on the branches of neurons, in various experimental systems. We use theory from nonlinear dynamics together with simulations to derive insights into the workings of the various systems.

**COMPUTATIONAL NEUROSCIENCE SUMMER SCHOOL
UNIVERSITY OF OTTAWA
JUNE 17-29, 2007**

We are pleased to announce the first Canadian Summer School in Computational Neuroscience, which will be held from Sunday, June 17, 2007 until Friday, June 29, 2007 inclusively. It is organized by the new Center for Neural Dynamics and Computation at the University of Ottawa. The course is directed at graduate students and postdoctoral fellows from the physical sciences (e.g. physics, applied mathematics, engineering, computer science) and the life sciences (e.g. neuroscience, biology, physiology, human kinetics) who wish to develop their skills in neural data analysis and in mathematical modeling of neural activity. The topics will range from cellular to systems neuroscience, with a focus on sensory and motor systems.

The course will consist of 3 hours of lectures in the mornings, followed by 3-hour MATLAB-based computer laboratories in the afternoons. Participants will pair up for these laboratories, and an effort will be made to pair someone from the life sciences with someone from the physical sciences. All classes and laboratories will be held on the main downtown campus of the University of Ottawa (Biosciences Complex). The School will be held in English, although many of the lecturers also speak French. The course can be taken for credit, since it is a University of Ottawa three-credit graduate course (NSC8104). The mark will be based on work done in the computer laboratories and a short project. The first day of the school (Sunday June 17th) will be a mathematics refresher open to all participants, which will include some introduction to differential equations.

Enrollment in the course will be limited to 40 participants.

The summer school ends just before Canada Day (July 1st), and a week before the beginning of the Computational Neuroscience Meeting (www.cnsorg.org) which will be held next year in Toronto from July 8-12, 2007. Please contact the local organizer, F. Skinner (fskinner@uhnres.utoronto.ca) for further information and/or if you are interested in organizing a workshop associated with this conference.

MATH PRE-REQUISITES: Calculus I and II, first-year university level Linear Algebra and Probability and Statistics.

LIFE SCIENCES PRE-REQUISITES: first-year university level life science courses for students in the physical sciences.

FACULTY:

Prof. Ramesh Balasubramaniam, School of Human Kinetics, U. Ottawa
Prof. Maurice Chacron, Physiology, McGill University
Prof. Victor LeBlanc, Mathematics and Statistics, U. Ottawa
Prof. John Lewis, Biology, U. Ottawa
Prof. Tim Lewis, Mathematics, U. California at Davis
Prof. André Longtin, Physics and Cellular and Molecular Medicine, U. Ottawa
Prof. Len Maler, Cellular and Molecular Medicine, U. Ottawa

TUITION: \$1400 CAN with credit, \$800 CAN without credit.

ACCOMMODATION

Accommodation will be available at the New Residence of the University of Ottawa, a few minutes walk away from the Biosciences Complex and cafeterias and restaurants. Accommodation consists of a single room with a double bed, with two such rooms per apartment. Each apartment has a living room, kitchen and bathroom. The cost is approximately \$48 CAN per night per person, taxes included.

FINANCIAL SUPPORT

Partial financial support will likely be available for those demonstrating the need.

IMPORTANT DATES

February 1st, 2007: Application (website to follow).

March 15th 2007: Notification of acceptance and level of financial support.

April 1st, 2007: Notification of acceptance by the participant.

Accommodation: as soon as possible after notification of acceptance, participants can reserve their accommodation online at reserve@uottawa.ca or by phoning 1-888-564-4545.

CONTACT:

compneuro07@uottawa.ca

www.neurodynamics.uottawa.ca/summerschool (website will go online soon)

SYLLABUS

- 1) Introduction to Linear and Nonlinear Dynamical Systems
 - solutions of linear differential equations
 - qualitative analysis of nonlinear differential equations
- 2) Single Neuron Models
 - ionic models
 - simplified deterministic and stochastic models
- 3) Neural Spike Train Analysis and Modeling
 - basic statistics
 - autocorrelation, spectrum
 - information theory toolbox
- 4) Sensory Coding
 - artificial and naturalistic stimuli
 - modeling activity along the afferent pathways
 - modeling feedback
 - population coding and information theory
- 5) Synaptic Plasticity
 - short term depression and facilitation
 - long term plasticity
 - implications for information processing
- 6) Coupled Neurons
 - gap junction
 - excitatory and inhibitory synaptic coupling
 - effect of coupling on neural population behavior

- 7) Computational and Dynamical Approaches to Motor Control
- posture control and equilibrium point approaches
 - movement adaptation to force fields
 - timing and rhythmic movements
 - computational approaches to movement pathologies

- 8) Waves of Activity in Neural Networks
- neural field models
 - traveling waves
 - spiral waves

**2nd International Come To Your Senses Conference
Opening the Sensory World to Children & Adults with Complex
Disabilities
May 23 – 27, 2007
Sheraton Centre Toronto**

Call for Papers NOW OPEN!

Due to overwhelming positive feedback from the 1st Conference in October 2005, MukiBaum Treatment Centres is organizing the 2nd International Come To Your Senses Conference which will take place May 23 – 27, 2007 at The Sheraton Centre Toronto. The focus of this conference is Opening the Sensory World to Children and Adults with Complex Disabilities.

Professionals, parents, caregivers, persons with disabilities, researchers and consumers are invited to present on a wide array of topics within the realm of Sensory-Motor Therapy and people with disabilities. The goal is to share and disseminate knowledge and experience from around the world so that we can better understand the Sensory Reality of people with disabilities and the many forms of treatment that exist.

If you are interested in presenting at this conference, please submit to the Come To Your Senses Call for Papers. Visit the website at www.sensoryconference.ca and click on the link for Submit Paper. The complete details and rules for submission are outlined on the website.

Registration will be open by October 15, 2006 and you can take advantage of Early Bird registering at that time. There will be opportunities for you and your organization to exhibit, become a sponsor of the event and participate in a number of activities throughout the conference.

To find out more information about MukiBaum Treatment Centres, visit the website at www.mukibaum.com.

**39th International Danube Symposium
for Neurological Sciences and Continuing Education
in conjunction with the
1st International Congress on ADHD
from childhood to adult disease**

June 2-5, 2007
Würzburg, Germany

www.danube-wuerzburg.de
www.adhd-wuerzburg.de