59 St George Street
Toronto, ON
Canada M5S 2E6

January 7, 2012

Dear Dr. Swanson,

I am writing to express my interest in becoming a postdoctoral fellow in your lab.

I finished my PhD in Physiology from the University of Toronto in November 2011. My PhD research focused on the emergence of different time scales in population activities of the brain. The phenomenon is particularly intriguing because some of these population time scales do not seem to correspond to the time scales as possessed by constituent members of the network (i.e. neurons and synapses). As a result, it is difficult for experiments alone to single out a particular element giving rise to population activities. I developed a multidisciplinary approach consisting of data extraction, simulation and mathematical analysis to explore how the interaction of cellular and synaptic properties could sustain novel population time scales. I discovered that input-output characteristics of individual neurons, when coupled with synaptic effects, were instrumental for slow population time scales. In particular, the curvature of individual neuron's input-output function determines whether the network as a whole exhibits multistability. Population slow time scales occur when the network moves from one stable state to another. Our results predict specific cellular properties of neurons and therefore provide novel quantitative hypotheses to experimentalists. (You can download my thesis from https://tspace.library.utoronto.ca/handle/1807/30056).

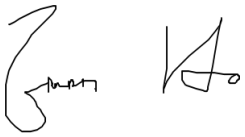
I am interested in being a member of your lab because I wish to apply my knowledge in computational biology to understand cancer formation. Quantitative methods (such as mathematical modelling and computer simulation) are still in their infancy in oncology research. Thus, there are immense potentials for computational biologists to develop new ideas and techniques to help understand disease mechanisms. The role of mathematics is even more pertinent in the context of today's multiple treatment modalities and advent of personalized medicine. For example, one may use mathematics to help predict a patient's response when subjected to different modes of treatment. However, to fully harness its power, mathematics needs to be combined with experimental efforts and clinical data. Your lab is particularly strong in fostering the synergy between theory and experiment as a result of your extensive collaboration with other groups and wealth of patient data (MRI/PET images).

Some of the projects I could work on should I become a member of your group include investigating the underlying determinants of patient specific glioma diffusion parame-

ters, which your lab has shown to have predictive values in terms of life expectancy of patients, or the possibility to use fractal properties to classify the spread of glioma. However, I am open to discuss and work on any potentially interesting projects. I am a Canadian citizen, and thus I am eligible to apply for postdoctoral funding from the Canadian Institutes of Health Research (the Canadian counterpart of NIH).

Thanks for considering my application. Please do not hesitate to contact me should you require more information. I look forward to hearing from you soon.

Yours sincerely,



Ernest Ho

encl: curriculum vitae (2 pages), references (1 page)

Ernest Ho

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Education

Nov 2011	**Ph.D., Physiology** University of Toronto, Toronto, Canada Dissertation: Fast-spiking interneurons control population slow activities via network multi-stability
May 2001	**M.Sc., Physics** University of British Columbia, Vancouver, Canada
May 1998	**B.Sc. (Honours), Physics and Mathematics** University of British Columbia, Vancouver, Canada

Summary of Skills

1. Modelling: 8 years of combined experience (B. Sc., M. Sc. and Ph. D. projects) using mathematics to model various problems in physics and biology, resulting in 4 refereed publications
2. Mathematics and statistics: numerical implementation of coupled ordinary and stochastic differential equations in network simulations, analysis of experimental data, implementation of parameter fitting algorithms
3. Computer languages: Fluent in C/C++, Perl, Maple, Matlab, LaTeX (typesetting software), SQL (database language), experience in high performance computing
4. Languages: English and Chinese

Research Experience

Nov 2011-present **Post-doctoral fellow** (part-time)

Sep 2005-Aug 2011 **Graduate Student**
Dept. of Physiology, University of Toronto
- Computational modelling of population activities in the brain
- Project requires development of a biologically plausible mechanism for population activities after analysing experimental data
- Implementation of model through high performance computing

Jan 1999-Oct 2001 **Research Assistant**
TRIUMF (TRI-University Meson Facility), Vancouver
- Investigated the nuclear process of radiative muon capture by helium using computational models
- Predicted theoretically the rate of the process using two different but interrelated approaches

Jan 1998-Jan 1999 **Research Student**
Dept. of Physics, University of British Columbia
- Developed C++ programme to model meteorological effects on an air-borne radioactive element

Major Awards

Apr 2010-Apr 2011	Ontario Queen Elizabeth II Scholarship in Science and Technology (Total: $15K)
May 2007-Apr 2010	Natural Sciences and Engineering Research Council of Canada (NSERC) PGS-D Scholarship (Total: $63K)
May 2007	Ontario Graduate Scholarship (Total: $15K)–*declined*
Sep 2005-Sep 2009	University of Toronto Open Fellowship (4 awards, each ∼$1K)

Selected Publications (Refereed Journals)

1. E. C. Y. Ho, L. Zhang and F. K. Skinner (2009). Inhibition dominates in shaping spontaneous CA3 hippocampal network activities *in vitro*, Hippocampus 19:152-165.
2. E. C. Y. Ho and D. F. Measday (2005). A simple model for describing the concentration of ^{212}Pb in the atmosphere, Journal of Environmental Radioactivity 78:289-309.
3. E. C. Y. Ho, H. W. Fearing and W. Schadow (2002). Radiative muon capture by ^{3}He, Phys. Rev. C 65:065501.

Book Chapter

1. F. K. Skinner and E. C. Y. Ho (2008). "Small networks, large networks, experiment and theory−Can we bring them together with oscillations, heterogeneity and inhibition?" In: Computational Neuroscience in Epilepsy (I. Soltesz, K. Staley, eds), Academic Press, Elsevier.

Manuscript Submitted

1. E. C. Y. Ho, M. Strüber, M. Bartos, L. Zhang and F. K. Skinner (2011). *"Interneuronal Network Multistability underlies the generation of Slow Population Activities"* (submitted to the Journal of Neuroscience)

Other Related Experience

Jan 2008-present **Librarian** (volunteer position)

Jan 2010-Oct 2011 **Co-executive Secretary** (volunteer position)
Hart House Singers, Toronto
- Choir's liaison with the Hart House music programme advisor
- Manage the library of the choir
- Prepare music folders for choristers three times a year

Sep 2011-present **Collaborator** (part-time)
Dept. of Cell and Systems Biology, University of Toronto
- Simulation of rotation of sex-comb during development of male Drosophila
- Investigating cell interactions and rearrangements during development

Apr 2002-Aug 2005 **Software Developer** (full time)
e^xware Solutions Corp., Vancouver
- Designed interfaces (using Perl) to bridge native database languages and user inputs

Interests & Activities

Reading, choral singing, performing comedy skits, cycling, hanging out with friends and relatives

(*References available upon request*)

References for Ernest Ho

1. Dr. Frances Skinner (PhD supervisor)
   MP13-308, Toronto Western Hospital
   399 Bathurst Street
   Toronto, Ontario
   Canada M5T 2S8
   Email: fskinner@uhnresearch.ca

2. Dr. Liang Zhang (PhD co-supervisor)
   MP13-411, Toronto Western Hospital
   399 Bathurst Street
   Toronto, Ontario
   Canada M5T 2S8
   Email: liangz@uhnresearch.ca

3. Dr. Hon Kwan (PhD supervisory committee member)
   Professor Emeritus
   Department of Physiology
   University of Toronto
   Toronto, Ontario
   Canada M5S 1A8
   Email: h.kwan@utoronto.ca