Patrick A. Fletcher

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Education

Ph.D, Mathematics (Biomathematics), August 2015. Florida State University, Tallahassee, Florida, USA. Dissertation title: *Theoretical, Computational, and Experimental Topics in Anterior Pituitary Cell Signaling*

M.Sc, Mathematics (Mathematical Biology), November 2008. University of British Columbia, Vancouver, Canada. Thesis title: *Modeling electrical spiking, bursting and calcium dynamics in gonadotropin releasing hormone (GnRH) secreting neurons*

B.S, Integrated Sciences (Mathematics and Biology), May 2005. University of British Columbia, Vancouver, Canada.

Published Articles

1. **P. A. Fletcher**, and Stojilkovic, Stanko S. and Sherman, Arthur. 2017. *Common and diverse elements of ion channels and receptors underlying electrical activity in endocrine pituitary cells.* Mol. Cell. Endocrinol. 463, 23–36.

2. **P. A. Fletcher**, and Zemkova, Hana and Stojilkovic, Stanko S. and Sherman, Arthur. 2017. *Modeling the diversity of spontaneous and agonist-induced electrical activity in anterior pituitary corticotrophs.* J. Neurophysiol. 117(6), 2298–2311

3. **P. A. Fletcher**, and Bertram, Richard and Tabak, Joel. 2016. *From global to local: exploring the relationship between parameters and behaviors in models of electrical excitability.* J. Comput. Neurosci. 40(3), 331–345

4. A. E. Gonzalez-Iglesias, , **P. A. Fletcher**, J. A. Arias-Cristancho, R. Cristancho-Gordo, C. V. Helena, R. Bertram, and J. Tabak. 2015. *Direct Stimulatory Effects Of Oxytocin In Female Rat Gonadotrophs And Somatotrophs In Vitro: Comparison To Lactotrophs.* Endocrinology 156(2), 600–612

5. **P. A. Fletcher**, F. Clément, A. Vidal, J. Tabak, and R. Bertram. 2014. *Interpreting Frequency Responses to Dose-Conserved Pulsatile Input Signals in Simple Cell Signaling Motifs.* PLoS ONE 9(4), e95613

6. M. N. Schulson, D. R. Scriven, **P. A. Fletcher**, and E. D. Moore. 2011. *Couplons in rat atria form distinct subgroups defined by their molecular partners.* J. Cell Sci. 124(7), 1167–1174

7. **P. A. Fletcher**, D. R. Scriven, M. N. Schulson, and E. D. Moore. 2010. *Multi-image colocalization and its statistical significance.* Biophys. J. 99(6), 1996–2005

8. **P. A. Fletcher**, and Y. X. Li. 2009. *An integrated model of electrical spiking, bursting, and calcium oscillations in GnRH neurons.* Biophys. J. 96(11), 4514–4524

9. M. W. Richter, **P. A. Fletcher**, J. Liu, W. Tetzlaff, and A. J. Roskams. 2005. *Lamina propria and olfactory bulb ensheathing cells exhibit differential integration and migration and promote differential axon sprouting in the lesioned spinal cord.* J Neurosci 25(46), 10700-10711

Invited Presentations

1. *Feature-Based Parameter Estimation in a Model of Anterior Pituitary Cell Electrical Activity* SIAM Dynamical Systems, Snowbird UT, 2017.

2. *Modeling electrical activity in pituitary coriticotrophs.* SIAM Life Sciences, Boston, MA, 2016.

3. *Real-Time Model calibration and prediction testing in pituitary cells using GPU and dynamic clamp.* SIAM Life Sciences, Charlotte, NC, 2014.

4. *How do cells detect the frequency of pulsatile chemical signals?* SIAM Dynamical Systems, Snowbird UT, 2013.

Contributed Presentations

1. **Talk:** P. A. Fletcher. *Real-Time Model calibration and prediction testing in pituitary cells using GPU and dynamic clamp.* Frontiers in Applied and Computational Mathematics, NJIT, Newark, NJ, 2014.

2. **Talk:** P. A. Fletcher. *Periodic forcing of simple models of cell signaling pathway components.* FSU biomathematics seminar, Tallahassee, Florida, 2012.

3. **Talk:** P. A. Fletcher. *Modeling frequency-dependent FSH transcription and secretion.* Workshop in Mathematical Neuroendocrinology, INRIA, Paris, 2011.

4. **Poster:** P. Fletcher, David J. Lyons, Christian Broberger, Joel Tabak, R. Bertram. *Modeling electrophysiological responses to prolactin in the tuberoinfundibular dopaminergic neurons of the arcuate nucleus.* Annual Meeting of the Society for Neuroscience, New Orleans, LA, 2012.

5. **Poster:** A. M. Stathopoulos, C. V. Helena, P. Fletcher, R. Bertram. *Acute effects of vasoactive intestinal polypeptide on prolactin release.* Annual Meeting of the Society for Neuroscience, Washington, DC, 2011.

6. **Poster:** P. A. Fletcher, N. A. Ciccone, U. B. Kaiser, R. Bertram. *Frequency response of gonadotropin-releasing hormone-induced follicle-stimulating hormone transcription.* SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah, 2011.

7. **Poster:** D. R. Scriven, P. A. Fletcher, J. Busby, S. Sequeira, E. D. Moore. *Multi-image colocalization applied to the structure of the cardiomyocyte.* Biophysical Society Meeting, 2010.

8. **Poster:** P. A. Fletcher and Yue-Xian Li. *Electrical activity, calcium dynamics, and autocrine regulation in GnRH neurons.* Society for Mathematical Biology Annual Meeting, Vancouver, Canada, 2009.

9. **Poster:** A. Yokoyama, <u>P. A. Fletcher</u>, Yue-Xian Li. *Synchrony and rhythmogenesis in diffusely distributed endocrine neurons by a diffusive autocrine regulator*. SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah, 2009.

10. **Poster:** <u>P. A. Fletcher</u> and Yue-Xian Li. *Electrical activity, calcium dynamics, and autocrine regulation in GnRH neurons*. SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah, 2009.

11. **Poster:** <u>P. A. Fletcher</u>, D. R. Scriven and E. D. Moore. *Determining the significance of colocalization in immunofluorescence data.* Biophysical Society Meeting, 2009.

12. **Poster:** <u>P. A. Fletcher</u> and Yue-Xian Li. *A minimal model of GnRH neuron electrical activity*. Rhythms in the Hypothalamus and Pituitary, Palo Alto, California, 2008.

13. **Poster:** P. Asghari, <u>P. A. Fletcher</u>, D. R. Scriven and E. D. Moore. *3D distribution of ryanodine receptors in the heart.* Frontiers in Biophysics. Vancouver, Canada, 2008.

Experience

Postdoctoral Fellowship

10/15–present: **Arthur Sherman**

- Analysis of single-cell RNA sequencing data in anterior pituitary cells
- Modeling electrical activity and response to hormones in pituitary cells
- Development of numerical simulation tools for parallel computation using graphics processing units (GPUs)

Research Assistantships

01/11–08/15: **Richard Bertram**

- Investigating the generation and decoding of pulsatile hormone patterns using mathematical models
- Performing calcium imaging experiments and mathematical modeling to study the response of pituitary cells to oxytocin
- Developing software for parallel numerical simulation of biophysical models of neuronal activity on graphics processing units (GPUs), for the purpose of rapid model calibration and studying how features of model solutions depend on model parameters

02/12, 07/12: **Frédérique Clément** - INRIA Rocquencourt, France - Studied pulsatile forcing of non-linear systems inspired by intracellular signaling pathways

10/05–08/06, 10/08–08/09: **Ed Moore** - Quantified spatial patterning and its statistical significance in fluorescence microscopy images of signaling proteins involved in excitation-contraction coupling in cardiac myocytes.

05/08–08/09: **Yue-Xian Li** - Modeled electrical activities, calcium dynamics, and G-protein signaling of GnRH neurons and pituitary cells.

02/06–06/06: **Eric Cytrynbaum** - Compared a model of *E. coli* cell division machinery to experimental data.

10/05–08/06: **Jane Roskams** - Quantified patterns of blood vessel growth and neurite outgrowth in fluorescence microscopy images of spinal cord explants.

Teaching Assistantships

08/09–12/14: **Florida State University**, Department of Mathematics

- Lecturer. **Courses taught**: Calculus 1 and 3, Pre-calculus algebra, Biocalculus Laboratory
- Teaching assistant. Supervised computer laboratories in Pre-calculus algebra, and trigonometry

09/06–05/08: **University of British Columbia**, Department of Mathematics - Tutored students, graded homework assignments.

Awards

04/14: Distinguished Teaching Assistant award.

Languages and Programming Skills

Bilingual: English and French.

Programming languages and software: MatLab, C, C++, C#, OpenCL, Python, R, CUDA, XPPAUT.

Course Delivery systems: Blackboard, WebAssign

Professional Service

Referee for papers submitted to Mathematical Biosciences, Journal of Neuroendocrinology, Journal of Theoretical Biology, PlOS One.

Leadership

05/17: **Co-organizer**, Minisymposium for SIAM Dynamical Systems conference, titled *State and Parameter Estimation in Models of Cellular Electrical Activity*.

03/11–08/15: **President, Vice-President, Treasurer**, Kiteboarding Association at FSU. Responsible for activities of the club including organization of club trips, competitions and community service events, budget request presentations, purchasing and negotiation with industry contacts for kiteboard equipment, instruction of beginners, and repairing equipment.

01/11–04/11: **Co-organizer of the Graduate Student Seminar**, FSU Mathematics Department. Select, organize and schedule speakers and participants for the graduate student run seminar.

References

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