

EDUCATION

Biomedical Communications Professional Master's Program

2013-Present: University of Toronto at Mississauga, ON

Doctor of Philosophy (Ph.D.) in Medicinal Chemistry

2008-2013: University of Toronto at Mississauga, ON

Honours Bachelor of Science, Biology/Chemistry/Mathematics with High Distinctions

2004-2008: University of Toronto at Mississauga, ON

RESEARCH EXPERIENCE

Biomedical Communications Professional Master's Program

2013-Present: University of Toronto at Mississauga, ON

Thesis – The development of an interactive teaching module on topics in molecular excitation, including exploration into analogies used in chemical education.

Supervisors – Dr. Jodie Jenkinson, Prof. Nick Woolridge, and Dr. Ulrich Krull

Goals – Develop an educational e-learning tool that students can explore to learn chemical principles. Use interactive modules to foster deep understanding and design quizzes to identify potential misunderstandings.

Areas of Expertise – Molecular excitation, research design, research with human participants, research ethics, user-centered interactive media design, and web application development.

Doctor of Philosophy (Ph.D.) in Medicinal Chemistry

2008-2013: University of Toronto at Mississauga, ON

Thesis – An Exploration into the Molecular Recognition of Signal Transducer and Activator of Transcription 3 Protein via Rationally Designed Small Molecule Binders

Supervisor – Dr. Patrick T. Gunning

Goals – Investigate the requirements for a potent inhibitor of Stat3. Explore the potential of small molecules for inhibitors of protein-protein interactions.

Significant contributions – (i) Produced a library of peptidomimetic and purine inhibitors of Stat3 (ii) Helped establish a rapid synthetic route to 2,6,9-trisubstituted purines (iii) produced a pharmacophore for binding to Stat3's SH2 domain (iv) published **3 first author publications**.

Areas of Expertise – Experimental design, synthesis, purification, fluorescence polarization, HPLC method development, instrument maintenance, NMR, Mass spectrometry, IR, ligand docking software (GOLD), computational energy minimizations, pharmacophore development.

PROFESSIONAL EXPERIENCE

Academic Illustrator

March 2015 - Present: Departments of Biochemistry and Biomedical Sciences–McMaster University
Produced figures depicting research from Dr. N. Magarvey's lab for publication and presentation

Academic Illustrator

November 2013 – January 2014: Department of Immunology -University of Toronto
Together with Dr. T. Watt's produced a review figure that was published in "Seminars in Immunology"

Application Designer

June 2014 – August 2014: Department of Physical Therapy -University of Toronto
Produced the framework for a digital resource to instruct and quiz students about joints

Chief Presiding Officer

2013 - 2014: Examinations Office -University of Toronto Mississauga
Ensured that exams were held under the regulations established by the University of Toronto

Teaching Assistant at Mississauga, ON

2008 - 2013: Introductory and Second Year Organic Chemistry TA- University of Toronto Mississauga
Managed tutorials and laboratories and provided feedback on tests/assignments

Guest Lecturer

2013: Second Year Organic Chemistry (CHM243) - University of Toronto Mississauga
Presented 2-weeks of lectures on aromatic compounds

Contracted HPLC Method Developer

2011: Ensminger Lab- University of Toronto Mississauga
Calibrated HPLC and developed method for separating pigments from plant extracts

Guest Lecturer

2011: Second Year Organic Chemistry (CHM243) - University of Toronto Mississauga
Presented lectures on the reactivity of carbonyl functionality

NSERC Research Position

2008: Researcher –University of Toronto Mississauga
Completed an independent project in the field of organic synthesis

Accurate One-On-One Tutoring

2004 – 2008: High School and University Tutor – Brampton Ontario
Clarified concepts from a variety of disciplines (mathematics, physics, chemistry and biology)

AWARDS AND HONOURS

- Vesalius Trust Research Award (2015), North America
- CIHR Health Research Communication Award (2013-2015), Canada
- Educational IT Summer Student Program (2014), Ontario
- Institute of Medical Sciences Entrance Award (2013), University of Toronto
- Ontario Graduate Scholarship (2011-2013), Ontario
- Teaching Reduction Award (2010), University of Toronto
- John Bunting Chemistry Prize Award (2010), University of Toronto
- Natural Sciences and Engineering Research Council (NSERC) USRA (2008), Canada

PUBLICATIONS

Thesis Dissertation

Shahani, V.M. and Gunning P.T. (2013) "An Exploration into the Molecular Recognition of Signal Transducer and Activator of Transcription 3 Protein Via Rationally Designed Small Molecule Binders". *PhD Thesis Dissertation*. Department of Chemistry, University of Toronto, Canada.

Published Refereed Papers

- Martic, S.; Rains, M.K.; Haftchenary, S.; Shahani, V.M.; Kraskouskaya, D.; Ball, D.P.; Gunning, P.T.; Kraatz, H.B. (2014) "Electrochemical detection of the Fc-STAT3 phosphorylation and STAT3-Fc-STAT3 dimerization and inhibition", *Mol. BioSyst.* (10), 576-580.
- Haftchenary, S.; Luchman, H.A.; Jouk, A.O.; Veloso, A.J.; Page, B.D.; Cheng, X.R.; Dawson, S.S.; Grinshtein, N.; Shahani, V.M.; Kerman, K.; Kaplan, D.R.; Griffin, C.; Aman, A.M.; Al-Awar, R.; Weiss, S.; Gunning, P.T. (2013) "Potent Targeting of the STAT3 Protein in Brain Cancer Stem Cells: A Promising Route for Treating Glioblastoma" *ACS Med. Chem. Lett.* (4), 1102-1107.
- Haftchenary, S.; Ball, D.P.; Aubry, I.; Landry, M.; Shahani, V.M.; Fletcher, S.; Page, B.D.G.; Jouk, A.O.; Tremblay, M.L.; Gunning, P.T. (2013) "Identification of a Potent Salicylic Acid-based Inhibitor of Tyrosine Phosphatase PTP1B." *MedChemComm.* (4) 987-992.
- Shahani, V.M.; Ball, D.P.; Ramos, A.V.; Li, Z.; Haftchenary, S.; Trudel, S.; Schimmer, A.D.; Gunning P.T. (2013) "A 2,6,9- hetero-trisubstituted purine inhibitor exhibits potent biological effects against multiple myeloma cells". *Bioorganic & Medicinal Chemistry.* (17): 5618-5628.
- Lukkarila, J.L.; da Silva, S.R.; Ali, M.; Shahani, V.M.; Xu, W.G.; Berman, J.; Roughton, A.; Dhe-Paganon, S.; Schimmer, A.D.; Gunning, P.T. (2011) "Identification of NAE Inhibitors Exhibiting Potent Activity in Leukemia Cells: Exploring the Structural Determinants of NAE Specificity." *ACS Med. Chem. Lett.* (2), 577-582.
- Shahani, V.M.; Fletcher, S.; Yue, P.; Luu, D.; Sharmeen, S.; Schimmer, A.S.; Turkson, J.; Gunning, P. T. (2011) "Design, synthesis and in vitro characterization of novel hybrid peptidomimetic inhibitors of STAT3 protein." *Bioorg. Med. Chem.* (19), 1823-1838.
- Shahani, V.M.; Yue, P.; Haftchenary, S.; Zhao, W.; Lukkarila, J.; Zhang, X.; Ball, D.; Nona, C.; Gunning, P. T.; Turkson, J. (2011) "Identification of purine-scaffold small-molecule inhibitors of Stat3 activation by quantitative structure activity relationship studies." *ACS Med. Chem. Lett.*, **2011**, 2 (1), pp 79-84.
- Fletcher, S.; Shahani, V.M.; and Gunning, P.T. (2010) "Concise access to N9-mono-, N2-mono- and N2,N9-disubstituted guanines via efficient Mitsunobu reactions." *Tetrahedron.* (66), 4621-4632.
- Fletcher, S.; Drewry, J.; Shahani, V.M.; Page, B.D.G; Gunning, P.T.; (2009) "Molecular Disruption of Oncogenic Signal Transducer and Activator of Transcription 3 (STAT3) Protein." *Biochem. Cell Biol.* (87), 825-833.
- Fletcher, S.; Singh, J.; Zhange, X.; Yue, P.; Page, B.D.G.; Sharmeen, S.; Shahani, V.M.; Schimmer, A.D.; Turkson, J.; Gunning, P.T. (2009) "Disruption of Transcriptionally Active Stat3 Dimers with Non-phosphorylated, Salicylic Acid-Based Small Molecules: Potent in vitro and Tumor Cell Activities." *ChemBioChem*, (10), 1959-1964.
- Fletcher, S.; Shahani, V.M.; Gunning, P.T. (2009) "Facile and efficient access to 2,6,9-tri-substituted purines through sequential N9, N2 Mitsunobu reactions." *Tet. Lett.* (50), 4258-4261.

Manuscripts in Preparation

Shahani, V.M. and Jenkinson J. (2015) "Comparing the effectiveness of analogies in teaching potential energy wells."

PRESENTATIONS

- Shahani, V.M.; Jenkinson, J. "Exploring Visual Analogies and their Impact on Student Understanding when Teaching Unfamiliar Chemical Concepts" 98th Canadian Chemistry Conference and Exhibition. Ottawa, ON, Canada. Oral Presentation. June 2015. (Accepted)
- Shahani, V.M.; Ball, D.P.; and Gunning, P. T. "Second Generation Purine Inhibitors of Stat3 Show Greater Than 6-fold Increased Activity Over Previous Library" 95th Canadian Chemistry Conference and Exhibition. Calgary, AB, Canada. Oral Presentation. June 2012.
- Shahani, V.M.; Ball, D.P.; and Gunning, P. T. "Decorating purine-based STAT3 inhibitors with drug-like functionalities to improve cell permeability and anti-cancer potency" 94th Canadian Chemistry Conference and Exhibition. Montreal, QC, Canada. Oral Presentation. June 2011.
- Shahani, V.M.; Fletcher, S.; and Gunning, P. T. "Utilizing a pharmacophore model for the development of potent small molecule inhibitors of STAT3 function" ACS National Meeting. Boston, MA, USA. Poster Presentation. August 2010.
- Shahani, V.M.; Fletcher, S.; and Gunning, P. T. "A Peptidomimetic STAT3 Inhibitor Sensitizes Human Prostate Cancer Cells to Chemotherapeutic Treatment: A Promising Synergistic Combination Strategy" 93rd Canadian Chemistry Conference and Exhibition. Oral Presentation. May 2010.
- Shahani, V.M.; Fletcher, S.; and Gunning, P. T. "Strategic Design and Synthesis of Highly Effective Peptidomimetic Inhibitors of STAT3" 92nd Canadian Chemistry Conference and Exhibition. Poster Presentation. May 2009.

SKILLS/INTERESTS/ASSOCIATIONS

Visualization Tools

- Traditional Media (pen and ink, carbon dust, and wash).
- Digital Media (Adobe Illustrator, Photoshop, Dreamweaver, Cinema4D and Blender)
- Website programming (basic HTML, CSS, PHP and Javascript- AngularJS, three.js, D3.js)
- Content Management Systems (Drupal)

Laboratory Skills

- Separation Techniques (TLC, flash column chromatography, analytical and preparative HPLC).
- Biological Techniques (PCR, gel electrophoresis, centrifugation, biological dissection).
- Computational methods, including: 3D molecule imaging (pyMOL), basic geometry optimization (ChemDraw3D/ArgusLab) and ligand docking (GOLD)

Interests

- Using molecular mimicry and organic synthesis to develop novel molecules for use in biological applications.
- The use of visualization tools for the transmission of complex ideas in education.

Associations

- Canadian Institute of Chemistry (CIC)
- Association of Medical Illustrators (AMI)

REFERENCES

Dr. Patrick Gunning

Associate Professor, Department of Chemical and Physical Science.
905 828.5354
patrick.gunning@utoronto.ca

Dr. Jodie Jenkinson

Assistant Professor, Biomedical Communications
905 569.4263
j.jenkinson@utoronto.ca

Dr. Steven Fletcher

Assistant Professor, Department of Pharmaceutical Sciences
410 706.6361
sfletcher@rx.umaryland.edu