SGC 20TH ANNIVERSARY SYMPOSIUM

ACCELERATING DRUG DISCOVERY THROUGH OPEN SCIENCE

Chelsea Hotel (Mountbatten Salon), Toronto, Canada

March 8-9, 2023

https://www.thesgc.org/sgc-20th-anniversary-symposium

Speakers' Bio

Cheryl Arrowsmith

Cheryl Arrowsmith is a Senior Scientist at the Princess Margaret Cancer Centre, Professor in the Department of Medical Biophysics, University of Toronto, and the Chief Scientist of the Structural Genomics Consortium (SGC) at the University of Toronto. Her research focuses on the structural and chemical biology of chromatin and epigenetic regulatory factors especially as relates to cancer and drug discovery. In partnership with major pharmaceutical companies, she leads the SGC's international open science program that is developing and distributing unencumbered Chemical Probes that support the discovery of new medicines. She received her Ph.D. from the University of Toronto and carried out postdoctoral research at Stanford University, and was co-founder of Affinium Pharmaceuticals, which developed a new medicine for multidrug resistant bacteria. She has published over 300 research articles, and was recognized by Clarivate Analytics as being among the worlds top 1% of highly cited scientists in 2018 and 2019. She was elected a AAAS Fellow (2015), and a Fellow of the Royal Society of Canada (2020).

Session 1 - Tackling emerging infectious diseases

Dafydd Owen

Dafydd Owen has twenty-four years of experience as a medicinal chemist in the design and synthesis of drug-like molecules for Pfizer at its Sandwich UK and Cambridge MA research sites. He obtained his first degree at Imperial College in 1994 before moving to the University of Cambridge to gain a Ph.D under the supervision of Professor Steve Ley FRS in 1997. Having won a research fellowship for postdoctoral work, he spent 1998 with Professor Leo Paquette at Ohio State University. During his research career he has delivered over one hundred invited lectures and is an author on over seventy research papers and patents. He has made contributions to seven clinical candidates during his career at Pfizer. He has been recognized through Pfizer's Breakthrough Science and Innovation Prize, the Pfizer Worldwide R&D People Leader Award and was also selected as an ACS Organic Division Young Industrial Investigator earlier in his career. He serves as a board member of the Structural Genomics Consortium and sits on the editorial advisory board of the Journal of Medicinal Chemistry. He currently works in an outward looking, academically collaborative group for Pfizer looking to better understand protein families and their role in human disease through chemistry. Most recently he led Pfizer's oral protease inhibitor program that ultimately delivered PAXLOVID, the world's first oral anti-viral therapy for the treatment of COVID-19.

Tim Willson

Dr. Willson is the Harold Kohn Distinguished Professor in Open Science Drug Discovery at the Eshelman School of Pharmacy, University of North Carolina at Chapel Hill and Chief Scientist of the SGC-UNC site. He has over 30 years of experience in pharmaceutical research with a track record in discovery of first in class clinical candidates. He led the Glaxo program on orphan nuclear receptors that used chemical biology to uncover their role in regulation of human metabolism. He was codiscoverer of the FXR agonist obeticholic acid, an FDA-approved breakthrough drug for liver diseases. His lab discovered the mechanism of action of the diabetes drug pioglitazone (PPAR agonist) and the psoriasis drug tapinarof (AhR agonist). He is widely recognized for scientific leadership in chemical biology and was named one of the world's 400 most influential biomedical researchers. Dr. Willson has been a long-time supporter of precompetitive chemistry in early drug discovery and was an early advocate of the SGC Chemical Probes project. His current laboratory at UNC works closely with pharma companies and academic investigators to develop small molecule chemical probes for understudied (dark) proteins that are then openly shared with the scientific community. His lab has developed the Kinase Chemogenomic Set (KCGS) that contains selective inhibitors of more than 200 kinases. He is currently the co-PI of the Rapidly Emerging Antiviral Drug Development Initiative AViDD Center (READDI-AC) that seeks to create drugs for viruses of pandemic potential.

Angela Cheung

Dr. Angela M. Cheung is Professor of Medicine, KY and Betty Ho Chair in Integrative Medicine at University of Toronto (UT) and Senior Scientist at University Health Network (UHN). She holds a Tier 1 Canada Research Chair in Musculoskeletal and Postmenopausal Health, and has held Canadian Institutes of Health Research Senior Investigator award, Canadian Society of Internal Medicine David Sackett Senior Investigator award, Ontario Premier Research Award, Chinese Canadian Legend Award, UT Eudenie Stuart Mentorship award, UHN Michael Hutcheon Mentorship award, and most recently (2021) UT Eaton Scholar Award for clinical research. She is the principal investigator CANCOV and RECLAIM, two large scale national studies on COVID-19 and has served as an advisor for Ontario Science Table, PHAC, CITF, CIHR, CADTH and the Chief Science Advisor's Task Force on Post COVID Condition. She obtained her M.D. (1988) from Johns Hopkins University School of Medicine, and her PhD (1997) from Harvard University. She is a Fellow of the Royal College of Physicians of Canada and has been in clinical practice for >30 years. Twitter @AngelaMCheung

Session 2 - *Chemical Probes, a gateway to new medicines*

Rima Al-awar

Dr. Rima Al-awar is the Head of Therapeutic Innovation and Drug Discovery at the Ontario Institute for Cancer Research (OICR; https://oicr.on.ca/) and Professor in the Department of Pharmacology & Toxicology and Department of Chemistry at the University of Toronto. With over 10-years' progressive experience at Eli Lilly, she joined OICR in 2008 to focus on building a drug discovery program to help efficiently translate discoveries made in Ontario's laboratories into novel oncology therapies that will benefit cancer patients. Under her leadership, the OICR Drug Discovery Program has played a major role in bridging the gap between academia and industry in Ontario by providing drug discovery capabilities. Today, the program is one of the largest of its kind in Canada with a team of more than 30 researchers whose collective expertise spans the entire drug discovery process from target identification and validation to clinical candidate selection. Dr. Al-awar has published over 90 peer-reviewed publications and patent applications in the field of medicinal chemistry and drug discovery. Her team's research in identifying small molecules that disrupt the protein-protein interactions of WDR5 and BCl6 resulted in a landmark deal with Triphase/Celgene (now BMS) for a first-in-class epigenetic drug targeting WDR5, and a partnership with Janssen on the BCL6 target.

Stefan Knapp

Prof Stefan Knapp studied Chemistry at the University of Marburg (Germany) and at the University of Illinois. He did his PhD in protein crystallography at the Karolinska Institute in Stockholm. In 1999, he joined the Pharmacia and left the company in 2004 to set up a group at the Structural Genomics Consortium at Oxford University. From 2008 to 2015 he was a Professor of Structural Biology at Oxford University (UK) and director for Chemical Biology at the Target Discovery Institute. He joined Frankfurt University in 2015 as a Professor of Pharmaceutical Chemistry. Since 2017 he is the CSO of the SGC node at the Goethe-University Frankfurt. His research interests are the rational design of selective kinase inhibitors and inhibitors of protein interactions modules that function as reader domains of the epigenetic code.

Rachel Harding

Dr. Harding is an Assistant Professor at the Department of Pharmacology and Toxicology and a Principal Investigator at the Structural Genomics Consortium. Dr. Harding completed her undergraduate and DPhil in structural biology at the University of Oxford, before moving to the University of Toronto for her postdoctoral training. The focus of Dr. Harding's research is the huntingtin protein, mutated in people with Huntington's disease. Huntington's is a devastating, incurable, genetic, neurodegenerative disease caused by a CAG-tract expansion in the *Huntingtin* gene. Dr. Harding studies the structure-function of the huntingtin protein in both its wildtype and disease forms, with a view to better understand the mechanisms of disease, as well as trying to find new avenues of therapeutic intervention.

Session 3 - *Probing the human (epi)genome for therapeutic opportunities*

Daniel De Carvalho

Dr. De Carvalho is Canada Research Chair and senior scientist at Princess Margaret Cancer Centre, and Associate Professor at University of Toronto, Department of Medical Biophysics. He is also the Founder and Chief Scientific Officer of Adela (www.adelabio.com). Dr. De Carvalho's research focuses on basic and translational aspects of cancer epigenetics. His lab is developing DNA methylation-based liquid biopsy tools combined with advanced computational approaches applied to cancer early detection, classification and monitoring. His laboratory also works on the epigenetic regulation of Transposable Elements (TEs) with the goal to understand their biology in tissue homeostasis and in cancer development. His group identified that Epigenetic therapies are able to re-activate TEs, leading to an immune response known as viral mimicry. In collaboration with pharmaceutical companies, his group is developing new drugs to induce an anti-viral response against cancer. Dr. De Carvalho is also investigating the epigenetic regulation of immune cells (CD8 T cells) and developing approaches to improve their killing potential against cancer cells.

Joe Walton

Joe recently completed his Ph.D. in the lab of Dr. Laurie Ailles and previously completed a B.Sc. in Biochemistry at McMaster University and Master's in Biotechnology and Physical Therapy at the University of Toronto. He has worked in a diversity of fields including management consulting, pharmaceutical marketing, and as a physical therapist. A love of science and a strong desire to pursue a research career inspired Joe to return for doctoral studies in the Medical Biophysics department at the University of Toronto where his current work focuses on understanding and determining the utility of novel epigenetic-based therapies in Kidney Cancer, specifically the potential therapeutic effects of inhibiting arginine methylation in this disease. Joe is currently completing a post doctoral fellowship in Dr. Ailles Lab.

Session 4 - *New tools for targeted protein degradation*

Dominic Owens

Dominic gained his PhD from the University of Oxford in chromatin biology where he studied the transcriptional regulation of RUNX1 in hematopoietic cells. After joining SGC Toronto in January 2020 as a Mitacs Elevate Postdoctoral Research Fellow, Dominic has been investigating the ubiquitin-proteasome system and specifically the CTLH E3 ligase complex. Dominic is now a Precision Medicine Initiative (PRiME) Postdoctoral Research Fellow exploring the role of ubiquitination in regulating ribosome biogenesis in cancer.

David Nie

David is a fourth-year Ph.D. candidate in the lab of Dr. Cheryl Arrowsmith at the University of Toronto, previously completing his undergraduate training in biochemistry at McGill University. His research interests are in cancer epigenetics and the development of small-molecule epigenetic modulators. His main project concerns the development and characterization of chemical degraders targeting the histone methyltransferase NSD2 and understanding the role of NSD2 in cancers.

Session 5 - *Initiatives to accelerate drug discovery and enhance data reproducibility*

Susanne Mueller-Knapp

Susanne Müller-Knapp studied Human Biology in Marburg Germany followed by a PhD in molecular biology at the Karolinska Institute in Stockholm, Sweden (1997). After spending more than 6 years as postdoctoral researcher in the area of inflammation and gene regulation at the Karolinska Institute and at the DIBIT San Raffaele Scientific Institute in Milan, Italy, Susanne joined 2004 the Structural Genomics Consortium, SGC, in Oxford. Susanne has been the Project Manager of the Epigenetic Probe Project, before moving to Frankfurt in 2015. In her role as Chief Operating Officer at the SGC Frankfurt Susanne is now coordinating several chemical probe programs and making these well-characterised tool compounds available to the scientific community. Her research group focuses on evaluating novel chemical probes for their cellular target engagement and biological roles. She is also Director of Operations of the Chemical Probes Portal, an online platform, providing recommendations for the right choice and use of chemical probes https://www.chemicalprobes.org/. Her research centers on using chemical biology on system evaluation to dissect the role of a specific target in biology and disease.

Matthieu Schapira

Matthieu Schapira is an Associate Professor in the Department of Pharmacology and Toxicology, UofT, and is the head of computational chemistry and protein bioinformatics at the SGC-Toronto. He leads the CACHE initiative for benchmarking computational 'hit finding'. His research focuses on the structural chemistry of drug target classes such as chromatin regulators, ubiquitylation pathways and WDR proteins, and he has created popular online informatics resources for these targets such as Chromohub, Ubihub and ChemBioPort.

Peter McPherson

Peter McPherson is a Distinguished James McGill Professor of Neurology and Neurosurgery at the Montreal Neurological Institute of McGill University. He received a Ph.D. in Neuroscience from the University of Iowa working with Dr. Kevin P Campbell and performed post-doctoral training with Dr. Pietro De Camilli at Yale. His laboratory uses biochemical, cell biological, molecular biological, structural, and genetic approaches to identify and functionally characterize proteins regulating membrane trafficking in the endosomal system. He has used subcellular proteomics to study the molecular make up of endosomal membranes and has identified numerous links between endocytic membrane trafficking and neurological disease including ataxia, ALS, Parkinson's disease, epileptic encephalopathy, and glioblastoma. His laboratory has developed approaches for antibody production and validation. Dr. McPherson is a Fellow of the Royal Society of Canada.

Session 6 - *Looking toward the Future: Industry partnerships to support drug discovery*

Levon Halabelian

Dr. Levon Halabelian is an Assistant Professor at the Department of Pharmacology and Toxicology, University of Toronto, and a Principal Investigator in structural biology at the Structural Genomics Consortium (SGC). He received a MSc degree in applied biotechnology from Uppsala University, Sweden, and a PhD degree in biomolecular sciences from the University of Milan, Italy. During his postdoctoral training in the laboratory of Dr. Cheryl Arrowsmith, he worked on structural and biophysical characterization of DNA-damage sensing proteins (HMCES), as well as protein arginine methyltransferases (PRMTs) that are involved in epigenetic regulation. Dr. Halabelian's research currently focuses on using x-ray crystallography and chemical biology tools to uncover the structures and functions of human WD-repeat (WDR) domain containing proteins that are often associated with diverse human diseases, including neurodegeneration and cancer. He is also involved in structure-guided drug discovery efforts for targeting disease-associated WDR proteins, such as LRRK2, RBBP7, WDR41, WDR12 as well as several other WDRs related to E3 ligases for PROTAC development. Most of his drug-discovery projects are in collaboration with pharma partners as well as with Artificial Intelligence (AI) based drug-discovery groups from academia and industry.

Matthew Robers

Matthew Robers is a Senior Research Scientist and Group Leader at Promega Corporation. Matthew received post-graduate training at University of Wisconsin-Madison, studying iron-sulfur cluster enzymes in bacteria. Following graduate school, Matthew emphasized technology development for cellular pathway analysis at Life Technologies (Invitrogen). Since joining Promega, Matthew has built a team focused on the development of new technologies to assess intracellular target engagement, residence time, and drug polypharmacology. Through industry/academic collaborations, Matthew has generated over 10 patents and over 50 peer-reviewed publications underlying biophysical techniques to enable live cell target engagement.

Aled Edwards

Dr. Aled Edwards is founder and Chief Executive of the Structural Genomics Consortium (SGC), a research organization celebrated for being a pioneer of open science, particularly as it applies to protein science, chemical biology and drug discovery. Aled leads the six SGC laboratories from the SGC headquarters in Canada. Aled is a Professor at the University of Toronto and Adjunct Professor at McGill University. He has published over 200 papers and his teams have contributed over 4,500 structures into the Protein Data Bank, as of 2021. Aled has also founded many companies, including Affinium Pharmaceuticals, which developed a novel antibiotic currently in late-stage clinical trials, and M4K Pharma, the first pharmaceutical company formed explicitly to invent new, and affordably priced, medicines for pediatric cancers.