University of Toronto Research Expertise

Biotechnology & Pharmaceuticals

UNIVERSITY OF TORONTO

March 2023

U of T Global Rankings

#1 in Canada | #18 worldwide	#1 in Canada | #6 worldwide
THE World University Rankings (2022)	NTU World University Rankings (2022)

A POWERHOUSE FOR INNOVATION & ENTREPRENEURSHIP

600+ Startups

More than **$2.5B** in investment secured by **600+** startups over the past decade.

350+ Private Sector Partners

U of T's global reputation as a top research university and its vibrant innovation and entrepreneurship culture attracts industry partners from across Canada and worldwide.

1100+ Patent Applications

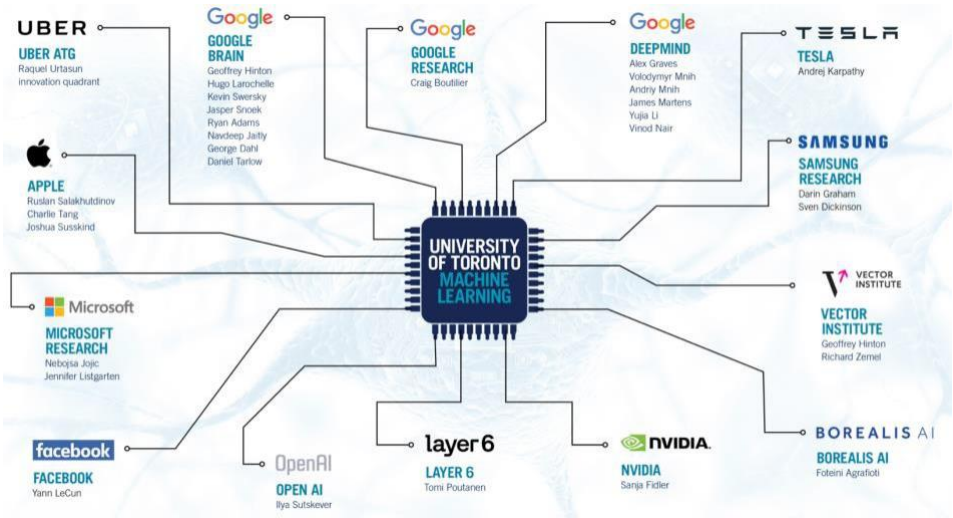
U of T is a leader among North American universities for research-based startups, inventions, licenses and options.

U of T & Affiliated Academic Hospitals

A Dynamic Network of Academic Health Organizations Providing Leading Edge Research, Teaching & Clinical Care

U of T Expertise Sought by Global Giants

U of T Faculty & Alumni are Hired by Some of the Most Influential Tech Companies Worldwide



The Toronto Region is home to one of the most vibrant life sciences, human health sciences, and biotechnology ecosystems in the world. ***Over half of Canada's life sciences, pharmaceutical and medical device, companies are located in the region including 50 of the world's top 100 multinational corporations.***

IMPACT STORIES

U of T launches new hub to strengthen Canada's pandemic preparedness & increase biomanufacturing capacity

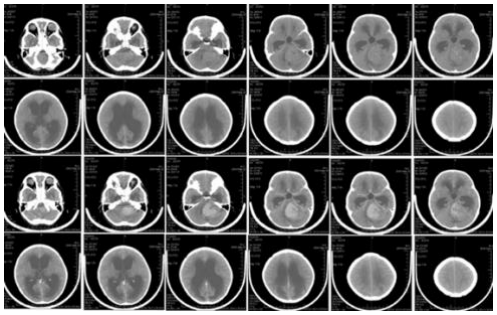
Mar 02, 2023

U of T among top 5 university business incubators in the world: UBI Global

Feb 06, 2023

Researchers use AI-powered database to design potential cancer drug in 30 days

Jan 19, 2023



Researchers uncover molecular vulnerability in childhood brain cancer, identify treatment

Jan 12, 2023

U of T scientists use AI to fast-track drug formulation development

Jan 11, 2023

U of T receives $35 million to modernize high containment facility

Nov 16, 2022

Acceleration Consortium launches partnership with Merck KGaA, Darmstadt, Germany

May 06, 2022

U of T partners with Moderna to advance research in RNA science & technology

Apr 07, 2022

U of T drug discovery startup BenchSci raises $63 million in funding

Jan 24, 2022

Table of Contents

KEY U of T RESEARCH CENTRES & INFRASTRUCTURE

Acceleration Consortium [Advanced Materials | Artificial Intelligence]
https://acceleration.utoronto.ca/
The **Acceleration Consortium** is leading a paradigm shift in scientific discovery through the development of self-driving artificial intelligence-guided robotic labs that accelerate the discovery of advanced materials and small molecules, from decades to years. The consortium addresses fundamental topics, such as deep learning algorithms, materials modelling, and robotics and applied challenges, such as discovering materials for a wide range of commercial applications. The **Acceleration Consortium** supports a commercialization-focused ecosystem that aims to translates materials discoveries through start-ups and industry partnerships.

BioZone [Bioscience, Bioengineering]
https://www.biozone.utoronto.ca/
BioZone is a Centre for Applied Bioscience and Bioengineering Research at the U of T's Faculty of Applied Science and Engineering. Our multi-disciplinary team consists of internationally renowned researchers who work at the interface of biology and engineering and share a common vision: to use the most advanced and innovative biotechnology to address urgent societal needs in energy, environment, and health.

Centre for Research and Applications in Fluidic Technologies [Microfluidics]
http://www.torontomicrofluidics.ca/craft/
The **Centre for Research and Applications in Fluidic Technologies (CRAFT)** is a unique long-term partnership between the University of Toronto (U of T) and Canada's National Research Council to advance the field of microfluidics — the manipulation of fluids at micron length scales by developing devices with improved precision, lower detection limits, and the capacity to parallelize procedures. This partnership positions Canada to become a world-leader in developing and translating microfluidic solutions, such as point-of-care diagnostics, organ-on-a-chip devices and organ-scale tissue substitutes, that will improve the health of all Canadians and lay the foundation of a thriving, internationally competitive industry sector.

Combined Containment Level 3 Unit [Infectious Diseases]
https://medicine.utoronto.ca/combined-containment-level-3-unit
The Temerty Faculty of Medicine, maintains secure facilities for work with Risk Group 3 pathogens such that crucial research on established and emerging infectious diseases can be conducted while ensuring researchers and the larger community are protected from risk. The C-CL3 Unit is outfitted to support both *in vivo* and *in vitro* research programs, with all appropriate biocontainment and essential laboratory equipment in place.

Data Sciences Institute [Big Data | Computational Research]
https://datasciences.utoronto.ca/
The Data Sciences Institute (DSI) is a multi-divisional, tri-campus, multidisciplinary hub for data science activity at the University of Toronto (U of T). The DSI facilitates research connections, fosters innovation, and enhances teaching and learning in data sciences, including in emerging data-driven disciplines with a highly collaborative, inclusive approach. DSI bring together researchers and trainees from across the University, its affiliated research institutes, industry and beyond to support data sciences research, innovation, collaboration, and training to translate promising ideas into real-world solutions and advance the data sciences.

Emerging & Pandemic Infections Consortium [Pandemics | Infectious Diseases]
https://epic.utoronto.ca/
The **Emerging and Pandemic Infections Consortium (EPIC)** harnesses the full potential of Toronto's diverse community, at U of T and its partner hospitals, of clinicians, scientists, engineers, and public health and policy-focused infectious disease experts to converge on innovative approaches that ensure future emerging infections do not wreak devastation. Anchored by U of T's Infectious Disease Laboratories (IDL), Toronto's only Combined Containment Level 3 (C-CL3) unit for the study of high-risk human pathogens, as well as the CL2+ aerosol containment facility and Biobank, EPIC aims to be the leading initiative on infectious disease research and training from discovery to policy, and a magnet for world-leading talent.

Institute of Biomedical Engineering [Health | Engineering]
https://bme.utoronto.ca/
The **Institute of Biomedical Engineering (BME)** at the U of T is a multidisciplinary research community where engineering, medicine and dentistry investigators collaborate to develop innovative solutions that address global challenges in human health.

Medicine by Design [Regenerative Medicine]
https://mbd.utoronto.ca/
Medicine by Design (MbD) brings together >130 scientists, engineers and clinicians at U of T and its affiliated hospitals to address challenges in regenerative medicine. These research teams enhance our understanding of the human body's regenerative capacities and develop clinical solutions to improve health outcomes.

MITO2i [Mitochondrial Diseases]
https://www.mito2i.ca/
The **Mitochondrial Innovation Initiative (MITO2i)** is an emerging network of researchers, clinicians, patients and advocates, academic institutions, non-governmental organizations and industry partners working together with a common mission – to transform our understanding of the role of mitochondria in human health and disease.

PRiME [Precision Medicine]
https://www.prime.utoronto.ca/
The **Precision Medicine Initiative at U of T (PRiME)** leverages the University's world-class expertise in biologics, omics, molecular chemistry, liquid biopsy, nanomedicine, biology-on-a-chip and related domains to develop new solutions to unmet needs in human disease. The multidisciplinary approach aims to fully understand disease biology, create new tools for disease diagnosis, and develop novel therapeutics, and thus establishing Toronto as a leading centre for next-generation precision medicine.

Schwartz Reisman Institute for Technology & Society [Technology | Integrative Research]
https://srinstitute.utoronto.ca/
The Schwartz Reisman Institute draws on U of T's signature strengths in the sciences, humanities and social sciences to explore the benefits and challenges that AI, biotechnology and other technological advances present for our economy, our society and our day-to-day lives.

Temerty Centre for AI Research & Education in Medicine [Health | Artificial Intelligence]
https://tcairem.utoronto.ca/
The **Temerty Centre for Artificial Intelligence Research and Education in Medicine (T-CAIREM)** at the U of T seeks to establish world-class educational programs in AI in medicine, fund research opportunities that bring together experts from a range of disciplines, and create a secure data platform to house datasets for applied AI learning and research.

University of Toronto Robotics Institute [Robotics]
https://robotics.utoronto.ca
The University of Toronto Robotics Institute is home to the largest and most diversified robotics research program in Canada. We unite, grow, and catalyze collaborations among the many exceptional robotics research clusters at the University. Serving as the headquarters for robotics collaboration at U of T, we unite leading robotics experts from across the University around three research pillars: Autonomous Field Robotics; Healthcare Robotics; Advanced Manufacturing.

Vector Institute [Artificial Intelligence]
https://vectorinstitute.ai/
The **Vector Institute** is an independent, not-for-profit corporation dedicated to research in the field of artificial intelligence (AI), excelling in machine and deep learning. The Vector Institute launched in March 2017 with generous support from the Government of Canada, Government of Ontario, and private industry, and in partnership with the University of Toronto and other universities.

TARGET AREA: ENABLING TECHNOLOGIES

Alán Aspuru-Guzik [Artificial Intelligence | Robotics]

University Affiliations
Professor, Chemistry, Faculty of Arts & Science
Professor, Computer Science, Faculty of Engineering
CIFAR AI Chair, Vector Institute

Lab Website
https://www.matter.toronto.edu/

Keywords
Machine Learning, Artificial Intelligence, Quantum Computing Algorithms, Genomics, Robotics, Self-Driving Laboratories

Prof. Aspuru-Guzik's lab aims to reduce the time and money required to discover a new functional material or optimize a known one by a factor of ten by developing self-driving laboratories, which combines AI with automated robotics platforms. This creation of a fully automated self-driving lab combines a diverse set of research fields. Machine learning and modeling methods are used for predicting materials properties and suggesting new experiments. While robotics, computer vision, and automated characterization methods are used to perform the experiments and analyzing the results.

Prof. Aspuru-Guzik is the Canada 150 Research Chair in Theoretical Chemistry and holds a Google Industrial Research Chair in Quantum Computing. He is the Director of the Acceleration Consortium. Prof. Aspuru-Guzik is also the co-founder and CSO of Zapata Computing, a quantum software company; and Kebotix, an advanced materials discovery and production company.

Publications: Click here for Prof. Aspuru-Guzik's publications.

Gary Bader [Computational Biology | Multiomics]

University Affiliations
Professor, Molecular Genetics, Temerty Faculty of Medicine
Professor, Computer Science, Faculty of Engineering

Lab Website
http://www.baderlab.org/

Keywords
Computational Biology, Functional Genomics, Proteomics, Transcriptomics, Biomolecular Interactions, Cell Mapping, Genome to Network Mutation, Perturbation Mapping, Data Analytics

Prof. Bader is an international leader in the field of Computational Biology. The Bader lab uses molecular interaction, pathway and 'omics data to gain a 'causal' mechanistic understanding of normal and disease phenotypes. They are developing novel computational approaches that combine molecular interaction and pathway information with 'omics data to develop clinically predictive models and identify therapeutically targetable pathways.

Prof. Bader is the Associate Director, Data Management, Research Software, Advanced Research Computing at the UofT Data Sciences Institute (DSI). In addition to his work at U of T, he is associated with the Princess Margaret Cancer Centre, and the Lunenfeld-Tanenbaum Research Institute at Mount Sinai Hospital.

Publications: Click here for Prof. Bader's publications.

Michael Brudno [Artificial Intelligence | Machine Learning]

University Affiliations
Professor, Computer Science, Faculty of Engineering
Faculty Member, Vector Institute

Lab Website
https://brudno.uhndata.io/

Keywords
Machine Learning, Artificial Intelligence, Computational Biology, Genomics, Algorithms, Clinical Data

Prof. Brudno's research focuses on the development of computational methods for the analysis of clinical and genomic datasets that captures the precise clinical data from clinicians using effective user interfaces, and its utilization in the automated analysis of genomes. The Brudno lab works on the capture of structured phenotypic data from clinical encounters, using both refined User Interfaces, and mining of unstructured data (based on Machine Learning methodology), and the analysis of omics data (genome, transcriptome, epigenome) in the context of the structured patient phenotypes, mostly for rare diseases. His overall research goal is to enable the seamless automated analysis of patient omics data based on automatically captured information from a clinical encounter, thus streamlining clinical workflows and enabling faster and better treatments.

Prof. Brudno is the Chief Data Scientist at the University Health Network (UHN) and Director of Digital Health at the Techna Institute. He also holds the Canada CIFAR AI Chair position.

Publications: Click here for Prof. Brudno's publications on PubMed.

Anna Goldenberg [Artificial Intelligence | Machine Learning]

University Affiliations
Assoc. Professor, Computer Science, Faculty of Engineering
Faculty Member, Vector Institute
Faculty Member, T-CAIREM

Website
http://goldenberglab.ca/

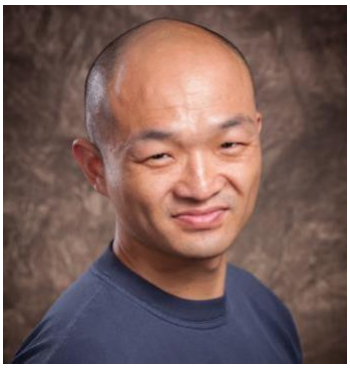
Keywords
Machine Learning, Artificial Intelligence, Biomedical Informatics, Genetics, Network Modelling, Clinical Data, Drug Response Prediction

Prof. Goldenberg's research is currently focused on developing machine learning methods that capture heterogeneity and identify disease mechanisms in complex human diseases as well as developing risk prediction and early warning clinical systems. The Goldenberg lab collaborates extensively with clinicians and is a Senior Scientist at the Hospital for Sick Children.

Prof. Goldenberg is a recipient of the Early Researcher Award from the Ministry of Research and Innovation. She also holds the Canada Research Chair in Computational Medicine and the Canada CIFAR AI Chair positions.

Publications: Click here for Prof. Goldenberg's publications on Pubmed.

Philip Kim [Multiomics | Computational Biology]



University Affiliations
Professor, Donnelly Centre for Cellular + Biomolecular Research
Professor, Molecular Genetics, Temerty Faculty of Medicine

Lab Website
https://www.kimlab.org/

Keywords
Functional Genomics, Proteomics, Protein-Protein Interactions, Lentivirus, Oncology, Inhibitor Design, Drug Discovery, Artificial Intelligence, High Throughput Screening, Therapeutics

Prof. Kim's lab uses and develops computational methods to study protein interactions and signaling networks in the context of cancer and other diseases. The ultimate goal of the Kim lab is to contribute to the development of novel therapeutics. The group focuses their efforts on studying proteins, their interaction networks and ways in which they can be exploited for drug discovery. Research in their lab is uncovering fundamental rules that govern protein-protein interactions and thus laying the groundwork for new avenues of drug discovery.

Publications: Click here for Prof. Kim's publications on PubMed.

Xinyu Liu [Artificial Intelligence | Robotics]

University Affiliations
Associate Professor, Mechanical & Industrial Engineering
Member, Toronto Nanofabrication Centre
Member, University of Toronto Robotics Institute

Lab Website
https://sites.google.com/site/biomedmicrolab/

Keywords
Robotics, Automation, Advanced Manufacturing, Data Analytics, AI, Thermofluids, Nanomaterials, Microfabrication, Nanofabrication, Microfluidics, Lab-on-a-chip, Biosensors, Wearables, Point-of-Care Diagnostics

Prof. Liu's research interests lie at the interfaces of microfluidics, bioMEMS (bio-microelectromechanical systems), and robotics. His research group is developing integrated micro/nanodevices and systems to target a variety of exciting applications primarily in biology and medicine. Applications of their recent technologies include point-of-care diagnostics, large-scale gene screening, neural basis of behaviour, high-throughput drug screening, and environmental pollution monitoring.

Prof. Liu has received numerous awards, including the McGill Christophe Pierre Award for Research Excellence (2017), and the MINE Outstanding Young Researcher Award (2018). He is a co-inventor of more than a dozen US/PCT patents (issued or pending). He currently serves as a Senior Editor of IEEE Robotics and Automation Letters and an Associate Editor on multiple journals, such as IEEE Transactions on Automation Science and Engineering, Journal of Sensors, etc.

Keith Pardee [Synthetic Biology | Point-of-Care]

University Affiliations
Professor, Faculty of Pharmacy, U of T
Co-Director, PriME

Lab Website
https://www.pardeelab.org/

Keywords
Synthetic Biology, Point-Of-Care Diagnostics, Sensors, Gene Circuits, Cell-Free, Portable, Virology, Bioproduction, Protein, Biomanufacturing

The Pardee lab is dedicated to the development of molecular technologies to manipulate & probe genetic material, with a focus in portable sensing & manufacturing (e.g. vaccines, small molecules, cell/gene based therapies). In addition to Dr. Pardee's previous work, the past few years have also seen the development of other point-of-use molecular sensing technologies with impressive features such as: pathogen detection at clinically relevant concentrations & potential for the multiplexed detection of diseases.

Prof. Pardee holds the Canada Research Chair in Synthetic Biology & Human Health and is co-founder of three biotech startups.

Publications: Click here for Prof. Pardee's publications on Pubmed.

Paul Santerre [Regenerative Medicine | Biomaterials]

University Affiliations
Professor, Biomedical Engineering, Faculty of Engineering
Professor, Faculty of Dentistry

Lab Website
http://www.santerrelab.com/

Keywords
Cardiovascular Diseases, Biomaterials, Biomedical Engineering, Wound Healing, Tissue Biology, Drug Delivery, Dental Materials, Antimicrobials

The Santerre group in collaboration with biomaterials, biomechanics and engineering scientists are exploring the application of tissue engineering principles for the development of cardiovascular tissue that has mechanical, cellular and physiological properties comparable to that of native healthy tissue. The Santerre Lab is investigating the use of polymers for drug delivery strategies in the regenerative medicine space.

Prof. Santerre's contributions has led to many successful inventions and startups. He is the recipient of the Governor General's Innovation Award (2017). He also holds the Baxter Chair of Health Technology and Commercialization, and drives entrepreneurship initiatives at U of T and UHN.

Publications: Click here for Prof. Santerre's publications on Pubmed.

Igor Stagljar [Multiomics | Oncology]

University Affiliations
Professor, Donnelly Centre for Cellular + Biomolecular Research
Professor, Molecular Genetics, Temerty Faculty of Medicine
Member, PRiME

Lab Website
http://local.biochemistry.utoronto.ca/stagljar/

Keywords
Membrane Proteins, Protein-Protein Interactions, Cell Signalling, Therapeutic Targets, Drug Discovery & Development, Cancer, MaMTH, MYTH, COVID-19

The Stagljar lab is focused on protein-protein interactions (PPIs), with a particular interest in disease progression due to altered signalling pathways. They examine how proteins involved in these signalling pathways interact with each other and try to understand how impaired PPIs lead to numerous human diseases such as lung cancer, pancreatic cancer, breast cancer, brain cancer and aging. They are internationally known for the development of the split-ubiquitin Membrane Yeast Two-Hybrid (MYTH) and Mammalian Membrane Two-Hybrid (MaMTH) technologies, powerful tools for the identification of interactors of a given integral membrane protein and one of the key interactive proteomic technologies available to researchers today. Currently, there are several large-scale on-going projects in the lab aimed towards elucidating how yeast and human integral membrane proteins and their interacting partners lead to either diseased or healthy states.

Prof. Stagljar is the recipient of several national and international science awards and is a member of the Croatian Academy of Arts and Sciences. In addition, he is a member of the Editorial board of multiple peer-reviewed journals and has co-founded 3 biotech startup companies.

Publications: Click here for Prof. Stagljar's publications.

Lisa Strug [Multiomics]

University Affiliations
Professor, Computer Science, Faculty of Engineering
Professor, Statistical Science, Faculty of Arts & Science
Director, Data Sciences Institute

Lab Website
https://lab.research.sickkids.ca/strug/

Keywords
Biostatistics, Genome Data Science, Big Data, Cystic Fibrosis, Epilepsy, Therapeutic Targets, Predictive Modeling

The Strug lab focuses on statistical sciences, developing novel methodology to unravel the complex underpinnings of genetic diseases. Specifically, her work seeks to identify the genes contributing to Cystic Fibrosis, and then identifying novel therapeutic targets; ultimately leading to diagnostic and predictive models for early intervention. Prof. Strug is also cross-appointed as a Senior Scientist at The Hospital for Sick Children.

Prof. Strug holds the Canada Research Chair in Genome Data Science and serves as Director of the Canadian Statistical Sciences Institute (CANSSI) for Ontario Region. She is also the Associate Director of The Centre for Applied Genomics at The Hospital for Sick Children. She is the inaugural Director of the UofT Data Sciences Institute (DSI).

Mikko Taipale [Multiomics | Oncology]

University Affiliations
Professor, Donnelly Centre for Cellular + Biomolecular Research
Professor, Molecular Genetics, Temerty Faculty of Medicine
Member, PRiME

Lab Website
http://taipalelab.org/

Keywords
Functional Proteomics, Protein-Protein Interactions, Systems Biology, Rare Diseases, Cancer, Platform Technology

The Taipale lab looks to understand how the human protein homeostasis network is organized and how it contributes to diseases. They aim to characterize how networks of chaperones, co-chaperones and ubiquitin-proteasome system are organized, and how protein-protein interaction specificity is achieved in the cell. In particular, Taipale is interested in understanding how these networks are rewired in cancer and in rare Mendelian disorders. Prof. Taipale, with his collaborators, have created a collection of over 2,500 mutant alleles for 1,100 rare Mendelian disorders and they aim to systematically phenotype this collection of disease-causing alleles in order to find novel connections between poorly studied rare diseases and known pathways.

Prof. Taipale holds the Canada Research Chair position in Functional Proteomics and Proteostasis.

Publications: Click here for Prof. Taipale's publications on PubMed.

Bo Wang [Artificial Intelligence | Machine Learning]

University Affiliations
Assistant Professor, Laboratory Medicine & Pathobiology, Temerty Faculty of Medicine
Faculty Member, Vector Institute

Website
https://wanglab.ml/

Keywords
Computational Biology, AI/ML, Healthcare, Cancer, Genomics, Proteomics

Prof. Bo Wang's primary research areas are artificial intelligence/machine learning, computational biology, natural language processing and computer vision. The Wang lab follows a multidisciplinary and collaborative research program focused on developing machine learning tools for healthcare related applications, ranging from cancer analysis to cardiovascular disease treatment. The lab's long-term research goals aim to develop integrative and interpretable machine learning algorithms that can help clinicians with predictive models and decision support to tailor patients' care to their unique clinical and genomic traits.

Prof. Wang holds the Canada CIFAR AI Chair position and is also the Lead Artificial Intelligence Scientist at the Peter Mun Cardiac Centre at the University Health Network (UHN) and the Techna Institute.

Publications: Click here for Prof. Wang's publications.

TARGET AREA: THERAPEUTICS

Christine Allen [Oncology | Drug Delivery]

University Affiliations
Professor, Leslie Dan Faculty of Pharmacy
Faculty Member, PRiME

Lab Website
https://allen.pharmacy.utoronto.ca/

Keywords
Cancer Detection, Cancer Diagnosis, Cancer Treatment, Nanotechnology, Image-Guided Drug Delivery, Thermosensitive Liposomes, Cannabis, Breast Cancer, Ovarian Cancer, Lung Cancer

Christine Allen's research focuses on developing advanced drug delivery formulations for the treatment of a wide range of indications including cancer and osteoarthritis. The research is broadly divided into several project areas including oncology (encompassing the identification of novel drug combinations for cancer therapy and the design of thermosensitive liposomes), the development of implantable drug carriers for sustained release, as well as determining the therapeutic potential for a range of formulated cannabinoid compounds for different indications. The Allen lab is committed to driving these technologies from bench to bedside in collaboration with several startup companies in the Toronto area and beyond.

Prof. Allen is a world-renowned leader in nanomedicine ad image-guided drug delivery and is U of T's first-ever Associate Vice-President & Vice-Provost Strategic Initiatives. Prof. Allen is also the GSK Chair in Pharmaceutics & Drug Delivery, and co-founded a JLABs startup company, Nanovista Inc., which develops multimodal visualization agents for high precision image-guided cancer therapy.

Publications: Click here for Prof. Allen's publications on PubMed.

Stephane Angers [Oncology]

University Affiliations
Professor & Assoc. Dean of Research, Leslie Dan Faculty of Pharmacy
Professor, Donnelly Centre for Cellular + Biomolecular Research
Founding Co-Director, PRiME

Lab Website
http://angerslab.org/

Keywords
Glioblastoma, Pancreatic Ductal Adenocarcinomas, CRISPR, Cas9, Signal Transduction, Wnt, Hedgehog Families, Growth Factors, Cullin Families, E3 Ligases, Proteomics

The Angers lab's research focuses on the molecular mechanisms underlying signal transduction events activated by the Wnt and Hedgehog families of secreted growth factors. The Angers Lab uses a combination of patient-derived stem cells, organoids (self-organizing tissue), and animal models of disease. Using novel proteomic and genomic tools, they investigate how the Wnt and Hedgehog pathways function in both normal and human disease contexts. The group also uses genome-wide CRISPR-Cas9 functional screens performed in patient-derived cancer stem cells to characterize the genes that are essential for tumor growth. By leveraging this knowledge, the Angers Lab is identifying novel therapies based on modulating the activity of the Wnt and Hedgehog pathways.

Prof. Angers held the Canada Research Chair in Functional Architecture of Signal Transduction from 2007 to 2017 and is the Associated Dean of Research at the Leslie Dan Faculty of Pharmacy and Director of the

Donnelly Centre for Cellular + Biomolecular Research. He is also the scientific founder of two biopharmaceutical startup companies, with multiple molecules on the clinical development pathway.

Publications: Click here' for Prof. Angers' publications on PubMed.

Liliana Attisano [Oncology]

University Affiliations
Professor, Donnelly Centre for Cellular + Biomolecular Research; Medical Biophysics; Biochemistry
Member, PRiME

Lab Website
http://attisanowranalabs.science/

Keywords
Cell Communication, Signal Transduction, Cancer Mechanisms, Neuronal Development and Disease, Multidimensional High-Throughput Screening

The Attisano lab focuses on understanding how intracellular signalling cascades receive and then transmit extracellular signals and thereby modulate complex biological responses. Current areas of particular interest are the TGFbeta, Wnt and Hippo signalling pathways, whose disruption is associated with numerous human cancers. The lab also studies pathways that regulate neuronal morphology, including the formation of axons and dendrites in primary neurons. They use mammalian cell model systems, biochemical and cell biological methods and mouse model systems to examine how pathway disruption alters cellular and developmental processes. In addition, the Attisano lab also uses high-throughput robotics-based methods to examine the dynamics of protein-protein interactions, and to screen for alterations in signalling output using siRNA and small-molecule chemical libraries.

Prof. Attisano holds the Canada Research Chair position in Signalling Networks in Cancer.

Publications: Click here for Prof. Attisano's publications on PubMed.

Benjamin Blencowe [Functional Genomics | Neuroscience]

University Affiliations
Professor, Molecular Genetics, Temerty Faculty of Medicine
Professor, Donnelly Centre for Cellular + Biomolecular Research
Faculty Member, PRiME

Lab Website
http://sites.utoronto.ca/intron/index.html

Keywords
Alternative Splicing, RNA, Functional Genomics, Bioinformatics, Platform Technologies, Autism Spectrum Diseases, SARS-CoV-2, CRISPR

Prof. Blencowe's research focuses on mechanisms underlying the regulation of gene expression and how these mechanisms are disrupted in human diseases and disorders. One of the primary focus of their research is directed at understanding how alternative splicing is regulated and integrated with other layers of gene expression to control fundamental biological processes. The Blencowe lab has pioneered the development and application of technologies for the genome-wide quantitative profiling of transcriptomes, RNA interactomes, as well as new CRISPR-based methods designed to comprehensively elucidate RNA regulatory networks.

Prof. Blencowe holds the Banbury Chair in Medical Research and serves as Director of the U of T's Donnelly

Sequencing Centre. He was recently elected Fellow of the Royal Society of London (UK) in 2019.

Publications: Click here for Prof. Blencowe's publications on PubMed.

Rob Bonin [Pain | CNS]

University Affiliations
Assistant Professor, Leslie Dan Faculty of Pharmacy

Lab Website
https://www.sensoryplasticity.com/

Keywords
Pain, Neuronal Activity, Sensory Process, Cognitive Processes, Synaptic Plasticity, Plasticity, Nervous System, Pain Hypersenstivity, Memory Traces, Pathological Pain, Cognitive Disorders, Spinal Cord

Prof. Bonin's lab aim to uncover the molecular changes and cellular processes involved in nervous system plasticity to identify new treatments that can target the root cause of chronic pain. The team uses optogenetic methods, which use light to alter neuron activity, and behavioural electrophysiology in pre-clinical models and in vitro cellular models to study how sensory input modifies nervous system connectivity to both induce and reverse chronic pain. His work aims to provide a conceptual framework for how plastic changes arise and are sustained in the nervous system to better understand how this plasticity can go wrong and contribute to pathological conditions. He and his team also aim to identify potential drug targets that would act to reverse pathological plasticity and address the source of the pain, helping pave the way for the development of new treatments that are more effective for chronic pain.

Prof. Bonin holds the Canada Research Chair position in Sensory Plasticity and Reconsolidation.

Publications: Click here for Prof. Bonin's publications on Pubmed.

Patricia Brubaker [Cardiometabolic Diseases]

University Affiliations
Professor, Physiology, Temerty Faculty of Medicine

Lab Website
https://www.physiology.utoronto.ca/content/patricia-l-brubaker

Keywords
Type I & II Diabetes, Obesity, IBD, Therapeutics, Peptide Hormones, GLP-1, GLP-2, Endocrines, Gut, Metabolic Disease, Pancreas, Vascular Disease, Circadian Rhythms

Prof. Brubaker's lab explores the role that intestinal peptide hormones play in integrating the regulatory processes of the gut. Her research focuses on GLP-1 and GLP-2 peptides, which are critical to the regulation of pancreatic cell physiology, and to the maintenance of the structure and function of the intestine. Prof. Brubacker is investigating the properties of GLP-1 as a natural anti-diabetic agent. Clinical trials of GLP-1 have demonstrated that administration of GLP-1 to patients with either Type 1 or Type 2 diabetes can improve blood glucose control. Prof. Brubaker's research has also turned up evidence that the GLP-2 peptide has potential as a wound-healing agent for chronic gut disease, including Crohn's Disease and Ulcerative Colitis. Both of those conditions involve inflammation of the bowel, sometimes requiring surgical intervention and loss of a significant percentage of the small bowel.

Prof. Brubaker holds the Tier 1 Canada Research Chair in Vascular and Metabolic Biology. A fellow of the Royal Society of Canada, Prof. Brubaker is the first woman scientist to receive the Diabetes Canada Lifetime Achievement Award.

Publications: Click here for Prof. Brubaker's publications on PubMed.

Leah Cowen [Multiomics | Fungal Infections]

University Affiliations
Professor, Molecular Genetics, Temerty Faculty of Medicine
Vice President, Research & Innovation, and Strategic Initiatives

Lab Website
http://individual.utoronto.ca/cowen/index.html

Keywords
Functional Genomics, Proteomics, Molecular Microbiology, Fungal Pathogenesis, Antifungal Drug Development, Therapeutics

The Cowen laboratory takes an interdisciplinary and innovative approach, that incorporates six major themes - functional genomics, chemical genomics, mechanism of drug resistance and disease, microbiome in health and disease, structure-guided drug design, experimental evolution. The lab exploits model and pathogenic fungi to address mechanisms governing evolution to understand what allows some microbes to exploit the host and cause disease, and to develop new strategies to treat life-threatening infectious disease. Prof. Cowen has cultivated a network of international excellence through her extensive team of over 70 collaborators.

Prof. Cowen is a Canada Research Chair in Microbial Genomics, co-director of the CIFAR program Fungal Kingdom: Threats & Opportunities and co-founder and Chief Scientific Officer of Bright Angel Therapeutics, a company that leverages state-of-the-art technologies for development of novel antifungal therapeutics. Prof. Cowen has also recently been appointed as the U of T's Vice-President, Research & Innovation, and Strategic Initiatives.

Publications: Click here for Prof. Cowen's publications on PubMed.

Carolyn Cummins [Cardiometabolic Diseases]

University Affiliations
Associate Professor, Faculty of Pharmacy

Lab Website
https://www.cumminslab.com/

Keywords
Diabetes, Obesity, Therapeutic Targets, Proteins, Diagnostics, Small Molecules, Genetic Tools, Drug Discovery, Vascular & Metabolic Diseases

Prof. Carolyn Cummins studies nuclear receptors and their role in the development of diabetes, obesity and other metabolic diseases, with the goal of identifying potential therapeutic targets in disease pathways and developing drugs to prevent or treat these conditions. Her research focuses on the glucocorticoid receptor, liver X receptor (LXR) and peroxisome proliferator-activated receptor (PPAR). The Cummins lab studies how glucocorticoids – stress hormones that are often prescribed as anti-inflammatory drugs – cause drug-induced diabetes. These drugs activate a receptor in the liver that stimulates the body to produce glucose, and, if they are taken chronically, predispose patients to conditions such as obesity and diabetes.

Prof. Cummins' work has led to the development and preclinical testing of several drugs for the treatment of metabolic diseases. Her team discovered that nuclear hormone signalling can induce alternative splicing during the process of translating genetic information into proteins, and their pioneering work investigating this previously unknown relationship is highlighting new potential drug targets.

Publications: Click here for Prof. Cummin's publications on PubMed.

Jennifer Gommerman [Multiple Sclerosis | Neuroinflammation]

University Affiliations
Professor, Immunology, Temerty Faculty of Medicine

Lab Website
https://www.immunology.utoronto.ca/faculty/jennifer-gommerman

Keywords
Multiple Sclerosis, Cell Therapy, Gut Immunology, Plasma Cells, COVID-19, CNS, Gut Microbiome, Gut-Brain Axis, Neuroinflammation

The Gommerman lab is focused on (1) mechanisms of immune dysregulation in autoimmune disease, particularly MS and how immune cells become activated with the CNS environment; (2) understanding the reason for the rapid increase in autoimmune disease observed in Canada and (3) determining the role of TNF family members in immune cell biology. Using an animal model of MS, they have been studying immune cell rich structures found in the meninges. In collaboration with a multi-disciplinary team of neuroimmunologists and using animal and human model systems, they are currently exploring how pro- and anti- inflammatory B cells impact MS pathogenesis. Lastly, they are particularly interested in how the mucosal immune system in the gut influences autoimmune responses in the CNS.

Prof. Gommerman holds the Tier 1 Canada Research Chair position in Tissue-Specific Immunity and serves as a section editor for the Journal of Immunology. In March 2021, Prof. Gommerman and her collaborator Prof. Kullervo Hynynen received $13.9 million in Canada Foundation for Innovation (CFI) funding for a platform technology focused on neuroimmunology and neuroimaging for dementia, stroke, mental health and addiction, multiple sclerosis and cancer.

Publications: Click here for Prof. Gommerman's publications on PubMed.

Scott Gray-Owen [Oncology | Infectious Diseases]

University Affiliations
Professor, Molecular Genetics, Temerty Faculty of Medicine
Director, Containment Level 3 Lab

Lab Website
http://www.moleculargenetics.utoronto.ca/faculty/2014/9/30/scott-gray-owen

Keywords
Infection, Cancer, Immune Pathogenesis, CL3 Lab, SARS-CoV-2, Bacterial Adhesions, HIV, Immune Modulation, Therapeutics

Prof. Gray-Owen's infectious disease-focused research aims to understand molecular and immunologic interactions that govern immunity and immunopathogenesis by bacterial and viral pathogens, with projects ranging from genome-wide systems-based studies to the analysis of clinical specimens from infected patients. Their work has led to a detailed description of molecular processes occurring downstream of immune activating and inhibitory carcinoembryonic antigen (CEA)-related proteins; to provide new molecular & immunological insights into the epidemiological synergy between sexually transmitted gonorrhea and HIV-1; to the development of novel vaccines with the potential to broadly protect against neisserial infection; and to discover a novel class of immune-active metabolites that is recognized as a pathogen associated molecular pattern (PAMP) by the innate immune system.

Prof. Gray-Owen is an inventor on 21 patents and co-founded Engineered Antigens Inc., focused on protein structure-based design of vaccine immunogens targeting human and livestock pathogens. Beyond his own research, he directs the Emerging and Pandemic Infections Consortium (EPIC), U of T's key strategic initiatives on infectious disease research and training from discovery to policy, a magnet for world-leading talent, and a knowledge leader for infectious disease-focused education and science-based advocacy. He has also been the longstanding Director of the high-tech Toronto Combined Containment Level 3 (CL3) Unit – the only such facility in the greater Toronto area. In 2020, Prof. Gray-Owen received the Minister of College and Universities' Award of Excellence for his extraordinary contributions to the COVID-19 response in Ontario.

Publications: Click here for Prof. Gray-Owen's publications on PubMed.

Patrick Gunning [Oncology]

University Affiliations
Professor, Chemistry
Professor, Chemical & Physical Sciences

Lab Website
https://www.gunninggroup.ca/

Keywords
Medicinal Chemistry, Biotechnology, Chemosensors, Cancer Biology, Rare Disease Therapeutics, Kinase Inhibitors, HDAC Inhibitors

The fundamental goal of the Gunning lab is the development of better treatment and diagnostic options for the most devastating and under-explored human diseases, including aggressive forms of cancers like blood, brain and breast. Their research seeks to design and develop scaffolds to artificially suppress or up-regulate specific gene expression profiles via manipulation of protein-protein interactions, thereby inducing therapeutically-beneficial cellular responses in malfunctioning human cells. Their research seeks to validate whether protein function can be 'switched' on or off through artificial protein complexation by divalent conjugated small molecule 'hot spot' recognition agents. One of the objectives of their research is to promote and illuminate the

efficacy of developing novel drug-like scaffolds incorporating inorganic, as well as organic, functionality to achieve in vivo manipulation of cellular signaling.

Prof. Gunning holds the Canada Research Chair position in Medicinal Chemistry and is the founder of two pharmaceutical companies, Janpix Bio and Dalriada Inc.

Publications: Click here for Prof. Gunning's publications on PubMed.

David Hampson [Neuroscience | Gene Therapy]

University Affiliations
Professor, Leslie Dan Faculty of Pharmacy
Professor, Pharmacology and Toxicology, Temerty Faculty of Medicine

Lab Website
http://pharmsci.utoronto.ca/hampson/

Keywords
Autism, Epilepsy, Dravet Syndrome, Genetic Disorders, Gene Therapy, Neural Developmental Disorder, Fragile X Syndrome, AAV, Biologics

The Hampson lab studies the application of viral vector-mediated gene therapy to the neurodevelopmental disorders Fragile X Syndrome and Dravet Syndrome. Using biochemical and behavioural tests in animal models, his lab examines whether gene therapy can reverse the phenotypic abnormalities associated with these disorders. His research includes elements of molecular biology, protein chemistry, neuroscience and neurology, drug delivery of viruses, and behavioral pharmacology. The team is currently studying whether an adeno-associated virus (AAV) engineered to include genes that code for therapeutic proteins can induce therapeutic benefits. Using a variety of biochemical and behavioural tests, they quantify the therapeutic changes seen in the mutant animals by comparing treated knockout animals with untreated knockout and wild-type animals.

Publications: Click here for Prof. Hampson's publications on Pubmed.

Omar F. Khan [Oncology | Gene Therapy]

University Affiliations
Assistant Professor, Temerty Faculty of Medicine, Immunology, Institute of Biomedical Engineering
Member, PRiME

Lab Website
https://ofklab.com/

Keywords
mRNA, Adaptive Immunity, Autoimmunity, Cancer, Developmental Immunology, Innate Immunity, Transplantation, Vaccines, Tissue inflammation

The OFK Lab combines engineering, immunology and chemistry fundamentals to create new nanotechnologies. Prof. Khan's lab works with nanomaterials for the delivery of nucleic acids and combines these nucleic acids' distinctive effects to control complex diseases caused by multiple aberrant genes that cannot be treated with small molecule drugs. They are currently applying their RNA nanotechnologies to the treatment of chronic inflammation, autoimmune diseases, cancer immunotherapy and the clearance of viruses in incurable infections. Furthermore, the platform technologies developed in the OFK Lab have many application, including non-traditional vaccines, the treatment of musculoskeletal diseases, cellular and gene therapies, vascular engineering and regenerative medicine.

Prof. Khan has also spun out a startup company called Tiba Biotech, which centres around a programmable RNA vaccine platform for the rapid production of a new generation of safer vaccines against multiple diseases.

Publications: Click here for Prof. Khan's publications on Pubmed.

Krishna Mahadevan [Cardiometabolic Diseases | Microbiome]

University Affiliations
Professor, Chemical Engineering & Applied Chemistry, Faculty of Engineering

Lab Website
http://lmse.utoronto.ca/

Keywords
Systems Biology, Synthetic Biology, Metabolic Engineering, Gut, Gut Microbiome, Microbial Communities, Computational Tools, Bioprocess Optimization, Regenerative Medicine, Insulin, Diabetes, IBD

Prof. Mahadevan is a pioneer in the fields of systems biology, synthetic biology, and constraint-based models of metabolic networks. His research interests include systems analysis, engineering and control of biological processes, and genome-scale models of cellular processes. The Mahadevan lab uses a systems biology approach for understanding the mechanisms behind diabetes and the role of potential therapeutic strategies. Their focus is on describing glucose, insulin, glucagon, TAG, cholesterol levels at the whole-body level using a multi-scale metabolic model. They are working on developing computational and experimental tools using metabolic models and synthetic biology. Using these models, they aim to understand the sensitivity of the different factors affecting complex diseases. The lab is also incorporating genomic information into these models and are using them to design strategies for personalized medicine.

Prof. Mahadevan *holds the Tier 1 Canada Research Chair in Metabolic Systems Engineering and is also the Associate Director for Computational Resources at UofT's bioengineering hub, Biozone.*

Publications: Click here for Prof. Mahadevan's publications on PubMed.

Alberto Martin [Inflammation | Immunology]

University Affiliations
Professor, Immunology, Temerty Faculty of Medicine

Lab Website
https://albertomartinlab.ca/

Keywords
Gut Microbiome, Adaptive Immunity, B Cells, Inflammatory Bowel Diseases, Colorectal Cancer, Antibodies, Molecular Mechanisms, Therapeutics

Prof. Martin's current research interest can be broadly divided into three main areas: B cell-specific activation-induced cytidine deaminase (AID) in antibody diversification, the molecular basis for germinal center selection and the molecular mechanisms of cancer development (i.e., specifically colon cancer and lymphoma). The Martin lab also carries out research on the gut microbiota and the etiology of inflammatory bowel disease (IBD). Their work also centers on characterizing specific microbes and their role in IBD. As IBD patients are prone to develop colon cancer, their research on these microbes also encompasses uncovering the mechanism of colitis associated colon cancer.

Prof. Martin currently holds the Sanofi Pasteur Chair in Human Immunology at the Temerty Faculty of Medicine at UofT and was awarded the Canadian Society for Immunology Investigator Award in 2019. Prof. Martin is also the co-founder of a biotech company that is developing a therapeutic platform technology based on a newly identified and druggable biological target that plays a key role in IBD, NAFLD and NASH diseases.

Publications: Click here for Prof. Martin's publications on PubMed.

Naomi Matsuura [Imaging | Oncology]

University Affiliations
Associate Professor, Institute of Biomedical Engineering, Materials Science and Engineering, Medical Imaging
Member, PRiME

Faculty Webpage
https://bme.utoronto.ca/faculty-research/core-faculty/naomi-matsuura/

Keywords
Nanomaterials, Cancer, Solid Tumour, Hypoxia, PET Imaging, Drug Delivery, Nanoparticles, Theranostic Agents, Perfluorocarbon

Prof. Matsuura leads a research program at the intersection of nanoengineering and medicine, focusing on the design of new contrast agents to guide the imaging and treatment of cancer. Her current research interests include engineering new agents with specific sizes and material properties to enhance their interaction with radiation, such that they can be remotely 'activated' using medical imaging sources, externally from the patient. Such contrast agents may facilitate more focused and targeted delivery of cancer therapies to tumours for higher therapeutic ratios and can permit the treatment of hard-to-access organs like the brain in a minimally invasive manner.

Publications: Click here for Prof. Matsuura's publications on Pubmed.

Cindi Morshead [Neuroscience | Gene Therapy]

University Affiliations
Professor & Chair, Division of Anatomy
Professor, Donnelly Centre for Cellular + Biomolecular Research; Faculty of Medicine, Institute of Biomaterial and Biomedical Engineering
Member, PRiME

Lab Website
https://morsheadlab.technology/

Keywords
Stem Cells, Gene Therapy, Stroke, Cell Biology, Neural Repair, Rare Disease

The Morshead lab works primarily on neural stem cell biology, throughout development and into the aging brain, with the goal of treating of stroke, acquired brain injury (including cerebral palsy) and spinal cord injury. They employ cell transplantation paradigms as well as activate stem cells residing in the nervous system to promote self-repair. Towards this goal they are creating tools to promote stem cell migration to sites of injury. Prof. Morshead's work aims to treat a number of neurodegenerative and injury states in the central nervous system.

Publications: Click here for Prof. Morshead's publications on Pubmed.

Milica Radisic [Cardiometabolic Diseases | Organ-on-a-Chip]

University Affiliations
Professor, Chemical Engineering & Applied Chemistry; Institute of Biomedical Engineering
Co-Lead, Centre for Research & Applications of Fluidic Technologies (CRAFT)

Lab Website
https://www.labs.chem-eng.utoronto.ca/radisic/

Keywords
Tissue Engineering, Cardiovascular, Biomaterials, Myocardial Infarction, Regenerative Medicine, Cardiac Regeneration, Organ-on-a-Chip

Prof. Radisic's research programs broadly fall under the cardiac tissue engineering and regenerative medicine umbrella. The Radisic lab is focused on pursuing molecular mechanisms governing the formation of contractile cardiac tissue *in vitro* as well as on practical strategies for treatment of myocardial infarction and heart failure through development of new biomaterials. They pursue the research programs alone (e.g. advanced bioreactors and cell tri-culture) or in collaboration with other PIs (e.g. microfluidic separation of heart cells). The research programs are categorized as: tissue engineering of cardiac patches; injectable biomaterials; microfluidic cell separation; and microfabricated systems for cell culture.

Prof. Radisic holds the Canada Research Chair position in Functional Cardiovascular Tissue Engineering and is the co-founder of two biotech startup companies, Quthero Inc. and TARA Biosystems.

Publications: Click here for Prof. Radisic's publications on PubMed.

Raymond Reilly [Oncology | Radioimmunotherapy]

University Affiliations
Professor, Leslie Dan Faculty of Pharmacy; Medical Imaging
Member, PRiME

Lab Website
http://reilly-lmir.weebly.com/

Keywords
Breast cancer, Radioimmunotherapy, SPECT, PET, Glioblastoma, Blood-Brain Barrier, Pancreatic Cancer, Head and Neck cancer, Metastases, Nanomedicines, Radiation Nanomedicine, CPO

Prof. Reilly's lab develops and studies the use of novel radiopharmaceutical probes that target proteins overexpressed on tumour cells to aid in cancer diagnosis, imaging and treatment. His group investigates monoclonal antibodies labeled with radioisotopes for imaging and treatment of cancer and is also studying the use of radiolabelled gold nanoparticles for locally treating tumours with radiation. Prof. Reilly's group aims to translate their most successful imaging and radiotherapeutic agents to clinical trials. They evaluate the agents preclinically using animal tumour models and develop pharmaceutical quality formulations of the agents that are ready to test in phase I clinical trials.

Publications: Click here for Prof. Reilly's publications on Pubmed.

Molly Shoichet [Oncology | Drug Delivery]

University Affiliations
Professor, Donnelly Centre for Cellular + Biomolecular Research; Chemical Engineering; Institute of Biomedical Engineering
Member, PRiME

Lab Website
https://shoichetlab.utoronto.ca/

Keywords
Hydrogels, Stem Cell Transplantation, Stem Cell Stimulation, 3D Cell Culture, Targeted Drug Delivery, Cancer, Stroke, CNS

The Shoichet laboratory works on cell and drug delivery strategies, which includes nanotechnology for targeted delivery in cancer. The four main themes of the lab are: (i) cell delivery of biomolecules directly to the brain or spinal cord for a prolonged time using a patented injectable hydrogel; (ii) an injectable hydrogel for local and sustained delivery of biomolecules to injured spinal cord and stroke-injured brain; (iii) designing biomimetic strategies to grow cells in 3-D environments to better understand disease progression and development and drug screening; (iv) and targeted delivery of antibodies and other chemotherapeutics to tumour cells via novel multifunctional polymeric nanoparticles.

Prof. Shoichet holds the Canada Research Chair in Tissue Engineering, amongst numerous other awards, and has also founded 3 start-ups. She is also the recipient of multiple awards for her invaluable contributions to science and technology, including Gerhard Herzberg Canada Gold Medal for Science and Engineering, NSERC; Fellow, Royal Society UK; Order of Canada, Governor General of Canada; and Killam Prize.

Publications: Click here for Prof. Shoichet's publications on PubMed.

Craig Simmons [Cardiovascular | Regenerative Medicine]

University Affiliations
U of T Distinguished Professor of Mechanobiology, Mechanical & Industrial Engineering; Institute of Biomedical Engineering, Faculty of Engineering

Lab Website
https://cml.mie.utoronto.ca/

Keywords
Cellular Mechanobiology, Tissue Engineering, Stem Cells, Cardiovascular, Cellular & Molecular Biology, Biomaterials, Therapeutic Drug Testing, Microfluidics

Prof. Simmons is an expert in cell and tissue engineering, with a research focus on understanding the processes by which biomechanical forces regulate tissue regeneration and disease. His research team applies this knowledge to develop new treatments for heart valve and blood vessel diseases, including strategies to regenerate cardiovascular tissues using stem cells and biomaterials.

Prof. Simmons is the recipient of numerous research awards and holds the Canada Research Chair in Mechanobiology. He is also the Scientific Director of U of T Translational Biology & Engineering Program (TBEP), Ted Rogers Centre for Heart Research.

Publications: Click here for Prof. Simmons' publications on PubMed.

Tania Watts [Oncology | Inflammation]

University Affiliations
Professor, Immunology, Temerty Faculty of Medicine
Member, PRiME

Researcher Profile Webpage
https://www.immunology.utoronto.ca/faculty/tania-watts

Keywords
T Cells, Inflammation, Viral Infections, TNFR Family, Adaptive Immunity, Influenza, SARS-CoV-2

The Watts lab's research focuses on T cells, adaptive immunity and infectious diseases. Prof. Watts' group examines how different TNF receptor family members contribute to the survival of lymphocytes to control viral infections. The Watts lab has a strong interest in T cell immunity in influenza and, more recently, SARS CoV-2. They also examined the state of immunity to A/2009 pandemic influenza in the Toronto population at 1-year post-pandemic. They recently compared recall responses to SARS-CoV-2 antigens as compared to memory responses to influenza in patients that had recovered from COVID19. The current focus of her group is to understand how different TNFR family members and their signaling adaptors contribute to survival of lymphocytes to control viral infections and how they also contribute to inflammation and cancer.

Prof. Watts is the founder of the Toronto Human Immunology Network, which was recognized as a FOCIS Centre of Excellence and held the Sanofi Pasteur Chair in Human Immunology from 2009 to 2019.

Publications: Click here for Prof. Watts' publications on PubMed.

Shirley X. Y. Wu [Cardiometabolic Diseases | Oncology]

University Affiliations
Professor, Leslie Dan Faculty of Pharmacy
Member, PRiME

Lab Website
https://www.shirleywulab.com/

Keywords
Drug Delivery, Cancer, Nanotechnology, Computer Simulation, Pharmaceutical, Pharmacological, Blood Brain Barrier, Multidrug Resistant, Metastatic Cancers, Nanomaterials

The Wu lab conducts research centered on advanced pharmaceutics and drug delivery technologies for unmet medical needs. Their current projects include blood-brain barrier-penetrating nanoparticles for treatment and diagnosis of brain cancer and CNS diseases; synergistic drug combination nanomedicine for enhancing chemotherapy; bioreactive hybrid metal oxide nanoparticles for modulating tumor microenvironment and enhancing cancer therapies; rational and computer-aided design of controlled release dosage forms; and stimulus-responsive systems for closed-loop delivery of therapeutic hormones for diabetes.

Prof. Wu is a co-inventor on multiple patents worldwide and is a co-founder of a BBB crossing drug delivery platform technology startup, called Nanology Labs.

Publications: Click here for Prof. Wu's publications.

SELECT TECHNOLOGY OPPORTUNITIES

For all U of T technologies available for licensing, visit http://uoft.me/tech-opps. For the latest on active investment opportunities and developments at companies emerging from U of T Research, sign up for the Deep Tech Download newsletter.

TARGET AREA: ENABLING TECHNOLOGIES

A Multi-Targeting CRISPR-CAS System for Systematic & Combinatorial Genetic Perturbation

https://research.utoronto.ca/technology-opportunities/db/multi-targeting-crispr-cas-system-systematic-and-combinatorial-genetic

Our scientists have engineered a novel hybrid CRISPR-based forward genetic screening platform that is based on the dual simultaneous expression of the two orthogonal Cas nucleases Cas9 & Cas12a, and the delivery of hybrid guide RNA (hgRNA) libraries. The hybrid system combines the DNA editing activity of Cas9 and Cas12a together with the RNA processing activity of Cas12a, which allows guide multiplexing by processing combined hgRNAs transcribed from a single U6 promoter into mature Cas9 and Cas12a single guide RNAs (sgRNAs).

Automatic Learning Filters to Improve the Accuracy of Sensing Algorithms

https://research.utoronto.ca/technology-opportunities/db/automatic-learning-filters-improve-accuracy-sensing-algorithms

The technology combines novel filters and a convolutional neural network model to automatically learn what kind of data will make an algorithm produce inaccurate results. While the idea of rejecting certain data is not new, existing filters are manually developed and rely on assumptions about what causes the algorithm to be unreliable. The approach applies machine learning methods to automatically learn when sensor processing algorithms will be reliable or unreliable and discards unreliable data, making the overall system more accurate.

CRISPR-Based Screening Platform Technology for Drug Discovery

https://research.utoronto.ca/technology-opportunities/db/crispr-based-screening-platform-technology-drug-discovery

This technology relates to *a novel method to discover receptors for extracellular proteins in an unbiased fashion*. The approach is based on a simple concept: bacterial exotoxin, when fused to a secreted protein, intoxicates cells in a receptor-dependent manner, which facilitates the identification of the cognate receptor through genome-wide CRISPR/Cas9-based positive selection screen.

Hi-Efficiency Protection of Linear DNA for Cell Free Protein Synthesis

https://research.utoronto.ca/technology-opportunities/db/hi-efficiency-protection-linear-dna-cell-free-protein-synthesis

Our researchers have developed a high-efficiency method for protection of linear DNA for cell-free protein synthesis. It uses a protecting protein which tightly binds to a particular 23-bp DNA sequence guide, the latter positioned flanking the gene of interest. This inhibits exonucleolytic degradation of linear DNA templates and allows for protein yields at least as high as plasmid-based expression.

Protein Domains for Controlling Gene Expression

https://research.utoronto.ca/technology-opportunities/db/protein-domains-controlling-gene-expression

Inventors at the University of Toronto have developed a fusion protein that displays almost complete silencing of gene expression. Based on the CRISPRi platform, it is composed of dCas9 tethered to a ZIM3 KRAB domain (Figure 1). Guide RNAs direct binding of dCas9 to the targeted gene whereafter interaction of the KRAB domain with corepressor proteins prevents expression of the gene. The ZIM3 fusion is the most potent CRISPRi-based repressor and a significant improvement on existing platforms.

Re-PAIR: A CRISPR-Based Technology for Portable Diagnostics and Biotechnology

https://research.utoronto.ca/technology-opportunities/db/re-pair-crispr-based-technology-portable-diagnostics-biotechnology

Our scientists have engineered a new nucleic acid sensor, based on CRISPR technology that is cell-free and can be rationally designed for broad applications in portable diagnostics, in sensing and in biotechnology. This novel, portable nucleic acid sensing platform uses a CRISPR technology that, unlike previous technologies,

can be deployed outside of the lab without pre-packaged RNA inputs, and can generate multiplexed signals in any reporter mode (e.g. colorimetric, electrochemical, enzymatic, fluorescent).

TARGET AREA: THERAPEUTICS

Appetite-Suppressing Cytokinin for Weight Loss and Obesity Treatment

https://research.utoronto.ca/technology-opportunities/db/appetite-suppressing-cytokinin-weight-loss-and-obesity-treatment

Researchers at the University of Toronto have discovered a plant-derived cytokinin (Cytokinin X or CX) that is effective for reducing weight, even when maintaining a “Western” diet. When administered in food or water, it resulted in significant and sustained weight loss in mouse models, driven by a reduced consumption of food. Changes in key signalling molecules were observed in the hypothalamus, the part of the brain controlling appetite. Upon treatment with CX, the feeding-inducing neuropeptide Y (NPY) was reduced in hypothalamic neurons in culture, while the appetite-suppressing neuropeptide proopiomelanocortin (POMC) increased in the hypothalamus of mice. Mechanistically, CX was found to block the palmitate-mediated increase in NPY levels.

A Small Molecule Allosteric Modulator of CB1R for Treatment of Psychosis & Schizophrenia

https://research.utoronto.ca/technology-opportunities/db/small-molecule-allosteric-modulator-cb1r-treatment-psychosis-and

Researchers at the University of Toronto have investigated a novel pharmacological approach to targeting CB1R. They have designed and tested a small molecule (ABM300) that binds to an allosteric site of this receptor (Figure 1) normally occupied by cholesterol. ABM300 partitions into the bilayer, competes with cholesterol, and acts as an inhibitor of CB1R agonist-mediated signalling. It has been tested and characterized both *in vitro* and *in vivo*. where it was shown to have comparable to better effects than the approved schizophrenia and bipolar disorder drug, olanzapine.

Genetically Engineered Proteins for Diagnosis & Treatment of Crohn’s Disease

https://research.utoronto.ca/technology-opportunities/db/genetically-engineered-proteins-diagnosis-and-treatment-crohns-disease

Inventors have genetically engineered Cytokine X to be a more effective therapeutic. They have found that mutating selective residues, resulting in altered glycosylation motifs while retaining normal biological function, facilitate the evasion from Cytokine X AuAB-mediated neutralization in CD patients. The investigators further identified that Cytokine X AuABs are a reliable early serological marker preceding the diagnosis of CD by years. Serological recognition of Cytokine X AuABs further indicates CD severity and complications of disease at the time of diagnosis. This invention generates a cytokine and serological diagnosis tool that is suitable for therapeutic use in all CD patients including those with Cytokine X AuAB.

Nanoconstructs for Diagnosis and Treatment of Alzheimer’s Disease

https://research.utoronto.ca/technology-opportunities/db/nanoconstructs-diagnosis-and-treatment-alzheimers-disease

Inventors at the University of Toronto have developed a multi-functional theranostic nanoconstruct for the early detection and treatment of Alzheimer’s disease. Synthesis is easily achieved using a “one-pot” method. The main components of the nanoconstruct include MnO2 nanoparticles for MRI imaging, a polymer/lipid structural core, and an exterior surface containing antibodies to selectively target the causative components of Alzheimer’s disease, i.e. soluble amyloid-β (Aβ) and Aβ-plaque. Further, recruitment of apolipoprotein from the plasma by the nanoparticles facilitates BBB-crossing, where the nanoconstruct can then exert its function as a diagnostic and therapeutic.

Peptide Therapeutic for Parkinson’s Disease

https://research.utoronto.ca/technology-opportunities/db/peptide-therapeutic-parkinsons-disease

Researchers at the University of Toronto have developed a platform to identify peptide-based protein-protein interaction inhibitors. They applied this platform to alpha-synuclein based models of Parkinson’s disease and identified several peptide candidates as potential therapeutics. They validated these peptides in a battery of follow-up measurements and optimized their top candidate, which inhibits a previously unknown interaction that they show to be a cause of alpha-synuclein accumulation. Following optimization, the researchers tested this peptide in animal and human models of Parkinson’s disease in which it demonstrated strong efficacy.

Probiotics to Prevent Dental Cavities

https://research.utoronto.ca/technology-opportunities/db/probiotics-prevent-dental-cavities

Inventors at the University of Toronto have identified a *Streptococcus salivarius* strain, called LAB813, with probiotic potential. The strain was isolated from the dental plaque of a caries-free child and significantly inhibited the growth of nearly all the primary bacterial agent responsible for causing dental caries, i.e., mutans streptococci (MS) strains. The LAB813 strain is safe for human use and contains a megaplasmid encoding four putative inhibitory peptides responsible for its probiotic function. The isolated peptides by themselves may also serve as natural inhibitors.

Recombinant Antibodies Network (RAN)

https://research.utoronto.ca/technology-opportunities/db/recombinant-antibodies-network-ran

The Recombinant Antibody Network (RAN) is a multi-institutional research consortium (member institutions: The University of Toronto, University of California San Francisco and The University of Chicago) created accelerate the identification and development **of** recombinant antibodies raised against valuable and challenging targets to support drug development and cutting-edge biomedical research.

Targeting the Hippo Pathway for Cancer and Fibrosis

https://research.utoronto.ca/technology-opportunities/db/targeting-hippo-pathway-cancer-fibrosis

Using systematic physical and functional screens, Dr. Attisano's lab has identified a kinase, NUAK2 (& the closely related NUAK1) that acts to inhibit the Hippo kinase cassette in cancer cell lines. They have shown that gene knockdown or small molecule inhibition of NUAKs restores pathway activity & inhibits tumorigenic properties in cells & in a mouse model. High expression of NUAK1 & 2 has also been confirmed in a subset of aggressive colorectal & bladder cancers.

Therapeutic Targeting of a Novel Gene Product in Inflammatory Bowel Disease

https://research.utoronto.ca/technology-opportunities/db/therapeutic-targeting-novel-gene-product- inflammatory-bowel-disease

Inventors at the University of Toronto have identified a novel gene encoding an "enzyme X" with no ascribed function as promoting IBD in mouse models (unpublished work). Mice deficient in this enzyme, or inhibiting the enzyme with an orally-delivered small molecule inhibitor (i.e. compound Z), prevents IBD using multiple mouse models of IBD. Importantly, genome-wide association studies (GWAS) have linked this gene to IBD in humans emphasizing the relevance of this work to human disease.

UBA5 Inhibitors for the Treatment of Cancer and Leishmaniasis

https://research.utoronto.ca/technology-opportunities/db/uba5-inhibitors-treatment-cancer-and-leishmaniasis

This invention involves the development novel drugs with the aim of making these cancer cells more susceptible to drug treatments, leading to the use of milder drug doses and the prevention or reduced occurrence of drug resistance.

TARGET AREA: DRUG DELIVERY

A Drug Delivery Method to Increase Delivery of Nanoparticles to Cancer Tumours

https://research.utoronto.ca/technology-opportunities/db/drug-delivery-method-increase-delivery-nanoparticles-cancer-tumours

Our researchers have demonstrated an approach, called AIDE (Artificially Increasing Dose for Efficacy), to increase the efficiency of nanoparticle delivery to tumours. It involves simultaneously administering a mixture of nanoparticle carrier vehicles loaded with an active ingredient (therapeutic nanoparticles), with nanoparticle carrier vehicles without the active ingredient (decoy nanoparticles).

Glucose-Responsive Microgels and Microneedle Patch to Prevent Hypoglycemia in Diabetics

https://research.utoronto.ca/technology-opportunities/db/glucose-responsive-microgels-and-microneedle- patch-prevent-hypoglycemia

This device is a composite transdermal microneedle patch comprising a microneedle array and embedded microgel particles. The microparticles are made from three types of monomers – one provides glucose-responsive volume change, one for stabilizing native glucagon, and one for facilitating glucagon encapsulation.

Linker-Based Lecithin Microemulsions as Drug Delivery Vehicles

https://research.utoronto.ca/technology-opportunities/db/linker-based-lecithin-microemulsions-drug-delivery-vehicles

This invention is a novel formulation for biocompatible microemulsions for use as delivery vehicles for active ingredients in transdermal, topical and oral delivery.

Nasal Delivery of Highly Effective COVID-19 Vaccines using Helper-Dependent Adenoviral Vectors

https://research.utoronto.ca/technology-opportunities/db/nasal-delivery-highly-effective-covid-19-vaccines- using-helper

Inventors at the University of Toronto have developed a helper-dependent adenoviral (HD-Ad) vector-based vaccine for SARS-COV-2. HD-Ad vectors are based on adenoviral (Ad) vectors, but they are completely devoid of adenoviral coding sequences. They are consequently safer than vaccines based on conventional Ad vectors. Moreover, the SARS-CoV-2 antigens used in these HD-Ad vectors incorporate unique features aimed at presenting the S-protein in a context like that found in the natural virus. Finally, intranasal delivery allows for protection of both the upper and lower airways which is expected to reduce transmission compared to current generation vaccines.

pH-Responsive Colloids for Enhanced Drug Delivery

https://research.utoronto.ca/technology-opportunities/db/ph-responsive-colloids-enhanced-drug-delivery

Our researchers show that the acidity of endo-lysosomal compartments can be used to trigger release of drugs from colloids into the rest of the cell, thereby increasing the cytotoxicity of these formulations. The acidic nature of the endosomes trigger disruption of colloids through a pH dependent mechanism (protonation of colloidal small molecules) releasing the drug to exert its function.

Portable Automated Manufacturing of Protein-Based Therapeutics

https://research.utoronto.ca/technology-opportunities/db/portable-automated-manufacturing-protein-based-therapeutics

Our researchers have developed molecular and hardware technologies for automated production and purification of these protein-based products. Importantly, the production platform is programmable and can be used to produce virtually any protein-based therapeutic (e.g. vaccines), countermeasure (e.g. toxin neutralizing antibodies and antivenoms) or lab reagent (e.g. cytokines and polymerases). This automated cell-free protein manufacturing platform can rapidly produce and purify cytokines and antibodies at various scales and within a few hours.

U of T ENTREPRENEURSHIP

The U of T Entrepreneurship community is Canada's leading engine for research-based startups and a global leader in transforming ideas into products and services that create jobs and impact the world. More than 500 research-based startups have been launched from U of T, outpacing every other Canadian university, and generating more than $1.5 billion (CAD) in investment in the past 10 years.

The University of Toronto is also home to 11 accelerator/incubator programs that serve students, alumni, and faculty from all disciplines and levels of experience.

UTEST

http://utest.to/

The University Early Stage Technology (UTEST) is a startup development program for nascent companies supported in partnership by the University of Toronto Connaught Fund and MaRS Innovation. UTEST provides investments of up to $100,000 per company in addition to intensive entrepreneurial education, advisory support, and dedicated incubation space.

↘ Click here for a list of all UTEST companies.

Health Innovation Hub

http://h2i.utoronto.ca/

The Health Innovation Hub (H2i) facilitates early-stage entrepreneurs with translation and commercialization of ideas into problem-solving designs on health matters. It works to align, connect, and leverage the significant mass of life science research expertise, facilities, programs and funds of the University and its partners towards effective and efficient health innovation ventures. H2i provides open and flexible educational and mentorship opportunities and serves as a conduit for innovation throughout the Toronto Academic Health Science Network.

↘ Click here for a list of all H2i companies.

SELECT HEALTHCARE COMPANIES

AI & MACHINE LEARNING

16Bit

https://www.16bit.ai/

16Bit develop artificially intelligent medical image analysis systems intended to augment physician's diagnostic. The company is in the process of creating a screening algorithm to triage mammograms, tomography of the head and paediatric bone age, enabling physicians and radiologist interpret the results efficiently.

Acrescend

https://acrescend.com/

Acrescend is a user-friendly platform that creates synthetic data in healthcare trials to facilitate medical innovation. Acrescend, delivers AI and Machine Learning benefits to clinical trials. Acrescend utilizes the proven technologies of AI/ML in healthcare data to optimize synthetic data that ultimately provides ethical, realistic results with privacy compliance.

Atomwise

https://www.atomwise.com/

Atomwise uses AI for its structure-based, drug design technology, which is based on convolutional neural networks along the lines of those that recognize faces in a crowd or enable self-driving cars. Atomwise's AI technology is designed to enable scientists to predict how well a small molecule will bind to a target protein of interest, as well as remove sole reliance on empirical screening.

bridge7
https://www.bridge7.ai/
bridge7 is the developer of an AI-powered consultation software designed to ensure patients receive the best care possible from cancer treatment centers. The company's software applies machine learning algorithms to provide the clinical team with AI-derived decision-making metrics utilizing data from thousands of patients, enabling them to gain instant consultation and insights on the quality of cancer care before patients begin their treatment course and hospitals to increase clinical efficiency and improve quality of delivery of cancer care.

Cerebtalk
Cerebtalk offers a brain-computer interface (BCI) that provides a communication tool for individuals with severe motor impairments who have limited voluntary movements, e.g., people with amyotrophic lateral sclerosis (ALS), spinal cord injury, stroke, cerebral palsy, and non-verbal autism.

Deep Genomics
https://www.deepgenomics.com/
Deep Genomics is developing a universe of individualized genetic medicines by creating AI systems that are used to accelerate all steps of drug discovery and development, including target discovery, lead optimization, toxicity assessment and innovative trial design.

MedStack
https://medstack.co/
MedStack is a platform for app-enabled healthcare. MedStack delivers automation-powered developer-flexible cloud hosting with built-in security protocols backed by real-time HIPAA and PIPEDA auditable privacy policies.

Mutuo Health
https://mutuohealth.com/
Mutuo Health's state-of-the-art artificial intelligence (AI) technology enables highly-enriched and structured patient data to be automatically recorded as the patient and clinician are interacting. Specifically, our AutoScribe platform transcribes the dialogue between healthcare provider and patient into high quality electronic medical record (EMR) data in real-time. Our Privacy-by-Design, point-of-care solutions improve the patient-clinician experience, and unleash the endless possibilities of big data analytics in healthcare.

Pathcore
https://www.pathcore.com/
Pathcore strives to streamline digital pathology for researchers and pathologists. Their solutions bridge complex workflows, connecting pathologists with their data faster and easier than ever before.

Pearl Interactives
https://pearlinteractives.com/
Pearl Interactives specializes in co-creating interactive media for children of all abilities for wellness, play, and learning. Our flagship product, a video game system called Bootle BlastTM, uses an innovative mixed reality technology to engage children and youth with neuromotor conditions in exercises that improve functional abilities.

PhenoTips
https://phenotips.com/index.html
PhenoTips, a medical software startup, is the world's first Genomic Health Record. The company offers software for genomic medicine workflows that enables healthcare providers and researchers to ensure clinical data is complete, standardized, shareable, and interoperable. PhenoTips' software allows specialists to record and use genetic information to help diagnose patients and advance genetics research. The startup aims to increase the use and access to genetic sequencing.

Phenomic AI
https://phenomic.ai/
Phenomic AI is leveraging computer vision and high-content screening to develop the next wave of therapeutic antibodies against cancer and fibrosis. Specifically, the deep neural networks that we've developed allow us to screen and analyse much more physiologically relevant disease models.

Structura Biotechnology
https://structura.bio
Structura is the developer of machine-learning algorithms for drug testing. The company develops machine-learning algorithms to help researchers study and reconstruct 3D atomic structures of proteins, bio-molecule complexes, viruses and similar components in drugs.

Tabiat Research
https://tabiatresearch.com/
Tabiat Research is a digital health research company intended to provide medical data. The company specializes in conducting and analyzing sensing studies and physiological endpoint detection through its wearable technology using statistics, machine learning and artificial intelligence, thereby providing clinical researchers, academics and pharmaceutical companies with research studies.

WinterLight Labs
https://winterlightlabs.com/
Machine learning and speech analysis to detect cognitive decline in patients.

DRUG DELIVERY

AmacaThera
https://www.amacathera.ca/
AmacaThera is a biotechnology company focused on developing and commercializing a unique, injectable hydrogel platform that provides a localized, sustained drug delivery and release for a wide range of diseases.

Interface Biologics
https://www.interfacebiologics.com/
Interface Biologics develops innovative materials for improving the efficacy of medical devices and targeted delivery of drugs. Their surface modification additives are used in FDA-cleared medical devices and are clinically proven to reduce infection and thrombus-related complications.

Micellae Delivery Systems
https://www.micellae.com/
Micellae provides a ground breaking nanotechnology designed to contribute towards improving the solubility and bioavailability of hydrophobic bioactive ingredients including non-storied anti-inflammatory drugs (NSAID), cannabinoids and lipophilic nutraceuticals. Based on more than 10 years of research on advanced drug delivery systems, we provide IP-protected smart solutions to develop water-soluble, highly bioavailable and controlled release products in liquid, gel and powder dosage forms for pharmaceutical, nutraceutical and cosmetic applications.

Ripple Therapeutics
https://www.rippletherapeutics.com/
Ripple Therapeutics is a clinical stage company focused on improving ophthalmic therapeutics with controllable, sustained drug delivery. Ripple's Epidel® technology platform is based on a discovery that drugs can be engineered into controlled release pharmaceuticals without polymers or excipients.

Synakis
https://synakis.com/
Synakis is a developer of a biodegradable hydrogel vitreous substitute intended to transform the treatment of retinal detachment and similar conditions which use vitreous substitutes. The company's platform is commercializing and translating vitreous substitutes into an injectable, non-cytotoxic in vitro and in vivo, surgical device, enabling low-swelling, stable, and optically transparent with a refractive index and density similar to those of the native vitreous.

DRUG DISCOVERY & DEVELOPMENT

Bright Angel Therapeutics
https://www.brightangeltherapeutics.com/
Bright Angel Therapeutics is a pre-clinical stage biotechnology company focused on the development of novel therapeutics for the treatment of drug-resistant and life-threatening fungal infections.

Dalriada Therapeutics
https://www.dalriadatx.com/
Our company develops novel therapeutics for treatment of proliferative diseases, with a focus on cancer and psoriasis. At the core of the company is a class of unique anti-proliferative compounds that effectively exert therapeutic effect by blocking the activity of a protein, which is widely recognized by the medical community as a main driver of many cancers and psoriasis.

Empirica Therapeutics
https://empiricatx.com/
Empirica Therapeutics is developing a pipeline of innovative and transformative immunotherapies for cancers with substantial unmet need. The engine behind Empirica is a powerful functional genomics platform combined with unique patient-based models of brain cancer and recurrence that enables the discovery of new therapeutics options that have emerged from the patient’s actual tumour biology.

InDanio Bioscience
http://www.indanio.com/
InDanio is a drug discovery company dedicated to developing new chemical entities (NCEs). The company offers an innovative approach to drug discovery based on human nuclear receptor gene expression and allows simultaneous assessment of drug delivery, stability, specificity, tissue-selectivity, toxicity and highest-value target lines enabling organizations to identify, extract and characterize new hormonal regulators and to identify new tissue-selective drugs, co-factors and mechanisms of action for each nuclear receptor.

Janpix
https://janpix.squarespace.com/
Janpix is discovering and developing ultra-sensitive inhibitors of Signal Transducer and Activator of Transcription (“STAT”) proteins. The company is committed to developing a pipeline of STAT inhibitors that deliver further treatment options to patients suffering from cancer as quickly as possible.

Nocimetrics
https://www.nocimetrics.com/
Nocimetrics has developed a unique behavioural measurement system that automatically detects natural behaviours associated with pain and illness in pre-clinical animal models, enabling efficient and effective drug discovery.

Northern Biologics
https://northernbiologics.com/
Northern Biologics develops therapeutic antibodies for oncology and fibrosis indications. The company's therapeutic antibodies uses antibody repertoires to develop functional modulators of key signalling pathways in cancer and fibrosis, enabling patients to get personalized cancer treatments.

Paradox Immunotherapeutics
https://www.paradoximmuno.com/
Paradox Immunotherapeutics is developing monoclonal antibody-based immunotherapies for rare protein misfolding diseases that cause organ failure. Using a proven-successful immunotherapy drug design platform, they design drugs that harness the body's own immune system to clear lethal deposits from affected organs and reverse organ damage. Their team also has a proven track record of success in designing drug candidates for amyloidosis and taking them from bench to bedside.

Perfusia Biosciences
http://www.perfusiabio.com/
Perfusia is developing next generation in vitro disease models for pharmaceutical drug testing. The company's platform allows for implantation and vascular support of various tissues within a microfluidic platform to be used to model a wide range of organs and diseases from brain cancer to drug absorption in the gut, thereby providing hospitals with stem cell-derived vitro disease 3D organ models for assistance in drug discovery.

Protagenic Therapeutics
https://protagenic.com/
Protagenic Therapeutics Inc is a biotechnology company focusing on the discovery and development of naturally occurring human brain hormones for the treatment of anxiety and depression based mood disorders. It provides treatments for mood, anxiety, depression and neurodegenerative disorders by using peptide-base and brain active therapeutics.

Reflexion Pharmaceuticals
https://www.reflexionpharma.com/
Reflexion Pharmaceuticals is developing a revolutionary new class of protein-based therapeutics that overcome the limitations of current biologics. By engineering enantiomeric proteins composed entirely of D-peptides, they are creating new drug entities that are non-immunogenic and inherently resistant to proteolysis, vastly improving pharmacokinetics.

Resolute Bio
https://www.resolutebio.com/
Resolute Bio is platform biotechnology company developing a novel class of peptide-based drugs, called xenopeptides. Resolute is improving properties of peptide-based therapeutics by combining advantages of D- & macrocyclic peptides that are engineered with their proprietary novel, patented computational & synthetic methods.

Rosetta Therapeutics
http://rosettatherapeutics.com/
Rosetta Therapeutics is an innovative drug discovery start up that offers solutions by providing new validated molecules and high throughput assays, which mitigate risk and lowers costs for Pharma and provides potential cures for human diseases. Their primary area of focus is Alzheimer's, ALS and Parkinson's diseases.

Virocarb
https://virocarb.com/
Virocarb is developing a paradigm-shifting drug platform to stop the replication of viruses by targeting a cellular function critical for their propagation in cells. Our lead drug candidate exhibits potent broad spectrum antiviral activity against multiple viral families including SARS-CoV-2 and other members of the coronavirus family.

Zucara Therapeutics

http://www.zucara.ca/

Zucara is developing the first once-daily therapeutic to prevent hypoglycemia (low blood sugar) in people with diabetes. Preventing hypoglycemia will dramatically change diabetes disease management, improving both patient health and quality of life.