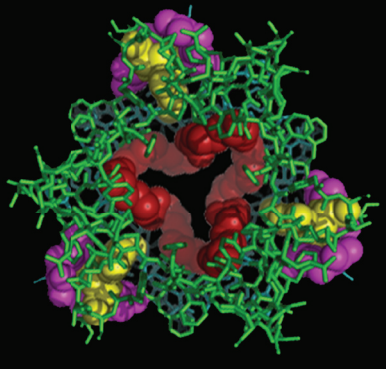
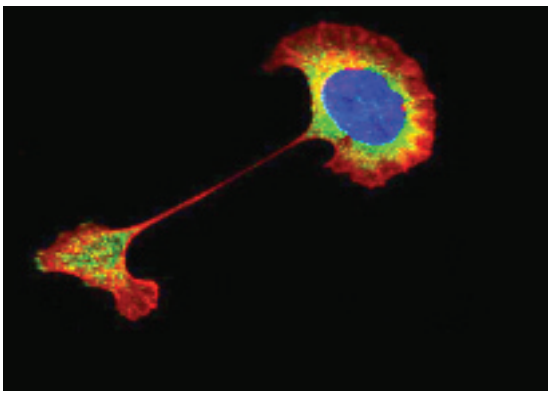
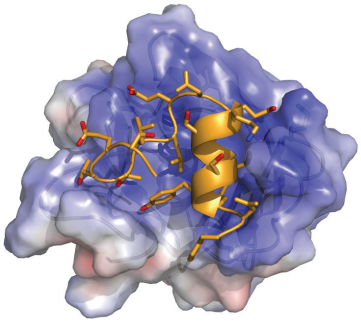
Chemical Biology of Disease

Providing early-stage chemical agents for the treatment of a variety of disease-related pathologies including atherosclerosis, cancer, cardiovascular, immune and infectious diseases.







Graduate Programs

Biochemistry & Molecular Biology (MSc, PhD)

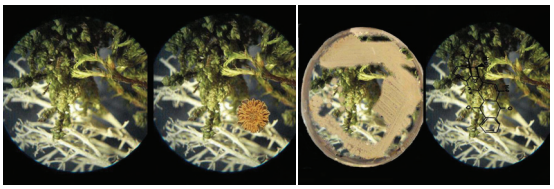
Cell & Developmental Biology (MSc, PhD)

Chemistry (MSc, PhD)

Earth & Ocean Sciences (MSc, PhD)

MIcrobiology & Immunology (MSc, PhD)

Zoology (MSc, PhD)



Research Strengths & Facilities

The objectives of this multi-disciplinary team comprising biochemists, biophysicists, chemists, microbiologists, and molecular biologists is to collaborate on:

- Identification of potential drug targets
- Assembly of natural product and synthetic libraries
- Development of novel high-throughput screening for chemical inhibitors and modulators
- Analysis of biochemical and structural aspects of compound-target interactions
- Pharmacologic and genetic studies
- Elucidation of drug resistance mechanisms

These objectives will lead to the discovery of early-stage chemical agents for the treatment of a variety of diseases including atherosclerosis, cancer, cardiovascular, immune and infectious diseases. *http://cbd.lsi.ubc.ca/*

The Biological Screening Unit in the Life Sciences Institute (LSI) houses high-throughput robotic systems essential to screen libraries of pure chemicals and of natural extracts, including devices to dispense cells, reagents, and small molecules into multi-well plates, and a suite of instruments for the automated detection of biological activity through a range of in vivo and in vitro assays. Researchers in this group as well as others in the LSI collaborate with the Centre for Drug Research and Development (CDRD) housed in the Pharmaceutical Sciences building adjacent to the LSI.

The Drug Discovery and Target Identification (DDTI) researchers use the Chemistry Unit, located in the nearby Department of Chemistry, to generate chemical libraries with equipment for the automated combinatorial synthesis of peptides and organic molecules. This unit is responsible for the isolation and identification of active chemicals, as well as for the synthesis and optimization of active second generation chemicals for subsequent biological studies.

The Target Identification Unit is in the Michael Smith Laboratories. It houses mass spectrometers and other proteomic instrumentation needed to carry out the identification of proteins whose activities are modulated by the chemicals and to study the effects of these chemicals at the molecular, cellular, and organismal levels. The LSI also houses the X-ray crystallographic and NMR spectroscopic equipment needed for structural characterization of chemicals bound to their target proteins.

http://cbd.lsi.ubc.ca

a place of mind
THE UNIVERSITY OF BRITISH COLUMBIA

Life Sciences Institute
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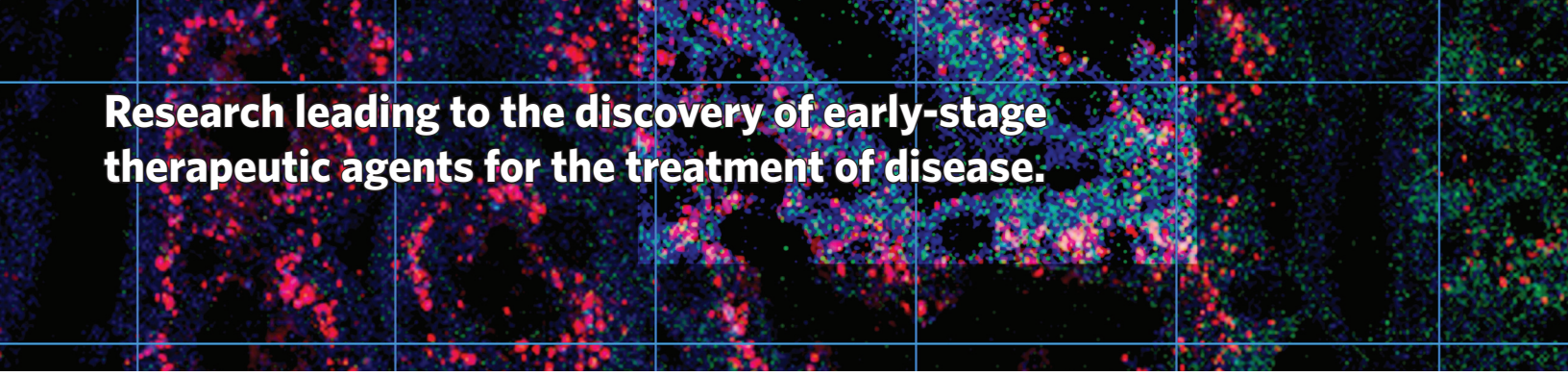

Research leading to the discovery of early-stage therapeutic agents for the treatment of disease.

CBD Researchers:

Raymond Andersen: using high throughput screening of marine sponge sediments and terrestrial actinomycete isolates, we have identified natural products of novelty with a wide variety of biological activities.

Gary Brayer: our laboratory is pursuing both mechanism-based and chemical library screening-based strategies to develop therapeutics for diabetes, obesity and prostate cancer. Special attention is directed towards elucidating the protein structure-function relationships present in inhibitory complexes and using these to enhance the efficacy of putative therapeutics.

Dieter Bromme: our studies of proteases implicated in atherosclerosis, bone and joint and autoimmune diseases have led to the identification of several promising low molecular weight inhibitors with novel binding sites.

Pieter Cullis: we have designed and are in the process of optimizing liposomal nanoparticle based delivery systems that will allow siRNA to be used therapeutically in vivo.

Julian Davies: the world of biologically-active small molecules includes products of all living organisms (the Parvome). What are their roles? We are studying the cell-cell signaling functions of microbial products by the use of reporter systems. In addition, the laboratory has projects directed towards antibiotic discovery and on the analysis of antibiotic resistance mechanisms and their genetic organization.

Lindsay Eltis: we discovered a cholesterol degradation pathway in M. tuberculosis and are providing new insights into how these cholesterol-degrading enzymes function. Collaboratively, we have established that M. tuberculosis metabolizes cholesterol during infection and that this metabolism is critical during the early stages of infection, contributing to the dissemination of the pathogen in the host.

Geoffrey Hammond: we focus on ligand-binding protein structures and function, their roles in disease, and utility as drug targeting vectors.

Lawrence McIntosh: using NMR spectroscopy, new mechanisms for the regulation of ETS transcription factors by "bead-on-a-string" sumoylation and the "rheostatic" effects of multi-site phosphorylation on DNA-binding auto-inhibition were elucidated. This may provide a new approach to the understanding and treatment of ETS-related cancers.

Robert Molday: using a wide variety of biochemical, molecular and cell biology techniques, we are studying mechanisms responsible for a number of retinal degenerative diseases that are leading causes of vision loss. These include X-linked retinoschisis, retinitis pigmentosa, Stargardt macular degeneration and others. The information obtained from these studies is being used to develop novel gene and drug based treatments in animal models for these diseases.

Masayuki Numata: organellar pH is tightly regulated within a narrow range, which plays a vital role in various physiological processes. Our research group has identified novel binding proteins to organellar membrane type sodium hydrogen exhangers that contribute to organellar pH homeostasis. Characterization of these binding proteins will lead to a better understanding of these ill-defined ion transporter functions in different cell types.

Michel Roberge: we are using high throughput screening methods with both natural product and CombiChem Libraries in collaboration with a number of other groups in areas of cancer chemical biology, cancer cell invasion and metastasis, mitotic progression, autophagy and drug discovery associated with these disease processes.

Natalie Strynadka: high-resolution methods are being used to analyse the detailed structures of enzymes responsible for antibiotic resistance in bacteria.

Graduate Studies Admission

UBC Faculty of Graduate Studies establishes common minimum academic requirements. One of the major academic requirements for LSI graduate programs is having a research supervisor.

Contact

Recruitment & Outreach Coordinator
lsi.grad@ubc.ca
website: grad.lsi.ubc.ca

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