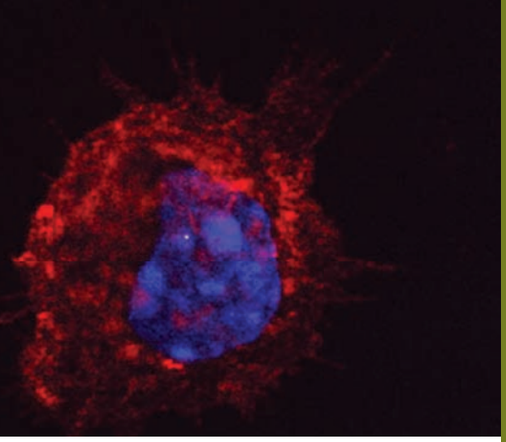
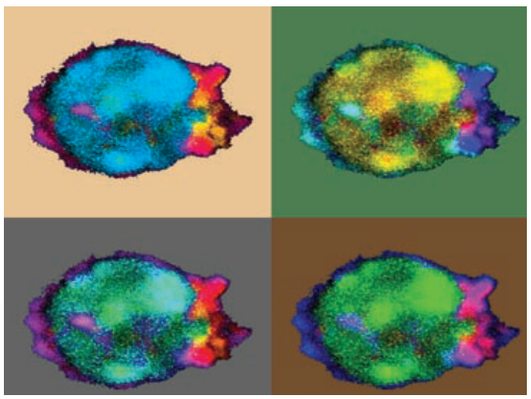
The Infection, Inflammation & Immunity (I^3) Research Group focuses on how micro-organisms cause infections and how the immune system combats infections and prevents disease.



Infection, Inflammation & Immunity Research Group



Graduate Programs

Cell & Developmental Biology (MSc, PhD)

Biochemistry & Molecular Biology (MSc, PhD)

Bioinformatics (MSc, PhD)

Microbiology & Immunology (MSc, PhD)

Pathology & Laboratory Medicine (MSc, PhD)

Experimental Medicine (MSc, PhD)

Zoology (MSc, PhD)

Research Strengths & Facilities

Both newly emerged pathogens (e.g. H5N1 pandemic flu, West Nile Virus) and pathogens making a comeback in immune compromised persons (e.g. tuberculosis) represent **major threats to human health**.

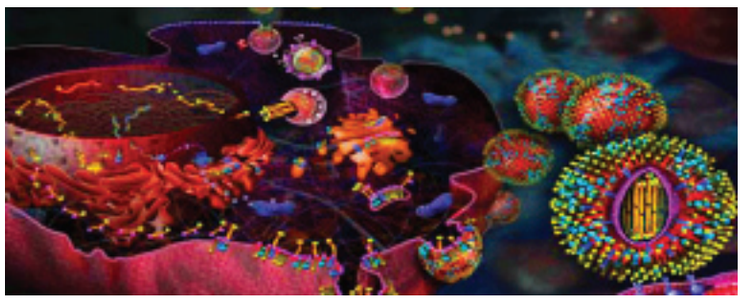
At the same time, disease caused by **uncontrolled or inappropriate immune responses** are now a leading health problem in the developed world. This includes chronic diseases such as type 1 diabetes, multiple sclerosis, inflammatory bowel disease, arthritis, asthma, atherosclerosis, and immune cell cancers.

Many **cancers also silence or subvert the immune system**, suggesting that modulating the immune system could provide new cancer treatments.

Together, these diseases are a significant cause of deaths and cost the health care systems billions of dollars for patient care. Although the underlying causes of these diseases are diverse, they are linked by a common theme, **inappropriate or insufficient immune function**.

To improve human health and reduce the suffering caused by these diseases, the 70 trainees, technicians, and faculty members who comprise the I^3 Research Group are dedicated to understanding:

- How the immune system functions to prevent disease
- How immune deregulation can cause disease
- How targeting pathogens and manipulating the immune system could lead to new drugs and vaccines for curing or preventing infectious diseases, inflammatory and autoimmune diseases, and cancer



Infection, Inflammation & Immunity

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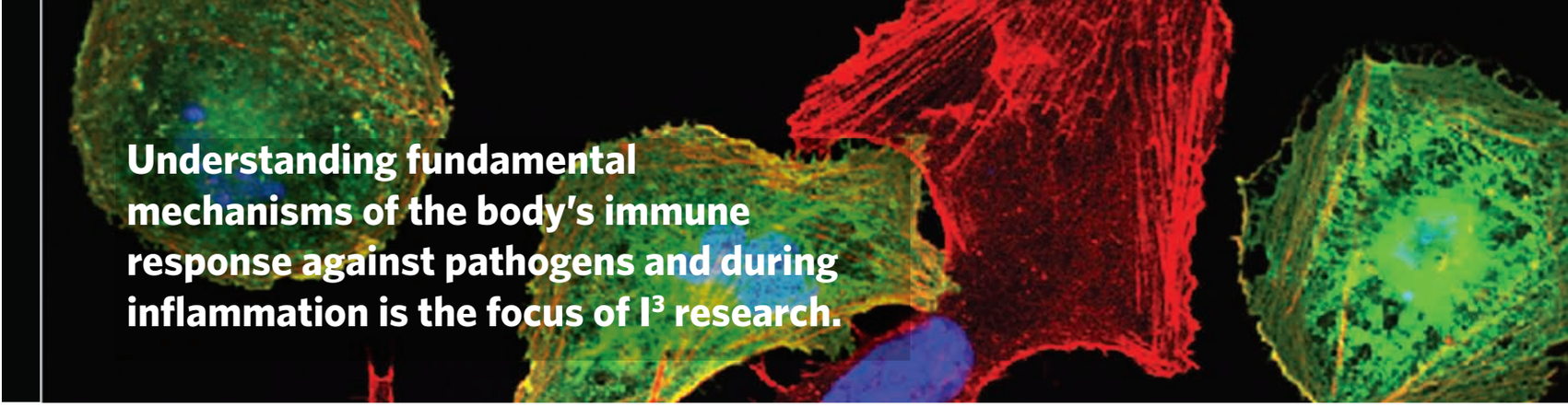

Understanding fundamental mechanisms of the body's immune response against pathogens and during inflammation is the focus of I³ research.

Diseases studied by I³ labs:

Infectious diseases: West Nile Virus, Hepatitis C, pandemic flu, HIV, tuberculosis, Epstein-Barr virus, Coxsackievirus, Dengue Fever Virus.
Inflammatory diseases: colitis, inflammatory bowel disease, arthritis, atherosclerosis.
Autoimmune diseases: Type 1 diabetes, Multiple Sclerosis, Autoimmune myocarditis.
Immune cell cancers: T and B cell lymphomas, multiple myeloma.
Metastatic cancers: Melanomas, breast and ovarian cancer.

Major research themes:

- How pathogens cause infections, manipulate host cells, and evade the immune system - **Drs. Jean, Harder, Horwitz, Perona-Wright.**
- How immune cells respond to pathogens and tumor cells; How immune responses to pathogens and tumors can be enhanced **– Drs. Johnson, Gold, Abraham, Harder, Matsuuchi, Perona-Wright.**
- How immune cells travel to sites of infection; How cells move and how these processes influence immune cell trafficking and tumor cell metastasis – **Drs. Gold, Roskelley, Weeks.**
- How immune cells cause and resolve inflammation; How immune dysfunction leads to autoimmune and inflammatory diseases **– Drs. Horwitz, Harder, Gold, Johnson.**
- How immune cells are transformed into leukemias and lymphomas **– Dr. Abraham.**

Research approaches:

- In vitro and in vivo models of disease including model organisms
- Multi-color flow cytometry
- Confocal microscopy and live cell imaging
- Proteomics, genomics and systems biology

Graduate Studies Admission

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

Contact

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

Recent Publications

Loveday EK, Svinti V, Diederich S, Pasick J, Jean F. (2012). Temporal and strain-specific host microRNA molecular signatures associated with swine-orgin H1N1 and avian-origin H7N7 influenza A virus infection. *J Virology* 86:6109-6122

Krebs DL, Chehal MK, Sio A, Huntington ND, Da ML, Ziltener P, Inglese M, Kountouri N, Priatel JJ, Jones J, Tarlinton DM, Anderson GP, Hibbs ML, Harder KW. (2012). Lyn-dependent signaling regulates the innate immune response by controlling dendritic cell activation of NK Cells. *J Immunol* 188:5094-5105.

Casiraghi C, Dorovini-Zis K, Horwitz MS. (2011). Epstein-Barr virus infection of human brain microvessel endothelial cells: A novel role in Multiple Sclerosis. *J Neuroimmunol* 230:173-177.

Freeman SA, Lei V, Dang-Lawson M, Mizuno K, Roskelley CD, Gold MR. (2011). Cofilin-mediated F-actin severing is regulated by the Rap GTPase and controls the cytoskeletal dynamics that drive lymphocyte spreading and BCR microcluster formation. *J Immunol* 187: 5887-5900.

Plumb AW, Patton DT, Seo JH, Loveday E-K, Jean F, Ziegler SF, Abraham N. Interleukin-7, but not Thymic stromal lymphopoietin, plays a key role in the T cell response to Influenza A virus. PLoS ONE 7(11) 2012: e50199.doi:10.1371/*J Pone*.0050199

Ruffell B, Poon GF, Lee SS, Brown KL, Tjew SL, Cooper J, Johnson P. (2011). Differential use of chondroitin sulfate to regulate hyaluronan binding by receptor CD44 in inflammatory and interleukin 4-activated macrophages. *J Biol Chem* 286:19179-19190.

Perona-Wright G, Kohlmeier JE, Bassity E, Freitas TC, Mohrs K, Cookenham T, Situ H, Pearce EJ, Woodland DL, Mohrs M. (2012). Persistent loss of IL-27 responsiveness in CD8+ memory T cells abrogates IL-10 expression in a recall response. *PNAS* 109:18535-18540.

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