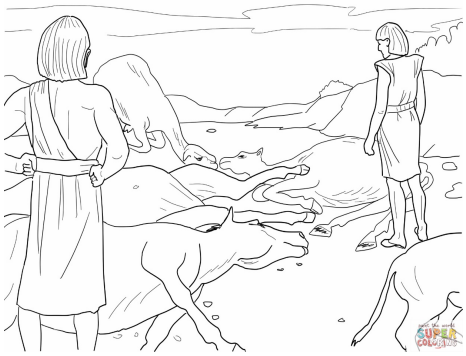
IALS **Models to Medicine** Center

Infection & Immunity

CURRENT RESEARCH AND EXPERTISE

We are beset by pestilence and other diseases…



Let us give thanks for Immunologists!

Mammals repel pathogens and tumor cells by leukocyte counterstrikes.
The coup de grâce may fail to pass or miss the mark.
Alas, immune defenders may turn on self as their agenda.
This loss of immune homeostasis betrays us.
Immunoprophylaxis and immunotherapy may save us.

We seek to understand and direct innate and adaptive immune responses to prevent or alleviate disease in people and animals.

Control of T cell mediated allo- and auto-immune diseases

Using a humanized mouse model of aplastic anemia and graft versus host disease (GVHD) the Minter lab is investigating the therapeutic impact of manipulating Notch 1 and protein kinase C theta signal pathways that originate at the CD4 T cell antigen specific receptor and regulate stable gene transcription

Therapeutic regulation of CD4 T cells

Using in vitro culture, genetic manipulation of inbred mice, hematopoietic cells and cell lines, and mouse models of multiple sclerosis and other autoimmune diseases the Osborne lab is defining and investigating therapeutic regulation of T cell signaling pathways, particularly Notch 1 and gamma-secretase dependent signal pathways

Regulation of T cells by Let7 miRNAs

Using knock-in lines of mice and immunocytes the Pobezinsky and Pobezinskaya lab is investigating genes and proteins that positively and negatively regulate let-7 miRNA expression and thus regulate T cell development, differentiation and effector functions, and their impact during infectious disease, cancer and auto-immunity

Theme Leader
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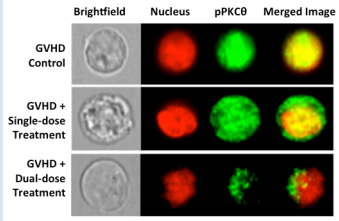
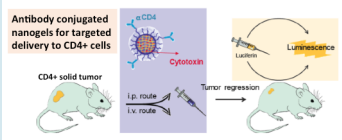
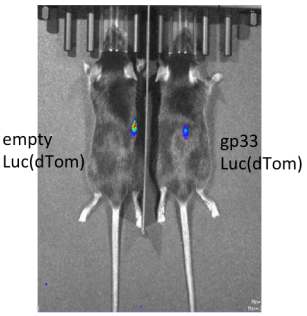


Lisa Minter - Novel cell-based therapies reduce GVHD severity in a humanized mouse model by altering the nuclear localization of PKCθ, a key pro-inflammatory protein. Bone marrow samples were collected 19 days after disease induction with Human peripheral blood mononuclear cells. Cells were surface-stained for CD4 expression with fluorescently-conjugated antibodies, fixed, permeabilized and stained intracellularly with fluorescently-conjugated antibodies specific for pPKCθ (Thr 538). Nuclei were stained using cell-permeable DRAQ5™ fluorescent probe.



Barbara Osborne – Targeted delivery of toxin loaded nanogel prevented tumor cell growth *in vitro* and is under test *in vivo*

Imaging test using IVIS Spectrum™ mCT



Leonid Pobezinsky, Elena Pobezinskaya. Tumor cells transduced with sequence coding for lymphocyte choriomeningitis virus GP33 peptide and luciferase, or luciferase alone were inoculated into recipient mice and observed after injection of D-luciferin 6 days later.

Improved neonatal ruminant vaccines

Direct antigenic stimulation through the co-receptor WC1, which is an SRCR domain protein, is required for bovine γδ T cell activation. The Baldwin and Telfer labs are investigating the complexity of the WC1 haplotype in ruminants, cloning and expressing WC1 family members and using these to select for components of next generation vaccines and to develop diagnostic arrays

Recombinant Gas vesicle vaccines

Halobacteria can be genetically engineered to express multimeric pathogen polypeptides on their gas vesicles (GV), buoyancy particles that are purified from disrupted bacteria by flotation and which invoke immune responses without additional adjuvant. The Webley lab is identifying Chlamydial and other antigens that induce immunoprotection when expressed in the GV system

Pathogen immunomodulators

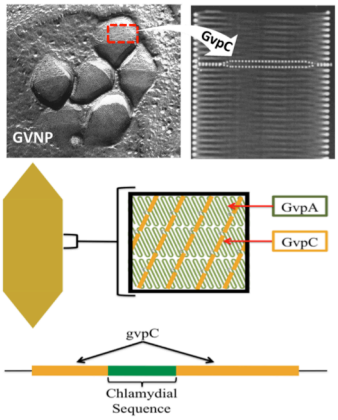
African trypanosomes co-opt host NK cells to kill B2 B cells and CD8 T cells thus ablating adaptive immunity. The Black lab is investigating the inductive mechanism of this potent secondary immunodeficiency syndrome using recombinant inbred strains of mice, and cattle, with the goal of alleviating pathogenesis in African trypanosomiasis

Facilitated by:

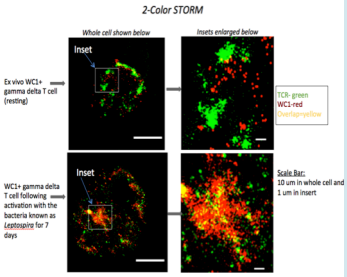
IALS Institute for Applied Life Sciences
Research and Innovation to Improve Human Health

Infection & Immunity is on the forefront of exciting collaborative, translational, and product-driven science with a mission to improve human health and well-being. Within the new Life Science Laboratories at UMass Amherst, made possible by a $95-million investment by the Massachusetts Life Sciences Center, IALS houses a vibrant community of interdisciplinary faculty, as well as, state-of-the-art laboratory space and IALS Core Facilities.

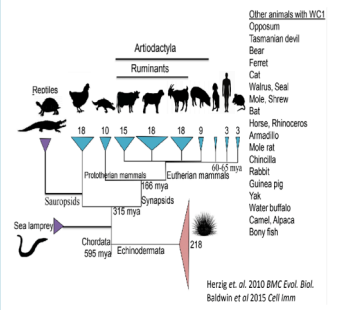
Researchers in the Infection and Immunity cluster use cell and molecular immunology techniques, immunochemistry, cell and tissue culture as well as cell, tissue and whole animal imaging. We work closely with the flow cytometry, live imaging, proteomics and genomics, and animal models of disease cores, which have been instrumental in the ongoing research efforts of this theme. For more information on the IALS Core Facilities, please visit: umass.edu/ials/core-facilities.



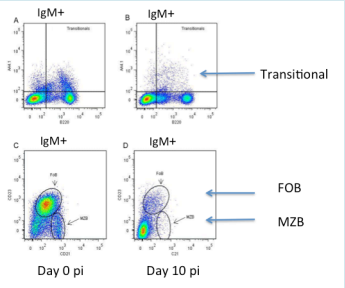
Wilmore Webley – Halobacterium gas vesicle with chlamydial sequence inserted in gvpC



Cynthia Baldwin - STORM Image of a bovine gamma delta T cell stained with anti-WC.1 (red) and anti-TCR (green) – merge (yellow) before (top 2 panels) and after (bottom panels) stimulation with *leptospira* showing antigen-induced co-localization of the TCR and WC.1 co-receptor



Janice Telfer – Inverted triangles indicate the number of WC1 or WC1-like genes detected so far in each species. These multigenic arrays of SRCR proteins have been conserved through 600 million years of evolution.



Samuel Black – Splenic Transitional, Marginal Zone and Follicular B cells are rapidly depleted from trypanosome infected mice. This is mediated by NK cell-dependent cytotoxicity