Jonathan Irish, PhD
Assistant Professor of Cell and Developmental Biology
Assistant Professor of Pathology, Microbiology and Immunology

jonathan.irish@vanderbilt.edu
615-875-0965
https://my.vanderbilt.edu/irishlab

"Artificial intelligence for human biology: using computers to discover cells & tailor treatments"

Single cell biology and data science are revolutionizing our understanding of complex, multicellular diseases and therapies. This is especially the case with cancer targeted therapies and immunotherapy, where an understanding of signaling interactions among cancer cells, microenvironment cells, and immune cells is critical.

A central goal of our research is to understand how cell signaling mechanisms govern healthy development and control the outcomes of human diseases and treatments. Our lab creates cutting-edge single cell mass cytometry and phospho-specific flow cytometry tools to search through billions of cells from human tumors, lymph nodes, bone marrow, and blood samples in order to precisely target rare, abnormal cells.

We are especially focused on targeting signaling networks and immune interactions in rare cell populations from patient clinical samples obtained over time during therapy. Our lab members have diverse scientific backgrounds and work at the interface between multiple fields, including computational biology, chemical biology, neuroimmunology, and precision medicine.

We believe great potential exists to detect diseases earlier and to tailor a patient’s therapy to the biological alterations detected in the cells of their disease. By better understanding biological systems which control development and cell-cell interactions in healthy and diseased contexts, we can learn to program cells to become therapeutic agents or target malignant signaling events to specifically kill cancer cells.

Key Publications

"Computational immune monitoring reveals abnormal double negative T cells present across human tumor types," Cancer Immunology Research, in press, 2018

"Discovery of human cell selective effector molecules using single cell multiplexed activity metabolomics," Nature Communications, 2;9(1):39, 2018