Eric Zhao

Hello! I am an MD/PhD student with an interest in cancer genomics and clinical bioinformatics. The MD/PhD program alternates between medical school and research, allowing students to obtain both an MD and a PhD degree after 7 years of study. My research focuses on discovering personalized treatments for cancer.

How does one personalize cancer treatment? The secret is in the genes. DNA dictates the behaviour of every cell in our bodies. Comparing cancer cells with healthy ones, we find out what makes tumours tick: that is, what drives their biological clocks and makes their cells divide uncontrollably. It starts with the genome, a full DNA sequence. At the BC Cancer Agency, teams are sequencing a growing number of participants, giving them hope for a cure. The goal? Identify targeted drugs which kill cancer cells and spare healthy ones. The promise? Better treatment with fewer side effects.

What happens next is my interest: analysis of the genome. Bioinformatics is a young and highly interdisciplinary field which uses computation, mathematics, and statistics to make sense of complex biological data. Some bioinformaticians develop new tools, whereas others specialize in using existing tools to interpret new biomedical data.

I believe that bioinformatics is an ideal field for REX students to explore. No lab access is necessary to access the wealth of publicly available data and apply novel ideas to its analysis. In my first year as a REX mentor, my students were able to carry out a full research project. They discovered interesting findings which will soon be published in the UBC Medical Journal.

Every person is different. Every cancer is personal. Indiscriminate treatments limit our capacity to treat and cure. They cause painful toxicity and decrease quality of life. Now, we are learning how to cater treatments to the individual. There are already powerful approaches for understanding the inner workings of a cell. Extending this to personalized medicine is the next step to better treatment.

Evan Chen

Neural diseases, especially those related to myelin degeneration (Parkinson's, Multiple Sclerosis, Alzheimer's) can be potentially detected with a range of medical imaging methods, though each possesses limitations associated with factors such as frequency shifts, field inhomogeneity, and chemical exchange.

Working at the UBC MRI Research Center, I conduct research investigating rat spinal cords, focusing on the micro- and macro- structure of white and gray matter, myelin sheaths, and their effect on the phase of the signal we measure.

MRI is a great method of assessing biological tissue, allowing a peek into the workings of the inner body in a non-invasive (no surgery required) and safe (non-radioactive). To assess injury to the spinal cord, we extract damaged spinal cords and analyze them with fluorescence microscopy

(for biomarkers that detect axons or myelin) and electron microscopy (provides super-high-resolution images), then compare them with our MRI scans of the same spinal cord.

What we're investigating is the relationship between the MRI image we acquire, and what the microscopy tells us about the tissue environment. By linking certain behaviors in the spinal cord after injury with patterns in the MRI signal, we can begin to figure out what neural degeneration looks like on MRI. The overall goal is to have MRI accurately determine the level of damage in the spinal cord without needing to conduct surgery on a patient, and reducing the need for X-rays or CT scans.

The research is heavily interdisciplinary, encompassing engineering physics, medical imaging, and computer programming.

Darra Hofman

Research: I study privacy, identity, and human rights in records, with a particular focus on the impact of digital recordkeeping technologies such as blockchain. My dissertation focuses on the relationship between transparency and privacy in digital records. I am a Graduate Academic Assistant with both InterPARES Trust (https://interparestrust.org/) and Blockchain@UBC (https://blockchainubc.ca/).

Message For Mentees: I'm fairly open to projects looking at the intersection of archives, records, and law (which is admittedly a pretty big field!). I also would encourage anyone with a strong interest in blockchain technology (aka distributed ledger technology, which underlies Bitcoin, Ethereum, and other cryptocurrencies) to bring their research ideas to my group! Although my personal expertise is in privacy, there are a number of issues in this space, including e-government/open government; discrimination from algorithmic decision making; and personal rights beyond just privacy. Because archival science is only taught at the master's level and above in North America, I imagine the process beginning with some (simple!) reading (given by me) about archival theory to ground the group as they begin their lit review. Based on the lit review, we will draft initial research questions, then return to the literature to refine the research question(s). Once we're happy with our research question(s), we will design our methodology and predict our results.

Keyword: Privacy, Human rights