BCHM 421/422 – 2021-2022

Project #1: Pain is caused by interaction between the nervous and immune systems: when you cut your hand, immune cells are recruited to the site of injury where they secrete mediators that function to clean tissue debris to allow for the tissue healing. This same site of injury is densely populated by skin-resident immune cells like dendritic cells and richly innervated by sensory neurons that sense pain, called nociceptors. We have now shown that skin-resident dendritic cells are the first cell to respond to tissue injury, and that they secrete two specific mediators (CCL17 and CCL22) that act on nociceptors to cause pain. However, these cells likely secrete many other inflammatory mediators that contribute to pain outcomes and nociceptor activation. The goal of this project is to identify novel dendritic cell-derived inflammatory mediators that may contribute to pain outcomes.

Supervisor: Nader Ghasemlou

Project Title: *In silico* and *in vivo* approaches to identify novel pain mediators

Project Goals: Identify inflammatory mediators expressed specifically by dendritic cells using the ImmunologicalGenome dataset. Determine expression of identified mediators in mouse skin tissue after incisional wound. Confirm cell-specific expression of mediators in the inflamed skin.

Experimental Approaches: Bioinformatics (differential gene expression) will be used to identify targets of interest using the ImmGen database. Quantitative PCR and/or Western blotting is used to characterize temporal expression patterns of targets of interest. Immunohistochemistry is used to confirm expression of targets in dendritic cells.

References:

CD11b+Ly6G- myeloid cells mediate mechanical inflammatory pain hypersensitivity.
Ghasemlou N, Chiu IM, Julien JP, Woolf CJ. *Proc Natl Acad Sci USA*. 2015 Dec 8;112(49):E6808-17. doi: 10.1073/pnas.1501372112.

Skin-Resident *γδ* T Cells Exhibit Site-Specific Morphology and Activation States.
Marshall AS, Silva JR, Bannerman CA, Gilron I, **Ghasemlou N.** *J Immunol Res*. 2019 Jan 6;2019:9020234. doi: 10.1155/2019/9020234.