

A post-doctoral position is available in the laboratory of Tudorita (Doina) Tumber, at Cornell University in Ithaca, NY, USA. Experience with tissue stem cell biology, mouse genetics, and cell culture are a plus, but are not required. If you are interested, please contact Dr. Tumber at tt252@cornell.edu for additional information.

These are three possible projects that we could explore:

(1) *Defining the stem cell lineage hierarchy in the epidermis*

This is based on a project recently published in *Nature Cell Biology* (2016). Epidermis provides the essential body barrier function. Our study identifies two distinct epidermal stem cell populations, which might generate distinct types of previously un-recognized epidermal differentiated cell types. This finding has profound implications for understanding tissue regeneration in general, and for skin disease in particular. We will employ mouse genetics combined with cell biology, genomics, and biochemical approaches to examine molecular mechanisms of regulation of stem cell behavior and differentiation. We will extend our studies to human skin biology, including implications to skin cancer, through our collaborative efforts with dermatologists at Rochester Medical School.

(2) *Epigenetic regulation of tissue stem cells in a mouse hair follicles model*

This is based on a project recently published in *Nature Communications* (2016). For the past 5 years, we examined global histone modification patterns and ongoing transcription in a live mammalian tissue. In contrast to the cell culture conditions, within most adult mammalian tissues, cells do not actually proliferate and instead they spend extensive time in G0 quiescence. In their normal (G0) baseline state within tissues, we find that the “epigenetic histone code” based on cell culture systems are challenged. We are in the process of re-defining this code using mouse genetics, genomics, and biochemical tools and approaches.

(3) *Transcriptional control of tissue regeneration in adult stem cells*

Runx1 is a model transcription factor we found to regulate adult stem cell activation and normal hair follicle regeneration in mouse and human skin. We also showed it was essential for squamous cell carcinoma in mouse and human (see our PubMed publications at <http://www.ncbi.nlm.nih.gov/pubmed/?term=tumber+t>). Currently, we examine how Runx1 transcriptional acts from within the epithelial stem cells, molecularly controls the remodeling of 3D organization of different cell types (such as blood vessels, nerves, fat cells, fibroblast) for proper tissue maintenance in adulthood. In particular, we found that Runx1 role in epithelial tissue stem cells might promote angiogenesis, thus possibly augmenting its function in both tumor and tissue growth via a non-cell autonomous process.