**Research Theme**
Dermatology & Skin Biology

**Research Project Title**
Novel Antimicrobial Peptide Antagonists of T-Lymphocyte Migration for Targeting Inflammatory Skin Diseases

**Principal Investigator**
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**Project Description**
Immune cells, in particular circulating and skin resident T-lymphocytes, are key players in orchestrating extrinsic mechanisms of peripheral tolerance and skin-specific autoimmunity (e.g., psoriasis). Drugs or reagents that can selectively alter T-cell migration thus represent a promising class of the anti-inflammatory therapy. Given the need for a new class of such reagents, a number of molecules are being investigated for their potential to block unwanted T-cell trafficking causing chronic inflammation and autoimmunity, and possibly cancers and infectious diseases. Antimicrobial peptides (AMP) are effector molecules of innate immunity. Recent evidence suggests multifunctional roles for AMPs in inflammation and in antigen-driven immune responses. The overall goal of this interdisciplinary study is to identify novel, non-toxic AMPs that can selectively modulate T-cell motility for targeting inflammatory skin conditions.

The student will perform multimodal screening assays for a novel series of AMPs that affect T-cell polarization, adhesion, migration or effector functions (aim1). The identified migration-inhibitory peptides will then be subjected to more detailed cellular, biochemical, molecular, phenotypic, imaging and bioinformatics characterization to define their mechanisms of action (aim2). Selected novel peptides will be purpose-engineered for tissue-specific topical and transdermal delivery (e.g., use of micro-needles) and to improve their targeting efficacy against inflammatory skin diseases utilizing advanced bioengineering and nanotechnology approaches (aim3).

The student will work as a team with the co-supervisor, collaborators, clinicians and other laboratory members. He/she will gain specialized training in AMP design, synthesis and engineering in addition to learning T-cell biology, immunology and cell signalling, with techniques to include cell culture, microscopy, High Content Analysis, small animal models, molecular targeting, cellular, molecular, biochemical and metabolic assays. Based on this innovative research, the student will write scientific papers and potential intellectual property documents that will form the basis of his/her PhD thesis.
Contact Us

If you have questions regarding this project, please email the Principal Investigator.

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