BCHM 421/422 Project – 2023/2024

Project Outline: This project will define the role of a cluster of microRNAs (miRNAs) in regulating the growth and invasive properties of cutaneous melanoma tumour cells. Expression of the Chromosome 19 miRNA cluster (C19MC) is normally restricted to placenta and some stem cell populations. However, the Craig lab identified several melanoma cell models that express C19MC at high levels (1), and we are currently using genome editing approaches to define the function of C19MC miRNAs and their mRNA targets that regulate melanoma cell growth and invasiveness.

Supervisor: Andrew Craig

Project Title: Genome editing studies of C19MC+ melanomas to identify functions and targets of C19MC miRNAs

Project Goals: 1) Develop CRISPR/Cas9-mediated knockout (KO) of C19MC in melanoma models, 2) Define effects of C19MC KO on melanoma cell growth and motility/invasion

Experimental Approaches: The student will learn how to culture human melanoma cell lines, to safely prepare lentiviruses encoding a CRISPR/Cas9-based system to KO C19MC expression in melanoma cell lines. They will test isogenic control and C19MC KO melanomas for effects on cell growth rates and motility/invasion using an IncuCyte Zoom system. The student will also profile expression changes in all miRNAs (miRNAseq) and mRNAs (RNAseq) to identify potential gene expression programs regulated by C19MC. The student will select some mRNA targets for validation at the protein level using immunoblot assays. If time permits, the isogenic cell lines will also be injected into immune compromised mice to test effects of C19MC KO on melanoma tumour growth and metastasis in vivo.

References:

1. https://pubmed.ncbi.nlm.nih.gov/32474365/
2. https://www.ncbi.nlm.nih.gov/pubmed/29112174
3. https://www.ncbi.nlm.nih.gov/pubmed/31287992
4. https://www.ncbi.nlm.nih.gov/pubmed/29673952
5. https://www.ncbi.nlm.nih.gov/pubmed/29935234