Department of Molecular and Cellular Biology

Graduate Seminar MCB*6500

Friday, January 20, 2023 @12:45 p.m.

presented by:

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"Effect of intestinal stressors on the growth and metabolic profile of Lachnospiraceae isolates of the human gut microbiome"

The human gut microbiome contributes to numerous health benefits within the host. One of these benefits is colonization resistance (CR), which functions to prevent the establishment of pathogenic bacteria. Unfortunately, perturbations of the gut microbiome that lead to dysbiosis can limit the effectiveness of CR, leaving the host susceptible to infection. Therefore, to prevent infection, the restoration of CR is currently under investigation. One restoration method is the use of biotherapeutics, which is a safe and well-defined consortium of bacteria. A prime candidate for inclusion in biotherapeutics is the Lachnospiraceae family. Unfortunately, little is known about the stress tolerance of this family. This information is vital when developing biotherapeutics as both the healthy and dysbiotic gut environments present various stressors which the candidates must be able to resist. Common stressors of the gut environment include: bile acid, short-chain fatty acids (SCFAs) in acidic conditions, osmotic, oxidative and heat stress. This thesis project will focus on determining how human donor-derived isolates of the Lachnospiraceae family resist these stressors. To determine this, a high throughput assay will be developed to generate growth patterns of isolates under various stress conditions. Further, the resistance patterns will be correlated with the annotated whole-genome sequences of the isolates to determine the genetic basis for stress resistance. Finally, the metabolic profile changes of isolates exposed to stress will be investigated utilizing gas chromatography-mass spectrometry. Overall, this research project will determine the stress resistance of isolates of the Lachnospiraceae family to infer their candidacy as biotherapeutics.