Department of Molecular and Cellular Biology

Graduate Seminar MCB*7500

Friday, June 2, 2023 @1:30 p.m.

presented by:

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" Investigating carbohydrate utilization in the *Lachnospiraceae* family of the human gut microbiome"

Diet is a primary driver of the human gut microbiota's composition. The survival of microbes which inhabit the gut depends on their efficiency in utilizing limited nutrients compared to competitors. The use of these nutrients forms distinct niches within the gut environment. Identifying specific microbes and their carbohydrate utilization patterns is pivotal in understanding the impact of dietary carbohydrates on the abundance of microbes and their subsequent impact on the host's physiological state. These patterns are particularly well understood within gut Gram-negative anaerobic bacteria. However, Gram-positive bacteria possess a different cell membrane structure, which requires different enzymatic systems and processes to utilize simple and complex carbohydrates. As a result, the exact mechanisms and specific carbohydrate sources utilized across gut Gram-positive anaerobic bacteria are relatively unknown. The proposed project aims to determine the utilization of simple and complex carbohydrates in isolates of the Gram-positive *Lachnospiraceae* family derived from the human gut microbiota. Individual isolates will be screened for carbohydrate utilization through in vitro and in silico analysis to identify intra- and inter-specific variation. GC-MS and RNA-sequencing methods will then be used to determine the mechanistic basis of these patterns. Finally, carbohydrate supplementation will be employed to enhance the growth of specific *Lachnospiraceae* isolates within a complex community system. This research will gain insight into carbohydrate utilization of gut Gram-positive anaerobic bacteria and the methods that can select for their increased growth, which is essential for developing therapeutic treatments to restore a healthy gut microbiota.