Presenter: Kris Martens

Poster Title: Metagenomic sequencing detects injury-specific changes to the microbiome 30 days following traumatic brain injury in rodents

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Abstract:

Traumatic brain injury (TBI) increases risk for psychiatric disease and exacerbates related symptoms such as risky decision-making and impulsivity. Impaired monoamine neurotransmission is a likely contributor to such symptoms, with serotonin signaling contributing to impulsive dysfunction and impaired decision- making. Despite this knowledge, precisely why these systems are vulnerable to TBI is unknown. Emerging data indicate a role for the gut microbiome. Gut dysbiosis occurs rapidly after TBI and may persist for years in patients.

In a previous study, our lab manipulated the microbiome of rodents using antibiotic dysbiosis. We then assessed function. The findings from the study showed a delay in the onset of TBI symptoms in the antibiotic cocktail group pointing to a potential causal role for the gut microbiome in psychiatric disease following TBI. 16S amplicon-based sequencing identified broad changes in the microbiome but could not identify species-level information and injury-specific differences resolved by 14 days post injury. To better understand the mechanisms at play, we performed metagenomic shotgun sequencing. From these data, we were able to construct bacterial metagenome-assembled genomes (MAGs) to determine changes occurring at key time points post injury and at the species level. The results of this study showed that TBI and antibiotics differentially affected the prevalence of multiple MAGs. These differences persisted 30 days following injury. Of particular interest to our lab, sequencing identified several MAGs associated with behavioral performance even after accounting for manipulations of TBI and antibiotics identifying potential therapeutic targets in the gut.