The Effect of Probiotics on Serotonin Signaling in the Onset of DSS Colitis in Mice

Serotonin (5-HT) and its reuptake transporter, SERT, are essential for many gastrointestinal functions. Numerous gastrointestinal conditions including irritable bowel syndrome and colitis have altered serotonin signaling, abnormal intestinal microbial profiles, and increased pro-inflammatory cytokine expression. Probiotics have long been used to help treat such disorders. The purpose of this study is to examine the effect of probiotics on serotonin signaling in the gut, specifically to see if probiotics impede the onset of colitis through modulation of serotonin signaling. Mice will be randomly assigned to four groups: a control given maltose vehicle, one given the probiotic in a maltose suspension, one with induced colitis and given the maltose solution, and one with induced colitis and given the probiotic solution. After the animals are humanely euthanized, samples of each colon will be analyzed for serotonin content, SERT and serotonin expression using immunohistochemistry, macroscopic damage score, histological damage score from hematoxylin and eosin stained sections, and expression of transcript of SERT, 5-HT and pro-inflammatory cytokines IL-6, TNFα, and IL-1β using qPCR. It is hypothesized that the probiotics will have a significant effect on the onset of colitis through regulation of serotonin signaling, with an increase in SERT expression in inflamed preparation. If the results are as expected, this study could help to explain the way in which the composition of the microflora of the gut alters intestinal serotonin signaling.