FINAL REPORT

Understanding the Relationship between Intestinal Bacteria and Inflammatory Bowel Disease (IBD)

Caroline Mansfield, PhD, The University of Melbourne, Australia, D18CA-045

RESULTS: Researchers map microbiome in dogs with canine inflammatory disease
Morris Animal Foundation-funded researchers at the University of Melbourne, Australia, studied if specific gut bacteria can drive or exacerbate intestinal inflammation in dogs with inflammatory bowel disease or chronic enteropathy. Their findings could inform continuing studies on how the gut microbiome may be manipulated for novel treatments as well as inform the development of new diagnostics.

22 dogs were successfully enrolled and completed the longitudinal clinical trial. At the time of enrollment, blood fecal and intestinal samples were taken (biopsy and brush cytology). Throughout the treatment phases, as well as clinical assessment, stool samples were collected. When treatment was either deemed to be successful or needed to be changed, blood samples also were obtained.

The team noted each dog showed high variability between each sample in their microbiome- reflecting the highly unstable microbiota that exists with inflammatory bowel disease. Each dog has their own individual microbiome, suggesting generalizations should not be made in diagnosis or treatment based on assumptions about what microbiome shifts may be present.

While there were no notable differences in bacterial families at different stages of the disease (active versus remission), one bacterial family, *Ruminococcaceae,* was more abundant in certain forms of the disease in all active stages. Data analysis also confirmed a decrease of one bacteria genus called *Faecalibacterium* and an increase in *E. coli* in the course of the disease. Also a genus of bacteria with probiotic characteristics called *Blautia* was associated with disease remission. Interestingly, clinical remission is not always associated with complete recovery of the gut microbiome, at least in the short-term observational period of this study.

Of the 22 dogs that completed the study, 12 dogs responded to diet changes, 7 dogs required fecal microbial transplants in addition to diet changes and 3 dogs required, diet, fecal microbial transplants and immune suppression for successful resolution of their clinical signs. This suggests most dogs with inflammatory bowel disease respond well to dietary changes alone, regardless of length of clinical signs or previous treatment with diets, anti-microbials or probiotics. Response in the diet-only changes was long-term and rapid.

For dogs receiving fecal microbial transplants combined with dietary changes, this group responded well to one or two treatments. This suggests that transplants are successful in resetting the microbiome. However, it is unknown if this is through the actions of the bacteria themselves or via postbiotics (specific products produced by bacteria). Data on the study dogs also suggests that antimicrobial treatment is not necessary in the management of inflammatory bowel disease.

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Future work by this team includes assessing the metabolomics, looking for disease and diagnostic fingerprints within the dogs with inflammatory bowel disease. This will help determine whether a postbiotic would be a possible therapeutic intervention. Findings also could reveal if a signature metabolomic profile corresponds to treatment efficacy or disease prognostication.

Thanks to the generous sponsors of this study!