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Correlating Stool Deposition and Gut Health Dynamics with Microbial Diversity Alterations

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Abstract
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Abstract

Background: Dysbiosis or altered gut microbiome (decrease in commensal bacteria, increase in opportunistically pathogenic bacteria), is a contributing factor in pathogenesis of Inflammatory bowel diseases (IBD) and irritable bowel syndrome (IBS).[1] Analysis of human fecal samples is reflective of gut microbiome diversity, and gut health.

Methods: Shotgun metagenome sequencing of consecutive samples illustrated microbiome differences within single defecation when polar sides of one fecal sample were tested. Fecal samples from an IBS volunteer over 48 hours were analyzed for microbial diversity changes. We divided each fecal deposition into proximal (P) and distal end (D) for analysis. The first day of sample collection was day 0. Intensity of color change on myeloperoxidase assay qualitatively accounted for sample-associated inflammation associated.

Results: Remarkable pinpoint differences due to specific bacterial species (e.g., *Bacteroides plebeius*, *Lachnospiraceae bacterium 1_1_57FAA*) in polar ends of single fecal deposit were noted. OneCodex® (transnetyx) generated statistical data. Over 48 hours, specific bacterial species were enriched/ deficient at distal end (1D) of fecal deposition collected on day 1 compared to proximal end of same sample (1P). This also contrasted with sample collected on day 0 (0P, 0D). The 1D sample showed abundance of *Bacteroides plebius* and decreased population of *Lachnospiraceae bacterium 1_1_57FAA* compared to proximal end of same sample, or samples from day 0. Myeloperoxidase assay demonstrated that 1D had least inflammation of all samples (0P, 0D, 1P, 1D) indicating that microbiome shift correlated with inflammation and with symptoms of donor who felt worse (bloating/cramping) on day 1.

Conclusion: Gut microbiome is a measure of gut health. Microbiome rapidly shifts over short intervals influenced by external factors such as diet, stress correlating with gut inflammation and with gut-associated symptoms: diarrhea, constipation, bloating. Therefore, fecal transplantation from healthy donors may help IBS/IBD symptoms by restoring microbial homeostasis.