

Link found between stress and Crohn's disease

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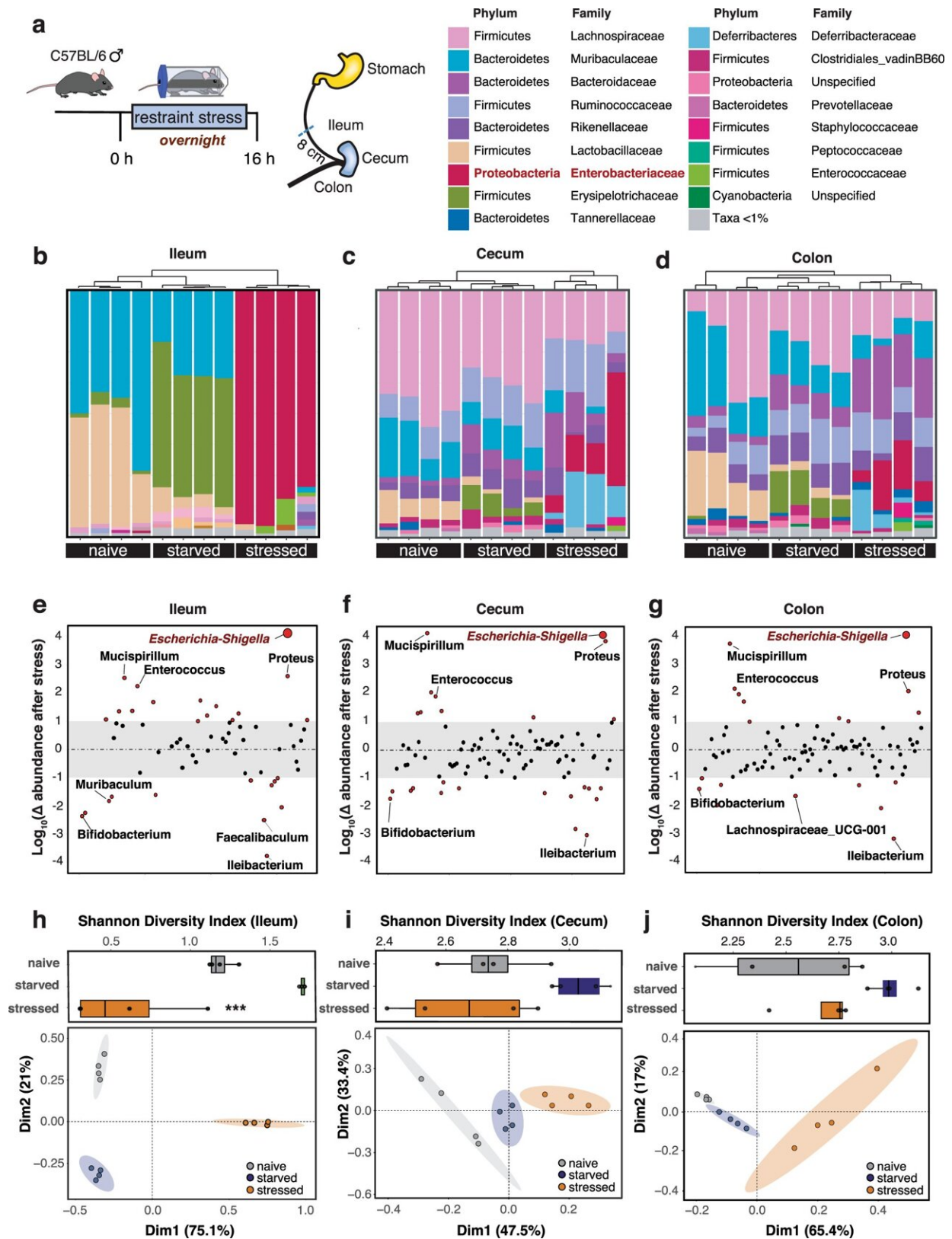


Fig. 1: Psychological stress promotes the expansion of ileal Enterobacteriaceae. a

Schematic representation of the stress protocol and legend of bacterial phylum and family. Taxonomy plots of 16S rRNA sequencing of the ileal (b), cecal (c), or colonic (d), contents of naive (n = 4), starved (food and water deprived, n = 4), and restraint-stress (n = 4) exposed mice. Analysis of the proportional change in species abundance seen following restraint stress in the ileum (e), cecum (f), or colon (g). Change was calculated based on the relative proportional change of species abundance in stress mice, compared to the species abundance in the starved control. Shannon diversity index and principal component analysis of ileal (h), cecal (i), or colonic (j), 16S rRNA sequencing from naive (n = 4), starved (n = 4), and stress (n = 4) mice. PCA plots display a 95% confidence interval in the ileum, and 80% confidence interval in the cecum and colon. For Shannon diversity index, significance between starved and stressed mice $p = 0.0002$ was determined by one-way ANOVA. Box plot represents median and 25th and 75th percentiles—interquartile range; IQR—and whiskers extend to maximum and minimum values, adjusted for multiple comparisons (* $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$). Credit: DOI: 10.1038/s41467-021-26992-4

A team of researchers from McMaster University, the Michael G. DeGroote Institute for Infectious Disease Research, and the Farncombe Family Digestive Health Research Institute, has found a link between stress and Crohn's disease. In their paper published in the journal *Nature Communications*, the group describes research they conducted with stressed mice and measurements of invasive gut bacteria and how their findings related to Crohn's disease flareups.

Crohn's [disease](#) is an autoimmune disease in which needless inflammation in the lining of the intestines leads to problems for the [epithelial cells](#), which in turn leads to pain, problems eating and also blood and/or mucus in stool samples. For people without the disease, signals from the [immune system](#) keep the lining healthy by properly secreting mucus, which repels harmful microbes. Prior research has suggested that one of the main contributors to flareups of the disease is

an imbalance of bacteria in the [gut microbiome](#). In this new effort, the researchers have found that stress can lead to such an imbalance, which in turn leads to a flare-up.

The work involved stressing lab mice (by restraining them overnight and/or by not feeding them for 16 hours) and then measuring the levels of several types of bacteria in their guts. The team also measured stress hormone levels.

In looking at their data, the researchers found a connection between increases in stress hormone levels and increases in some types of gut bacteria, particularly Enterobacteriaceae, which include E. coli. The researchers suggest that stress leads to a weaker immune response in the gut, allowing more harmful types of bacteria to proliferate. And when such gut bacteria multiply, they can do harmful things to the gut lining, such as incite ulcers and other lesions.

The researchers found that when they gave the test mice drugs to suppress the production of stress hormones, immune response improved, bad bacteria numbers dropped and the symptoms of Crohn's disease lessened. They note that their work is still in the preliminary stages with much more work to be done—but they also suggest that their work could someday lead to new ways to treat people suffering from Crohn's disease.

More information: Christopher R. Shaler et al, Psychological stress impairs IL22-driven protective gut mucosal immunity against colonising pathobionts, *Nature Communications* (2021). [DOI: 10.1038/s41467-021-26992-4](https://doi.org/10.1038/s41467-021-26992-4)

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