

Another important area of study is the relationship between stress, microbiota, and behaviour [9,10]. Recently, evidence supporting this suggestion was provided by a clinical study that observed elevated serum levels of IgM and IgA against the lipopolysaccharide (LPS) of gut commensals in patients with depression. Using a mouse model of induced anxiety and depression via olfactory bulbectomy, investigators showed that elevated corticotropin-releasing hormone (CRH) expression, increased c-Fos activity, serotonin levels, and colon motility were associated with an altered intestinal microbiome [11], which was suggested to be due to the activation of the hypothalamic pituitary adrenal (HPA) axis [11]. The addition of rifaximin treatment in stressed rats significantly decreased the total bacterial load, altered the microbial community leading to a dominance of Lactobacilli, and prevented the increase of gut permeability induced by the stress trials, a finding that suggests the antibiotic protects intestinal barrier function by modulation of the gut microbiome [14]. Analysis of the composition of luminal bacteria using fluorescence in situ hybridization revealed that stress alone resulted in a loss of Verrucobacteria, a twofold increase in Clostridium spp., and the added presence of a low abundance population of Lactobacillus/ Enterococcus spp. and significant increases in Verrucobacteria, Enterobacteria, and Lactobacillus/Enterococcus spp. population. [12]