

Gut microbiota as a target for supplementary therapy of chronic stress-related depression

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Text of the abstract

Different stressors affect the composition of the gut microbiota and vice versa, gut microbiota changes can affect emotional behavior and related brain systems. The theory that altered communications between the gut microbiome and the brain may play an important role in human brain disorders has recently taken into consideration.

Chronic stress is a major environmental factor to trigger depression and also induce dysbiosis in microbiome. Based on these facts, we address the following questions: How chronic stress affects gut microbiota in mice? How the gut-specific antibiotic (rifaximin) affects stress-induced changes in gut microbiome and if antibiotic treatment restores stress-induced changes in host behavior.

In our experiment, mouse pups were separated from their mother (maternal separation MS) for 12 days every day for 3 hours and later they were exposed to chronic variable stress (CVS) in adulthood. In CVS, mice were stressed two times every day by different stressors. During CVS, half of the mice received rifaximin, a non-absorbable antibiotic. At the end of the CVS, behavior tests were performed. Composition of the gut microbiome was analyzed in colon samples by RT-PCR based on 16S rRNA. Plasma corticosterone level was measured by RIA and expressions of selected genes were analyzed from colon tissue by RT-PCR.

In the open field behavior test, stressed mice display increased anxiety and locomotor activity. Chronically stressed mice had decreased sucrose preference, which indicates anhedonia.

Plasma corticosterone level was elevated in the stressed groups. Amount of different taxon were increased in colon microbiome of the stressed mice, however rifaximin treatment normalized the number of Clostridia. Moreover, tight junction proteins' mRNA expressions were elevated in response to antibiotic treatment.

In conclusion, chronic stress changed the gut microbiome and behavior. Although, rifaximin reduced the level of Clostridia and induced tight junction proteins' expression in colon, suggesting decreased gut permeability.

Data of the presenter

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