1. **No.**

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2. **Title**

   Role of Alpha-7 Nicotine Acetylcholine Receptor in the Pathogenesis of Neuropsychiatric Disorders: Focus on Gut-mictobiota-brain Axis

3. **Period**

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4. **Summary**

The α7 subtype of the nicotinic acetylcholine receptor (α7 nAChR: coded by Chrna7) regulates the cholinergic ascending anti-inflammatory pathway involved in depression. We previously reported that Chrna7 knock-out (KO) mice show depression-like phenotypes through systemic inflammation. In this study, we investigated whether fecal microbiota transplantation (FMT) from Chrna7 KO mice causes depression-like phenotypes in mice treated with an antibiotic cocktail (ABX). Chrna7 KO mice with depression-like phenotypes show an abnormal gut microbiota composition, although the alpha diversity and beta diversity were not altered. FMT from Chrna7 KO mice caused depression-like phenotypes, systemic inflammation, and downregulation of synaptic proteins in the prefrontal cortex (PFC) in the ABX-treated mice compared to FMT from the control mice. The boxplots representing the FMT group from the KO mice were distanced from those representing the FMT group from the control mice in an unweighted UniFrac distance analysis. We found differences in abundance for several bacteria in the FMT group from the KO mice at the taxonomic level when compared with the other group. Interestingly, subdiaphragmatic vagotomy significantly blocked the development of depression-like phenotypes in the ABX-treated mice after FMT from Chrna7 KO mice. These data suggest that FMT from Chrna7 KO mice produce depression-like phenotypes in ABX-treated mice via the subdiaphragmatic vagus nerve. The brain–gut–microbiota axis association with the subdiaphragmatic vagus nerve plays an important role in the development of depression.