1. No.
   2023Y002

2. Title
   Effects of Carbon Monoxide on Transformation of Intestinal Flora and Therapeutic Application for Disorders

3. Period
   2023-2025

4. Summary

   It has been suggested that smoking heated tobacco containing carbon monoxide (CO) and induction of heme oxygenase-1 (HO-1), which is involved in the production of endogenous CO, may alter the gut microbiota. However, until now, there have been no reports directly demonstrating the relationship between the HO-1/CO system and the gut microbiota. In this study, in order to directly clarify the effect of CO on changes in the gut microbiota, we conducted a longitudinal analysis and comparison of changes in the gut microbiota in HO-1 knockout mice, which do not produce endogenous CO, and wild-type mice, which do. As a result, up to 20 weeks of age, both the wild-type and HO-1 knockout mouse groups showed a high occupancy rate of the *Bacillota* and *Firmicutes* phyla, with the HO-1 knockout mice exhibiting a time-dependent increase in the occupancy rate of the *Bacillota* phylum. Additionally, in the HO-1 knockout group, 9 types of gut bacteria changed significantly at 5 weeks of age, 1 type at 10 weeks, none at 15 weeks, and 3 types at 20 weeks. However, all the altered gut bacteria were different from each other. Based on these results, it is suggested that the HO-1/CO system does not alter the major gut microbiota but can induce changes in several gut bacteria, and that these effects may depend on the duration of CO exposure. Furthermore, if the affected gut microbiota is closely associated with diseases, it is possible that such changes could influence the onset and progression of disease.