

Involvement of gut microbiome in the behavioral abnormality by early weaning

Kazutaka Mogi¹, Itsuka Kamimura¹, Eiji Miyauchi², Hiroshi Ohno^{2,3}, Takefumi Kikusui¹

¹*Dept. Animal Sci.Tech., School of Vet. Med., Azabu Univ.*, ²*Lab. Intestinal Ecosystem, Center for Integrative Med. Sci., RIKEN*, ³*Intestinal Microbiota Project, Kanagawa Institute of Industrial Sci.Tech.*

Mammalian infants heavily depend on their mothers, and mother-infant interactions greatly influence neurobehavioral development. We have shown that early weaning consistently affect the emotional development in mice. Early-weaned mice show increased anxiety-like behaviors, heightened hypothalamic–pituitary–adrenal axis activity, and prolonged reduction of the expression of brain-derived neurotrophic factor (BDNF) in the prefrontal cortex (PFC). Recently, we found that normalizing circulating corticosterone in early-weaned mice, either in adulthood or soon after weaning, ameliorated anxiety levels. Anxiety in early-weaned mice was also ameliorated by pretreatment with glucocorticoid receptor antagonist or BDNF into the PFC. These suggest that early weaning increased anxiety levels by modulating glucocorticoid and BDNF signaling in the PFC. As other mechanisms, we are now focusing on the gut microbiome. It has suggested that the gut microbiome does not only affect intestinal cells locally, but also impact the central nervous system. In this symposium, we would like to discuss our current study evaluating the developmental impact of the microbiome by analyzing offspring of germ-free mother mice orally administrated the fecal microbiome of early-weaned mice.