

## Minimum Flora for the Development of the Intestinal Mucosa in the Gut Ecosystem

Yoshinori Umesaki

Yakult Central Institute for Microbiological Research

1796, Yaho, Kunitachi-shi, Tokyo | 88-8850, Japan

### Summary

Intestinal flora strongly affects the cell composition and characters of the intestinal mucosa, and the immunological activity of the intestinal mucosa affects bacterial composition in the digestive tract. In this study, we aimed to clarify the structure of the intestinal flora responsible for the development of the immunological and physiological functions of the intestine. Gnotobiological experiments showed that a kind of non-cultivable bacteria called segmented filamentous bacteria (*Candidatus Arthomitus*) exclusively affect the immunological and physiological characteristics, such as the intraepithelial lymphocytes (IEL), IgA producing cells, and the columnner/goblet cell ratio in the small intestine. A limited number of clostridia greatly affect IEL and IgA producing cells of the large intestine. When both bacterial populations are associated with germ-free mice, the mucosal characteristics developed as observed in fecal flora-associated mice (conventionalized mice). The binding to the ileal epithelial cells for SFB and the production of bacterial metabolites such as short chain fatty acids for clostridia, respectively, may be key factors for the development of the intestinal mucosa. Human fecal flora (HF)-associated mice showed a marked difference in the characteristic of the intestinal mucosa, such as the expression of MHC class II molecules compared to conventionalized mice. However, an addition of SFB to the HF mice restores the expression of those molecules as observed in the conventionalized mice. Together, the both stimuli derived from SFB and clostridia, respectively, may be required for the development of the intestinal mucosa.