

KEYNOTE SPEAKER

Integrated multi-omics approach for understanding the gut ecosystem

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Abstract

Animal gut is colonized with a huge number of commensal bacteria; for example, the human colon is colonized with more than 100 trillions of commensal microbes classified into 500~1,000 species, collectively called gut microbiota. These microbes closely interact with the host to establish the unique and complicated gut ecosystem, which deeply impacts host physiology and pathology including host defense and immunity. However, the underlying mechanisms of how gut ecosystem influences host defense and immune system have poorly understood.

We have proposed an integrated multi-omics approach, where different levels of exhaustive analyses such as (meta)genomics, (meta)transcriptomics and metabolomics are combined. By applying the integrated multi-omics approach, we have shown that *Bifidobacterium*-derived acetate can modify gene expression of the colonic epithelium to confer resistance against enterohemorrhagic *Escherichia coli* O157, which ultimately protects mice from O157-infectious death. We have also found that butyrate produced by gut microbiota can enhance differentiation of colonic regulatory T (Treg) cells from naïve T cells, via epigenetic modification through its histone deacetylase inhibitory ability.

Multiple sclerosis (MS) is a demyelinating disease. While the precise cause is not clear, it is thought to be an autoimmune disorder including the host genetic factors and environmental factors; among the latter is the gut microbiota. We are studying experimental autoimmune encephalomyelitis (EAE), an animal model for MS with the integrated multi-omics approach, and the results will be discussed.

Biography

Hiroshi Ohno obtained his Ph. D as Dr. of Medical Science at the Chiba University, Japan in 1991. He is currently a Visiting Professor in both Yokohama City University and Chiba University, Japan. At present, he is also the Chief Scientist in the RIKEN Science Council, Wako, Japan; the Group Director of Laboratory for Intestinal Ecosystem, RIKEN Center for Integrative Medical Sciences, Yokoyama, Japan.