

Current Status of Gut Microbiota & Their Applications

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Recent research has identified the intestinal microbiota as an essential 'super organism', which is important to both health and disease. The gut microbiota are found to play a pivotal role in immune function, nutrition, physiology and host metabolism.

Development of next generation sequencing technologies as well as availability of powerful bioinformatic analysis tools provide new insights into the composition and structure of the human gut microbiota. With these newly developed technologies, we began to know that human gut host hosts up to 1000 bacterial species that encode about 5 million genes, perform many of the functions required for host physiology and survival. Gut microbial colonization begins immediately at birth, which colonization can be affected by a various stimuli, namely, diet, physical activity, travel, illness, hormonal cycles and therapies. Alteration of the microbiota and changes in its biodiversity (dysbiosis) can contribute to of a number of gastrointestinal (GI) and non-GI disorders. Examples of diseases associated with microbial dysbiosis include autoimmune and allergic diseases, obesity, inflammatory bowel disease (IBD), irritable bowel syndrome (IBS), hepatic encephalopathy and diabetes.

Even if associations of dysbiosis with the above mentioned illness/diseases do not reach a cause-effect relationships, great interests have been gradually developed to 'restore' the normal quality and quantity of the human gut microbial ecosystem. Different interventions including the prebiotics, probiotics, antibiotics, fecal material transplantation, or even oral capsules containing frozen fecal material have gradually emerged. These approaches aim to improve host-microbe symbiosis in the gut by combating overgrowth of opportunistic community members. They can also provide live micro-organism or metabolic substrates in order to promote growth and activity of beneficial species. Despite of the rapid accumulation of the related knowledge, to modulate the gut microbiota to gain a healthy status remained a great challenge in coming years.