Editorial

Gut Microbiota and Metagenomic Advancement in Digestive Disease

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Recent studies have made significant advances in understanding the mechanisms of gut microbiota involved in human health and disease [1, 2]. Now the gut microbiota has been recognized as a key player in a broad spectrum of human diseases from obesity associated liver and cardiovascular diseases to mental development and psychiatric diseases [3, 4]. Accordingly, modulations of gut microbial diversity and composition are expected to improve human health and to provide novel therapeutic modalities for human disease. The gut microbial modulators can be simply specific diets and drinks, natural tea and Chinese herbs, or specialized prebiotics and probiotics.

In this special issue, authors presented a number of very interesting studies on changes of gut microbiota in digestive diseases. These review and original articles of research and clinical studies cover a range of topics, including the pathogenesis of alcoholic and nonalcoholic fatty liver diseases (NAFLD), the outcome of intestinal bacterial translocation in advanced cirrhosis, the gut microbiota changes in an animal colitis model after treatment with a monoclonal antibody, and fecal microbiota transplantation (FMT) in elderly patients with refractory *Clostridium difficile* infection. In these articles, authors have described mechanisms of disease development as well as therapeutic effects of specific antibodies, probiotics, and FMT.

While we know the simple cause of alcoholic fatty liver disease (AFLD), its pathogenesis is complicated and it involves a wide range of changes in host metabolism and gut microbiota. Certainly, removal of the cause (alcohol abuse) is the first treatment for AFLD, and the use of probiotics can ameliorate its development as shown in recent clinical and animal studies [5–7]. Although sharing many pathological and clinical features with AFLD, NAFLD does not have a simple, single cause. Instead, NAFLD is the result of interactions between gut microbiota, host genetics, and diet. There have been a number of studies evaluating the effects and mechanisms of probiotics [8–10], natural tea [11, 12], and Chinese herbs/recipes [13, 14] on AFLD and NAFLD. These studies reported beneficial effects with promising perspectives for future development of novel therapeutic strategies.

However, in light of the nature of gut microbiota being highly diverse and constitutional, built during the early life of individuals, cautious optimism is necessary for any future therapeutic developments aiming at modulations of gut microbiota, as we do not yet know long-term effects from those initial efforts or indeed which of those microbiota and metabolomics changes are contributory, causative, or simply a cofounder in AFLD and NAFLD, or indeed any other condition. Thus far, it is not clear whether the modulations by specific diets and drinks including natural tea, even by probiotics, are able to change the constitutional nature of gut microbiota, although the relative abundance of microbial species is altered upon administrating modulators [12, 13, 15].

Moreover, current analytic strategies on metagenomics data are focused on major changes in gut microbial compositions and have not paid sufficient attention to or have even ignored the changes in minor species with less than 1% abundance. Furthermore, sampling of microbiota in intestinal lumen may not necessarily represent the mucosal portion or the whole population of gut flora [16]. In fact, the true signal and messengers governing the alterations of gut microbiota and host metabolism are largely elusive. Enteric short-chain fatty acids (SCFAs), such as acetate, propionate, and butyrate, are fermentation metabolites by intestinal bacteria. Recent studies have suggested a messenger role of SCFAs in several human diseases including metabolic syndrome [17] and autism [4]. In short, careful designs of future studies should take these factors and host genetic background under consideration to discover the real effectors and to discern the true effects of gut microbial modulators in alcoholic and nonalcoholic fatty liver disease and other human diseases.

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