

## GUT BACTERIOPHAGES AND ITS IMPLICATIONS IN HEALTH AND DISEASES

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Dear Sir,

The human gut microbiota comprises of bacteria, fungi, archaea and viruses which are termed as bacteriophages and these densely colonizing microorganisms interact with each other and human as a host.<sup>1,2</sup> According to recent study, the human gut nurtures abundant bacteriophages along with giant and plant-derived viruses. Bacteriophages show abundant diversity of gut virobiota. Bacteriophages play as regulators in the gut for bacterial population and it also acts as an immunomodulatory role in the gut. Studies showed that phages are involved in the onset of inflammatory bowel diseases (IBD) but also acts as a protective barrier in the gut of patients suffering from IBD. A recent study suggest that bacteriophages may generate beneficial effects of Fecal Microbiota Transplantation (FMT).<sup>3</sup> On contrast, according to the findings of recent study, bacteriophages are considered to be a new mammalian pathogen which leads to the possible development of diseases due to increased intestinal permeability such as cytokines causing inflammation, plasma endotoxin concentration, lactulose mannitol ratio.<sup>4</sup>

The impaired gut permeability leads to dysbiosis in the intestine and the underlying mechanisms and dynamics are still unknown. But, the use of phage transplant can restore the health which indicate that bacteriophages can be applied in the treatment of diseases.<sup>5</sup> According to the evidence from metagenomic studies on gut virome, there is a slight possibility of future therapeutic use of modulating gut virome in treating human diseases. Engineering of gut virome can be done through diet. Beside diet, use of probiotic and pre biotic could also affect the gut microbiome composition and could possibly target in the application such as preventing viral gastroenteritis.<sup>6</sup> Another therapeutic approach for prevalence of antibiotic-

resistance strains of pathogenic bacteria is the use of engineered bacteriophages which will actively reduce the proliferation of pathogenic antibiotic resistance strains. These bacteriophages alone or in combination with antibiotics can reduce the growth of pathogenic antibiotic resistance strain.<sup>7</sup> Larger studies are needed on the composition of gut virome through metagenomic, meta-transcriptomic and metabolomic approaches which may expand our knowledge on the importance of phages in the human gut microbiome. More solid interventional studies of human and animal on phage modulation are needed to provide a compact structure for future therapeutic implications.

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