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The Beneficial Effects of Postbiotics on Human Health

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Postbiotics are non-viable bacterial products or metabolic products from microorganisms that have beneficial biological activities on the host. Postbiotics include cell originated molecules and metabolites such as cell-free supernatant (CFS), extracellular vesicles (EVs), cell lysate, short chain fatty acids (SCFAs), exopolysaccharides (EPSs), heat-killed cell and metabolites from fermented products. Several studies reported beneficial effects of cell originated molecules. For example, lysate of *Lactobacillus plantarum* showed protective effects against unbalanced immune system and damage to the histological mucosa induced by dextran sulfate sodium colitis. In other study, heat-killed *L. casei* protects immunodeficient mice against candida albicans colonizing. *L. paracasei* derived EVs attenuate LPS-induced inflammation both *in vivo* and *in vitro* experiments. EPSs produced by *L. coryniformis* have antioxidant activity and biofilm-inhibiting properties *in vitro.* Metabolites generated by fermentation, also showed remarkable results. A clinical trial had compared the effects of fresh and fermented Kimchi, a traditional Korean food, in overweight patients with a significant decrease in waist-hip ratio, blood pressure, fasting blood glucose and changes of metabolic pathway related gene expressions only in the fermented kimchi group. *L. gasseri* fermented with *Cudrania tricuspidata* leaf extract showed anti-inflammatory effects in an azoxymethane/dextran sulfate sodium-induced colorectal cancer mice model. Treatment of metabolites from glycated milk protein fermented with *L. rhamnosus* in an unpredictable chronic mild stress mice model attenuated intestinal inflammation and brain injury by reducing anxiety levels in behavioral tests. These studies imply that postbiotics has potential as novel prophylactic and therapeutic agents against various diseases. However, applications of postbiotics have been limited due to the lack of knowledge on its mode of action. Recent studies reveal that gut microbiome (GM) modulation could be involved in the actions of postbiotics. The GM is a key mediator of host metabolism, which its effect is not only limited to the gastrointestinal tract, but also affects various organs beyond the gut such as the heart, bones, liver, reproductive organs, and the brain. Due to its linkage to various organs, numerous studies suggest that postbiotics effect on gut microbiota composition may lead to alleviation of disease symptoms. Future studies on identifying the mechanisms of postbiotics shall expand the usage of postbiotics