

The Mechanism of *Parabacteroides goldsteinii* on Immune Modulation and Anti-Obsoogenicity

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Abstract : It is urgent that novel anti-obesity measures that are safe, effective and widely available are developed for counteracting the rapidly growing obesity epidemics. In the present study, we show that a probiotic bacterium *Parabacteroides goldsteinii* screened through culture under the high molecular weight polysaccharides prepared from two iconic medicinal fungi, the *Ganoderma lucidum* and the *Hirsutella sinensis*, reduced body weight by ca. 20% in high-fat diet (HFD)-fed mice. The bacterium also decreased intestinal permeability, metabolic endotoxemia, inflammation and insulin resistance. Notably, oral administration of live, but not high temperature-killed, *P. goldsteinii* to HFD fed mice considerably reduces weight gain and obesity-associated metabolic disorders. A three months feeding of the mice with *P. goldsteinii* did not show any aberrant side effects, indicating the safety of this bacterium. Transcriptome analysis indicated that *P. goldsteinii* enhances immunity in resting dendritic cells, but reduces inflammation in lipopolysaccharide (LPS)-induced dendritic cells. On top, Naïve T-cells were skewed towards regulatory T-cells after encountering with dendritic cells (DCs) pretreated with *P. goldsteinii*. These results indicated *P. goldsteinii* showed anti-inflammatory effects and can work as a potential probiotic ameliorating obesogenicity and related metabolic syndromes.

Keywords : *Parabacteroides goldsteinii*, gut microbiome, obesity, immune modulation

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