

**Abstract Submission No. : IL-9013**

## **The possibility to modulate renal diseases via microbiome therapy**

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The possibility to modulate renal diseases via microbiome therapy

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Gut microbiota plays a critical role in maintaining human physiology. A number of recent studies demonstrated that gut microbiota can modulate immune responses affecting on both distal organs, such as the brain, and proximal organs, such as the intestine and the liver. Although there are a couple of studies investigating on the linkage between the gut microbiome and the kidney, the effect and underlying mechanism of gut microbiota on kidney via gut-kidney axis has not been well characterized yet. Metabolites produced by gut microbiota can circulate through blood vessels and controlling immune-metabolism in the kidney. For example, gut microbiota can transform TMA (trimethylamine), indole, and *p*-cresol into TMAO (trimethylamine *N*-oxide), indoxyl sulfate, and *p*-cresyl sulfate. These microbial-derived metabolites can evoke renal inflammatory responses and act as renal toxins. These metabolites regulate the population of intestinal immune cells, particularly Th17 responses, and the activated immune cells are recruited into the kidney and participate in the inflammation leading to nephropathies. Therefore, microbiome therapeutics can be potentially used as novel drugs for improving kidney health.