The possibility to modulate renal diseases via microbiome therapy

Gwang Pyo Ko

Seoul National University, Korea, Republic of

Seokcheon Song1, Seung Hyeok Han2,3, Tae-Wook Nam4, GwangPyo Ko1,5

1Department of Environmental Health Sciences, Graduate School of Public Health, Seoul National University, Seoul, 08826, Republic of Korea
2Department of Internal Medicine, Institute of Kidney Disease Research, Yonsei University College of Medicine, Seoul, Republic of Korea
3Renal Electrolyte and Hypertension Division, Perelman School of Medicine, University of Pennsylvania, Philadelphia, Pennsylvania
4Kobiolabs, Seoul, Republic of Korea
5Institute of Health and Environment, Graduate School of Public Health, Seoul National University, Seoul, 08826, Republic of Korea

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.