

Chronic kidney disease alters intestinal microbial flora, study finds

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(Medical Xpress)—Chronic kidney disease changes the composition of intestinal bacterial microbes that normally play a crucial role in staving off disease-causing pathogens and maintaining micronutrient balance, according to UC Irvine researchers.

This profound alteration of the gut [microbial population](#) may contribute to the production of uremic toxins, systemic and local [inflammation](#), and nutritional abnormalities present in patients with advanced [renal disease](#), they said.

Study leader Dr. N.D. Vaziri of the UCI School of Medicine's Division of Nephrology & Hypertension noted that consumption of high-fiber foods and better control of uremia – a disease common in kidney failure – by diet and dialysis may improve the composition of gut [microbes](#) and the well-being of patients.

The researchers studied microbial DNA extracted from the stool samples of a group of renal failure patients and healthy control individuals. They found marked differences in the abundance of some 190 types of bacteria in the gut microbiome of those with kidney disease – and confirmed the results in a concurrent study of rats with and without [chronic kidney disease](#).

Vaziri explained that nitrogen-rich waste products – particularly urea and uric acid, which are usually excreted by the kidneys – accumulate in the body fluids of patients with renal failure. This leads to the massive

release of these waste products in the gastrointestinal tract, supporting the growth and dominance of microbial species that can utilize these compounds.

The impact of this flooding of the gut by nitrogenous waste products in patients with advanced [kidney disease](#), Vaziri added, is compounded by dietary restrictions on fruits and vegetables, which contain the indigestible fibers that favorable gut microbes feed on. This is because fruits and vegetables contain large amounts of potassium, a mineral normally excreted by the kidneys. In cases of renal failure, potassium levels are high, increasing the risk of cardiac arrest.

One solution, Vaziri said, is to provide longer, more frequent dialysis treatments. This would let more potassium be removed by dialysis and allow for more potassium in the diet. Alternatively, packaged fiber foods that do not contain potassium could be used as a dietary supplement.

Dr. Madeleine Pahl, Dr. Jun Yuan and Dr. Zhenmin Ni of UCI; Jakk Wong, Yvette Piceno, Tien-Hung Nguyen and Gary Andersen of Lawrence Berkeley National Laboratory; and Todd DeSantis of San Bruno-based Second Genome participated in the study, which appears online in *Kidney International*.

The work adds to a growing body of evidence pointing to the role of gut bacteria in disease and health. Recent research by other groups has identified changes in the [composition](#) of intestinal microbial flora in people with diabetes, colorectal cancer, obesity and inflammatory bowel disease, among other conditions.

More information: www.nature.com/ki/journal/vaop...full/ki2012345a.html

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