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The right diet can safeguard against acute kidney injury

Scientists at the University of Cologne have shown in an animal model that certain diets protect the kidneys from damage, promising successful clinical application / publication in 'Translational Research'

A research team led by Professor Dr Roman-Ulrich Müller has established that four out of six different nutritional strategies prevent acute kidney injury in the mouse model. Furthermore, the team identified a potential mechanism protecting the organs in their interdisciplinary, translational study. This is the first step towards transferring the results from bench to bedside. The research was conducted at the Department II of Internal Medicine, the CECAD Cluster of Excellence in Aging Research, and the Center for Molecular Medicine Cologne (CMMC) at the University of Cologne. The article 'A systematic analysis of diet-induced nephroprotection reveals overlapping changes in cysteine catabolism' has been published in *Translational Research*. The study was made possible by the Else Kröner-Fresenius Foundation.

Acute kidney injury is a very common and dangerous disease, often leading to hospitalization and death. As an aging-associated disease, cases of acute kidney injury have increased rapidly in recent years. Despite the immediate danger to patients, there are currently neither therapeutic nor preventive measures. However, more and more data are available showing how nutrition and especially specific diets can help to protect organs from damaging influences such as insufficient blood flow, infections, side effects of drugs, or surgery. Still, a direct comparison of different diets in the prevention of kidney damage has not been available until now.

The six diets tested are: (1) Fast Mimicking Diet (FMD), also known as mock fasting, (2) ketogenic diet, a high intake of fats and reduced intake of carbohydrates, (3) reduced intake of the branched-chain amino acids valine, leucine, and isoleucine, (4 and 5) two diets with restriction of the sulphur-containing amino acids methionine and

cysteine, and (6) calorie restriction with a generally reduced intake of calories. The researchers were able to show that FMD, sulphur amino acid restriction, and calorie restriction were effective in protecting against kidney damage in animal models. A common feature of all diets is not only the already known lifespan extension in various model organisms, but also their availability in human medicine. Their preventive use in the treatment of acute kidney injury can therefore make a substantial contribution as a new therapeutic option for patients.

‘The problem of not having an effective therapeutic approach for acute kidney damage is something we encounter every day in the clinic. We are excited about the great positive effects the diets have in the animal model,’ said Professor Dr Roman-Ulrich Müller, senior physician at the Department II of Internal Medicine at University Hospital Cologne.

In addition, the scientists were able to identify a possible mechanism for how the diets protect against kidney damage. ‘The tested approaches show overlapping changes in the oxidative and hydrogen sulphide (H₂S)-dependent degradation of the amino acid cysteine, which is a possible common mechanism of organ protection and enables new pharmacological targets for the treatment of acute kidney injury,’ Dr Felix Köhler, lead author of the study, added. To be able to apply this approach to kidney protection to the clinic, the interdisciplinary research team consisting of physicians and basic researchers has already initiated a clinical trial at University Hospital Cologne among kidney donors.

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