

Gut microbes could determine the severity of melamine-induced kidney disease

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Microbes present in the gut can affect the severity of kidney disease brought on by melamine poisoning, according to an international study led by Professor Wei Jia at the University of North Carolina in collaboration with the research group of Professor Jeremy Nicholson at Imperial College London.

In 2008, nearly 300,000 Chinese children were hospitalised with kidney disease brought on by supplies of powdered milk deliberately contaminated with melamine to boost the apparent [protein content](#). Although melamine was known to combine with uric acid in the children's bodies to produce harmful kidney stones, the details of the reaction and the role of specific gut microbes were not well understood.

By studying how melamine contributes to the development of kidney stones in rats, the research groups have shown experimentally that gut microbes may be central to understanding melamine-induced kidney failure in humans.

The formation of kidney stones occurs when melamine reacts with cyanuric acid in the kidney to form crystals which cannot be dissolved in the [bloodstream](#). According to the paper, published today in *Science Translational Medicine*, certain species of gut microbes are responsible for converting melamine into the toxic cyanuric acid, thereby accelerating the rate at which kidney stones are formed.

Tests on rats showed that the presence of microbes of the *Klebsiella*

family tended to facilitate the process of melamine conversion, potentially making them key players in the formation of kidney stones. This study suggests that toxicity in this case is linked to the make-up of gut microbes in the poisoned organism.

"The metabolic activities of gut [microbes](#) strongly influence human health in profound ways and have been linked to the development of multiple [medical problems](#) ranging from [autoimmune diseases](#), obesity, diabetes, and cardiovascular disease," said Professor Nicholson, head of the Department of Surgery and Cancer at Imperial. "The specific implication of this research is that the expression of the [kidney disease](#) in the Chinese contaminated milk scandal is likely to have been mediated by gut bacteria in affected children. The more general implication is that gut microbial status affects the outcome to exposures to environmental and food contaminants."

Provided by Imperial College London

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