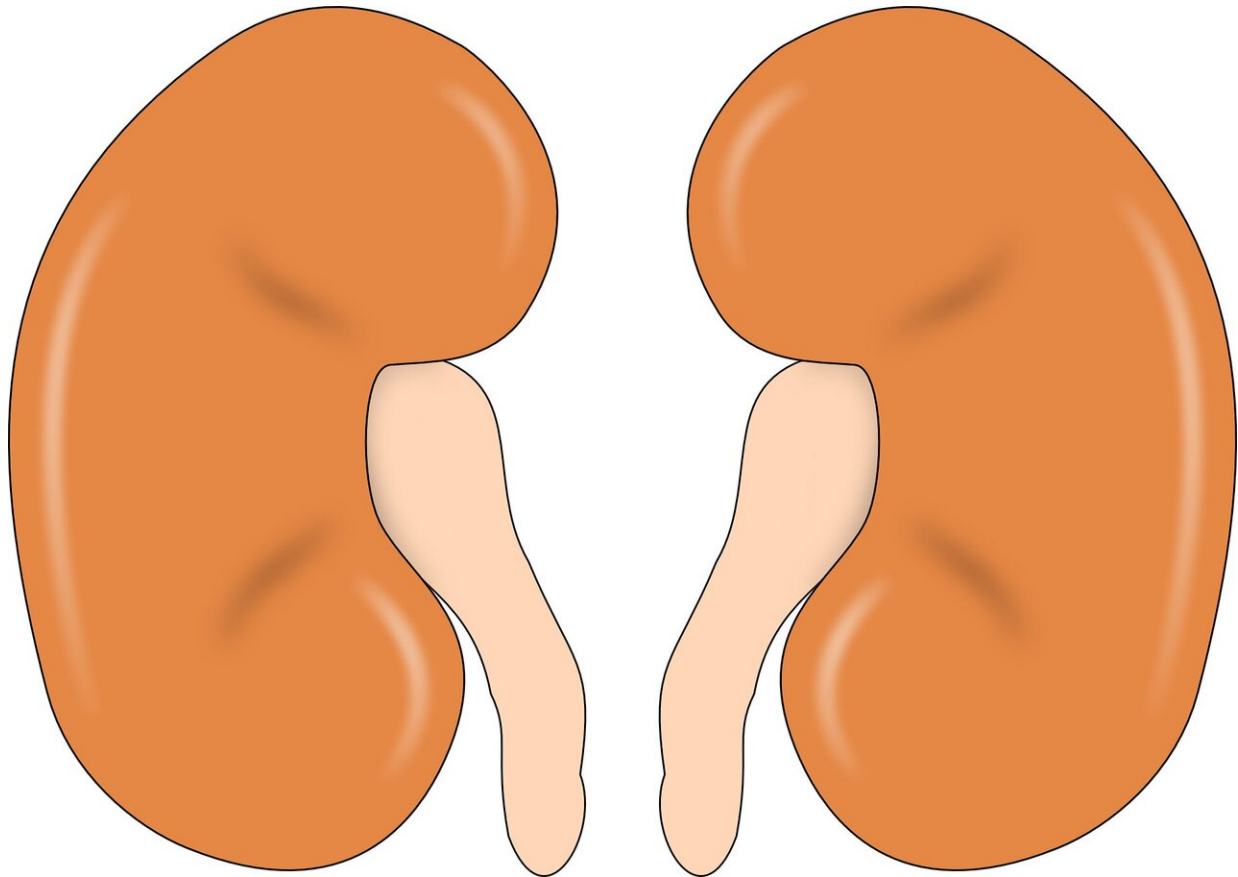


# Through the kidneys to the exit

August 13 2019

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Scientists at the National University of Science and Technology "MISIS" (NUST MISIS) have identified a new mechanism for removing magnetic nanoparticles through the kidneys, which will help to create more effective and safe drugs. The results of the study are published in the

*Journal of Controlled Release.*

The development of nanoparticles for carrying drugs, which can accumulate in the target organs and are safely metabolized remains a big scientific problem. The distribution and metabolism of nanoparticles are determined by many factors, in particular, their size, composition, surface charge, and coating.

"The combination of such methods as atomic emission spectroscopy, [fluorescence microscopy](#), and [magnetic resonance](#) imaging revealed the rapid accumulation of [magnetic nanoparticles](#) in the kidneys. Moreover, intravital microscopy made it possible to track in [real-time](#) the transportation of nanoparticles from the blood into the renal clearance within an hour after administration. Two hours later, with the help of transmission electron microscopy the magnetic nanoparticles were detected in the urine of animals," said one of the study authors, Maxim Abakumov, head of Laboratory of Biomedical Nanomaterials at NUST MISIS.

The results suggest that it is possible to transport nanoparticles through the endothelial barrier, not into the glomerular filter of the kidney, but directly into the renal tubule.

The study has shown the fundamental possibility of creating magnetic nanoparticles that will be excreted through the kidneys, reducing the total dose and side effects, and not accumulate in the liver for several weeks until being completely dissolved. Scientists plan to evaluate the most optimal surface design and structure of magnetic [nanoparticles](#) to increase the efficiency of excretion by the kidneys.

**More information:** Victor Naumenko et al, Intravital microscopy reveals a novel mechanism of nanoparticles excretion in kidney, *Journal of Controlled Release* (2019). [DOI: 10.1016/j.jconrel.2019.06.026](https://doi.org/10.1016/j.jconrel.2019.06.026)

Provided by National University of Science and Technology MISIS

Citation: Through the kidneys to the exit (2019, August 13) retrieved 23 June 2024 from <https://phys.org/news/2019-08-kidneys-exit.html>

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