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to their diameter. In medicine, they are being studied as potential scaffolds for attaching other materials, such as antibodies, drugs, DNA and RNA, or radioactive metal ions, which can be used for both medical imaging and delivering targeted treatments.

“A big hindrance in developing nanotubes for medical application has been determining how they are cleared out of the body,” explained Memorial Sloan Kettering’s Michael R. McDevitt, the senior investigator of the study. “People have been concerned, and have asked, ’Why use a drug that can’t be eliminated?’ Now we have shown that these materials can be eliminated by the kidneys.”

Using mouse models, the researchers injected the animals with nanotubes labeled with fluorescent and radio-metal ion probes so they could be tracked. Previous work in mice by Dr. McDevitt and his colleague, Molecular Pharmacology and Chemistry Program Chair David A. Scheinberg, investigated nanotubes as a possible way to deliver treatments for lymphoma. Their studies indicated that these molecules end up in the urine, but the mechanism for how the kidneys handle the materials was not well understood.

In the current study, published in *Proceedings of the National Academy of Sciences*, the investigators used PET and fluorescence imaging to show that, after they were injected, the nanotubes traveled to the kidneys and the bladder (an indication that they were present in the urine). The researchers also removed the kidneys and found that the nanotubes were present in the tubules, giving a better picture of how they were being filtered through the kidneys. “Surprisingly, these high-molecular-weight molecules were cleared similarly to small molecules, despite their much-larger size,” Dr. McDevitt added. [PubMed Abstract]

Drs. McDevitt and Scheinberg are continuing their research on using nanotubes as a scaffold for delivering targeted therapies in mouse models of lymphoma and other cancers. Much of their current work is focused on using antibodies to deliver radioactive ions to the site of a tumor, where they can release particles that destroy tumor cells.

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