

Gadolinium MRI Contrast Agents are not Physiologically Inert

Scientific Achievement

Studies were conducted to characterize the composition of intracellular gadolinium-rich minerals that form after systemic MRI contrast agent treatment.

Significance and Impact

Gadolinium is dechelated from MRI contrast agent formulations in vivo and is metabolized into mineralized intracellular nanoparticles.

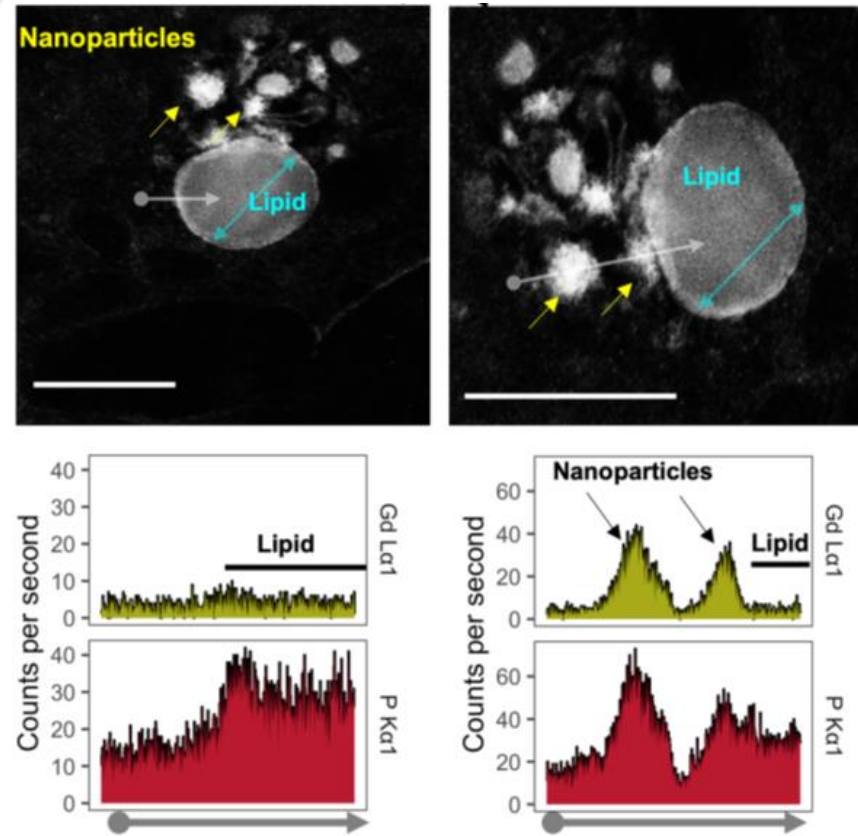
Research Details

Human kidney tissues from MRI contrast agent-treated patients were obtained and analyzed with STEM/XEDS.

The high concentrations of phosphorus (and oxygen) suggest that the nanoparticles contain insoluble $GdPO_4$ however the source of P is unknown.

Gadolinium is not a physiologic element and its nanotoxicity is undoubtedly a cause of MRI contrast agent complications.

J. DeAgüero, T. Howard, D. Kusewitt, A. Brearley, A. M. Ali, J. H. Degnan, S. Jett, J. Watt, G. P. Escobar, K. Dokladny, B. Wagner, **The onset of rare earth metallosis begins with renal gadolinium-rich nanoparticles from magnetic resonance imaging contrast agent exposure.** *Scientific Reports* 2023, 13, 2025.



Energy-dispersive X-ray spectroscopy (XEDS) line scan profiles through sub-cellular regions of nanoparticles, showing high levels of gadolinium and associated phosphorous. Kidney samples were obtained from a MRI contrast agent-treated male mouse.

Work was performed, in part, at the Center for Integrated Nanotechnologies.