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Nanodiamond-enhanced MRI offers wide range of diagnostic applications

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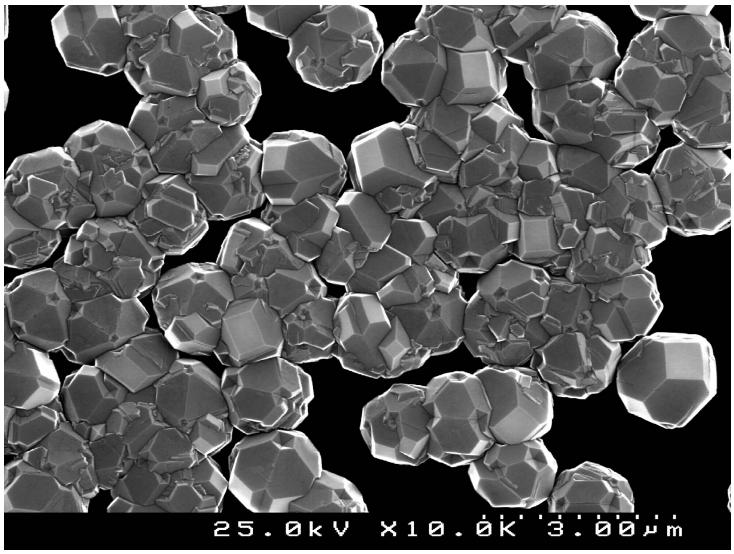

Nanodiamonds - synthetic industrial diamonds only a few nanometers in size - have recently attracted considerable attention because of the potential they offer for the targeted delivery of vaccines and cancer drugs and for other uses.

A team of investigators based at the Athinoula A. Martinos Center for Biomedical Imaging at Massachusetts General Hospital has devised a means of tracking nanodiamonds noninvasively with magnetic resonance imaging (MRI), opening up a host of new applications.

Previously, the use of nanodiamond imaging in living systems was limited to regions accessible using optical fluorescence techniques. However, most potential diagnostic and therapeutic applications of nanoparticles, including tracking of complex disease processes like cancer, call for the use of MRI - the gold standard for noninvasive, high-contrast, three-dimensional clinical imaging.

In the present study, the researchers show that they could achieve nanodiamond-enhanced MRI by taking advantage of a phenomenon known as the Overhauser effect to boost the inherently weak magnetic resonance signal of diamond through a process called hyperpolarization, in which nuclei are aligned inside a diamond so they create a signal detectable by an MRI scanner.

The researchers continue to explore the potential of the technique and are now planning a detailed study of the approach in an animal model, while also investigating the behavior of different nanodiamond-drug complexes and imaging them with the new capability.