Making Better Magnetic Nanoparticles

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Using a polymer coating designed to resemble the outer surface of a cell membrane, a team of investigators led by Steve Armes, Ph.D., of the University of Sheffield in the United Kingdom, has created a highly stable, biocompatible magnetic nanoparticle expected to improve the sensitivity of magnetic resonance imaging (MRI). This work is reported in the journal *Langmuir*.

The investigators first created the polymer by joining two polymers that each have constituents found on the surface of cell membranes. They then added this polymer to the standard chemical reaction mixture used to produce iron oxide nanoparticles. The resulting particles have an average diameter of approximately 34 nanometers, with the iron oxide core having an average diameter of 9 nanometers and a range of 6 to 14 nanometers.

In comparison, iron oxide nanoparticles prepared without the coating had an average diameter of 13 nanometers and a range of 9 to 21 nanometers. The magnetic properties of the stabilized nanoparticles were similar to those of standard iron oxide nanoparticles.

Characterization studies showed that both polymer components were essential to nanoparticle stabilization. The investigators note that they have developed synthetic methods that should enable them to add targeting agents and even drug molecules to these stabilized magnetic nanoparticles.

This work is detailed in a paper titled, “Synthesis of biocompatible

poly[2-(methacryloyloxy)ethyl phosphorylcholine]-coated magnetite nanoparticles." Investigators from the University of Durham and Biocompatibles UK Ltd., both in the United Kingdom, and the Universidade Estadual de Campinas, in Brazil, also participated in this study.

This paper was published online in advance of print publication. An abstract is available at the journal's website.

Source: National Cancer Institute