Labeling Cells with Magnetic Nanoparticles

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Investigators at the German Cancer Research Center have developed silica-coated iron oxide nanoparticles that allow for cell tracking in a live animal using magnetic resonance imaging (MRI). More sensitive methods for tracking cells in vivo could lead to a better understanding of how cancer spreads throughout the body or how the immune system reacts to tumors.

Fabian Kiessling, Ph.D., led this study, whose initial stages involved preparing iron oxide nanoparticles and coating them with an ultrathin layer of various silicon-containing chemicals.

During this part of their study, the investigators determined that the nature of this coating had a profound impact on the magnetic properties of the resulting nanoparticle. Only those coated with silicon dioxide retained the optimal magnetic properties needed to generate the strongest MRI signal per particle.

Next, the researchers determined that cells will take up these silicon dioxide-coated iron oxide particles in sufficient quantities to produce an observable MRI signal. One interesting result from these experiments was that cells appear to use a different mechanism to take up these small nanoparticles than they do to take up the larger dextran-coated iron oxide particles now being used in clinical MRI studies.

This work is detailed in a paper titled, “Silica- and alkoxysilane-coated ultrasmall superparamagnetic iron oxide particles: a promising tool to label cells for magnetic resonance imaging.” Investigators from Merck

and the University of Munich also participated in this study. An abstract of this paper is available through PubMed.

Source: National Cancer Institute