Latest News

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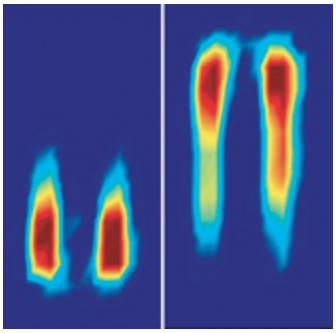
INSTRUMENTATION

Portable MRI

Optical magnetometer detects magnetic resonance image of flowing water

Celia Henry Arnaud

A magnetic resonance imaging (MRI) method developed at the University of California, Berkeley, requires neither high-field magnets nor cryogenics. Such a method could be used to develop portable, compact, and inexpensive imaging devices for nonclinical applications.



Proc. Natl. Acad. Sci. USA
??2006

Flowing Magnetic resonance images detected with a magnetometer capture the flow of water through two microfluidic channels.

The technique "is the latest in a growing field of alternative measurement techniques for magnetic resonance that aim to make low-field magnetic resonance a viable alternative to conventional high-field approaches," says Andrew G. Webb, director of the Huck Institute Magnetic Resonance Centre at Pennsylvania State University.

Such detection methods are made possible by separating the three stages of the MRI experiment—polarization of the nuclear spins, spatial encoding, and detection. Each stage can then be optimized independently.

A team of researchers led by UC Berkeley chemistry professor Alexander Pines and physics professor Dmitry Budker used an optical magnetometer to obtain a magnetic resonance image of water flowing through two microfluidic channels (*Proc. Natl. Acad. Sci. USA*, DOI: 10.1073/pnas.0605396103). The magnetometer determines the magnetization of the sample by measuring its effect on the polarization of a laser beam shining through rubidium vapor.

The components of the magnetometer are small and potentially inexpensive. "The optical method needs no high-field magnet or cryogenics, so it should be relatively straightforward to miniaturize and maybe multiplex," comments NMR

expert M. Daniel Raftery of Purdue University. "You can think about making a portable device that can do some very interesting imaging experiments."

Budker hopes that such portable devices could be used in places such as Africa that might not be able to afford expensive instrumentation. "We see this as a first step in that direction," he says.

Pines cautions that such a technique will never compete with conventional MRI. Instead, he sees it as being useful for applications in microfluidics, geology, and cell biology.

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