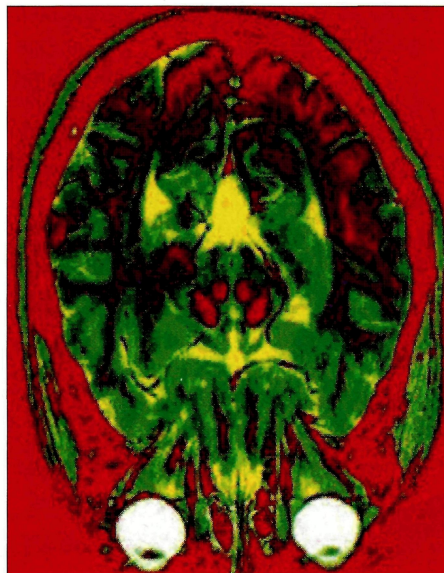
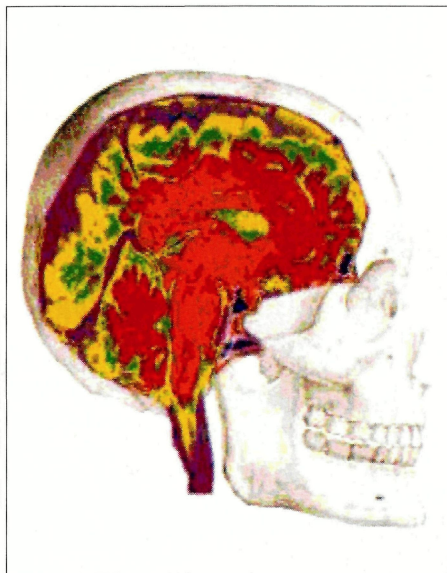


Edited by Archana Sharma

US team reports MRI at microtesla field



Left: an artificially coloured MRI image of the brain, superimposed on a classical drawing of the skull, produced using a 3 T machine operated jointly by the University of Florida's Shands Hospital and the Gainesville Medical Center in Virginia. Right: MRI enables high-resolution images of human tissue such as the brain from virtually any angle. (University of Florida.)

Imaging technologies are advancing at an incredible pace thanks to faster computers, more powerful magnets and more precise radioactive isotopes. One technique set to move forward is magnetic resonance imaging (MRI), which has been observed at microtesla fields for the first time.

The basis of MRI is that a strong magnetic field applied to randomly spinning protons inside the atoms of the body, particularly hydrogen, will cause them to line up and spin in the same direction. A radio signal beamed into the magnetic field knocks the protons out of alignment, and as they fall back into alignment they release energy in the form of radio waves. The amount of energy released and the time it takes for the protons to line up again is unique for different tissues in the body, so a computer can take this information and create an image of that tissue.

A tumour has a slightly different water density compared with surrounding healthy tissue, allowing computer processing and contrast enhancement to disclose its position to a trained observer.

Until now, large magnetic fields have been required for MRI, limiting the availability of the technique. Recently, however, researchers at the University of California, Berkeley, and the University of Florida have imaged four columns of fluid with a field of 10 μ T over several hours.

In another recent development, researchers at the MRI Institute for Biomedical Imaging in St Louis have reported a new MRI technique called susceptibility weighted imaging (SWI). By measuring the differences in magnetic susceptibility of tissues in the brain, this technique gives unique information about veins and blood products. MRI images of blood vessels in the brain have been obtained with details never before possible.

SWI can potentially detect angiogenesis – the growth of blood vessels caused by cancer – and may improve diagnosis of Parkinson's and Alzheimer's diseases through its ability to monitor iron deposits in the brain. *AIP*

Further reading

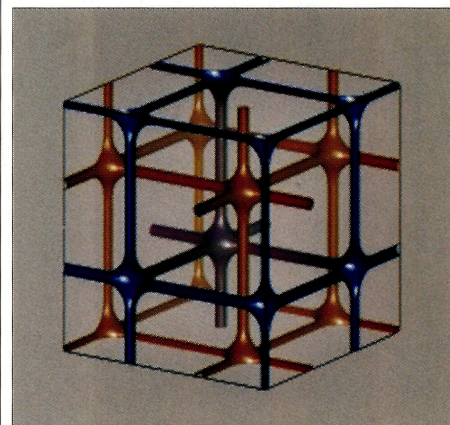
R McDermott *et al.* 22 March 2002 *Science*.

Cornell develops a flexible ceramic

Researchers at Cornell University have used an atomic self-assembly technique to create a promising hybrid material with the flexibility of polymers and the strength and functionality of ceramics. The material was made by blending a known self-assembling molecule called a diblock copolymer with a ceramic.

Although only small pieces have been made so far, they have enabled the material's properties to be tested. It is transparent, flexible and strong, and unlike a pure ceramic it does not shatter. In one form it is a good conductor of ions and could lead to a superior electrolyte for batteries and fuel cells. Another possible application is using the material to separate live proteins.

The self-assembly feature could be used to create large batches of the material in many molecular configurations, possibly opening up new avenues for materials science.



The molecular architecture of Cornell's flexible ceramic resembles a plumber's nightmare, but the new material has many valuable potential applications. (Wiesner research group, Cornell University.)

New international society formed

A new international society has been formed to address the demands for closer international co-operation for advancing muon spin rotation, relaxation and resonance (μ SR) techniques. For more information see <http://musr.triumf.ca/~isms/>.

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