Magnetic resonance imaging goes on the road

Magnetic Resonance Imaging Goes on the Road Nuclear Magnetic Resonance (NMR) has been used by chemists to analyze chemical properties for over 50 years, but due to the complexity of the equipment it has seldom been outside the laboratory. According to an article titled " Nuclear Magnetic Resonance, On the Go", Vasilki Demas is about to change all that. The article, which appeared in the June 2005 issue of Today's Science on File, reports that the graduate student at UC Berkeley has developed a portable system that weighs less than 30 kilograms and is about the size of a DVD player. This is in contrast to previous units that were heavy, cylindrical, and the size of a barrel. Pervious attempts at a portable design have met with limited success due to the sensitivity of the technology that is required.

NMR technology works on the principle of identifying an atom's structure by measuring its resonance. As spinning nuclei in the atom are subjected to an intense magnetic field, they will line up with the lines of magnetism either opposing them or matching them. As another oscillating magnet is induced into the field, the nuclei begin to reverse the direction of their spin. When the spin reverses, energy is released as the nuclei go from a higher state to a lower state or vice versa. A coil can pick up this energy as electricity in the same way a magnet can induce an electric current through an electrical wire in a generator.

The researcher is not looking only for electric current. The key to NMR is finding the frequency of the externally oscillating field where the nuclei give off the most energy. This is known as the frequency of resonance. By monitoring the electrical output over a range of frequencies, scientists look for the frequency where the output spikes. This is unique for every different element and by measuring this frequency, the element can be identified. By

evaluating the mix of elements and their relative quantities, complex molecules can be identified.

The article notes that while previous portable instruments have been used, they have not had the precision or accuracy required to be useful. Demas, along with American and German researchers, have overcome the previous obstacles by utilizing highly sensitive feedback loops to generate error correction and allow for more precise readings.

Works Cited

" Nuclear Magnetic Resonance, On the Go." Today's Science On File June 2005. Today's Science @ FACTS. com. Facts On File News Services. 2 Nov. 2006 .