

Transforming medical diagnosis with new scanning technology

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A new technology which dramatically improves the sensitivity of Magnetic Resonance techniques including those used in hospital scanners and chemistry laboratories has been developed by scientists at the University of York.

Ultimately, the technique, based on manipulating parahydrogen, the fuel of the space shuttle, is expected to allow doctors to learn far more about a patient's condition from an MRI scan at lower cost while increasing the range of medical conditions that can be examined.

The research is published in the latest edition of the journal *Science*.

Researchers have taken parahydrogen and, through a reversible interaction with a specially designed molecular scaffold, transferred its magnetism to a range of molecules. The resulting molecules are much more easily detected than was previously possible. No-one has been able to use parahydrogen in this way before.

Professor Gary Green, from the Department of Psychology and Director of the York Neuroimaging Centre, said: "Our method has the potential to help doctors make faster and more accurate diagnoses in a wide range of medical conditions.

"The technique could ultimately replace current clinical imaging technologies that depend on the use of radioactive substances or heavy metals, which themselves create health concerns."

The new method will also have major implications for scientific research because it radically reduces the time taken to obtain results using Nuclear Magnetic Resonance technology, the most popular method for obtaining analytical and structural information in chemistry.

Professor Simon Duckett, from the University's Department of Chemistry and Director of the Centre for Magnetic Resonance, said: "We have been able to increase sensitivity in NMR by over 1000 times so data that once took 90 days to record can now be obtained in just five seconds. Similarly, an MRI image can now be collected in a fraction of a second rather than over 100 hours.

"This development opens up the possibility of using NMR techniques to better understand the fundamental functions of biological systems."

Professor Ian Greer, Dean of the Hull York Medical School, said: "This technological advance has the potential to revolutionise the accessibility and application of high quality medical imaging to patients. It will bring significant benefits to diagnosis and treatment in virtually all areas of medicine and surgery, ranging from cancer diagnosis to orthopaedics and trauma. It illustrates the enormous success of combining high quality basic science with clinical application."

Bruker BioSpin has been one of the first collaborators in developing this technology for commercial use. Dr Tonio Gianotti, Director and International NMR Research and Development Co-ordinator for Bruker BioSpin, said: "This technology has the potential to revolutionise both NMR and MRI methods in a short space of time."

Dr Mark Mortimer, Director of the University's Research and Enterprise Office, said: "The rapid development of this research from the chemistry bench through to measurement opens up many exciting possibilities to extend this work. The York research team are now

seeking partners to help turn this groundbreaking research into commercial and medical applications."

Source: University of York

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