

“Ground-breaking research needs ground-breaking facilities and that is where people like us can make a difference.

The campaign for an MRI-PET Facility in Sheffield is about investing in the forefront of imaging technology to provide insights into major diseases like cancer, dementia and MND that have never been possible before. I'm proud to support a project that will transform the way we treat these conditions in the future and save more lives.”

Stephen Sly (LLB 1984). Campaign Ambassador. Partner and Co-Global Chair of Litigation and Regulatory, DLA Piper.



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MRI-PET: the future of imaging

Introduction by Professor Dame Pamela Shaw

The future of imaging research starts here

The chances are your life, or that of someone close to you, has been affected by medical research. The University of Sheffield is an outstanding centre for health research and is committed to finding new solutions to the significant health challenges facing us today. We have won worldwide acclaim for our work so far but to achieve even more, we need your help.



Her Majesty the Queen and Professor Shaw at the opening of SITraN in 2010.

MRI-PET combines the simultaneous power of whole body Magnetic Resonance Imaging (MRI) and Positron Emission Tomography (PET) in a single scan to produce some of the most highly detailed pictures of the inside of the body currently available. A new MRI-PET Facility in Sheffield represents the next leap forward in medical imaging and would have a crucial research and clinical role in many areas of medicine.

With this innovative technology our ambition is to develop new knowledge and treatments for patients more rapidly. It would provide enhanced patient care and diagnosis in the hospital and deliver insights and impact for a wide variety of serious conditions including cancer, dementia, heart and lung diseases, MND, Parkinson's and stroke.

I invite you to find out how your support can make a real difference to the health issues you care about most.

Professor Dame Pamela Shaw

Founding Director of the Sheffield Institute for Translational Neuroscience (SITraN).
Vice-President and Head of Faculty (Medicine, Dentistry and Health).



“Ultimately, our vision is about channelling the immense power of this new technology with the talent and passion of our community to create a healthier future for Sheffield, the UK and beyond.”



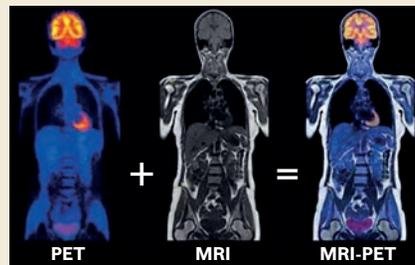
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MRI-PET: the future of imaging

What is MRI-PET?

Capturing anatomy and metabolic activity together enables us to see what is happening inside a diseased organ with unprecedented detail and whether it is responding to treatment.

An MRI-PET scanner combines images from Magnetic Resonance Imaging (MRI) and Positron Emission Tomography (PET) to provide a superior diagnostic picture in a single scan. MRI uses strong magnetic fields and radiowaves to show detailed information of the organs, tissues and structures of the body. A PET scan measures important body functions such as blood flow, oxygen use and sugar metabolism, to evaluate how well organs and tissues are functioning. It uses small doses of targeted radioactive chemicals called tracers that have been injected into the body. For example, PET scans can reveal how cancer cells use sugar or oxygen, while MRI highlights fine detail such as changes within the tissues of the brain.

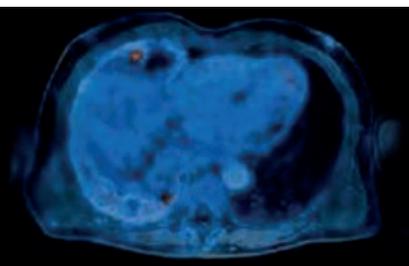
Capturing anatomy and metabolic activity together, enables us to see what is happening inside a diseased organ with unprecedented detail and whether it is responding to treatment. Knowledge is our most powerful weapon and technologies such as this present us with incredible opportunities to fight disease on many fronts.





“When my mum was diagnosed with MND it was devastating. Not just for her but for our entire family. What gives me hope is that there are people like Professor Shaw dedicated to beating this horrible disease. I’m excited about the possibilities that MRI-PET would provide for research and treatment so that one day no one else will have to go through what we have.”

J Phelps
Patient relative.



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Life-changing impact

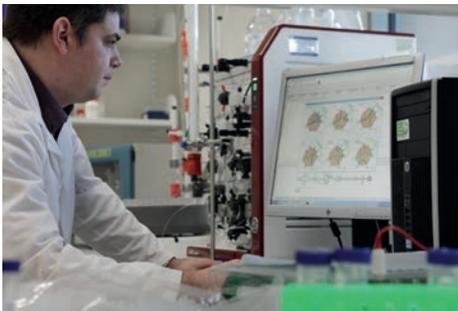
An MRI-PET Facility would transform our research by increasing our understanding of the causes, effects and progression of disease. With this knowledge we can take exciting discoveries from the laboratory into clinical trials to develop new therapies and better outcomes for patients. Breakthroughs in research would lead to faster and better diagnosis, characterisation, staging and treatment of disease.

In hospital, the new scanner would provide doctors with a more precise and accurate assessment of serious conditions leading to better care and monitoring of patients. Furthermore, radiation exposure is reduced in adults by 50 percent of that of the next best technology. That's a reduction equivalent to 100 chest x-rays worth of radiation. The reduced radiation exposure significantly improves patient safety, which is particularly important for children, young adults, and individuals requiring regular scans to monitor treatment. It would also reduce the need for patients to attend multiple hospital visits.

Changing the way we diagnose neurodegenerative diseases

Current treatments for neurodegenerative diseases such as Motor Neuron Disease (also known as Amyotrophic Lateral Sclerosis or ALS in the United States), Parkinson's and Alzheimer's disease focus on alleviating symptoms and, at best, provide only modest benefit. There is an urgent need to develop new treatments that can slow or halt the progression of disease and diagnose conditions earlier, so that treatments can be introduced before irreversible brain damage has occurred.

MRI-PET imaging is one of the most promising areas of research for early diagnosis and preclinical detection of neurodegenerative diseases. The ability to combine more detailed information about metabolic abnormalities with structural resolution would enable us to identify early brain changes and discover novel imaging biomarkers. This would overcome a major barrier to early diagnosis and provide us with a better understanding about which treatments would be most effective.



Transforming treatment for cancer patients

Approximately 50% of all cancer patients will receive radiotherapy to shrink tumours and kill cancer cells. Two of the major challenges in radiotherapy are to accurately define the tumour and deliver the highest dose of radiotherapy to the target whilst sparing the surrounding healthy tissue. The advanced sensitivity available through MRI-PET has the potential to improve treatment of a range of previously hard to reach cancers, and would enable us to precisely target a tumour and adjust treatment, in-near real-time, according to how the cancer is responding in each individual.

Research has also demonstrated that MRI-PET is superior in the detection and diagnosis of several different types of cancer, especially small tumours.



Reducing long-term disability in acute stroke patients

Stroke is one of the leading causes of death and the biggest cause of adult disability. Most strokes are caused by a blockage of one or more blood vessels in the brain by blood clot. Research shows that thrombectomy (removing the blood clot using specialised catheters) can dramatically reduce disability after stroke if treatment is started within 6 hours.

Unfortunately, most people arrive in hospital much later and many cannot be treated because their brains are already too severely injured. MRI-PET could be used in acute stroke cases to locate areas of the brain which could still be saved by thrombectomy. Current technology is not sensitive enough to achieve such accuracy. This could have an immense impact on treatment and in many more patients, long-term disability might be reduced.

The MRI-PET scanner would be invaluable for many diseases, including:

Alzheimer's disease and dementia

Cancer

Epilepsy

Diabetes

Heart and lung diseases

Infectious diseases

Motor Neuron Disease (MND/ALS)

Multiple Sclerosis

Parkinson's disease

Stroke



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A time of exceptional opportunity

We have reached a pivotal moment in our ability to address the global health challenges facing our society today. Never before have we seen such exciting developments in our understanding of the underlying mechanisms of disease, or had more powerful tools available. MRI-PET is the most complex imaging technology to date. It would help us to answer major questions about disease and overcome current obstacles to the development of new treatments.

There are only 7 MRI-PET scanners in the UK, 5 of which are used exclusively in dementia research. We believe that both the direct clinical use of MRI-PET and any new therapies that it helps bring to the clinic more rapidly, would benefit patients affected by many diseases and save more lives.

International medical research centres like ours must invest now or risk being left behind. Our ambition to bring MRI-PET technology to Sheffield was a key factor in securing a prestigious award from the National Institute for Health Research for a Biomedical Research Centre in Translational Neuroscience. Investing now in an MRI-PET system would enable us to leverage additional major research funding and attract more collaborators and experts from around the world to work with us in the search for, and development of, better treatments.

This would be the first MRI-PET Facility in Yorkshire and a vital investment in the health of people in this region, across the UK and beyond.



“A new MRI-PET Facility would further enhance the vital partnership between the University and Sheffield Teaching Hospitals. It is this partnership that will enable us to translate new knowledge into new treatments more quickly. The ambition for MRI-PET has energised our entire scientific and clinical community and I hope it inspires other people to become involved too.”

Tony Pedder, OBE
Chairman, Sheffield Teaching Hospitals
NHS Foundation Trust.



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The University of Sheffield: at the forefront of health research

Excellence

Health research at Sheffield is internationally renowned. Biomedical Research at Sheffield is ranked number one for world-leading quality in the UK. We are in the top 5 in the UK for research impact in Biomedical Science, Health and Related Research, and areas of Human Communication Sciences. We rank in the top 10 in the UK Russell Group of leading universities for clinical medicine.

The University of Sheffield has significant strengths in clinical and biomedical imaging. The Sheffield MRI Unit is the UK's leading centre for MR engineering hardware development, with a track record of device development for clinical applications. The Academic Unit of Radiology is internationally leading in the research and development of technology for clinical lung imaging with hyperpolarised gases and proton MRI which provide very detailed images of patients' lungs without relying on X-ray radiation. Collaborating with clinicians in Sheffield and across the UK they have pioneered the development of these techniques into the hospital. We also have advanced facilities and expertise in preclinical imaging.

Collaboration and innovation

Health research at Sheffield is multidisciplinary; clinicians, basic scientists and healthcare researchers work together with leaders from our partner faculties including engineering and science to drive discovery and its translation into new drugs and treatments for patients.

Our relationships with local hospitals are absolutely vital. We are proud to work in partnership with Sheffield Teaching Hospitals NHS Foundation Trust – the second largest NHS Trust in England and one of the best performing in the country. Together, we have established the NIHR Clinical Research Facility which offers purpose built state-of-the-art dedicated research facilities and we are partners in the creation and continuing development of the first Children's Clinical Research Facility in the UK.



Making it happen

The MRI-PET Facility would be located at the Royal Hallamshire Hospital on the central University campus, ideal for both direct clinical use and for research programmes across priority disease areas. The facility would include:

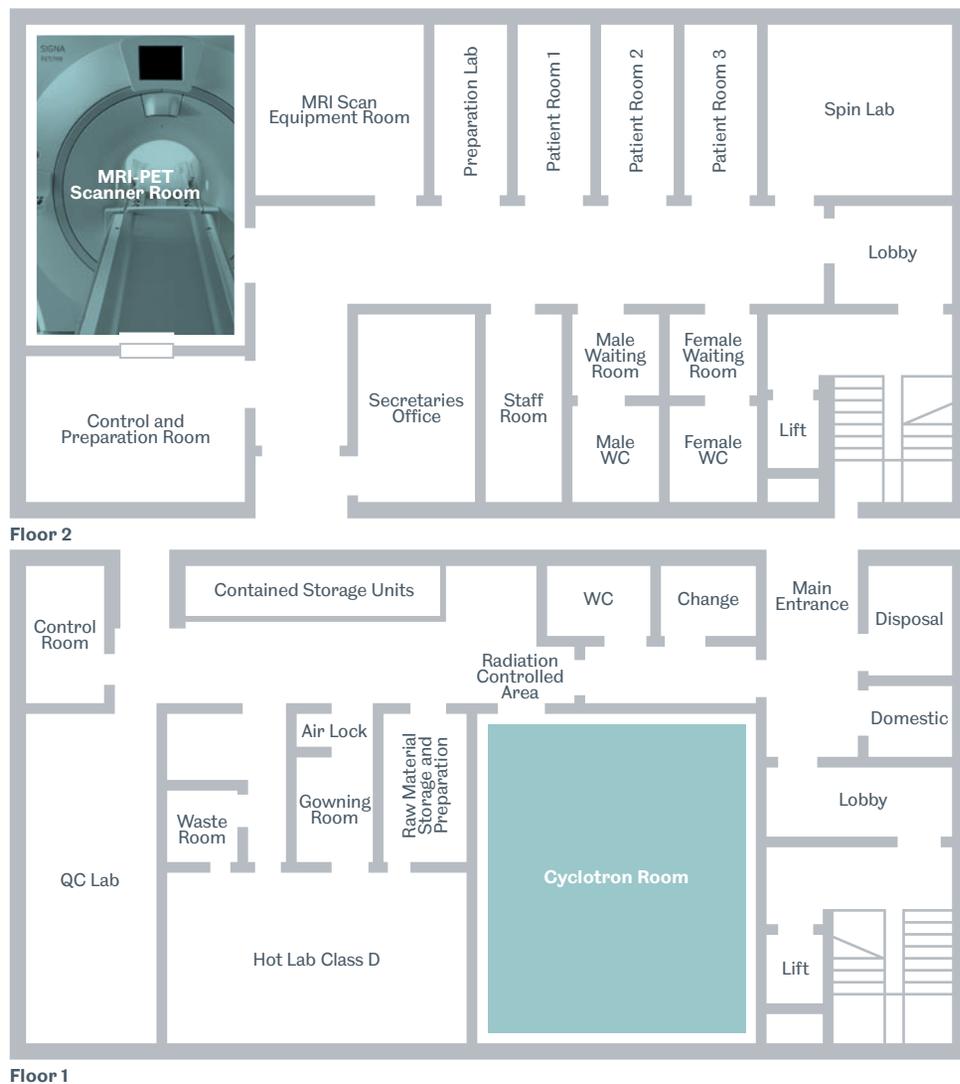
MRI-PET

MRI-PET is the most powerful imaging technology currently available. The two main multinational medical imaging companies, Siemens and General Electric, have developed whole body human MRI-PET scanners. The University of Sheffield is extensively reviewing the technical details of both systems.

Cyclotron for PET

The cyclotron has two important functions; to produce the tracers used in diagnostic scans and clinical studies, and to provide the facilities in which new tracers are developed for preclinical research. As well as a dedicated space to house the cyclotron, tracer-production facilities need to include a fully sterilised Good Manufacturing Practice compliant production area, including clean rooms and remote-handling equipment for the safe management of radioactive products. Quality Control labs for testing of the product prior to use in patients are also required.

A team of specialist staff are required to operate the centre including radiochemists and technicians.



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We need your support

MRI-PET is the future of imaging research. The ability to perform this type of imaging is crucial for cutting edge experimental medicine and would provide us with a real opportunity to advance treatments for patients more rapidly.

The University of Sheffield is committed to this project. The campaign is already underway, but we are not there yet. We now need your help to raise £2 million and make this vision a reality.

Please support the SheffieldScanner campaign to make this life-changing project possible.



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