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## UK's first integrated MR/PET system marks one year of pioneering research

The University College Hospital Macmillan Cancer Centre, part of University College London Hospitals NHS Foundation Trust, is celebrating the one year anniversary of the installation of the UK's first MR/PET system, the Biograph™ mMR from Siemens Healthcare. The world's first fully integrated MR and PET scanner has expanded horizons for research to better understand, diagnose and address priority diseases including heart attack, stroke and dementia. It allows for the simultaneous acquisition of MR scans with their excellent anatomical and functional information together with PET scans which can depict cellular activity. Siemens Healthcare, the National Institute for Health Research (NIHR) University College London Hospitals Biomedical Research Centre and NHS patients have all worked in partnership to drive forward the technological advances that impact on key diseases.

The Biograph mMR is used for clinical and research purposes at the University College Hospital Macmillan Cancer Centre, and was installed in 2012 to help investigate and improve the understanding of cancer, as well as to help deliver new improved patient treatment pathways. There are 20 active research projects utilising the system and it is hoped the combination of clinical applications, innovative technology, leading researchers and industry support will allow the Biograph mMR to deliver immediate benefits and continue to evolve to meet its full potential.

The use of a combined MR and PET system provides benefits for the hospital and the patient, producing excellent image quality and helps to improve the diagnosis and monitoring of cancer. The Biograph mMR can provide information on blood flow to monitor a tumour's response to chemotherapy utilising its powerful 3T MR imaging capability. The combination of high quality MR imaging with simultaneous PET, increases the power of both methods, enabling clinicians and researchers to monitor

cell activity levels, potentially removing a requirement for two separate examinations.

The single seamless examination offers comprehensive diagnostic imaging for the delivery of critical information used in the early detection and effective staging of disease. The Biograph mMR also allows for the more precise alignment of MR and PET, beneficial in several applications including staging, prostate cancer imaging and evaluation of smaller lesions.

“The Biograph mMR installation at UCLH was a landmark in innovation driving clinical work and oncology research in the UK, made possible by a close collaboration between Siemens and the Biomedical Research Centre,” states Peter Harrison, Managing Director UK at Siemens Healthcare. “The innovative MR/PET system delivers comprehensive diagnostic imaging that is critical during the early detection and staging process and we look forward to its discoveries and crucial steps towards the advancement of cancer research and care.”

Research infrastructure provided by the NIHR University College London Hospitals Biomedical Research Centre has enabled £1.6million of research activity on the scanner over 3 years as well as funding a dedicated MR/PET clinical scientist to work on the system. The UCLH Charity helped to fund the initial capital outlay required to spur the research into action. NIHR funding with grants from other research councils such as the European Research Council and the Engineering and Physical Sciences Research Council has supported UCLH’s ambitions. The unit has also been able to attract funding from charitable institutions including Wolfson Brain and Cancer Research UK. Industrial sponsorship has also been attracted from GlaxoSmithKline, who are supporting an ambitious programme investigating the role of fibrosis in many diseases.

“The Institute of Nuclear Medicine is at the forefront of clinical imaging; we were the first in the UK and fifth in the world for clinical PET-CT. When seeking simultaneous MR and PET imaging, we looked to Siemens who brought something unique to the market with the Biograph mMR,” states Professor Ashley Groves, Head of the Institute of Nuclear Medicine at UCL and Academic Lead at the Department of Nuclear Medicine at University College Hospital. “The system is being used for translational research, ensuring that we are transforming scientific knowledge into visible clinical benefits at UCH.”

“The applications for the system are wide-ranging, from providing early diagnosis in dementia, individualised treatment in oncology to better understanding of a range of conditions such as myocardial disease,” continues Professor Ashley Groves. “The overarching objective is to better understand, diagnose and address priority diseases including heart attack, stroke and dementia. The research has been groundbreaking in the way we have been able to better characterise individual tumours, enabling the most suitable treatment is provided and facilitating early detection. We look forward to witnessing the first clinical benefits of this research over the coming months.”

Dr Bomanji, Clinical Lead at the Department of Nuclear Medicine at University College Hospital states “The Siemens Biograph mMR is a novel machine and prospective data is being acquired to establish its use. In our experience, there is potential for MR/PET to further refine staging. Monitoring treatment response in tumours and radiotherapy planning are also potential uses of MR/PET. MR/PET imaging may benefit patients with dementia and epilepsy. These prospective indications might have a significant effect on patient outcomes.”

A wide range of healthcare professionals including clinical imagers, technologists and physicists worked closely with Siemens to gain the desired output from the state-of-the-art MR/PET imaging system in its first year at the University College Hospital Macmillan Cancer Centre.

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**Picture caption:**

The Biograph™ mMR from Siemens Healthcare is used for clinical and research purposes at the UCH Macmillan Cancer Centre.



**Picture caption:**

The Biograph™ mMR from Siemens Healthcare is the world's first integrated whole-body molecular MR system with simultaneous data acquisition technology.

