BY PETER GORDEBEKE, CARINA KERN, KATHARINA KRISCHAK AND PAMELA ZOLDA

EIBIR supports innovations in diagnosis and treatment of cancer and Alzheimer's disease

The European Institute for Biomedical Imaging Research (EIBIR) supports tomorrow's medical imaging technology and is currently managing seven projects funded by the Horizon 2020 framework programme, working together with numerous universities and industry partners.

EUROPEAN INSTITUTE FOR BIOMEDICAL IMAGING RESEARCH

Horizon 2020 is the European Commission's eighth framework programme funding research, technological development, and innovation. Three out of EIBIR's seven Horizon 2020 projects are involved in researching how to improve the diagnosis and treatment of cancer and Alzheimer's disease.

The HYPMED project

The project 'Digital Hybrid Breast PET/MRI for Enhanced Diagnosis of Breast Cancer (HYPMED)' is developing a fully digital, MRI-transparent, PET detector with a novel, multi-channel, PET-transparent, MRI surface coil. This PET-RF insert facilitates the imaging of breast cancer with high-resolution and ultra-high sensitivity PET. It will be combined with high-level structural and functional MRI, allowing minimally invasive MR and PET-guided targeted biopsy. This innovative combination of MRI and PET has the potential to greatly improve the detection and diagnosis of breast cancer, as well as tumour characterisation. HYPMED's ground-breaking combination of PET and MRI is also likely to have major benefits in other applications, such as prostate cancer detection and hybrid cardiac imaging. The first results indicated that, with the insert, any regular clinical MR machine can be turned into a hybrid system when required. This will lead to a paradigm shift in the field of PET/MR hybrid imaging with many new applications in other diseases.

EIBIR acts as the project coordinator, while Prof. Christiane Kuhl (Aachen/DE) is the Scientific Coordinator. More information about the project can be found at www.hypmed.eu.

The GLINT project

The high level of sophistication in cancer treatment has led to a new problem: differentiating between treatment effect, regrowth, and pseudo-progression of the tumour. To address these challenges, the project 'GlucoCEST Imaging in Neoplastic Tumours (GLINT)' is developing a new imaging method based on the combined use of D-Glc and 3-OMG that can characterise and image glucose delivery, uptake, and metabolism in cancer. Once successful, GLINT will provide a radiation-free, non-invasive, wide-ranging, new diagnostic tool for one of the most devastating diseases in the world.

The project is already recording promising preliminary results: a new data acquisition technique called Snapshot-CEST has been developed, a publicly available toolbox has been created to allow evaluation of CEST data from different vendors, and a radiometric approach for accurate estimation of pH change has been established. 3OMG CEST MRI measurements were successful in animal models while analyses of glucose analogues have also shown the potential of Glucosamine, a novel MRI contrast agent. The GLINT patient study has shown that a positive glucoCEST signal can only be obtained in glioma patients, on whom the project will focus in the last year of the project.

GLINT is coordinated by Prof. Xavier Golay from UCL, London/UK. EIBIR is involved in the project management and acts as dissemination lead. More information about the project can be found at www.glint-project.eu.

The CoSTREAM project

The 'Common mechanisms and pathways in stroke and Alzheimer's disease (CoSTREAM)' project aims to improve our understanding of the co-occurrence of stroke and Alzheimer's disease. The project builds upon extensive sets of longitudinal follow-up studies spanning up to 25 years. These studies include data on both diseases as separate clinical outcomes and contain information on genetics and metabolomics to brain structure assessed by imaging, and cognition.

An essential concept of the project is that stroke and Alzheimer's disease are sequential diseases with overlapping pathophysiological mechanisms and shared risk factors. The project focuses particularly on finding common mechanisms to reveal when and how these diverge to cause either stroke, Alzheimer's disease, or both.

Major progress has already been made in genetics and metabolomics analyses, finding candidate genes and metabolites causing either disease, or acting as a link between them. Effects of compensatory mechanisms were studied using epidemiological research. Imaging studies revealed and validated the conclusion that amyloid and the volume of particular brain regions can be predictors of disease pathology and may be suitable for risk prediction. Finally, an in vitro cell culture model which co-cultures endothelial cells neurons, astrocytes, and pericytes to for a functional model of the neurovascular unit and the blood-brain barrier is being developed.

CoSTREAM is led by Prof. Cornelia van Duijn from Erasmus MC (Rotterdam/NL). EIBIR leads the management and dissemination activities of the project. More information can be found at www.costream.eu.

If you are interested in learning more about these projects, stop by the **EIBIR Lounge** on the entrance level.

BY JONATHAN CLARK

ESR to set up image collections to facilitate imaging research and integration with -omics databases

Biobanks are repositories for the storage and retrieval of biological samples of a large number of subjects. A major goal of biobanks is the organised collection of biological material and associated information to spread access among scientists requiring the data and material for scientific research.

Imaging biobanks, repositories of resources for medicine and medical research which typically include radiology imaging data, relevant clinical data, and other possible modalities, store image collections just as standard biobanks store biological samples. The ESR noted in their *Position Paper on Imaging Biobanks* (2015) that approximately 70% of the world's biobanks were located in Europe

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