

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.



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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and most did not include, or were not linked to nor include, any kind of imaging information. The position paper stated that: 'A European imaging biobanks network would significantly boost European research in the imaging domain by stimulating the design and validation of new imaging biomarkers, as well as improving our understanding of their biological significance'. However, such a network would require standardisation, validation and benchmarking of the data in imaging biobanks.

The harmonisation of data-acquisition protocols as well as standardising image processing methods to extract reliable information is thus of great importance. Recognising the importance of integrating imaging and 'omics' data and the need for a structured repository for imaging data in order to facilitate personalised medicine, clinical trials, and the evaluation of new drugs, the ESR and Biobanking and Biomolecular Resources Research Infrastructures - European Research Infrastructure Consortium (BBMRI-ERIC), which hosts the world largest biobanking

directory (catalogue), have been working together since November 2015, their agreement being renewed in December 2018. A key part of this collaboration has been the extension of MIABIS 2.0 (Minimum Information About Biobank data Sharing) with metadata on imaging collections and DICOM (Digital Imaging and Communications in Medicine) information.

The ESR has worked together with BBMRI-ERIC on extending the BBMRI-ERIC Directory 2.0 so it can be used also to describe image collections. A number of biobank representatives were approached and asked to populate the directory by providing metadata on their image collection data. During the collection process, it became clear that, in some cases, descriptions of image collections already existed in various BBMRI national nodes in different countries and, in other cases, image collections existed that were not included/described in any BBMRI national nodes (e.g. where a node did not exist, or where a node did not include image biobanks).

The ESR MIABIS-DICOM Working Group has taken on the task of establishing a platform to enable

the descriptions of image collections from countries which are not part of BBMRI-ERIC or whose collections are not included in BBMRI national nodes.

In late 2018, ESR experts began collaboration with the European Institute for Biomedical Imaging Research (EIBIR), who have the infrastructure necessary to support the creation of an online catalogue for existing image collections as well as access to the biomedical imaging research community in Europe. The catalogue will not provide the images or access to them but describe the collections of images, relevant information on data acquisition and image analysis, and provide contact information for access requests.

The implications of the EU's new General Data Protection Regulation (GDPR) on biobanks with a focus on the secondary use of samples and data will be highlighted in today's ESR and BBMRI-ERIC joint session at 14:00 in Room E1. Secondary use of image data is a common practice in radiological research and raises numerous ethical, legal and organisational challenges. BBMRI-ERIC has in collaboration with more than 90

Joint Session of the ESR and BBMRI-ERIC (Biobanking and BioMolecular resources Research Infrastructure - European Research Infrastructure Consortium)

Friday, March 1, 14:00-15:30, Room E1

Will the General Data Protection Regulation (GDPR) hamper the secondary use of clinical imaging data for research?

Moderators: E. Steinfelder; Graz/AT

A. van der Lugt; Rotterdam/NL

- » Why is secondary use of existing imaging data important for research progress?
E. Steinfelder; Graz/AT
- » Can I reuse, share or give open access to existing imaging data for research?
M.T. Mayrhofer; Graz/AT
- » Can I sell or licence imaging data to industry or spin-off companies?
J.A. Bovenberg; Aerdenhout/NL
- » How to anonymise imaging data for research?
B. Gibaud; Rennes/FR
- » Panel discussion: How to overcome the hurdles of secondary use of imaging data

public and private health research organisations spearheaded the development of guidance on how to use the GDPR to ensure the protection of patients' privacy and to empower medical research. This

collaboration will result in a Code of Conduct for Health Research, a soft law instrument that research organisations and EU countries can use to better implement the GDPR.

EPOS

READ ALL CONGRESS POSTERS AT epos.myESR.org OR AT THE EPOS LOUNGE ON LEVEL 1



Canon
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Friday, 1 March

WORKSHOPS

Room 0.14 (Entrance Level)

9:30 - 10:30 | DR

Clinical Value of "Advanced Edge Enhancement" Image Processing Software

C. Deurman, Amstelveen, Netherlands

11:00 - 12:00 | UL

Clinical Value of Ultra-High Frequency in Breast Ultrasound

Dr. L. Steyaert, Bruges, Belgium

13:00 - 14:00 | UL

Multi-Parametric Approach of Liver Diseases: Fibrosis and Steatosis Assessment

Dr. G. Ferraioli, Pavia, Italy

Room 0.16 (Entrance Level)

9:30 - 10:30 | MR

Breast Imaging and Post-Processing Using Olea Medical breastscape®

Dr. M. Fischer, Teltow, Germany

11:00 - 12:00 | CT

Added Value of Deep Learning CT Reconstruction (AiCE) in Clinical Practice

Dr. M. Brink, Nijmegen, The Netherlands

14:00 - 15:00 | HII

The New Age of Advanced Visualization - Using Global Illumination for MSK and Forensic Imaging

Prof. A. Blum, Nancy, France

15:30 - 16:30 | HII

Improving Your Confidence: CT-Subtraction in Head and Neck Studies

Dr. S. M. Niehues, Berlin, Germany

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Expo X3

Missed our Lunch Symposium? Watch the presentations on our YouTube channel: www.youtube.com/CanonMedicalEU
For a complete overview of our educational program, please visit <https://eu.medical.canon/ecr2019>