



### Welcome to Action TD1007

Welcome to MPNS COST Action TD1007, "Bimodal PET-MRI molecular imaging technologies and applications for in vivo monitoring of disease and biological processes", first Newsletter.

We hope that our Newsletter will be a great communication tool for those that have already joined the Action, as well as for those interested in PET-MRI evolution. It will be published twice per year. Printed versions of the newsletter will be distributed in major PET/MR events and conferences and both current and previous Newsletters will be available online for download on the Action website <http://pet-mri-eu/>.

It will be really useful and creative if Action members provide us with ideas on its topics or even send us their own articles.

The next COST Action TD1007 Newsletter will come out in January 2012. We would like to wish all Action's members and partners good summer holidays and we look forward to see most of you to the upcoming Working Group Meetings in Autumn.

Best Regards,  
George Loudos, Theodora Christopoulou

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### Why COST Action TD1007?

The rapid growth in genetics and molecular biology is changing diagnostic and therapeutic medicine. Molecular imaging techniques aim to

visualize molecular changes that are associated with a disease and not its symptoms, allowing early diagnosis and optimization of therapeutic strategy. Multimodal techniques provide powerful tools for understanding molecular mechanisms, in vivo, on both preclinical and clinical level. Since 2000 PET/CT and later SPECT/CT have been established in clinical practice with significant impact. However, those systems are not truly simultaneous and CT information is provided with an additional radiation dosage.

PET-MRI has gained attention over the past five years due to the complementary advantages of those technologies. The high sensitivity and low radiation of PET is combined with the soft tissue contrast and additional functional information of MRI. Molecular imaging with PET-MR is an interdisciplinary topic; new instrumentation, data acquisition and processing strategies, bimodal contrast agents and preclinical and clinical protocols need to be designed, evaluated and optimized. Although a number of prototype hybrid systems are being developed and one system recently became commercially available, PET/MR technology is in its infancy.

Although several institutions worldwide are working in topics related to PET/MR, very often research efforts are being duplicated, as a result of the absence of a network that could coordinate research on a European level, bridge the gap between detector, contrast agent developers and end users, and speed up the transfer of basic research to clinical practice. COST has been considered as the most appropriate framework, due to the flexible association mechanism that allows to the interested partners to join the Action during its development.

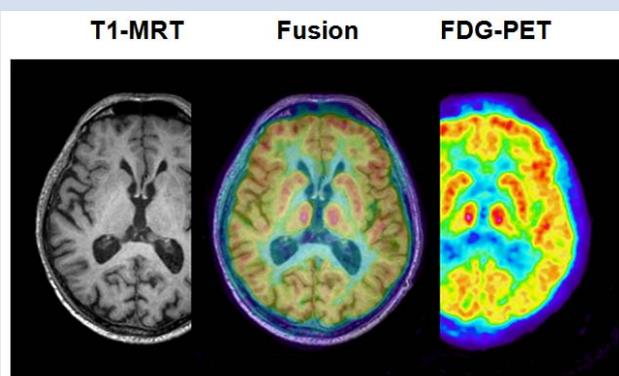
The main aim of the Action is to create a framework in which researchers involved in



the development of PET/MRI equipment, bimodal probes and related applications can share and increase knowledge and information. The Action foresees to bridge the gap between detector, tracer developers and end users and gather feedback from them, to improve services.

On networking level, the Action is expected to i) lead to a higher level of young researchers with fair European distribution, ii) strengthen the bonds between participants and sparkle new collaborations in terms of FP7 and other EU or international programs, iii) facilitate interaction with industry and possible setup of spin off companies and iv) encourage interaction with non-EU countries that have significant experience in the field.

On technical level, the Action is expected to i) provide low cost detectors that will be exploited by smaller affiliated groups, ii) construct new efficient PET/MRI systems, with application in research and clinical environment, iii) design new bimodal agents for preclinical evaluation, iv) lead to new and therapeutic pharmaceuticals and v) explore and propose new preclinical and clinical applications.



Simultaneous PET/MR brain imaging study. Left: T1-MR image. Right: FDG PET image. Center: Combined PET/MR image. (Image reproduced by permission of Hans Herzog, Forschungszentrum Jülich GmbH)

### Action's TD1007 Structure

The key persons and structures of the COST Action TD1007 are:

- **Action Chair** (Prof. George Loudos, Greece).
- **Action Vice Chair** (Prof. Christer Halldin, Sweden).
- **The Management Committee (MC)**, which has two representatives from each participating country and is responsible for the overall coordination of the Action.
- **The five Working Groups (WGs)**, where the research activities are carried out.
- **The Dissemination Manager** (Prof. George Kagadis, Greece).

So far fifteen countries have signed the Memorandum of Understanding (MOU) and are participating in the Action: Belgium, Denmark, Germany, Greece, Spain, Finland, France, Hungary, Italy, Netherlands, Norway, Poland, Portugal, Sweden and United Kingdom.

### Working Groups

The five WGs and their main objectives are:

#### Working Group 1: Hardware

*WG leader: Prof. Alberto Del Guerra (Italy)*

- asses if new materials can be used as detector components and how they have to be treated
- suggest if technology is mature for their application
- detailed study of Silicon Photomultipliers (SiPMs)
- integrate hardware components with data acquisition software
- produce low cost imaging systems and innovative multimodal prototypes for animal and clinical application



### Working Group 2: Software

*WG leader: Prof. Dimitris Visvikis (France)*

- develop new algorithms for motion and attenuation correction
- provide software for efficient translation of multimodal information
- understand user needs in order to make easy-to-use the developed systems

### Working Group 3: Bimodal Tracers

*WG leader: Dr. Rafael Torres (UK)*

- provide probes for new imaging applications besides oncology and brain imaging, e.d cardiovascular diseases
- provide bimodal contrast agents as tools for preclinical research
- provide critical input for the design of prototype PET/MRI systems

### Working Group 4: Preclinical Applications

*WG leader: Prof. Carlos Zaragoza (Spain)*

- provide input about vital signal measurements during imaging process
- develop specific phantoms and design evaluation protocols
- evaluate the performance of integrated preclinical prototypes
- optimize application in small animal imaging

### Working Group 5: Clinical Applications

*WG leader: Prof. Sibylle Ziegler (Germany)*

- provide input about specific requirements of clinical imaging
- design specific clinical protocols for dedicated organs imaging
- evaluate and ensure quality of the developed systems in clinical imaging
- propose new NEMA-like standards for PET/MR

## 1<sup>st</sup> Joint MC and WG Meeting: 28 to 29 June 2011 - Aarhus University Hospital - Denmark

The 1<sup>st</sup> Joint Management Committee and Working Group Meeting took place at the University Hospital of Aarhus, a small and very beautiful town in Denmark. All MC members had the chance to introduce themselves, and communicate their scientific skills to other members, as well as their future contribution to the Action.

The Working Groups were formed and first goals of each WG were defined. In addition the overall Action's plans for the first year, were discussed and approved, including the organization of the first "PET/MR and SPECT/MR: New Paradigms for Combined Modalities in Molecular Imaging Conference".

The MC was informed by the Chair, Prof. George Loudos that the Action's budget increased from 74000€ to 95800€.



*The WGs meetings in Aarhus*

All Action's members had the opportunity to participate in "The Aarhus PET-MR Hybrid Scanner Workshop Instrumentation, Development, Research and Clinical Application", which was organized by the Aarhus University Hospital, and was co-funded by the COST Action TD1007. The workshop took place at the 29<sup>th</sup> of June, with over than 90 participants and many invited speakers.



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