



Welcome to Action TD1007

Welcome to the 6th Action's TD1007 Newsletter.

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Reykjavik MPNS Annual Progress Conference

The Annual Progress Conference of the Materials, Physics and Nanosciences (MPNS) Domain took place between 10th and 11th of September 2013 in Reykjavik, Iceland. In this annual meeting all Action Chairs present the status of their Action to COST DC members and MPNS Action Chairs. George Loudos presented the activities for the second year of the TD1007 PET/MR Action.



WG1 and WG2 meeting in Ghent

The joint WG1 and WG2 meeting was organized by Prof. Stefaan Vandenberghe from Medical Imaging and Signal Processing

(MEDISIP), of the department of Electronics and Information systems (ELIS) of the faculty of Engineering (FIRW) at the Ghent University (UGent) on Monday 16th December, 2013.

The meeting was attended by 19 Action members and 12 presentation were given, which showed the results of common work between Action partners. Then internal meetings focused on the next steps for each WG for the upcoming period.

Short Term Scientific Missions

Until the end of December 2013, twelve additional STSMs were implemented. In total 43 STSMs have been. The performed STSMs have provided several common results and a number of Action papers has been accepted for publication. These STSMs were:

Ms. Carla Semedo

Faculty of Sciences, University of Lisbon, Portugal

Ms. Semedo visited the group of Dr. Rafael Rosales, Kings College London, London, UK, for 6 months in April 2013. The aim of the visit was to conciliate the use of bimodal nanoparticle imaging agents and PVC (Partial Volume Correction) methods for enhancing the resolution of PET-MRI images. PET and MRI images were obtained by using pre-clinical and clinical scanners from St. Thomas' Hospital

Mr. John Barrio

IFIC (UVEG/CSIC), Valencia, Spain

Mr. Barrio visited the group of Prof. Sibylle Ziegler at Nuclear Medicine department of TUM, Muenchen, Germany for three weeks in July 2013. The aim of this visit was to carry out tests with a scanner based on continuous LYSO crystals coupled to SiPM arrays and to take measurements using phantoms with liquid sources (FDG) in order to evaluate the performance of the scanner. compatibility of



such a technology with a MRI scanner. Additional measurements were performed using digital SiPMs and continuous crystals.

Ms. Nathalie Camus

University of Brest, Brest, France

Ms. Camus visited the group of Prof. Steve Archibald at University of Hull, UK for 3 weeks in May 2013. The objective of this STSM was to develop multimodal imaging constructs utilizing nanoparticles and metal ion chelators. Two main methods of attachment were used: the functionalization of azamacrocyclic chelators with pendant siloxy groups that react on the surface of the nanoparticles to form a silica shell and the use of phosphonate groups on extended polyether linkers to bind to the surface of the SPIO NPs via coordination interactions.

Ms. Lydia Stanford

King's College London, UK

Ms. Stanford visited the group of Prof. Yves Gossuin at University of Mons, Belgium for one week in June 2013. The main objective of her work was to develop hydrophilic nanoparticles (NPs) with high stability in vitro and in vivo for use as a PET/SPECT-MR contrast agent with low RES uptake and to target them to specific tissues in vitro/vivo. Furthermore she further investigated the relaxation properties of these USPIOs by using a relaxometer to measure the relaxations at several field strengths (0.24T-0.96T).

Mr. Joao Tourais

University of Lisbon, Lisbon, Portugal

Mr. Tourais visited the group of Dr. Gaspar Delso at University Hospital of Zürich, Switzerland for 2 months in July 2013. The aim of this visit was to evaluate the automatic binding algorithms with real acquired data and to carry out a preliminary study of the developed binding methods in image registration, image segmentation and posterior attenuation correction.

Ms. Sophie Poty

Université de Bourgogne, Dijon, France

Ms. Poty visited the group of Prof. Steve Archibald at University of Hull, UK for one month in September 2013. The aim of this visit was to facilitate GPCR protein targeted multimodal imaging. The proposed study for this STSM allowed the selection of the lead molecular framework for imaging studies by PET and MRI of a chemokine receptor target over-expressed to cancer and other diseases.

Dr. Albert Hirtl

Department of Radiology and Nuclear Medicine, Medical University of Vienna, Austria

Dr. Hirtl visited the group of Prof. Uwe Pietrzyk at the Institut Neurowissenschaften und Medizin, Juelich, Germany for one week in September 2013. The aim of this visit was to benefit from Juelich advanced experience in GATE simulations and image reconstruction. Furthermore, due to the availability of the MR-BrainPET installed at the host institution, possible applications of GATE simulations relevant for the clinical mMR (MR-based attenuation correction) were explored.

Dr. Hadi Fayad

INSERM UMR1101, LaTIM, UBO, Brest, France

Dr. Fayad visited the group of Dr. Holger Schmidt at University Hospital of Tübingen, Germany, for one week in September 2013. The aim of this STSM was to ameliorate the attenuation and respiratory motion correction in PET/MR imaging by testing two different algorithms previously developed in PET/CT imaging, adapted to PET/MR imaging. Those algorithms were validated on real patient acquisitions on a simultaneous PET/MR system, installed at the University Hospital of Tübingen, which is not available at the CHRU of Brest.

Ms. Theodora Kostou

Medical School, University of Patras, Greece

Ms. Kostou visited the group of Prof. Dimitris Visvikis at LaTIM, Brest, France for one month



in November 2013. The aim of her visit was to insert the respiratory and cardiac motion in the MOBY model, as well as import characteristics of pre-clinical studies to realistic simulations. In addition to investigate an anthropomorphic model for multimodal imaging simulations in order to design and evaluate a phantom for PET-MRI applications, studying the modifications for a realistic appearance on two modalities.

Dr. Miguel Patricio Dias

IBILI, Faculty of Medicine of the University of Coimbra, Portugal

Dr. Dias visited Dr. Liliana Caldeira at Institute of Neurosciences and Medicine at the Forschungszentrum Juelich, Germany for three weeks in November 2013. The aim of his visit was to apply implemented compartmental models and related graphical analysis methods, which have been proposed to quantify receptor kinetics to [¹¹C]Raclopride data obtained at Juelich. In addition, to compare the results to those given by the commercial software PMOD for quantifying PET data. Finally to test the impact of the parameters of each method on the accuracy of the quantification. Test which PET protocol.

Dr. Charalampos Tsoumpas

University of Leeds, UK

Dr. Tsoumpas visited the group of Prof. Habib Zaidi at University of Geneva, Switzerland for one week in November 2013. The aim of his visit was to install the recent version of the STIR package and to make a tutorial presentation on how to reconstruct motion compensated PET data for the moving PET-MR phantom. In addition the use of the 5D phantom was explored for extending the realistic PET simulations database, which is intended to be made available to the community.

Mr. John Barrio

IFIC (UVEG/CSIC), Valencia, Spain

Mr. Barrio visited the group of Dr. Claudio Piemonte at Fondazione Bruno Kessler (FBK) of Trento, Italy for two weeks in November 2013. The aim of his visit was to work with the photodetectors provided by FBK and obtain a deep knowledge about the technology related with the fabrication and evaluation procedure. Measurements were carried out using single side and double side monolithic SiPMs and check differences in the performance.

Other Dissemination Activities

A pre-conference Symposium on PET/MR was organized during European Association of Nuclear Medicine (EANM) in Lyon, France by Prof. Alexander Hammers (Lyon, France) and Prof. Dimitris Visvikis (Brest, France). EANM is the largest European Conference on Nuclear Medicine with more than 2,000 attendants/ The symposium was focused mainly on the application and clinical aspects of PET/MR and had a very high attendance from conference participants. The symposium talks were:

- *MRI-PET System Developments (P Marsden, London)*
- *Exploiting PET/MR Synergy in Quantitative PET Imaging (D. Visvikis, Brest)*
- *Contrast agents in PET/MR: possibilities and challenges? (R. Torres Martin de Rosales, London)*
- *Clinical MRI-PET in Oncology (A. Loft, Copenhagen)*
- *Clinical MRI-PET in Neurology (A. Drzezga, Cologne)*
- *Clinical MRI-PET in Cardiology (S. Nekolla, Munich)*
- *Closing Remarks (A. Hammers, Lyon & D. Visvikis, Brest)*



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