

COST

Domain Committee "MPNS"

COST Action TD1007

Start Date 27/04/2011

Bimodal PET-MRI molecular imaging technologies and applications for in vivo monitoring of disease and biological processes

MONITORING PROGRESS REPORT

Reporting Period: from 27/04/2011 to 31/05/2013

This Report is presented to the relevant Domain Committee.
It contains three parts:

- I. Management Report** prepared by the COST Office/Grant Holder
- II. Scientific Report** prepared by the Chair of the Management Committee of the Action
- III. Previous versions of the Scientific Report;** i.e., part II of past reporting periods

The report is a "cumulative" report, i.e. it is updated annually and covers the entire period of the Action.

Confidentiality: the documents will be made available to the public via the COST Action web page except for chapter II.D. *Self evaluation.*

Based on the monitoring results, the COST Office will decide on the following year's budget allocation.

Executive summary (max.250 words): The TD1007 Action aims 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. In the second year of its implementation the Action: i) has increased from 20 to 22 member countries, ii) the participants in the five WGs have been increased and more than 80 scientists participate actively, iii) 1 MC - Joint WG meeting has taken place, iv) the first International PSMR Conference on PET/MRI that was initiated by the Action has been established as an international event; the 2nd PSMR attracted ~185 world experts, v) the proceedings of the conference will be published again in NIMA, following peer review, vi) a 2nd workshop for ESRs was organized during PSMR and supported 19 ESRs to attend this event, vii) 21 STSMs were successfully carried out, viii) two additional Working Group meetings have been organized in London and Athens, ix) Two large FP7-Health Innovation projects have been funded with active participation of Action members and with a total budget of 12M€, x) one Marie Curie IEF for Dr. Liliana Caldeira was funded, xi) Two Action newsletters were published, xii) a PET/MR workshop was organized in Athens in February 2013 and a PET/MR session in the European Molecular Imaging Society meeting in May 2013.

I. Management Report prepared by the COST Office/Grant Holder



I.A. COST Action Fact Sheet

• **COST Action TD1007** - Bimodal PET-MRI molecular imaging technologies and applications for in vivo monitoring of disease and biological processes

• **Domain** MPNS

• **Action details:**

CSO Approval: 02/12/2010

End date: 27/04/2011

Entry into force: 20/01/2011

Extension: 26/04/2015

• **Objectives** (from DB as in About COST)

The main objective 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. To achieve this aim the primary objectives of the Action are:

1) To bridge the gap between detector and tracer developers, demonstrate the benefits of novel techniques understand end users needs and gather feedback from them, to improve services.

2) To extensively study new detector materials and optimized geometries that will improve the performance of existing PET/MRI systems and allow the construction of new more efficient.

3) To design, develop and evaluate bimodal contrast agents and nanoparticles with attractive biological applications in diagnosis and therapy.

4) To systems cost, by improving detectors components and overall architecture.

5) To explore new imaging acquisition and processing methods and protocols.

6) To identify how existing technologies are likely to change either in their operating characteristics or in novel ways, the applications in which they are likely to be used, what impact these would have and on what time scale.

• **Parties:** list of countries and date of acceptance

Austria 20/04/2012	Greece 20/01/2011	Poland 04/03/2011
Belgium 07/06/2011	Hungary 17/02/2011	Portugal 05/05/2011
Bulgaria 19/03/2012	Iceland (date)	Romania (date)
Croatia 30/03/2012	Ireland (date)	Serbia 30/05/2012
Cyprus 27/09/2011	Israel (date)	Slovakia (date)
Czech Rep. 23/01/2013	Italy 20/01/2011	Slovenia (date)
Denmark 08/06/2011	Latvia (date)	Spain 20/01/2011
Estonia (date)	Lithuania 03/06/2013	Sweden 10/05/2011
Finland (date)	Luxembourg (date)	Switzerland 19/03/2012
FYR of Macedonia (date)	Malta (date)	Turkey (date)
France 11/02/2011	Netherlands 04/05/2011	United Kingdom 20/01/2011
Germany 20/01/2011	Norway 05/05/2011	

• **Intentions to accept:** list of countries and date

None at the moment

Other participants:

None at the moment

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• **Working Groups** (*list of WGs and names and affiliations of participants*)

The Action has 5 Working Groups:

- WG1: Hardware Group
- WG2: Software Group
- WG3: Bimodal Tracers Group
- WG4: Preclinical Applications Group
- WG5: Clinical Applications Group

More specifically:

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It is noted that some Action members participate in more than one Working Groups. Effort has been made to keep the primary interest of most members, according to their active participation during the first Year of the Action.

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Prof. Edoardo Charbon	Switzerland	edoardo.charbon@epfl.ch
Dr Gaspar Delso	Switzerland	GasparDelso@ge.co
Dr Charalampos Tsoumpas	United Kingdom	charalampos.tsoumpas@kcl.ac.uk
Dr Rafael Torres Martin De Rosales	United Kingdom	rafael.torres@kcl.ac.uk

Begona Lavin	15/02/2013 - 24/02/2013	From ES to UK						1200	
Sebastian Furst	24/02/2013 - 01/03/2013	From DE to UK						840	
Sophie Poty	04/03/2013 - 15/03/2013	From FR to UK						1380	
Kotasidis Fotios	23/03/2013 - 07/04/2013	From CH to UK						1500	
Alessandro Ferri	07/04/2013 - 19/04/2013	From IT to PL						1400	
Charalampos Tsoumpas	11/04/2013 - 18/04/2013	From UK to DE						900	
Andras Anderla	19/05/2013 - 31/05/2013	From RS to CH						1980	
Charalampos Tsoumpas	27/05/2013 - 31/05/2013	From UK to EL						750	
									41,156.00

Workshops

Title	Date		Place					Cost	Total
	From	To							
1 st ESR Workshop on PET/MR: Who is who!	28/05/2012	28/05/2012	Elba (IT)					8146.42	
1 st Hellenic Workshop on PET/MRI	23/02/2013	23/02/2013	Athens (EL)					5,170.00	
2 nd ESR Workshop on PET/MR	06/05/2012	07/05/2012	Aachne (DE)					13227.95	
PET/MR workshop in ESMI meeting	27/05/2013	27/05/2013	Italy (IT)					1,485.82	
									28,030.19

General Support Grants

Beneficiary	Date							Cost	Total
									0

Schools

Title	Date	Place						Cost	Total
									0

Dissemination

Title	Date	Place						Cost	Total
Website	02/06/2011 - 31/05/2011	Athens (EL)						2000	
NIMA proceedings								6000	
Website	02/06/2011 - 31/05/2011	Athens (EL)						4000	
									12000

Others

Title	Date	Place						Cost	Total
Bank Transfer expenses for Year 1								1001.00	
Bank Transfer expenses for Year 2								1254.00	
									2255.00

Action Total : 196,480.02

II. Scientific Report prepared by the Chair of the Management Committee of the Action, describing results achieved during the Action operation in this period, in no more than 3 pages (the report is “cumulative”). All items listed in Sections A, B, and C, below, must be addressed.

Additional documentation such as extended scientific reports, proceedings of workshops, seminars or conferences may be provided separately as an annex to this report, and should be referenced in the report.

II.A. Innovative networking

II.A.1. Innovative knowledge resulting from COST networking through the Action. (Specific examples of Results vs. Objectives)

During the first year and in terms of the running STSMs original results have been produced. The most important results were:

- i) The development of dual-IR sequences for imaging cardiovascular disease and mainly myocardial scar and vessel walls (Kings College, UK and Aarhus University, DK)
- ii) Development of a PET/MRI tracer for amyloid plaques imaging in Alzheimer Disease (CBM Orléans -Université Tours INSERM - Cyceron Caen, FR and Karolinska Institute SE)

During the second year and in terms of the now running STSMs and direct collaboration between Action participants the most important results were:

- i) The validation of scintillator arrays coupled to the new generation of Digital SiPMs and analog SiPMs. Such studies have been carried out by different groups: (TEIA, EL and Delft, NL) ; (FBK , IT and NCNR, PL) ; (IFIC, ES and TUM, DE)
- ii) Implementation and assessment of new MR based attenuation and motion correction for PET/MR. Action members have taken advantage of the availability of simultaneous PET/MRI systems. (KCL, UK and TUM, DE) ; (KCL, UK and Geneva, CH) ; (KUL, BE and UCL, UK)
- iii) Several groups have joined efforts to develop new PET/MR probes and bimodal tracers. It has been possible to image for the first time such probes on PET/MR systems. (KCL, UK and Karolinska, SE) ; (Hull, UK and Brest, FR) ; (Bourgogne, FR and Hull, UK)
- iv) Several combined PET/MR studies in animal models have been carried out in Karolinska PET/MR system, which has become an imaging center for the Action. (CNIC, ES and KCL, UK) ; (Karolinska, SE and KCL, UK)

II.A.2. Significant scientific breakthroughs as part of the COST Action. (Specific examples)

The Action includes the most important keyplayers in PET/MR in Europe. It is rather important that 2 FP7 projects have been funded, which aim to develop new PET/MR systems for brain imaging. It is likely that those projects will have a significant impact, if properly carried out. In addition the Action conference on PET/MR has been established as an international event and the 2nd PSMR increased its participants from 150 to 185.

II.A.3. Tangible medium term socio-economic impacts achieved or expected. (Specific examples)

No term socio-economic impacts achieved for the first two years.

II.A.4. Spin off of new EC RTD Framework Programme proposals/projects. (List)

In Year 1 a number of FP7 Two Marie Curie ITN networks were proposed but not funded.

- i) Marie Curie ITN network on PET/MR: “Advanced Technologies for Hybrid molecular Imaging using INnovAtive PET/MR Systems” (grade 88,4 and will be resubmitted)
- ii) Marie Curie ITN network on multimodal imaging of angiogenesis: “ANGIONet” (grade 70,6 and will be carefully revised and resubmitted)

In Year 2, two FP7-Health Innovation projects were approved. These projects have a strong Action contribution as well as strong industrial involvement.

- i) TRIMAGE with budget 6M€. The main objective of the project is the construction of a PET/MR/EEG prototype for schizophrenia. The project has 11 partners and 4 of them are COST members including Chair, WG1 leader and WG5 leader.

ii) MindView with budget ~5.54M€. The main objective of the project is the construction of a PET insert MR compatible for Parkinson disease. The project has 3 COST members including Vice Chair and WG2 leader.

In addition a Marie Curie IEF project was submitted and approved for Dr. Liliana Caldeira in order to carry out post doctoral research from University of Lisbon to Forschungszentrum Jülich. Dr Caldeira has participated in STSMs and is the ESRs representative in the MC. Her research will last for 4 years and will focus on the dynamic PET/MR - Innovative reconstruction approaches to simultaneously acquired data

More FP7 projects were submitted with the participation of the Action members, with most of them being at the Marie Curie calls (IAPP, IRSES).

II.A.5. Spin off of new National Programme proposals/projects. (List)

For National Projects were proposed and requested official Action's support:

- i) CheMI Labex project, coordinated by Professor Franck Denat from the Institute of Molecular Chemistry of the University of Bourgogne, ICMUB, Dijon, (FR).
- ii) SPAD-MRI project submitted to Swiss Secretariat for Education and Research Mr. François Powolny from Institute Ecole Polytechnique Fédérale de Lausanne (CH)
- iii) "Dynamic PET/MR - Innovative reconstruction approaches to simultaneously acquired data" project, submitted to Fundação de Ciência e Tecnologia by Ms. Liliana Caldeira from the Institute of Biophysics and Biomedical Engineering (PT).
- iv) HyperGnostic project, submitted by Prof. George Loudos from Technological Educational Institute of Athens, (EL).
- v) "Multimodal image derived input function for quantitative PET studies", coordinated by Dr Miguel Patrício from the Institute for Biomedical Imaging and Life Sciences (IBILI) in Coimbra, Portugal
- vi) "Early Diagnosis and Simultaneous Cancer Treatment through Novel Imaging Modalities and Supramolecular Nanotheranostics", submitted by George Loudos to the General Secretariat of Research and Technology, Greece.
- vii) "Targeted therapy to diabetes microvasculature using magnetic nanoparticles loaded with thrombine", submitted by Prof. Dimitrios Karnabatidis to University of Patras.

II.B. Inter-disciplinary networking

II.B.1. Additional knowledge obtained from working with other disciplines within the COST framework. (Specific examples)

Through the interdisciplinary STSMs knowledge is exchanged among partners. Some examples are:

- i) STSM of Ms. Tsiapa (Patras, GR->Bordeaux, FR): The Greek group has experience in radiolabelling peptides and the French group in designing nanoparticles. The STSM allowed exchange of expertise in order to properly attach peptides on nanoparticles surface and radiolabel them.
- ii) STSM of Ms. Alkystis Phinikaridou (London, UK-> Aarhus, DK). Ms. Phinikaridou had experience in MRI of atherosclerosis in mice, rabbits and human coronary and carotid arteries and acquired knowledge in imaging vascular disease using bigger animals and PET/MR techniques.
- iii) STSM of Mr. Florin Tixier (Brest, FR->Zurich, CH): The French group had a strong experience in software processing, while the Swiss group hosts a clinical PET/MR/CT system. As a result, innovative work on the usefulness of new ¹⁸F-FDG PET image derived indices for patient's management in oncology, was carried out.
- iv) STSM of Mr. Rafael Torres (London, UK-> Karolinska, SE). Mr. Torres group has unique experience in the design of dual probes, while the Karolinska group hosts the first PET/MR imaging system. Thus original results were produced on the experimental evaluation of those probes in vivo.
- v) STSM of Ms Begona Lavin (CNIC, ES->KCL, UK). The group of Ms Lavin has expertise in the non-invasive detection of endothelial regeneration by Molecular Imaging, which was combined with the PET/MRI specific nanoprobe of KCL, in order to explore new means of endothelial regeneration.

II.B.2. Evaluation of whether the level of inter-disciplinarity is sufficient to potentially provide scientific impacts. (Specific examples)

Action participants cover a range of expertise in hardware and software experts and increased the contribution of tracer developers. The number of groups that host clinical PET/MR systems has increased and some of them will be invited to join Action WGs. The Action members, as well as their network of collaborations provide the means to design interdisciplinary projects among Action members. A good indication of this is the two FP7 projects that were funded and provide a framework of collaboration between hardware and software specialists, with clinicians and tracer developers. At the moment the Action continues its efforts to attract experts from the field of MRI.

II.B.3. Evaluation of whether the level of inter-disciplinarity is sufficient to potentially provide socio-economic impacts. (Specific examples)

While the most important scientific groups are part of the Action, in order to provide socio-economic impacts the participation of additional key players is required. During Year 1 the Action has considered this issue and planned to contact some important Associations to gain from their feedback and cooperation. During Year 2 the Action has contacted and organised a PET/MR workshop during the European Society of Molecular Imaging meeting in Torino (May 2013) and has announced a pre-conference Symposium during the Annual conference of European Association of Nuclear Medicine in Lyon (October 2013). In Year 3 more efforts will be made to exploit contacts with European Society of Radiology, as well as Brain, Cardiovascular and Oncological Societies. Their feedback and cooperation is important to coordinate scientific activities and achieve socioeconomic impact.

II.C. New networking

II.C.1. Additional new members joining the Action during its life.

In Year 1 eight new members have joined the Action: Austria (20/04/2012), Belgium (07/06/2011), Bulgaria (19/03/2012), Croatia (30/03/2012), Cyprus (27/09/2011), Denmark (08/06/2011), Serbia (30/05/2012), Switzerland (19/03/2012). In Year 2 two new members have joined: Czech Republic (23/01/2013) and Lithuania (03/06/2013).

II.C.2. Total number of individual participants involved in the Action work. (Number of participants. Give % of female and of Early Stage Researcher participants)

The number of Active participants is 79 people. This number includes persons that have participated in at least one Action meeting, workshop or STSM. Female participants represent $24/79=30,3\%$. ESRs (PhD students or MC/WG members obtained a PhD in less than 8 years) are $40/79=40,5\%$.

II.C.3. Involvement of Early Stage Researchers in the Action, in particular with respect to STSMs, networking activities, and Training Schools. In addition, justification should be provided if less than 4 STSMs were carried out during the year.

Up to Year 2 thirty (30) STSMs were carried out. Nine (9) were carried out in Year 1 and twenty one (21) in Year 2. The demand for STSMs continues to increase, since Action participants understand the value of this tool. A number of STSMs has already taken place during Year 3 and in total ~35 STSMs have taken place, since the beginning of the Action.

II.C.4. Involvement of researchers from outside of COST Countries. (Number of participants from non-COST Countries approved by the CSO. Give % of such participants from countries with reciprocal agreements. Specify their contribution)

At the moment the Action does not have involvement of researchers outside the Action. Dr. Roger Fulton from Australia had shown interest to join the Action, but this was not possible in the end due to some budget issues in funding Australia participation in COST. Prof. Stan Majewski from University of West Virginia participated in the last Action Conference and MC meeting as an invited speaker.

II.C.5. Advancement and promotion of scientific knowledge through publications and other outreach activities. (Number of publications and other outreach activities that resulted from COST networking through the Action. Complete list should be given in an annex)

The Action organizes a series of event to promote PET/MRI, bring researchers together and disseminate its outcomes.

- i) One Action Conference was organized in May 2012 that attracted ~150 participants world wide (PSMR2012, <http://psmr2012.df.unipi.it/>)
- ii) The second Action Conference was organized in May 2013 and attracted ~185 participants world wide (PSMR2013, http://www.fz-juelich.de/conferences/psmr2013/EN/Home/home_node.html)
- iii) 60 articles from PSMR'12 were revised and published in Nuclear Instruments and Methods in Physics Research A in autumn 2012 (Annex I) and more than 20 articles will result from the 2nd Action Conference PSMR'13, which are at the moment under peer review.
- iv) At the moment three journal publications and two conference posters acknowledges COST. The list of publications is updated, since all Action participants have been requested to update their publication status.
- iv) Four Action Newsletters have been published and are available on Action website. (Annex II)

II.C.6. Activities and projects with COST network colleagues.

Besides the 30 STSMs, several Action members have initiated or continue cooperation including exchange of small detector components and validation of new bimodal tracers. Some examples are:

- i) Testing and validation of [64Cu](DTCCBP)2-Endorem as a bimodal PET-MRI probe (KCL, UK – Karolinska, SE - Cromed/Mediso, HU)
- ii) Testing and validation Gd-L-Biotin and Ga-68-L-Biotin as bimodal probes for tissue pH measurement (Uppsala/Karolinska, SE - TD1004)
- iii) Evaluation of pixilated scintillators on Digital SiPMs (TEIA, EL – TUD, NL)
- iv) Imaging enzyme inhibitors of RNAases (Univ. Thessaly/Demokritos, EL – LaTIM, FR)
- v) Measurement of pH with PET/MR (Karolinska, SE - TD1004 – KCL, UK)
- vi) Optimization of scintillators/SiPM coupling (Univ. Pisa, IT – TEI Athens, EL)
- vii) Metal artifact correction (Novisad, RS – Zurich, CH)
- viii) Availability of an open data set for PET/MR exams, which was initiated from KCL, UK and included the collaboration of other Action members. This database is available in <http://www.isd.kcl.ac.uk/pet-mri/simulated-data/>

II.C.7. The capacity of the Action members to raise research funds.

Several proposals, with the participation of COST members have been submitted on international and national level and they are reported in II.A.4 and II.A.5. The Action during Year 2 succeeded in attracting 2 FP7 Health Innovation projects with an overall budget of 12M€. Since Both projects have a strong Action involvement and one of them (TRIMAGE) was inspired by the Action and is committed to support and continue the Action PET/MR conference, until 2018. The Action has a strong interest in both projects and will support them in terms of scientific consultancy, as well as through Action means such as STSMs. Finally, the successful application of Dr. Liliana Caldeira (ERS representative in MC) will provide the means to a very promising young researcher, to carry out his postdoctoral Research in Juelich, as well as inspire other ESRs, to follow this example.

III. Previous scientific report(s)

This is the second Scientific Report submitted to COST Office and it is a follow up of Year 1 report.

III.1 Report from Period 27/04/2011 to 31/05/2012

II.A. Innovative networking

II.A.1. Innovative knowledge resulting from COST networking through the Action. (Specific examples of Results vs. Objectives)

During the first year and in terms of the now running STSMs original results have been produced. The most important results are:

- i) The development of dual-IR sequences for imaging cardiovascular disease and mainly myocardial scar and vessel walls (Kings College, UK and Aarhus University, DK)
- ii) Development of a PET/MRI tracer for amyloid plaques imaging in Alzheimer Disease (CBM Orléans -Université Tours INSERM - Cyceron Caen, FR and Karolinska Institute SE)
- iii) Physical validation of Mediso's nanoScan PET-MR (Karolinska Institute SE and CROmed, HU)
- iv) Biological validation of the PET-MRI scanner (Karolinska Institute SE and CROmed, HU)

II.A.2. Significant scientific breakthroughs as part of the COST Action. (Specific examples)

No significant scientific breakthroughs for the first year. However, the establishment and successful organization of the first PET/MR conference (PSMR 2012), which will continue as an annual event, is considered as an important scientific outcome of the Action.

II.A.3. Tangible medium term socio-economic impacts achieved or expected. (Specific examples)

No term socio-economic impacts achieved for the first year.

II.A.4. Spin off of new EC RTD Framework Programme proposals/projects. (List)

Two Marie Curie ITN networks were proposed in the first year, while more FP7 projects are under preparation.

- i) Marie Curie ITN network on PET/MR: "Advanced Technologies for Hybrid molecular Imaging using INNovActive PET/MR Systems" (grade 88,4 and will be resubmitted)
- ii) Marie Curie ITN network on multimodal imaging of angiogenesis: "ANGIONet" (grade 70,6 and will be carefully revised and resubmitted)

II.A.5. Spin off of new National Programme proposals/projects. (List)

For National Projects were proposed and requested official Action's support:

- i) CheMI Labex project, coordinated by Professor Franck Denat from the Institute of Molecular Chemistry of the University of Bourgogne, ICMUB, Dijon, (FR).
- ii) SPAD-MRI project submitted to Swiss Secretariat for Education and Research Mr. François Powolny from Institute Ecole Polytechnique Fédérale de Lausanne (CH)
- iii) "Dynamic PET/MR - Innovative reconstruction approaches to simultaneously acquired data" project, submitted to Fundação de Ciência e Tecnologia by Ms. Liliana Caldeira from the Institute of Biophysics and Biomedical Engineering (PT).
- iv) HyperGnostic project, submitted by Prof. George Loudos from Technological Educational Institute of Athens, (EL).

II.B. Inter-disciplinary networking

II.B.1. Additional knowledge obtained from working with other disciplines within the COST framework. (Specific examples)

Through the interdisciplinary STSMs knowledge is exchanged among partners. Some examples are:

- i) STSM of Ms. Tsiapa (Patras, GR->Bordeaux, FR): The Greek group has experience in radiolabelling peptides and the French group in designing nanoparticles. The STSM allowed

exchange of expertise in order to properly attach peptides on nanoparticles surface and radiolabel them.

ii) STSM of Ms. Alkystis Phinikaridou (London, UK-> Aarhus, DK). Ms. Phinikaridou had experience in MRI of atherosclerosis in mice, rabbits and human coronary and carotid arteries and acquired knowledge in imaging vascular disease using bigger animals and PET/MR techniques.

II.B.2. Evaluation of whether the level of inter-disciplinarity is sufficient to potentially provide scientific impacts. (Specific examples)

Action participants cover a range of expertise in hardware and software experts as well as tracer developers. Most of existing preclinical and clinical PET/MR systems belong to Action participants. This allows the set up of interdisciplinary projects among Action members that are likely to have scientific impact. At the moment the Action makes effort to attract experts from the field of MRI and identify new groups that host new commercial PET/MR human scanners.

II.B.3. Evaluation of whether the level of inter-disciplinarity is sufficient to potentially provide socio-economic impacts. (Specific examples)

While the most important scientific groups are part of the Action, in order to provide socio-economic impacts the participation of additional key players is required. The Action has considered this issue and in Year 2 it is planned to contact some important Associations, including European Association of Nuclear Medicine, European Society of Radiology, as well as Brain, Cardiovascular and Oncological Societies on European and National level. Their feedback and cooperation is important to coordinate scientific activities and achieve socioeconomic impact.

II.C. New networking

II.C.1. Additional new members joining the Action during its life.

Eight new members have joined the Action since its initiation: Austria (20/04/2012), Belgium (07/06/2011), Bulgaria (19/03/2012), Croatia (30/03/2012), Cyprus (27/09/2011), Denmark (08/06/2011), Serbia (30/05/2012), Switzerland (19/03/2012).

II.C.2. Total number of individual participants involved in the Action work. (Number of participants. Give % of female and of Early Stage Researcher participants)

The number of Active participants is 63 people. This number includes persons that have participated in at least one Action meeting, workshop or STSM. Female participants represent $16/62=25,8\%$. ESRs (PhD students or MC/WG members obtained a PhD in less than 8 years) are $22/62=35,5\%$. The Chair of the Action was (till the end of May 2012) an ESR.

II.C.3. Involvement of Early Stage Researchers in the Action, in particular with respect to STSMs, networking activities, and Training Schools. In addition, justification should be provided if less than 4 STSMs were carried out during the year.

In Year 1 eight STSMs were carried out. The first one started on Month 7 and the demand for more STSMs has been rapidly growing, which shows that Action participants understand the value of this tool.

II.C.4. Involvement of researchers from outside of COST Countries. (Number of participants from non-COST Countries approved by the CSO. Give % of such participants from countries with reciprocal agreements. Specify their contribution)

The Action is in contact with Australia and Dr. Roger Fulton. However, the participation of Australia was not possible due to a budget limitation in 2011 and the procedure for its participation has been re-initiated.

II.C.5. Advancement and promotion of scientific knowledge through publications and other outreach activities. (Number of publications and other outreach activities that resulted from COST networking through the Action. Complete list should be given in an annex)

i) One Action Conference was organized that attracted ~150 participants world wide (PSMR2012, <http://psmr2012.df.unipi.it/>)

ii) Approximately 60 articles are under revision and will be published in Nuclear Instruments and Methods in Physics Research A in autumn 2012 (Annex I)

iii) At the moment only one conference poster acknowledges COST, but the results of recent STSMs and other common collaborations have provided the material for joint publications.

iv) Two Action Newsletters have been published and are available on Action website. (Annex II)

II.C.6. Activities and projects with COST network colleagues.

Besides the 8 STSMs several Action members have initiated cooperation including exchange of small detector components and validation of new bimodal tracers. Some examples are:

- i) Testing and validation of $[^{64}\text{Cu}](\text{DTCBP})_2\text{-Endorem}$ as a bimodal PET-MRI probe (KCL, UK – Karolinska, SE - Cromed/Mediso, HU)
- ii) Testing and validation Gd-L-Biotin and Ga-68-L-Biotin as bimodal probes for tissue pH measurement (Uppsala/Karolinska, SE - TD1004)
- iii) Optimization of scintillators/SiPM coupling (Univ. Pisa, IT – TEI Athens, EL)
- iv) Imaging enzyme inhibitors of RNAases (Univ. Thessaly/Demokritos, EL – LaTIM, FR)

An important project which has been initiated by Kings College (UK) and is in cooperation with several Action groups is the preparation of an open data set for PET/MR exams, which will be made available by the Action and will be ready in Year 2.

II.C.7. The capacity of the Action members to raise research funds.

Several proposals, with the participation of COST members have been submitted on international and national level and they are reported in II.A.4 and II.A.5. It is highlighted that the ITN PET/MR network has been initiated by WG1 and WG2 and aims to attract resources for 13 PhD students who will work on the hardware and software aspects of the Action. The very good rating (88,4) and positive reviewers' comments encourage the Action to resubmit it.

ANNEX I

PSMR 2012: PET/MR and SPECT/MR: New Paradigms for Combined Modalities in Molecular Imaging Conference

Book of Abstracts

26-30 May, 2012
PSMR 2012

**PET/MR and SPECT/MR: New Paradigms
for Combined Modalities in Molecular Imaging**
Hotel Hermitage La Biodola, Isola d'Elba - Italy

Conference chairs
Alberto Del Guerra, Italy
Hans Herzog, Germany
George Loudos, Greece

International Advisory Committee
Paul Marsden, UK
Stefan Vanderberghe, Belgium
Simon Cherry, USA
Sybille Ziegler, Germany
Dimitris Veksikis, France
Benjamin Tsui, USA
Hidehiro Iida, Japan
Jon Shah, Germany
Silvio Aime, Italy
Osman Ratib, Switzerland

Local Organizing Committee
e-mail: psmr2012@df.unipi.it
Department of Physics and INFN, Pisa,
Nicola Belcari
Maria Giuseppina Bisogni
Alberto Del Guerra
Lucia Lilli

<http://psmr2012.df.unipi.it>

UNIVERSITÀ DI PISA
INFN
JÜLICH

PSMR 2013 / 4th Jülich MR-PET Workshop

May 6-8, 2013
Forschungszentrum Jülich, Germany



Conference Chairs

Jon Shah
Alberto del Guerra
George Loudos

Information: www.mr-pet-juelich.de

Contact: mr-pet@fz-juelich.de



UNIVERSITÀ DI PISA



Local Organizing Committee

H.H. Coenen
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International Advisory Committee

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S. Cherry	J. van den Hoff
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H. Iida	C. Zaragoza
S. Majewski	S. Ziegler
B. Pichler	

1st Hellenic PET/MR workshop



1st Hellenic Workshop on PET/MRI “Sharing experience with experts” Saturday 23 February 2013, 09:30 - 14:30

Venue:

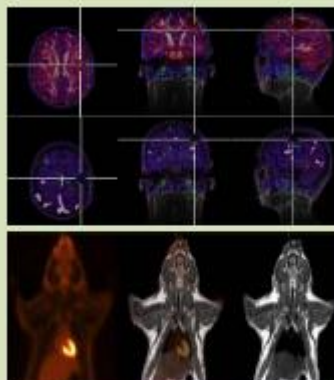
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Tel.: 00302105385376,
Email: thchristopoulou@gmail.com



Free Registration

To facilitate workshop organization please send an e-mail to thchristopoulou@gmail.com including your contact details, institution and expertise.

Short Description

The workshop is organized by the Department of Medical Instruments Technology, Technological Educational Institute of Athens and the COST Action TD1007 “Bimodal PET-MRI molecular imaging technologies and applications for in vivo monitoring of disease and biological processes”. It will include a number of invited talks that cover all aspects of the emerging field of PET/MRI. The main goal of the Workshop is to allow the interaction between Greek academics, researchers, technicians, clinicians and students and foreign experts, already working in the field of PET/MRI. Already confirmed speakers are:

- Prof. Brian Hutton: “Issues and opportunities for simultaneous PET/MRI”, University College London, UK
- Dr. Gaspar Delso: “PET/MR and PET/CT-MR Research at the University Hospital of Zürich”, University Hospital of Zürich, CH.
- Prof. Dimitris Vtsvikts: “Challenges in quantitative PET/MR imaging”, University of Brest, France.
- Prof. Uwe Pietrzyk: “Development of Hybrid Brain-Imaging - From the very Beginnings till the Introduction of PET/MRI”, Forschungszentrum Jülich GmbH, DE.
- Dr. Dennis Schaart: “Digital detector technology for fully simultaneous PET/MRI”, Delft University of Technology, NL.
- Dr. Giancarlo Sportelli: “Acquisition electronics and dedicated PET/MRI systems” University of Pisa, IT.
- Dr. Liliana Caldeira: “PET Image Reconstruction using MRI-based Information”, Universidade de Lisboa, PT.
- Dr. Charelamos Tsoumpes: “Recent Advances in Simultaneous PET-MRI Imaging at King’s College London”, King’s College London, UK.

For more info please visit: www.pet-mri.eu

ANNEX II

Action Newsletters