

Project no. 238802
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Project title: Integrated Interventional Imaging Operating System

Initial Training Network
(Marie Curie People Programme)

D2.1: Project Level Training Programme

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Duration: 48 months

Organisation name of lead contractor for this deliverable: University of Dundee

Coordinator: Professor Andreas Melzer (University of Dundee)

Signed:

Date: 31-03-2010

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Dissemination Level		
PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

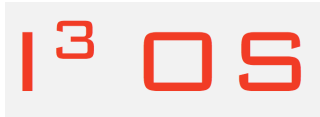


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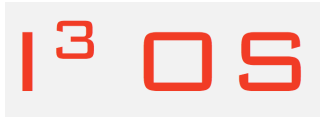
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Integration of Interventional Imaging in the Operating Systems of the Future

Calendar of Events:

Event	Date	Location	Network Level Training Course	Organizer
1	8 th & 9 th of Oct 2009	SMIT 2009, Sinaia, Romania	State of art of Imaging in Operating Theatres Numerical modelling and simulation of medical procedures	RH & NTNU Hosted by SMIT MEDIS
2	10 th March 2010	DGE-BV 2010 DGBMT Hannover	Model and Imaging Based Personalised Medicine	UNIVDUN hosted by DGBMT
3	12 th April 2010	Uppsala	Basics of Imaging Technology PET/CT/MRI/US	GE
4	3 rd & 4 th June 2010	Dundee	Safety of Image Guided Procedures	MRCOMP
5	2nd Sept 2010	Trondheim SMIT 2010	Navigation and intra-operative imaging in MI procedures SMIT 2010	NTNU Hosted by SMIT
6	3 rd Sept 2010	Oslo SMIT 2010	New Principles for Hybrid ORs – SMIT 2010	RH Hosted by SMIT
7	16 th Nov 2010	St Andrews	Exploitation of Results and Intellectual Property Rights Commercialization, Entrepreneurship, market studies	USTAN & Dundee
8	Mar 2011	Homburg or MUNICH	Interventional radiology and image guided procedures DGE-BV 2011:	USAAR (&MEN)
9	May-2011	St Andrews	Imaging Techniques based on medical photonics	USTAN
10	Jun-2011	Dundee	Safety of Diagnostic and Interventional Imaging	MRCOMP
11	Sep-2011	Tel Aviv SMIT 2011	Human Machine Interface and Interaction	TUD
12	Sept 2011	Tel Aviv	From Molecular Imaging to Image guided Molecular Therapy SMIT 2011	GE
13	Nov-2011	Luebeck	Advanced anaesthesia techniques and equipment Luebeck 2011	UoL
14	2012	Dundee	Techniques of workflow analysis, modelling, simulation, optimization	UNIVDUN
15	2012	Uppsala	Regulatory affairs FMEA / CE Mark / FDA for new imaging techniques	GE
16	June 2012	Dundee	Process of Standardization and Norms for Medical Device Safety and Testing	MRCOMP (& DGBMT)
17	2012	Dundee	Scientific and EU project management, knowledge transfer	UNIVDUN
18	Sept-2012	Brno/SMIT 2012	Basics on diagnosis and therapy of cardiovascular diseases	ICRC BRNO
19	2012	Delft/SMIT2012	Risk analysis and management, human factors, human failure analysis	TUD



Integration of Interventional Imaging in the Operating Systems of the Future

Network Level Training Events:

Full programmes for all events will be published on the IIIOS website, www.iiios.eu/training.

1. State of art of Imaging in Operating Theatres, numerical modelling and simulation of medical procedures

Host: NTNU & RH – 8th-9th October 2009, Sinai Romania
Event Programme: Annex 1.

The main content of this event is in line with the main objectives of the training content of IIIOS; state of the art imaging in operating theatres, and the future of medical procedures. The attendees will have lectures on the most advanced research in this field based in clinical needs and the goal of improving patient care.

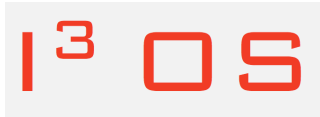
The main sessions of this event are:

- *Operating Theatre of the Future*
- *State of the Art Hybrid Imaging Operating Theatres*
- *Technology of the Hybrid Imaging OR*
- *Virtual reality – Numerical Modelling and Simulation of Medical Procedures*
- *Ergonomics in Surgery*
- *Image Guided Interventions.*

2. Model and Imaging Based Personalised Medicine

Host: DGBMT and SMIT UNIVDUN – 11^h March 2010, Hannover, Germany
Event programme: Annex 2

Model and Imaging based personalised medicine is a very important new trend in the research on integration of imaging with patient specific information such as Genome, Proteome, Phenotype, Habits and Co Morbidity. The event will provide basic knowledge presented by leading speakers from Europe in: patient-specific modelling and management for diagnosis and therapy (Hein Lemke TU Berlin/UCL), personalized image guided molecular diagnostics and therapy (Bengt Nielson, GE Stockholm) Integrated personalized data imaging for cardiovascular diseases management (Tomas Kara, ICRC, CZ). This section will be followed by presentation from the Fraunhofer society on related subjects in the field of drug development, tissue engineering biopsy analysis etc. The event is linked to the largest interdisciplinary German conference in the field of Endoscopy and imaging DGE-BV.



Integration of Interventional Imaging in the Operating Systems of the Future

3. Basic Imaging Training Course with Special Focus on Molecular Imaging:

Host: GE – 15th April 2010, Uppsala, Sweden

Event programme: Annex 3.

The following training programme will be used to teach researchers from across the network basic imaging techniques. Topics covered will include:

- An introduction to imaging modalities
- Imaging with ionizing radiation, X-ray & CT
- SPECT & PET imaging
- Magnetic Resonance Imaging
- Ultrasound
- Optical Imaging
- Molecular Imaging Image guided interventional toolkit: today in the future

4. Safety of MR Image Guided Procedures

Host: MR Comp GmbH – Dundee, June 3/4, 2010

Event programme: Annex 4

MR safety and compatibility are internationally recognized as important issues in terms of medical devices. The testing of devices is important as is transportation of this output - the labelling - for the MR safety user interface at the MR console.

This event will provide an introduction to the safety of MR Image guided procedures and will focus on devices that can be exposed to an MR environment. These devices must be tested for magnetically induced forces, torques, RF- and gradient induced interactions and safe functioning as well as MR image artefacts. Standardized test methods should be established. Further standards development is a work in progress e.g. RF and gradient induced voltages, vibration, heating as well as EMC issues. Results must be coded into a comprehensive device labelling considering readability and adaptability for the user interface.

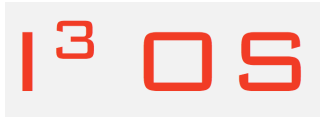
5. Navigation and intraoperative imaging in MI procedures

Host: NTNU – SMIT2010

Event Programme: Annex 5

The course will give researchers an introduction in how to navigate surgical instruments and perform resection guidance and control using 2D and 3D ultrasound integrated neuronavigation. Special topics covered in the course will be:

- Basic ultrasound imaging
- Basic principles of neuronavigation
- 3D ultrasound acquisition
- Image guided resection based on 3D ultrasound
- Hands on session and training
- Clinical experiences



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6. New Principles for Hybrid ORs

Host: The Interventional Centre, Oslo University Hospital - I³OS, Oslo
Event Programme: Annex 5

The course will provide an introduction to the fundamentals in physics related to MR-imaging and the use of MR-imaging in neuro and vascular structures. Basic theory on image navigation and general use of intraoperative MRI will also be covered. The course will include some examples of applications using intraoperative MR and the plans toward the use of MR-tracking for intra-operative catheter navigation in 3T MR.

- Introduction to Basic MR imaging
- Neuro imaging and functional MRI
- Vascular imaging in MR
- Basic principles of image navigation
- Applications for image navigation
- Different principles of Intraoperative MRI
- Applications for Intraoperative MRI
- Real-time Intra-operative catheter navigation in 3T MR
- Guided tour at The Interventional Centre including demonstration

7. Exploitation of Results and Intellectual Property Rights Commercialization, Entrepreneurship, market studies

Host: University of St Andrews – St Andrews, November 2010
Event Programme: TBC

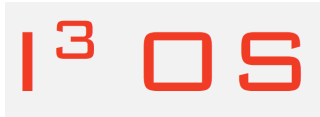
The course will focus on how researchers can go about protecting the commercialisation of their discoveries by patenting them, avoiding common patent pitfalls and guarding themselves against infringement of their intellectual property rights.

In the first part, the participants will be given training on how researchers can exploit their innovations and make money from their ideas, for example by licensing them or through the formation of moderate growth rate businesses (i.e. which don't require the injection of large sums of venture capital).

The course will then proceed by giving an understanding of IPR and of the regulations affecting the filing and licensing of patents, as key topics for researchers wishing to exploit the commercial potential of their work or improve their business acumen.

The course will proceed according to the following schedule:

- Commercialising your research
- Understanding Intellectual Property Rights (IPR)



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8. Interventional radiology and image guided procedures DGE-BV 2011:

Host University of Homburg Saar / DGE-BV 2011

Event Programme: TBC

The following training program will be set up to teach persons with different background the basics of Interventional Radiology. There will be three major parts:

1. Theoretical and practical basics for (A) medical and (B) non-medical persons
 2. Set up of data base of teaching videos with the long term aim to enable access and teaching with these videos throughout the consortium
 3. Teaching of backgrounds for MR guided interventions
1. For all people there will be seminars available. During these seminars ranging from 1 day to 5 days, the trainees will attend the interventional procedures in the angiography suite at the University Clinic in Homburg. This will be accompanied by lesson dealing with the theoretical background of different kinds of interventions. Especially for non medical personnel it will be interesting to perform some interventions like puncture of a phantom. Depending on the availability vascular phantoms for guidance of catheters and guide wires will be used as well (possible collaboration with Mentis).
 2. In addition to this teaching videos for interventional procedures shall be produced. The long term aim of this will be to provide a platform, which can be accessed via Internet. These videos can be used as training material for all partners. Especially those people, who attended the courses at USAAR should also be able to teach some of this material to their colleges at home.
 3. Special demands are generated by using MR guidance for interventions. Training of these with special consideration of imaging sequences, choice of instruments and artefact behaviour in the MR environment will be performed.

9. Imaging Techniques based on medical photonics

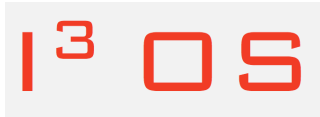
Host: University of St Andrews - St Andrews, Scotland, 10 May 2011

Event programme: TBC

Medical imaging in Bio-Photonics is a rapidly expanding field that attracts significant interest from academic and government institute as well as industry. Research and Development steps under this theme directly impacts life and as a result it has a transformative global effect on our society.

In this meeting/training we aim:

- To discuss and present fundamental issues and solution related to current trends in Bio-Photonics Imaging.
- To provide young scholars to receive tutorial and relevant hands on experience.



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This 8 hour program will be set up to trained researchers/students with the help of invited speakers as well as members of the network. In general we will cover medical photonics where tissue affects photons, which is used for spectroscopy, diagnostic sensing and imaging. Specifically Raman Spectroscopy, Optical Coherence Tomography (OCT) and its pathological, surgical and clinical aspects will be discussed. Further Magnetic Resonance Imaging (MRI) compatibility of above mentioned devices will be covered. There will be relevant hands on training for the scholars. Finally the event will be end up with a round table discussion as a get together with high tea session.

10. Safety and Compatibility of Diagnostic and Interventional Imaging

Host: MR Comp GmbH – Dundee June 2011

Event programme: Annex 7

This event will provide researchers with training in the safety and compatibility of diagnostic and interventional imaging. MR safety and compatibility is an important issue when developing medical devices. The number of MRI scans is increasing as are the number of clinical interventions guided by MRI. Different robotic and manipulator systems have been developed for use with MRI. MR safety and compatibility testing of medical devices is required for device approval by the regulatory agencies e.g. the FDA and the EU Notified Bodies. Basic standard test methods for MR safety issues were already established e.g. by ASTM International. Additional safety issues specific to a particular situation must be considered to evaluate specific medical systems for safe, precise and reliable functionality within an MR environment. Therefore manufacturing of MR suitable interventional systems needs standardized test methods and guidelines in order to comply with safety and compatibility requirements. Also the MR operator has to be provided with MR safety testing results in order to safely scan patients with devices using appropriate interface parameters to control the MR system

11. Human Machine Interface and Interaction

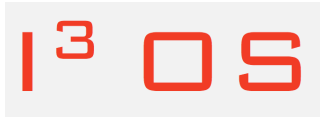
Host: TUD - SMIT 2011, Tel Aviv, Israel

Event Programme: TBC

During the SMIT 2011 conference a one day IIIOS training course will be organized focusing on Human Machine Interface and Interaction.

During the course the following aspects will be taught:

- Human machine interaction in simulators - role of imaging and (limited) depth perception
- Interfaces in simulators - haptic feedback systems
- Interfaces for interventional imaging.
- Interfaces for multimodality of imaging guided interventions
- Robotic interfaces for medical interventions
- Human machine interaction with articulating instruments with many degrees of freedom
- Telemanipulation of a steerable catheter for use in the MRI



Integration of Interventional Imaging in the Operating Systems of the Future

12. From Molecular Imaging to Image guided Molecular Therapy including MRgFUS and Imaging guided drug delivery.

Marketing and management of imaging system
Host: GE – SMIT 2011, Tel Aviv, Israel
Event Programme: TBC

This training course will focus on new Molecular Imaging opportunities opening new ways of doing targeting therapy. Nanoparticles as carriers of a drug to a target, imaging is used to check that the target is reached and then release of the drug through heat stimulation or change of PH value. The heat stimulation can be adapted via MR guided Focused Ultrasound. With this method the drug release and also the effect of the drug can be studied in real time. The labeling of the nano-particle carrier can be done with for instance PET tracers

The training course is meant to stimulate young researchers to think in new directions and to integrate new knowledge into their present experience. Marketing and management of imaging systems and future combinations will be covered to help research to understand the need to interface with his field for a successful commercialization of new imaging technologies

13. Advanced anaesthesia techniques and equipment

Host: University of Luebeck – Luebeck, November 2011
Event Programme: TBC

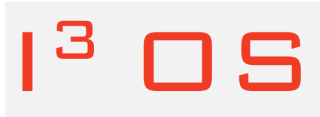
This event will involve: the presentation of anesthesia systems and technologies, initializing systems with respect to existing standards, communication between staff and patients and video control units.

The event will provide an overview on principles of current anesthesia techniques for the different types of procedures of open surgery, minimally invasive surgery and interventional image guided procedures

Risk analysis, human factors and scenario handling in between patient - physician interactions is also a part of program.

Risk analysis and standard operation procedures versus advanced image guided techniques:

- Handling of a patient in an MRI field with cardiac fibrillation?
- Effects of a rapidly induced stop of the static and dynamic magnetic field, consequences for patients and medical attendants?
- Workflow analysis and optimization



Integration of Interventional Imaging in the Operating Systems of the Future

14. Techniques of workflow analysis, modelling, simulation, optimization

Host: University of Dundee –
Event Programme: TBC

The integration of imaging systems into interventional and image guided procedures requires a detailed analysis of the procedure, the related equipment and the workflow including staff requirements and resource allocation.

New procedures require development and training of the clinical staff for optimised handling of instrumentation and equipment. Patient safety is the mandatory element of the procedures. Efficiency, efficacy and economics of medical procedures are today very important in order to save costs in the healthcare systems and on the other hand improve the quality of life for patients; the outcome of diagnosis and treatment; and a cost-effective utilisation of equipment, materials and, last but not least health and safety for medical staff performing the procedures.

The intra network training event plus the initial training network IIIOS, Integration of Interventional Imaging to the Operation System of the Future, will cover the following subjects:

- Tools and techniques for analysing medical interventional procedures and utilisation of the imaging
- Workflow design for surgical interventional and image guided procedure
- Integration of imaging modalities with existing procedures and defining workflow issues safety problems
- Hands on with MedModel numerical simulation of workflow and procedures for image guidance
- Hands on MRI guided interventions and Surgery using Thiel soft embalmed human cadaver

15. Regulatory affairs FMEA / CE Mark / FDA

Host: GE –
Event Programme: TBC

Modern research in healthcare is meeting new challenges in the from of the regulatory bodies.

This course will give an overview of the regulatory landscape in mainly Europe with clear definitions on the requirements and regulation for animal work as well as human trials. The course will also lay out the roadmap of taking new methods into full scale clinical practice. Imaging equipment , Medical devices and Drug introductions will be discussed. Roles & Responsibilities for different categories involved in research and development will be structured.

- Introduction medical devices approval systems FDA, CE Japan etc



Integration of Interventional Imaging in the Operating Systems of the Future

- Basics of QM and QA (ISO, GMP, GLP, GCP)
- Product classification and consequence to preclinical testing and clinical trials
- Designs of preclinical animal trials
- Design of clinical studies
- Documentation

16. Process of Standardization and Norms for Testing of imaging Medical Devices

Host: MR Comp GmbH – June 2012

Event Programme: Annex 8

The training course will involve learning about laws, authorities guidance documents and the establishment of testing standards from the introduction of testing to the until up-to-date standard of testing of today's medical devices.

- Medical Device Directive, Laws, Guidance documents
- Standardized Testing for Medical Devices:
 - Biocompatibility Testing
 - Mechanical Testing
 - Ultrasound and Radiopacity Testing
 - MR Safety and Compatibility Testing
 - Hygiene Testing and Sterilisation
 - Hands on procedures

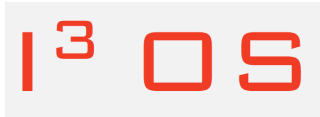
17. Scientific and EU project management, knowledge transfer

Host: University of Dundee –

Event programme: TBC

This event will be used to provide researchers with an understanding of project management and the skills required to successfully manage a project. The course will highlight the key contractual and financial issues that should be considered when embarking on a project. The event will combine lectures with hands on training to help develop the management skills of researchers. Special attention will be paid to the management of European projects. Topics covered will include:

- Consortium: Consortium contractual structure and key documents; Implementation of contractual and financial obligations. Eligible and ineligible costs. Financial and progress reporting.
- Management: Consortium structures and roles of consortium bodies, Promotion of good communications.
- Exploitation: FP7 IP rules, Intellectual property agreements, What is an exploitation plan and techniques for developing and monitoring one based on research activities. Examples of FP7 funded research exploitation.



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18. Basics on diagnosis and therapy of cardiovascular diseases

Host: ICRC BRNO – September / SMIT 2012

Event Programme: TBC

The Conference will provide most recent update related to in prevention, early diagnostic and advanced individualized treatment of cardiovascular diseases. Integral part of presentations will be description of contribution of IIIOS network in all of these areas.

Topics/program of the conference:

A. Clinical Panel

- Update on prevention of cardiovascular diseases
- Update on advanced diagnostic and treatment of coronary heart disease
- Update on advanced diagnostic and treatment of heart failure
- Update on advanced diagnostic and treatment of cardiac arrhythmias
- Update on advanced diagnostic and treatment of stroke

B. Translational Research Panel

- Novel technologies for cardiovascular and transplant surgery
- Stem cell technology and cardiovascular medicine
- Progress in molecular cardiovascular imaging
- Tissue engineering in cardiovascular medicine
- Biomolecular engineering in cardiovascular medicine
- Biomedical engineering in cardiovascular medicine
- Animal modeling for cardiovascular research and clinical practice

Presenters: Leading specialists from IIIOS Network, Mayo Clinic and Czech Republic

19. Risk analysis and management, human factors, human failure analysis

Host: TUD – Delft, SMIT 2012

Event programme: TBC

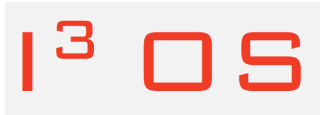
During this training program researchers will learn the role of risk management, human factors and human failure analysis during the development of medical devices. They will learn about the medical devices directives and classifications. Focus will be on class II and class III devices and the necessary testing, quality assurance system. The course will include the following topics:

- Product description: including e.g. Intended clinical use, Indications / contra indications, Operating instructions / instructions for use warnings / precautions, marketing claims
- Product specification including: Parts list, Drawings, assembly drawings, Sub-assembly drawings, Drawings of components, Specifications of materials used incl. data sheets, List of standards applied, manufacturing specifications, sterilization specifications (if required), Packaging



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- specifications, QA specifications (QC specs., in-process controls etc.) , Labeling, Instructions for Us, Service Manual
- Product verification including: Testing data and reports, Functionality studies, Wet lab or bench top testing, Materials certificates / reports on biological tests, Compatibility studies (connection to other devices), Risk analysis (ISO 14971)
- Human factors. The attendees will learn on the important role of human factors can play in creating safe, usable and innovative medical products. Creating simpler, safer and more user-friendly products is a key if you wish to be competitive in the medical device market. It will be explained how human factors - the science of making technology better fit the people who use it - can be applied to create more usable medical devices. FDA and other international regulatory bodies requires that it is demonstrated how human factors considerations were met during their product's development. The rationale behind these regulation will be explained.
- Understanding use-related errors. Medical error is a undeniable problem. But the reality of medical errors is that they are seldom due to carelessness or negligence. More commonly, errors are caused by faulty systems. The psychology of error will be discussed, and a framework for understanding why people make errors when using medical devices will be provided. E.g. why are displays misread, important warnings ignored, and the wrong buttons pushed. That the application of human factors can lead to better designs will be demonstrated.
- A startup company that recently developed a new device that they brought into the market will explain their experience with the regulation around medical device regulation. They will explain their quality system that they developed.
- During the course an example of a product developed within IIIOS will be used to work themselves through all essential steps.



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Annex 1.

State of the art imaging in operating theatres. Numerical modelling and simulation of medical procedures.

The 21st Conference of the Society for Medical Innovation and Technology
8th & 9th October 2009, Sinaia Romania.

Palace Hotel Sinaia, Conference Centre Casino Sinaia.

Session XIV

Operating Theatre of the Future

Presenters: Byrnjulf Ystgaard – Trondheim, William Meng – Hong Kong,
Cornelius Grimbergen – Delft.

Session XV

State of the Art Hybrid Imaging Operating Theatres

Presenters: Per Kristian Hol – Rikshospitalet, Toril Nagelhus Hernes –
Trondheim.

Lunch Symposium – Technology of the Hybrid Imaging OR

- Robotic Angiography Zeego Siemens - Per Kristian Hol (Rikshospitalet)
- Open and close bore MRI Philips – Arno Buecker (University of Homburg Saar)
- MR and surgical suite GE – Andreas Melzer (University of Dundee)

Session XVI

Notes-NOS-SAS

Presenters: Gerhard Buess, Marco Maria Lirici

Session XVIII

Virtual Reality II – Numerical modeling and simulation of medical procedures

Presenters: Jenny Dankelman – Delft University of Technology, Toril Nagelhus
Hernes – Trondheim, Grig Burdea

Session XIX

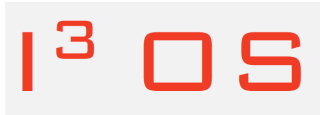
Ergonomics in Surgery

Presenters: Abe Fingerhud, Sanchez Margallo J A.

Session XXIII

Image Guided Interventions

Presenters: Thomas Lango – Trondheim, Chengli Song - Shanghai



Annex 2.

Model-based and personalized Diagnosis & Therapy

DGBMT/DVMT/DGE-BV/Fraunhofer, SMIT Symposium, Hospital of the Future
10th March 2010, 10.00 - 18.00 Uhr,
Messe Convention Center

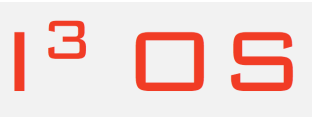
DGE-BV Congress

Supported by the Initial Training Network (ITN) IIIOS, EU FP7 ITN IIIOS
training event "Model and Imaging Based Personalized Medicine"

Organisation: DGBMT Andreas Melzer & Thomas Wittenberg

Programme:

- 10:00 Prof. Andreas Melzer, University Dundee, (UK)
Dr. Thomas Becks, DGBMT at VDE, Frankfurt a. M.
Dr. Thomas Wittenberg, Fraunhofer IIS, Erlangen
- 10:15 Keynote Lecture
Patient-specific Modelling and Management for Diagnosis and
Therapy - Prof. Heinz U. Lemke, TU Berlin (DE)
- 11:00 Personalized Image guided Molecular Diagnostics and Therapy,
a corporate perspective - Dr. Bengt Nielsen, Nielsen GE Medical
Systems, Stockholm, (SE)
- 11:30 Integrated Personalized Data Imaging for Cardiovascular Diseases
Management - Dr. Tomas Kara, International Clinical Research
Center Brno, (CZ)
- 12:00 Lunch
- 13:15 Fraunhofer Presentations - Computer asited Analysis of Breast
biopsies in Context of personalised medicine - Dr. Maria
Althelougou, Definiens AG, München
- 13:35 Endo-Pill-Project - Prof. Georgios Sakas, Fraunhofer IGD,
Darmstadt
- 13:55 Personalised Medicine for Drugdevelopment - Prof. Dr. Norbert
Krug, Fraunhofer ITEM, München
- 14:15 Neue Sichtweisen: Product development in the field of Personal
care, Rehab and Prevention - Prof. Dr. Martina Schraudner,
Fraunhofer ZV, München
- 14:35 Personalised Medicine – Personal Health – Ambient Assisted Living
- Thomas Norgall, Fraunhofer IIS, Erlangen



Integration of Interventional Imaging in the Operating Systems of the Future

14:55 Tissue Engineering for personalised Medicine - Prof. Dr. Heike Mertsching, Fraunhofer IGB, Stuttgart Dr. Michaela Kaufmann, Fraunhofer IGB, Stuttgart

15:15 Eine Fabrik zum Schlucken, A Plant to Swallow
Dr. Jan Stallkamp, Fraunhofer IPA, Stuttgart

15:35 Coffee

16:00 Personalised Endoscopy?: Single Port Laparoscopy versus NOTES?

Panel discussion:

Prof. Gerhard Bueß, Universitätsklinik Tübingen

Prof. Hubertus Feussner, TU München

Prof. Karl-Herrmann Fuchs, Markus-Krankenhaus, Frankfurt a. M.

Prof. Jürgen Hochberger, St. Bernward-Krankenhaus, Hildesheim

Moderation: Prof. Karl-Ernst Grund, Universitätsklinik Tübingen



Integration of Interventional Imaging in the Operating Systems of the Future

Annex 3.

The Future of Molecular Imaging.

New technology and scientific challenges to meet clinical needs.

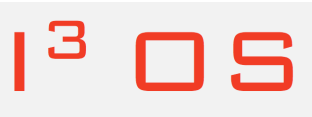
April 12th -14th, Uppsala, Sweden

Monday 12th April – 3rd EU FP7 Training Event “Molecular Imaging”

- 08:30 Coffee and Registration
- 09:00 Welcome and Introduction – Bengt Neilsen
- 09:15 Introduction to Imaging Modalities – Bengt Neilsen
- 09:45 Magnetic Resonance Imaging – Anders Nordell
- 10:15 Ultrasound – Johan Oscarsson
- 10:45 Optical Imaging – Len Fass
- 11:15 Introduction to Molecular Imaging: PET, SPECT, Tracer development and Cyclotrons – Hakan Hall
- 11:45 Q&A
- 12:00 Lunch
- 13:00 GEHC and the academic initiative – Bengt Neilsen
GEHC vision of MI – Jean-Luc Vanderheyden
MDx and Imanet – Lennart Thurfjell
Tracer preparation and in vitro techniques for tracer validation - Bengt Neilsen

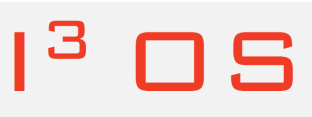
Tracer development a story around technology and validation – Bengt langstrom

Radio tracer technology platforms new directions – Johan Ulin
68Ga tracers – Irina Velikyan
Maldi imaging – Per Andren
In vitro tracer validation CNS – Marie Svedberg
11C tracers – Oleksiy Itsenko
18F tracers – Obaidur Rahman
Uppsala ASL – biotechnologies collaboration – Lena Kask
- 15:15 Coffee



Integration of Interventional Imaging in the Operating Systems of the Future

- 15:45 Bioimaging a big science vision – the need of integration and collaboration – Bengt Langstrom
- Multi modality imaging in neuro diagnosis – Elna-Marie Larsson
- MR-PET in whole-body imaging - Hakan Ahlstrom
- MI in studies of lung physiology – Goran Hedenstierna
- Affibody molecules in diagnosis and therapy – Vladimir Tolmachev
- New binder concepts for MI – Lars Baltzer
- Studies towards a selective PET-tracer for the AT2 receptor – Mats Larhed
- Hypertension is that something where PET can contribute? – Per Hellman
- Image Analysis – Ewert Bengtsson/Robin Strand
- Image analysis implemented in MI – Pasha Razifar
- MI as a tool in translational research in a drug development perspective – Raymond Josepsson
- 18:15 Close



Annex 4.

Safety of MR image guided procedures

Dundee, 3rd & 4th June, 2010

Seminar day 1:

Basics of physics and technical aspects of magnet resonance tomography

- Hardware (static magnetic field, gradient and RF fields)
- Physics (image generation, contrasts, artefacts, etc.)
- Research & trends

Hands-on course "Basics of MR imaging", 4 lessons MR system handling

- Precautions and behaviour in the MR environment (staff & items)
- Experience the interactions within the static magnetic field!
- Various experiments: MR imaging (contrasts, artefacts, etc.), incl. RF-induced heating experiment

Discussion

Seminar day 2:

MR safety and compatibility of devices

- Interactions of items and medical devices with the MR environment
- Current standards & guidelines
- MR testing methods
- Marking of medical devices for the MR environment

MR safety, the MR system and the MR worker – IEC 60601-2-33

- Requirements for the MR system and the MR environment

MRI from clinical view

- Diagnostic & therapy
- Surgery & interventions (biopsies, ablations (RF, laser), etc.)
- Robotics, navigation, visualisation of implants/ instruments

Hands-on course "MR interventions", 2 lessons

- MR guided biopsy

Final discussion



Integration of Interventional Imaging in the Operating Systems of the Future

Annex 5.

IIIOS Summer school , Part I – NTNU, Trondheim:

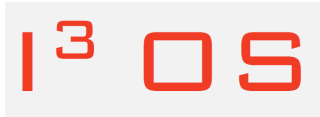
Tuesday 31st August

SESSION I: INTRODUCTION TO BASIC ULTRASOUND IMAGING AND NEURONAVIGATION

- 8:00 Registration and coffee
- 8:30 Welcome and introduction - Toril Hernes, SINTEF
- 8:40 Basics of ultrasound imaging - Tormod Selbekk, SINTEF
- 9:15 Basics of ultrasound based navigated neurosurgery - Toril Hernes, SINTEF
- 10:15 Coffee break
- 10:30 Ultrasound imaging and interpretation
- 11:30 Lunch

SESSION II: PRACTICAL ULTRASOUND BASED NEURONAVIGATION

- 12:30 How to acquire an excellent 3D ultrasound image volume in a clinical setting – followed by plenary session Geirmund Unsgård, St. Olavs Hospital
- 13:30 Break
- 13:45 Hands on training session - ultrasound and neuronavigation (3 groups)
- 14:30 Coffee break
- 14:45 Training session continued
- 15:15 Summary of hands on training
- 15:30 END of day 1



Integration of Interventional Imaging in the Operating Systems of the Future

Wednesday 1st September

SESSION III: PRACTICAL EXPERIENCES WITH ULTRASOUND GUIDED NEUROSURGERY

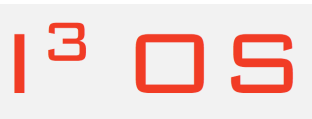
- 09:00 3D ultrasound in resection of low-grade and high-grade glioma - Geirmund Unsgård, St. Olavs Hospital
- 10:00 Break
- 10:15 3D ultrasound in neurosurgery at Charing Cross Hospital
- 11:00 Ultrasound in pituitary surgery - Ole Solheim, St. Olavs Hospital
- 11:15 3D ultrasound in resection of skullbase tumours - Geirmund Unsgård, St. Olavs Hospital
- 11:45 Lunch
- 12:45 3D ultrasound angio in vascular surgery - Geirmund Unsgård, St. Olavs Hospital
- 13:15 SURF - a new ultrasound technique for improved contrast imaging - Rune Hansen, SINTEF
- 13:30 Break - visiting the new neurosurgery operating rooms at St. Olavs
- 14:00 Ultrasound guided resection - Usefulness and impact of image quality - Ole Solheim, St. Olavs Hospital
- 14:15 Comparison of ultrasound findings vs. histopathology in glioma surgery - Tormod Selbekk, SINTEF
- 14:30 Summary of course – evaluation - Geirmund Unsgård, St. Olav Hospital
- 15:00 END of course

IIIOS Summer school , Part II – RH, Oslo:

Thursday 26th August 2010:

SESSION I: Introduction to Basics in MR imaging and NAVIGATION

- 09:00 Registration and Coffee
- 09:30 Welcome and introduction - Erik Fosse, The Interventional Centre



Integration of Interventional Imaging in the Operating Systems of the Future

- 10:00 Introduction to Basic MR imaging - Frederic Courevaud, The Interventional Centre
- 11:00 Neuro imaging and functional MRI - Atle Bjørnerud, The Interventional Centre
- 12:00 Lunch
- 13:00 Vascular MRI - Frederic Courevaud, The Interventional Centre
- 14:00 Basic navigation - Ole Jakob Elle, The Interventional Centre
- 15:00 Clinical application of image navigation - Jon Ramm-Pettersen, Department of Neurosurgery
- 16:00 Hands-on Navigation
- 17:30 END of day

Friday 27 August 2010:

SESSION II: Clinical use of image navigation and intraoperative MRI

- 09:00 Different principles of Intraoperative MRI - Per Kristian Hol, The Interventional Centre
- 10:00 MR Compatibility - Terje Tillung, The Interventional Centre
- 11:00 Coffee Break
- 11:30 Handling of patients in Intraoperative MRI - Per Steinar Halvorsen, The Interventional Centre
- 12:30 Lunch
- 13:30 Clinical experience with Intraoperative MRI - Torstein Meling, Department of Neurosurgery
- 14:30 Real-time Intra-operative catheter navigation in 3T MR - Frederic Courevaud, The Interventional Centre
- 15:00 Guided tour at The Interventional Centre
- 17:00 END of day

Thursday 2nd September 2010 – IIIOS Training Day NTNU

The main content of this event is in line with the main objectives of the training content of IIIOS; intraoperative imaging, the future operating rooms, and the future of medical innovation. The attendees will have lectures on the most advanced research in this field based in clinical needs and the goal of improving patient care.



Integration of Interventional Imaging in the Operating Systems of the Future

The main sessions of this event are:

- *Future of medical innovation (invited speaker)*
- *Future OR (scientific session)*
- *Interventional radiology (scientific session)*
- *Ultrasound and MR imaging (scientific session)*

Friday 3rd September 2010 - IIIOS Training Day Rikshospitalet

The main content of this event is in line with the main objectives of the training content of IIIOS. The attendees will have lectures on the most advanced research in the field of medical technology and image guided therapy.

The main sessions of this event are:

- *Communication, telemedicine (scientific session)*
- *Image guided therapy and interventions (scientific session)*
- *Nanomedicine and nanotechnology (scientific session)*
- *New surgical techniques (scientific session)*