APPENDIX I – Working Group 1

COST B21 – 2nd MANAGEMENT COMMITTEE MEETING

Venue: Invercarse Hotel – Dundee, Scotland

Saturday 13th March 2004

Cost B21 Dundee, 12.-13.3.2004

WG I: Measuring Techniques:

Tissue Parameters and Physiological Data

Jürgen R. Reichenbach

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Germany

List of Systems / Techniques / Activities related to COST B21 / WG I

Name	Systems	Techniques	Activities
Ewald Moser Vienna	3T / 80 cm (Bruker) research system ^{1}H, ^{23}Na coils 2 gradient systems	BOLD venography / SWI ^{1}H-MRSI ^{23}Na-Imaging Microimaging	brain tumors / MS human cartilage (in vivo / ex vivo) skeletal muscle
Said Ghandour Strasbourg	High field animal system	Perfusion Diffusion Texture Analysis Image Processing SPECT	Mouse Models Brain WM Diseases Contrast increase Quantification Molecular Imaging
Roger Dommisse Belgium	7 T / 8 cm (SMIS)	Diffusion Perfusion BOLD MRI Contrast Studies	Animal Models (mice, birds) different pathologies brain plasticity Phantoms

List of Systems / Techniques / Activities related to COST B21 / WG I

Name	Systems	Techniques	Activities
Lothar Schad Heidelberg	1,5 T clinical system Siemens Symphony	Perfusion (ASL) Diffusion BOLD venography ^{23}Na-Imaging	Brain (Tumours)
Jürgen Reichenbach Jena	1,5 T clinical systems (Siemens Symphony, Sonata, Vision)	SWI / BOLD venography Diffusion (DWI / DTI) Perfusion ^{1}H, ^{31}P Spectroscopy	Brain (Tumours, vascular disease) Muscle
Milan Hajek Daniel Jirak Matin Burian Prague	High field system (4,7 T)	MRI / MTS, DWI, CSI dedicated spinal cord coils; sequence developments at 4.7 T; construction of phantoms	Brain (Tumours) Cell transplantation Calf Muscles Liver

List of Systems / Techniques / Activities related to COST B21 / WG I

Name	Systems	Techniques	Activities
Olav Haraldseth Christian Brekken Trondheim	High-field systems NMR spectrometers	Diffusion Tensor Imaging Method development Perfusion BOLD-fMRI (preoperative planning)	Human brain tumou Animal models rat brain tumours rat brain CNS
J.D. De Certaines P.A. Eliat J. Bezy-Wendling M. Garreau Rennes	High-field systems: 4,7 T / 40 cm (12/04) Mice PET (05) 1,5 T (GE) (3 T in project) NMR spectrometers: 500 MHz 500 MHz HR/MAS 270 MHz µMRI: 7 T vertical magnet clinical SPECT & PET	Contrast-enhanced MRI Texture Analysis (2D & 3D) Modelling Interest for: BOLD, perfusion, diffusion Physiological relevance of texture parameters (by comparison with optical microscopy & modelling	Clinical oncology (brain, liver) Animal models (liver diseases) Modelling (liver) µPET (near future)

Expression of interest to participate or contribute to WG

Maria Petrou

Hans Stødkilde-Jørgensen

Arvid Lundervold

Jozsef Molnar

WG I: Measuring Techniques: Tissue Parameters and Physiological Data

Development and Implementation of MR sequences and/or techniques

Main Techniques

- Perfusion: first-pass methods, Arterial spin labeling (ALS)
- DWI, DTI
- BOLD-imaging: SWI, CO_2 challenge, CE-SWI
- ^{23}Na imaging

Organ(s):
Brain, (Liver)

WG I: Measuring Techniques: Tissue Parameters and Physiological Data

Development and Implementation of MR sequences and/or techniques

Perfusion: first-pass methods, Arterial spin labeling (ALS)

- Improvement of Perfusion-Modeling (A. Malyshev)
- Application of Perfusion Modelling to Perfusion Phantom (L. Schad)
  Improvement of Quantitation?
- Measurements at different sites at different field strength
- (Re-)-Analysis of acquired perfusion data (brain tumors, stroke, ...)
  in animals and humans

WG I: Measuring Techniques: Tissue Parameters and Physiological Data

Development and Implementation of MR sequences and/or techniques

BOLD-imaging: Susceptibility weighted imaging, CO_2 challenge, CE-SWI

- BOLD-Venography and Vascular Tree Modelling
  - Extraction of Blood Volume
  - Verification with Phantoms
- Susceptibility-Weighted Imaging and Exogenous Gases
- Combination with perfusion measurements, time resolved measurements
- Application in animals
- Applications in patients (brain tumors) at different field strengths combination with spectroscopy, MRSI

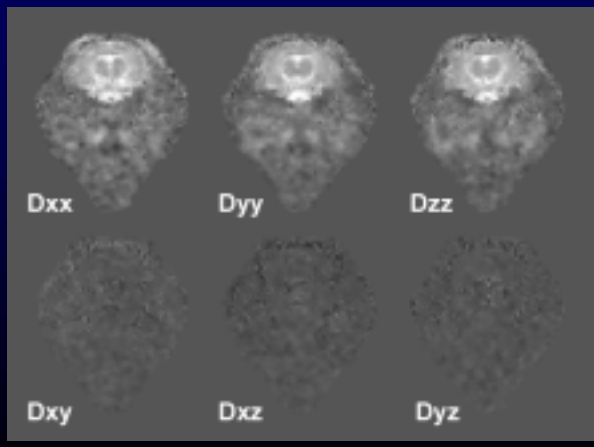
WG I: Measuring Techniques: Tissue Parameters and Physiological Data

Development and Implementation of MR sequences and/or techniques

Diffusion Weighted Imaging, Diffusion Tensor Imaging

- optimization of acquisition, minimization of tensor element variation
- diffusion spectral imaging ?? (high field machines)
- combining with other modalities --> MEG, extraction of conductivity tensor
- tractography

$$FA = \sqrt{\frac{3}{2}\frac{(\lambda_1 - \lambda_m)^2 + (\lambda_2 - \lambda_m)^2 + (\lambda_3 - \lambda_m)^2}{\lambda_1^2 + \lambda_2^2 + \lambda_3^2}}$$



WG I: Measuring Techniques: Tissue Parameters and Physiological Data

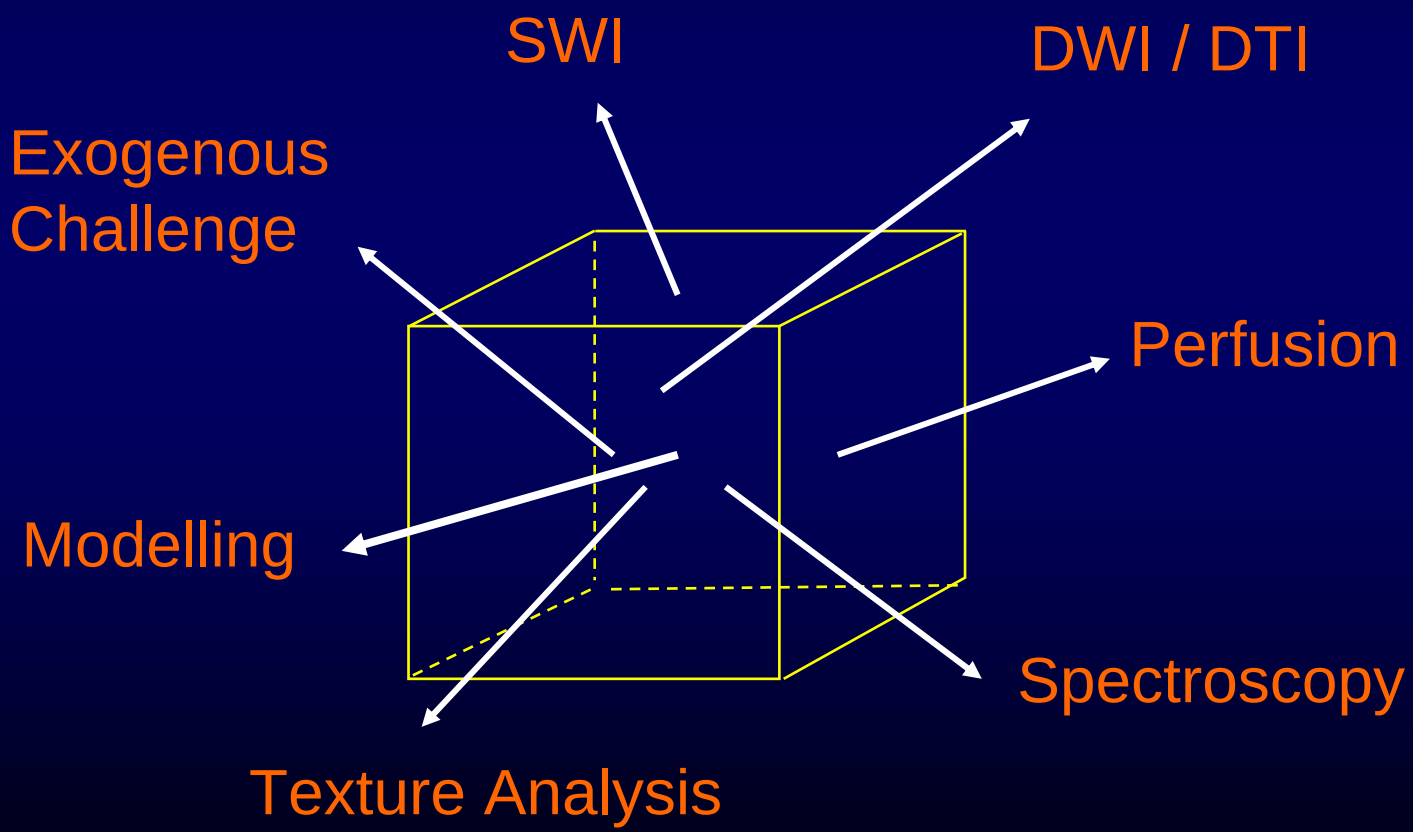
Development and Implementation of MR sequences and/or techniques

^{23}Na-Imaging

- high-field application (examples by Vienna-group)
- applicable at 1,5 T ?? (Heidelberg group)
- application in brain, cartilage, (cardiac)

WG I: Measuring Techniques: Tissue Parameters and Physiological Data

single voxel - multidimensional data



WG I: Measuring Techniques: Tissue Parameters and Physiological Data

- Increasing importance of (clinical) high-field systems (>= 3T)

- Planned short term missions (STM)

  Jena - Vienna

  Jena - Lódz

  Vienna - Heidelberg

  ...

  and many more

WG I: Measuring Techniques: Tissue Parameters and Physiological Data

Next meeting in Brussels 25.-26. June 2004:

- Presentation of available techniques of WG I
- Definition of (more) projects