

JAHRESBERICHT 2006



*Exzellenzzentrum Hochfeld-MR
am
Zentrum für Biomedizinische Technik und Physik, Bereich Medizinische Physik
und
Univ. Klinik für Radiodiagnostik, Medizinische Universität Wien*

Gemeinsame Forschungseinrichtung
mit den Universitätskliniken für Innere Medizin III, Neurologie,
Neurochirurgie, Physikalische Medizin und Rehabilitation, Psychiatrie und
Zentrum für Hirnforschung

MR-Holzhaus
Lazarettgasse 14
A-1090 WIEN

Bereichsleitung:

Univ. Prof. DI Dr. Ewald Moser (Naturwissenschaften)
Univ. Prof. Dr. Siegfried Trattning (Medizin)



MR Center of Excellence - Vienna

Heads: a.o. Univ. Prof. Dipl. Ing. Dr. Ewald Moser (Physics), Scientific Director.
Adjunct Professor of Physics in Psychiatry, University of Pennsylvania
Medical School, Philadelphia (USA)
a.o. Univ. Prof. Dr. Siegfried Trattnig (Radiology), Medical Director

Guest Researcher: Dr. R. Cunnington (Univ. Melbourne), PD Dr. U. Habel (Univ. Aachen/Univ. Wien)

Staff members (MUW): a.o. Univ. Prof. Dr. A. Berg (Med. Physik),
Dr. S. Gruber (Radiodiagnostik/Karenzvertretung)

Post-docs: Dr. B. Derntl-Hoheisel (Physik/Psychologie), Dr. DI M. Meyerspeer (Physik), Dr. S. Robinson (Psychologie/Physik), Dr. P. Szomolanyi (Radiodiagnostik), Dr. med. G. Welsch (Radiodiagnostik), Dr. DI C. Windischberger (Psychiatrie/Physik).

PhD students: Mag. M. Bittsansky (Radiodiagnostik), Mag. M. Chmelik (Innere Medizin III), DI M. Fürsätz (Physik), Mag. C. Kasess (Physik), DI E. Laistler (Physik), DI A. I. Schmid (Innere Medizin III), Mag. S. Zbyn (Innere Medizin III / Radiodiagnostik), DI W. Bogner (Radiodiagnostik), DI G. Grabner (Radiodiagnostik), Mag. V. Juras (Radiodiagnostik), DI Z. Majdisova, (Radiodiagnostik).

Research topics: Relaxometry, in vivo multinuclear-spectroscopy, MRI/MRS-quality control, MR-microimaging and -microscopy, functional neuroimaging, diffusion, parameter-selective imaging, contrast agent research, Na-imaging of cartilage, BOLD-imaging, high-resolution imaging (neuro- and non-neuro applications), molecular imaging, tumor spectroscopy, NMR-teaching.

Projects: 14 (2 - EU, 2 – UniInfrastruktur04-06, 5 – FWF, 2 – JF-OeNB, 1 – BRIDGE/FFG, 1 – BMF der Stadt Wien, 1- §26-MUW)
Mitarbeit in mehreren klinischen Forschungsprojekten

Collaborations: Univ. Klinik f. Radiodiagnostik, Innere Medizin III, Neurologie, Physikalische Medizin und Rehabilitation, Psychiatrie, Strahlentherapie, Unfallchirurgie, Orthopädie, Neurochirurgie, Fakultät f. Psychologie Uni Wien, Hanusch – Krankenhaus, Landsteiner Institut, Wilhelminenspital, EU-COST; Departments of Radiology and Psychiatry – Univ. of Pennsylvania (USA), Department of Musculoskeletal Science, The University of Liverpool (UK), Psychiatrische Klinik, Universitätsklinikum Aachen (D), Neurochirurgie, Kopfklinik, Uni Erlangen (D), Universitätsspital Basel, Universitätsspital Bern, Uni Klinik Grosshadern München, Bruker Biospin (D), Siemens Medical Solutions (A, D).

Oral presentations: 23 (incl. invited)

Poster presentations: 46

Publications: Top: 7 Standard: 5
in press: 11 (4 Top)

Other: 1
in review: 12

Diplomas: laufend: 1, abg.: 0

Dissertations: laufend: 7, abg.: 0

Habilitations: abgeschlossen: 0

Review activities: for 15 journals

PUBLICATIONS Exzellenzzentrum Hochfeld-MR 2006

1. R. Cunnington, **C. Windischberger**, **S. Robinson**, **E. Moser**, “The selection of intended actions and the observation of others’ actions: a time-resolved fMRI study”, *Neuroimage* **29** (2006) 1294-1302
2. **Trattnig S**, Pinker K, Ba-Ssalamah A, Nobauer-Huhmann IM. “The optimal use of contrast agents at high field MRI”. *Eur Radiol.* **16** (2006) 1280-7
3. **A. Stadlbauer**, S. Gruber, C. Nimsky, R. Fahlbusch, T. Hammen, R. Buslei, B. Tomandl, **E. Moser**, O. Ganslandt, “Preoperative Grading and Tissue Differentiation of Gliomas by Metabolite Quantification with high resolution Proton MR Spectroscopic Imaging”, *Radiology* **238** (2006) 958-69
4. J. Pripfl, **S. Robinson**, U. Leodolter, **E. Moser**, H. Bauer, “EEG reveals the effect of fMRI scanner noise on noise sensitive subjects”, *NeuroImage* **31** (2006) 332 - 341
5. **C. Bayreder**, D. Georg, **E. Moser**, **A. Berg**. “Basic investigations on the performance of a normoxic polymer gel with THPC as an oxygen scavenger: precision, accuracy, stability and dose rate dependence”, *Medical Physics* **33** (2006) 2506-2518
6. Are cerebral cavernomas truly nonenhancing lesions and thereby distinguishable from arteriovenous malformations? MRI findings and histopathological correlation. Pinker K, Stavrou I, Knosp E, **Trattnig S**. *Magn Reson Imag.* **24** (2006) 631-7
7. Magnetic resonance observation of cartilage repair tissue (MOCART) for the evaluation of autologous chondrocyte transplantation: Determination of interobserver variability and correlation to clinical outcome after 2 years. Marlovits S, Singer P, Zeller P, Mandl I, Haller J, **Trattnig S**. *Eur J Radiol* **57** (2006) 16-23
8. F. Riederer, **M. Bittsansky**, C. Schmidt, **V. Mlynarik**, C. Baumgartner, **E. Moser**, W. Serles, “1H-Magnetic Resonance Spectroscopy at 3 Tesla in Cryptogenic and Mesial Temporal Lobe Epilepsy”, *NMR Biomed.* **19** (2006) 544 – 553

9. A. Stadlbauer, O. Ganslandt, R. Buslei, T. Hammen, **S. Gruber**, **E. Moser**, M. Buchfelder, E. Salomonowitz, C. Nimsky, “Histopathologic Evaluation of Changes in Directionality and Magnitude of Water Diffusion in Gliomas by Diffusion Tensor MR Imaging”, *Radiology* **240** (2006) 803 – 10
10. Matrix-based autologous chondrocyte implantation for cartilage repair with Hyalograft C : Two-year follow-up by magnetic resonance imaging. **Trattinig S**, Pinker K, Krestan C, Plank C, Millington S, Marlovits S. *Eur J Radiol.* **57** (1) 2006: 9-15
11. Impairment of chondrocyte biosynthetic activity by exposure to 3-Tesla high-field magnetic resonance imaging is temporary. I. Sunk, K. Bobacs, **S. Trattinig**, WB Graninger, L Amoyo, B Tuerk, CW Steiner, JS Smolen. *Arthritis Res Ther.* 2006; **8**(4): R106
12. Radiological evaluation of cartilage disorders. **S.Trattinig**, *Osteosynthesis and Trauma Care* **14**; 2006; 195-202
13. High-field and ultrahigh-field magnetic resonance imaging: new possibilities for imaging joints. **S. Trattinig**, T.C. Mamisch, I.Noebauer. *Z Rheumatol.* 2006; **65**(8): 681-7. German.

Publications in press

14. Comparison of fMRI coregistration results between human experts and software solutions in patients and healthy subjects. A. Gartus, A. Geissler, T. Foki, AR. Tahamtan, G. Pahs, **M. Barth**, K.Pinker, **S. Trattinig**, R. Beisteiner *Eur Radiol.* 2006 Oct 12; June 2007 in press
15. A quantitative and topographical evaluation of ankle articular cartilage using high resolution MRI.SA Millington, B Li, J Tang, **S Trattinig**, JR Crandall, SR Hurwitz, ST Acton. *J. Orthopaedic Research* 2006 Oct 3; Feb. 2007, in press
16. High-resolution contrast-enhanced, susceptibility-weighted magnetic resonance imaging at 3 Tesla in patients with brain tumors - Correlation with Positron Emission Tomography and histopathological findings. K. Pinker, IM. Noebauer-Huhmann, I. Stavrou, R. Hoeffberger, **P. Szomolanyi**, G. Karanikas, M. Weber, A. Stadlbauer, E. Knosp, K. Friedrich, **S. Trattinig** *AJNR* (in press)
17. **E.Moser**, **B.Derntl**, **S.Robinson**, B.Fink, R.C.Gur, K.Grammer, “Amygdala activation at 3T in response to human and avator facial expressions of emotions”. *J.Neurosci. Methods* (2006), doi:10.1016/j.jneumeth.2006.10.016, Epub Nov.24 2006
18. A.Stadlbauer, C.Nimsky, R.Buslei, T.Hammen, M.Buchfelder, **E.Moser**, A.Ernst-Stecken, E.Salomonowitz, O.Ganslandt, “Optimized fiber tracking of tumor invaded white matter structures in patients with gliomas”, *NeuroImage* (2006) doi: 10.1016/j.neuroimage. 2006.08.051, Epub Dec 12, 2006
19. Improved preoperative evaluation of cerebral cavernomas by high-field, high-resolution susceptibility-weighted magnetic resonance imaging (HR-SW-MRI) at 3 Tesla –

Comparison with standard (1.5T) MRI and correlation with histopathological findings (preliminary results). K. Pinker, I. Stavrou, **P. Szomolanyi**, R. Hoeffberger, M. Weber, A. Stadlbauer, E. Knosp, **S. Trattnig** *Invest. Radiology* (in press)

20. A.Stadlbauer, C.Nimsky, **S.Gruber**, **E. Moser**, T.Hammen, T.Engelhorn, M.Buchfelder, O.Gnaslandt, “Changes in Fiber Integrity, Diffusivity, and Metabolism of the Pyramidal Tract adjacent to Gliomas: A Quantitative Diffusion Tensor Fiber Tracking and MR Spectroscopic Imaging Study”, *AJNR*, February 2007, in press
21. High-field MR imaging of meniscoids in the zygapophyseal joints of the cervical spine. K. Friedrich, S.A. Millington, **S. Trattnig**, K. Großschmidt, ML Pretterklieber. *Spine* Jan. 2007 (in press)
22. MR imaging of osteochondral grafts and autologous chondrocyte implantation. **Trattnig S**, Millington SA, **Szomolanyi P**, Marlovits S. *Eur Radiol.* (2007) in press
23. Quantitative T2 mapping of matrix-associated autologous chondrocyte transplantation at 3 Tesla: an in vivo cross-sectional study. **S. Trattnig**, **P. Szomolanyi**, T.C. Mamisch, P. Szomolanyi, S. Gebetsroither, O. Stastny, S. Marlovits. *Invest. Radiology* (in press)
24. **M. Meyerspeer**, G.J.Kemp, **V.Mlynarik**, M.Krssak, J.Szendrödi, P.Nowotny, M. Roden, **E.Moser**, “ Direct noninvasice quantification of lactate and high energy phosphates simultaneously in excersing human skeletal muscle by localised MRS”, *Magn. Res. Med.* 2007, in press

Guest editor

Special issue „Cartilage repair“. *Eur J Radiol* 2006
Marlovits S, **Trattnig S**

Rewards

S.Trattnig: „Researcher of the month“ February 2006, Medizinischen Universität Wien

GRANTS

**Uni-Infrastrukturprogramm II des BM für Bildung, Wissenschaft und Kultur
Grossgeräte-Antrag für ein 7 Tesla Ganzkörper-MRT (hardware grant),
eingereicht von Trattnig S und Moser E, Exzellenzzentrum für Hochfeld-MR
bewilligt im Juli 2005
Bewilligte Summe: 4 Mio € aufgeteilt auf 3 Jahre (2004-2006)**

Individual Research Projects

Newly granted:

Jubiläumsfondprojekt Nr.11954, PI: S. Trattnig

Verbesserte präoperative Evaluation cerebraler kaverner Gefäßmalformation mittels hochaufgelöster KM-verstärkter SWI-Hochfeld (3T) MRT-Vgl. mit Standard MRT und histopathologischen Befunden

Bewilligt am 29.6.2006

Bewilligte Summe: **41.000€**

BRIDGE-Program FFG, PI: S. Trattnig

Sequenztechnik-Entwicklung und Optimierung am Hochfeld-MR (3+7 Telsa)

Bewilligt am 28.6.2006

Bewilligte Summe: **340.000 €**

Ongoing Research Projects:

FWF-TRP-Project L243-B15 PI: S.Trattnig

Monitoring of autologous cartilage implantation by 3T MR

bewilligt am 12.10.2005

bewilligte Summe: **286.000 €**

FWF-Project P18110-B15 PI: S.Trattnig

Visualization of Biomechanical properties of articular cartilage by MR

bewilligt am 21.06.2005

bewilligte Summe: **408.000 €**

FWF TRP L36-B15 PI: E. Moser (Kern, Mayr, Kemp)

Functional electrical stimulation of long-term denervated skeletal muscle validated by combining quantitative MRI and MRS methods at 3 Tesla

05/05 – 04/08 €304.350,-

Bürgermeisterfondprojekt Nr.2332 PI: S.Trattnig

Natriumbildgebung des Knorpels

bewilligt am 14.2.2005

Bewilligte Summe: €25.000,-

ÖNB-JF 10943 PI: E. Moser (Cunnington Deecke)

Korticale und subcorticale Hirnaktivitaet bei Morbus Parkinson

08/04 – 06/06 €60.000,-

FWF P16669-B02 PI: E. Moser (Gur, Kryspin-Exner)

Neurobehavioral Probes of Emotion Recognition and Processing: and Intercultural Study
Correlating Psychometric Tests and Functional Neuroimaging at 3 Tesla

10/03 – 11/07 €251.792,-

FWF P15202-B02 PI: E. Moser (Kemp, Roden)

Metabolic regulation in human skeletal muscle studied by combining ¹H/³¹P-MR
-spectroscopy methods at 3 Tesla

2/02 – 1/06 €179.792,-

Firmenkooperation mit der Firma Bracco Mailand, PI: Trattnig S

§ 26-Projekt der MUW Wien

Contrast-Enhanced Magnetic Resonance Blood Oxygen Level Dependent Venography in Healthy
Volunteers and Patients with Brain Tumors.

Bewilligt am 14.02.2005

Bewilligte Summe: 65.000 €

Projekte mit finanzieller Beteiligung

ÖNB-JF 11903 PI: L.Pezawas (Kasper, Moser, Erfurt, Esterbauer)

Epistasis of 5 HTTLPR and val66met BDNF:A. Genetic Susceptibility
Mechanism for Depression

Mitarbeit von 10/06 – 3/08 €90.000,-

ÖNB-JF 11437 PI: I. Kryspin-Exner (Moser, Bauer, Trattnig)

Neuronale Korrelate des Entscheidungsverhalten bei Posttraumatischer
Belastungsstörung (PTSD)

Mitarbeit von 10/05 -6/07 €87.000,-

COST Aktion - B21

“Physiological modelling of MR image formation”

Coordinator: Dr. R.Lerski, Dindee (UK)

Austrian Delegates (E. Moser & S. Trattnig) from 9/2003 – 8/2006