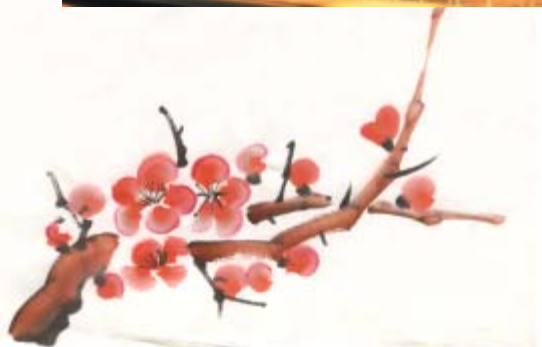




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Letter From The President

November is the mid-way point between ISMRM Annual Meetings. It is therefore appropriate to not only bring you the “news” but to reflect briefly on last year’s meeting, while we work towards our next one in Miami Beach.

The Kyoto meeting was our first in Asia. Holding a meeting in Asia was an unknown for almost all of us on the Board. We went forward with enthusiasm but considerable trepidation about what might face us, and ultimately how much it would cost. By all measures— scientific, social and financial— it was an outstanding success. While the scientific and social aspects of our Annual Meetings are usually immediately apparent to all that attend the meeting, it often takes several months for a full reconciliation of the financial matters. By that time the Board is focused on the next meeting, while ISMRM



Shoji Naruse and Atsuko Heshiki.



Mutsumasa Takahashi

members may still be wondering about the final financials for the last meeting. Now we have all our financial results and I am delighted to report that we were within a few thousand dollars of being revenue neutral for Kyoto. This is a fantastic result given that our meetings outside North America always incur higher costs due to the expense of non-North American convention centers. This financial success is in large part due to the efforts of the Kyoto Local Organizing Committee. Our Japanese, Australian and Asian ISMRM members on the LOC raised hundreds of thousands of dollars to completely cover all the expenses of our Sunday reception and the superb final banquet on the Thursday evening, fireworks and all. On behalf of the Board and all ISMRM members I sincerely thank the LOC for their excellent work!



See *President’s Letter* page 2

Looking forward, the program for the Miami Beach meeting has now been set. Under the direction of Drs. Vivian Lee and Roland Kreis and their Scientific Program and Education Committees, we will have a scientific program that is exceptionally strong, with an educational program that will have clinical components that are better than ever. Scientists will continue to find the ISMRM Annual Meeting the pre-eminent international forum for new work in MRI and MRS. Clinicians will experience lectures and workshops that deliver state-of-the-art material on MRI and MRS. To highlight the latter, in October we mailed a 24-page brochure, with nine pages devoted to ***“Educational Offerings for Clinicians”*** containing ***“Clinical MRI: From Principles to Practice.”*** This is a week-long course in Clinical MRI embedded throughout the entire week of the Annual Meeting, targeted to practicing radiologists, trainees, and technologists and taught by some of the world’s best teachers in MR. The brochure contains walks-through-the-week categorized by organ subspecialty – musculoskeletal, neurological, body, and cardiovascular. We hope this coming year’s program will be even more attractive to practicing clinicians than that of previous years.

We also have a new editor for *Magnetic Resonance in Medicine!* In September, the Board of Trustees approved and announced the appointment of Michael B. Smith, Ph.D., as Editor-in-Chief of *Magnetic Resonance in Medicine*, effective 1 January 2005. Dr. Smith succeeds Felix W. Wehrli, Ph.D., who during his 13-year tenure has raised the stature and importance of the journal to its present lofty position in our field. Dr. Smith was awarded the Ph.D. in Biochemistry by the University of Arkansas, Fayetteville, in 1978. He took up his appointment at Penn State in 1988, where he is currently Professor in the Departments of Radiology, Cellular and Molecular Physiology, and Molecular Medicine and Chief of the Center for NMR Research at the Milton S. Hershey Medical Center of the Penn State University College of Medicine in Hershey, Pennsylvania, USA. Dr. Smith has served the field of MR in medicine and the Society in many significant ways. He has been Deputy Editor of *Magnetic Resonance in Medicine* since 1998. He is currently a member of the Board of Trustees of the ISMRM and has also served on the Scientific Program Committee and the Young Investigator Awards Committee. The ISMRM Board of Trustees is pleased and proud to have engaged the services of such a distinguished scientist as Dr. Smith to take up the very important position of Editor-in-Chief of *Magnetic Resonance in Medicine!*



Michael B. Smith

The Board is also actively engaged in implementing its new strategic plan. While this plan is very broad in its scope, I am particularly excited about strategies to expand our global outreach and educational objectives, and to increase our collaborations with related societies and MR groups. For example, plans are solidly underway to hold educational workshops in South-East Asia, China, Korea, and Latin America in cooperation with local ISMRM organizers in these regions in the next one to two years. Also, members of our Board and Central Office have met with our counterparts in the European Society for Magnetic Resonance in Medicine and Biology to agree on the terms of our joint meeting in Barcelona in 2007, and begin site selection for our joint 2010 meeting. The spirit of cooperation in all these endeavors has been superb. I am sure these initiatives will yield excellent results in the near future as well as in the long term.



Communication with the membership is also a very important part of the strategic plan. The Board wants to stay attuned to the thoughts and needs of ISMRM members and serve them as well as possible. Accordingly we have again undertaken an electronic survey of our membership via Zoomerang. I hope you have completed the survey and let us know your thoughts. I look forward to hearing from all ISMRM members.

— Walter Kucharczyk, ISMRM President

ISMRM Membership Survey Results are displayed at this URL.

http://www.zoomerang.com/reports/public_report.zgi?ID=L2287YR5BN28



ISMRM Thirteenth Scientific Meeting and Exhibition 7-13 MAY 2005

MIAMI BEACH CONVENTION CENTER, MIAMI BEACH, FLORIDA, USA



ISMRM IMPORTANT DATES AND DEADLINES

17 NOVEMBER 2004

Deadline for online Abstract submissions.

22 NOVEMBER 2004

Deadline for receipt of Educational Stipend applications.

22 NOVEMBER 2004

Deadline for receipt of E.K. Zavoisky Stipend applications.

17 JANUARY 2005

Deadline for receipt of Proffered Papers for the SMRT 14th Annual Meeting.

31 JANUARY 2005

Deadline for receipt of New Entrant Stipend applications.

25 MARCH 2005

Deadline for Advance Registration for the ISMRM 13th Scientific Meeting and Exhibition.

22 APRIL 2005

Full Text version of the Proceedings is available online to preregistered attendees only.

FRIDAY, 6 MAY 2005

On-site Registration open from 14:00 - 20:00. SMRT Poster Tour & Reception 18:30 - 20:00.

SATURDAY, 7 MAY 2005

Weekend Educational Programs begin.
On-site Registration open from 06:30 - 18:00.
SMRT 14th Annual Meeting begins 07:45.

SUNDAY, 8 MAY 2005

Weekend Educational Programs continue.
On-site Registration open from 07:00 - 18:00.
SMRT 14th Annual Meeting continues.

MONDAY, 9 MAY 2005

On-site Registration open from 06:30 - 18:30.
Scientific Sessions begin at 07:45.
Technical Exhibition open at 10:00.

TUESDAY – THURSDAY, 10-12 MAY 2005

On-site Registration open from 06:30 - 18:00.
Morning Categorical Courses begin at 07:00.
Scientific Sessions begin at 08:15.
Technical Exhibition open at 09:30.

FRIDAY, 13 MAY 2005

On-site Registration for Scientific Meeting from 06:30 - 12:30.
Morning Categorical Courses begin at 07:00.
Scientific Sessions begin at 08:15.
Scientific Meeting adjourns at 12:30.

For clinicians and clinical trainees, the ISMRM offers this new week-long program, “Clinical MRI: From Principles to Practice” which starts on Saturday, 7 May with the one-day intensive course, “Clinical MRI: From Physical Principles to Practical Protocols.” On Sunday, attendees have a choice of day-long clinical educational programs. During the week, the Clinical MRI course features NEW case-based problem-solving courses. Run in parallel to the Scientific Sessions and Clinical Categorical Courses, these two-hour sessions focus on common, everyday clinical MR problems that are challenging to practicing physicians and clinical trainees. Instructors in the problem-solving courses are among the most experienced MR clinician-scientists in the field, selected for their renowned excellence as teachers. Also, as part of this initiative, Hands-On Workshops for vendor-specific protocol optimization will be run on two separate days (advanced sign-up at the meeting is required).

CLINICAL MRI: FROM PHYSICAL PRINCIPLES TO PRACTICAL PROTOCOLS

Joshua M. Farber, Vivian S. Lee, David J. Lomas, and James F.M. Meaney, Organizers

Saturday, 7 May, 08:00 - 17:45

EDUCATIONAL OBJECTIVES

Upon completion of the course, participants should be able to:

- Describe the basic physics principles of MRI;
- Explain the physics principles underlying common sequences used in musculoskeletal imaging, body imaging, vascular imaging, neurological imaging and cardiac imaging and apply these principles in protocol design for common indications;
- Recognize and avoid common pitfalls that arise in standard imaging protocols.

PROGRAM

08:00 **Overview of MR Physics,**
Norbert J. Pelc

Musculoskeletal MR

09:00 **Principles,** *H. Cecil Charles*

09:40 **Practical Protocols,** *Timothy J. Mosher*

10:20 Break- Meet the Teachers

Body MR

10:35 **Principles,** *Martin J. Graves*

11:15 **Protocols,** *David J. Lomas*

11:55 Break

11:55 - 12:15- Meet the Teachers

Vascular MR

13:10 **Principles,** *Frank R. Korosec*

13:50 **Protocols,** *James F.M. Meaney*

Neuro MR

14:30 **Principles,** *Timothy P.L. Roberts*

15:10 **Protocols,** *David J. Mikulis*

15:50 Break- Meet the Teachers

Cardiac MR

16:10 **Principles,** *Christine H. Lorenz*

16:50 **Protocols,** *Vivian S. Lee*

17:30 - Adjournment- Meet the Teachers

17:45

BODY MRI PROBLEM SOLVING: BREAST AND CIRRHOSIS

Vivian S. Lee, Organizer

Monday, 9 May, 11:00 - 13:00

PROGRAM

**The Hepatitis C Patient:
Early Diagnosis of Cirrhosis and HCC**

Speaker: *Donald G. Mitchell*

EDUCATIONAL OBJECTIVES

Upon completion of this course, participants should be able to:

- Recognize early morphologic signs of cirrhosis, before nodular texture or contour are evident;
- Describe the spectrum of findings of portal hypertension;
- List the categories of nodular lesions, and be able to evaluate their diagnostic features in a rapid comprehensive MRI examination.

PROGRAM

Problem Solving with Breast MRI

Speaker: *Christiane K. Kuhl*

EDUCATIONAL OBJECTIVES

Upon completion of this course, participants should be able to:

- Identify useful clinical indications for breast MR imaging;
- Describe and apply diagnostic criteria for benign mass and non-mass-related enhancement;
- Describe and apply diagnostic criteria for invasive and intraductal malignant lesions;
- Explain ways to distinguish benign from malignant solid tumors in breast MRI, and benign non-mass related enhancement from DCIS.

NEURO MR PROBLEM SOLVING: BRAIN AND SPINE

Vivian S. Lee, Organizer

Tuesday, 10 May, 10:30 - 12:30

PROGRAM

**How to Maximize your Diagnostic
Acumen in Brain MR:
Cases and Techniques**

Speaker: *Robert I. Grossman*

EDUCATIONAL OBJECTIVES

Upon completion of this course, participants should be able to:

- Determine the optimal techniques for imaging specific indications;
- Make specific diagnoses based on imaging findings;
- Recognize and avoid diagnostic pitfalls.

PROGRAM

**Dilemmas in Spine MR Imaging:
An Imaging/Clinical Correlative Approach**

Speaker: *Robert M. Quencer*

EDUCATIONAL OBJECTIVES

Upon completion of this course, participants should be able to:

- Establish MR imaging parameters to best answer specific clinical issues;
- Develop a differential diagnosis based on imaging findings in the spine;
- Explain the multi-modality imaging approach to diseases affecting the spine and spinal cord.

MUSCULOSKELETAL MR PROBLEM SOLVING: CARTILAGE AND SOFT TISSUE TUMORS*Joshua M. Farber and Vivian S. Lee, Organizers*

Tuesday, 10 May, 13:30 - 15:30

PROGRAM**Imaging Approach to Chondral and Osteochondral Injury: Diagnosis and Characterization***Speaker: Christine Chung***EDUCATIONAL OBJECTIVES**

Upon completion of this course, participants should be able to:

- Describe the anatomy of cartilage and its interface with subchondral bone;
- Compare current imaging techniques used to diagnose and characterize chondral and osteochondral lesions.

PROGRAM**Imaging of Soft Tissue Tumors: How to Stay Out of Trouble***Speaker: Mark Murphy***EDUCATIONAL OBJECTIVES**

This course will:

- Provide a logical framework in radiologic evaluation of soft tissue tumors;
- Review common diagnoses and staging—Lesions with diagnostic appearance—Lesions with nonspecific appearance;
- Provide information on the use of contrast.

CARDIAC MRI PROBLEM SOLVING: ISCHEMIC AND NON-ISCHEMIC DISEASE*Vivian S. Lee, Organizer*

Thursday, 12 May, 10:30 - 12:30

PROGRAM**Nonischemic Cardiac MRI: Clinical Scenarios***Speaker: Charles B. Higgins***EDUCATIONAL OBJECTIVES**

Upon completion of this course, participants should be able to:

- Describe the appropriate MR sequences for evaluating various types of nonischemic heart disease;
- Interpret the morphologic and physiologic aspects of the most frequent cardiac disease evaluated by MR.

PROGRAM**Evaluation of Ischemic Cardiac Disease with MRI: Case Studies***Speaker: Hajime Sakuma***EDUCATIONAL OBJECTIVES**

Upon completion of this course, participants should be able to:

- Explain MR protocols for evaluation of patients with coronary artery disease, including perfusion, wall motion, and viability;
- Interpret pharmacologic stress and viability images and avoid imaging pitfalls.

VASCULAR MR PROBLEM SOLVING: RENAL, PERIPHERAL, AND CAROTID MRA*Vivian S. Lee, Organizer*

Thursday, 12 May, 13:30 - 15:30

PROGRAM**Carotid MR Angiography: Case-Based Review for Clinicians***Speaker: Georg Bongartz***EDUCATIONAL OBJECTIVES**

Upon completion of this course, participants should be able to:

- Describe optimal techniques for carotid MRA;
- Recognize pitfalls in MRA acquisition and interpretation;
- Describe a spectrum of carotid vascular pathology.

PROGRAM**Renal MRA: Case-Based Review for Clinicians***Speaker: Martin R. Prince***EDUCATIONAL OBJECTIVES**

Upon completion of this course, participants should be able to:

- Describe optimal techniques for renal MRA;
- Recognize pitfalls in MRA acquisition and interpretation;
- Describe a spectrum of renal vascular pathology.

PROGRAM**Peripheral MRA: The Chase is Afoot***Speaker: Jeffrey H. Maki***EDUCATIONAL OBJECTIVES**

Upon completion of this course, participants should be able to:

- Explain typical vascular pathology and common anatomic variants seen in peripheral MRA;
- Describe the common pitfalls inherent to peripheral MRA and how to circumvent them;
- Explain the differences between claudication patients and ischemic soft tissue patients in terms of: a) required imaging coverage/resolution, and b) differing flow physiology and how that impacts the peripheral MRA protocol.

Hands-On Workshops*Leif Østergaard and Vivian S. Lee, Organizers***OVERVIEW**

Workshops complement the weekend and week-long didactic courses on neuro, cardiovascular, body and musculoskeletal MRI. They will cover vendor-specific and practical issues relating to protocol optimization. Through the use of interactive 'hands-on' sessions, supported by vendors and using commercial workstations, the courses aim to facilitate the transfer of knowledge gained in lectures to everyday clinical work. **Advanced sign-up at the meeting is required.**

EDUCATIONAL OBJECTIVES

Upon completion of this course, participants should be able to:

- Define basic routine protocols for MR imaging in each of these subject areas;
- Modify and customize protocols for less compliant patients;
- Incorporate new technological advances into the basic protocols (e.g. parallel imaging).

HANDS-ON WORKSHOP #1:**Neuro and Musculoskeletal Protocol Optimization**

Wednesday, 11 May, 10:30 - 12:30 and repeated on

Thursday, 12 May, 10:30 - 12:30

HANDS-ON WORKSHOP #2:**Body and Cardiovascular Protocol Optimization**

Wednesday, 11 May, 13:30 - 15:30 and repeated on

Thursday, 12 May, 13:30 - 15:30

MEET THE TEACHERS

This year, the weekend courses will have a new feature, "Meet the teacher" breaks. What it means is that the speakers in a session are requested to stay until the next break, and be available for one-to-one contact with attendees during the break, such that there is a greater opportunity for informal questions and discussion. This includes the lunch break, when a specific time in the program has been set aside for this at the start of the break, and at the final adjournment in the afternoon, when speakers are requested to stay afterwards for informal questions.

MR PHYSICS FOR PHYSICISTS

Michael H. Buonocore, John P. Mugler, and Klaus Scheffler, Organizers

**Saturday, 7 May, 08:30 - 18:10 and
Sunday, 8 May, 08:30 - 15:15**

EDUCATIONAL OBJECTIVES

Upon completion of the course, participants should be able to:

- Starting from first quantization in quantum mechanics, describe and derive the two-component Schrödinger equation, the equations for thermal equilibrium, the Bloch equation for magnetization dynamics, the magnetization relaxation terms T1 and T2, and explain the conclusion that the current induced in the MRI coil is a measure of the expectation value of the magnetic moment of the nuclear spins;
- Describe the spin operator formalism, mechanisms of spin coupling that lead to multiple quantum coherence phenomena, and alternate methods of NMR spin polarization;
- Explain the basic theory of relaxation, and processes of relaxation of water protons that occur in tissues and result in image contrast;
- Describe the physical principles of and engineering for RF signal reception, including sources of noise and the determination of the ultimate limits to signal to noise ratio that can be achieved;
- Describe the physical processes and technical innovations used to generate the MRI data needed to create images, such as selective excitation and RF pulse design, spatial encoding and the k-space;
- Describe data collection, magnetization dynamic equilibrium for image contrast, and the use of graphical tools and diagrams for understanding spin physics;
- Apply advanced image reconstruction methods based on gridding for non-cartesian k-space trajectories, based on coil sensitivity functions for parallel imaging, based on generalized temporal-spatial correlation, as well as methods for correction of image artifacts.
- Describe special MRI pulse sequences and processing methods used for spatial mapping of specific physiological processes such as anisotropic water diffusion and flow quantification;

- Describe physical phenomena that become important when attempting to image at high field strengths (3T), and describe electromagnetic field simulations that have become necessary for design of gradient and radiofrequency coil subsystems to be used in high field systems.

PROGRAM

Day 1: Saturday, 7 May

SESSION I: Origins and Basic Properties of the MRI Signal

- 08:30 **Origins of Magnetization**
Michael H. Buonocore
- 09:05 **Multiple Quantum Coherence and Spin Density Formalism**
Warren S. Warren
- 09:40 **Alternate Mechanisms for Spin Polarization**
Bastiaan Driehuys
- 10:15 Break- Meet the Teachers

SESSION II: Signal Relaxation

- 10:45 **QM and Semi-Classical Theory of Relaxation**
John C. Gore
- 11:20 **Relaxation in Living Tissue**
Valerij G. Kiselev
- 11:55 **Contrast Mechanisms in Living Tissue**
Greg J. Stanisz
- 12:30 Break
- 12:30 - Meet the Teachers
- 13:00

SESSION III: Signal Detection

- 13:55 **RF Receiver Coil and Coil Array Design**
Steven M. Wright
- 14:30 **Sources of Noise and the Limits of SNR**
Klaas Pruessmann

SESSION IV: Imaging Physics

- 15:05 **Selective Excitation and RF Pulse Design**
John Pauly
- 15:40 Break- Meet the Teachers
- 16:10 **Spatial Encoding and K-Space**
John P. Mugler
- 16:45 **Basic Sequences: Equilibrium Magnetization Equations**
R. Todd Constable

- 17:20 **Dynamic Equilibrium and Magnetization Manipulation in SSFP Sequences**
Klaus Scheffler

17:55 - Adjournment- Meet the Teachers
18:10

Day 2: Sunday, 8 May

SESSION V: Image Reconstruction

- 08:00 **Gridding for Non-Cartesian K-Space Sampling**
Douglas C. Noll
- 08:40 **Reconstruction for Multi-Coil Acquisition**
Peter Boernert
- 09:20 **Generalized Spatial and Temporal Interpolation, Limited Data Reconstruction**
Zhi-Pei Liang
- 10:00 Break- Meet the Teachers
- 10:25 **Identification, Mathematical Modeling, and Correction of Image Artifacts**
Krishna K. Nayak

SESSION VI: Pulse Sequences for Physiological Measurements

- 11:05 **Theory of Diffusion Processes and their Measurement**
Paul Callaghan
- 11:45 **Sequences for Flow Quantification, Flow Pattern Detection, Vessel Wall Function**
Sebastian Kozerke
- 12:25 - 12:50 Break- Meet the Teachers

SESSION VII: Physics of High Field Imaging

- 13:40 **Physics of High Field Imaging**
Lawrence L. Wald
- 14:20 **Electromagnetic Field Modeling: Theory and Practice**
Christopher M. Collins
- 15:00 - Adjournment- Meet the Teachers
15:15

BREAST IMAGING

Kimberly K. Amrami and Nola Hylton, Organizers

Saturday, 7 May, 09:00 - 18:15

EDUCATIONAL OBJECTIVES

Upon completion of the course, participants should be able to:

- Describe the clinical indications for MR imaging of the breast;
- Compare and contrast MRI with conventional breast imaging methods for breast cancer detection, diagnosis and staging;
- Evaluate the relative advantages and disadvantages of different imaging techniques and approaches for breast MRI;
- Identify the various MR-guided interventional procedures for the breast;
- Appraise the benefits and limitations of MRI for breast cancer screening for high risk women;
- Describe the techniques and potential applications for MR spectroscopy of the breast; and
- Describe newer, promising techniques and applications for breast MRI/MRS.

PROGRAM

- 09:00 **Overview of Breast MRI: Clinical Indications and Imaging Techniques**
Kathy Brandt
- 09:40 **Differential Diagnosis with Correlative Imaging: Challenges to Image Interpretation**
Debra M. Ikeda
- 10:20 Break- Meet the Teachers
- 10:45 **Dynamic Contrast-Enhanced Techniques and Computer-Aided Diagnosis for Breast MRI**
Michael V. Knopp
- 11:25 **Breast MRI for High Risk Screening**
Constance D. Lehman
- 12:05 **MRI for Staging and Assessment of Tumor Response to Treatment**
Nola Hylton
- 12:45 Break
- 12:45 - 13:15 Meet the Teachers
- 14:15 **MR-Guided Breast Interventional Procedures**
Elizabeth A. Morris
- 14:55 **High Field Breast MRI**
Christiane K. Kuhl
- 15:35 Break- Meet the Teachers
- 16:00 **MR Spectroscopy of the Breast**
Patrick J. Bolan
- 16:40 **MR Elastography of the Breast**
Richard L. Ehman
- 17:20 **Controversies and Future Directions Panel**
- 18:00 - Adjournment- Meet the Teachers
- 18:15

QUANTITATIVE IMAGE AND DATA ANALYSIS

Leif Østergaard, Geoffrey J.M. Parker, and Paul Tofts, Organizers

Saturday, 7 May, 08:30 - 17:45

EDUCATIONAL OBJECTIVES

Upon completion of the course, participants should be able to:

- Describe at least five basic principles of good methodology in quantitative image analysis;
- Describe five sources of variation in quantitative image analysis and methods to reduce each of these;
- List four ways of extracting features from images;
- Explain three types of image registration, depending on the properties of the data;
- Describe three basic models for analysis of dynamic contrast-enhanced MRI data; and
- Critically compare relative advantages and disadvantages of two algorithms for tractography.

PROGRAM

Fundamentals of Quantitative Image and Data Analysis

- 08:30 **Basic Methods for Quantitative Image Analysis**
Paul S. Tofts
- 09:10 **Image Restoration and Feature Extraction**
Geoffrey J.M. Parker
- 09:50 **Image Registration**
Mark Jenkinson
- 10:30 Break- Meet the Teachers
- 11:00 **Automated Segmentation and Volume Measurements**
Timothy Cootes
- 11:40 **Basics in Practice: Clinical View**
Declan T. Chard
- 12:20 Break
- 12:20 - 12:40- Meet the Teachers

Advanced Image and Data Analysis Applications

- 13:40 **Microvascular Function Using Kinetic Models**
Leif Østergaard
- 14:20 **fMRI Data Modeling**
Mark Woolrich
- 15:00 **Fiber Tracking Using Diffusion-Weighted Data**
Derek K. Jones
- 15:40 Break- Meet the Teachers
- 16:10 **Data Representation: Mapping, Rendering and Visualization**
Derek L.G. Hill
- 16:50 **Elastography and Strain Imaging**
Armando Manduca
- 17:30 - Adjournment- Meet the Teachers
- 17:45

MAGNETIC RESONANCE AND MOLECULAR IMAGING

Robert N. Muller and Silvio Aime, Organizers

Saturday, 7 May, 08:30 - 17:30

EDUCATIONAL OBJECTIVES

Upon completion of the course, participants should be able to:

- Summarize the recent research in molecular imaging by MR;
- Describe the actual challenges of molecular imaging in the context of MR;
- Evaluate the relative advantages and specificities of paramagnetic and superparamagnetic reporters;
- Identify the steps in the development of specific contrast agents for MR-Molecular Imaging;
- Critically orient the research in the field;
- Appraise the potential of molecular imaging in a clinical perspective.

PROGRAM

- 08:30 **Molecular Imaging: The Tools**
Thomas J. Meade
- 09:15 **MR in Molecular Imaging: Advantages and Challenges**
Mathias Hoehn
- 09:45 **Paramagnetic Reporters: The State of the Art**
Silvio Aime
- 10:15 Break- Meet the Teachers
- 10:45 **Superparamagnetic Reporters: The State of the Art**
Robert N. Muller
- 11:15 **Probes Accumulation and Activation**
Alexei A. Bogdanov
- 11:45 **Cellular Magnetic Labeling: The Strategies**
Jeff W.M. Bulte
- 12:15 **Molecular Imaging of Angiogenesis**
Michal Neeman
- 12:45 Break
- 12:45 - 13:15- Meet the Teachers
- 14:15 **Molecular Imaging of Apoptosis**
Kevin Brindle
- 14:45 **Molecular Imaging of Vascular Targets**
Samuel A. Wickline
- 15:15 Break- Meet the Teachers
- 15:45 **Molecular Imaging of Cancer**
Zaver M. Bhujwalla
- 16:15 **Molecular Imaging: The Patient's Benefit?**
Andreas Jacobs
- 16:45 **Hyperpolarized Probes for Molecular Imaging**
René in 't Zandt
- 17:15 - Adjournment- Meet the Teachers
- 17:30

METHODS AND APPLICATIONS OF MAGNETIC RESONANCE SPECTROSCOPY

Franklyn A. Howe, Roland Kreis, Organizers

Saturday, 7 May, 08:30 - 18:00

EDUCATIONAL OBJECTIVES

Upon completion of the course, participants should be able to:

- Describe fundamental principles of clinical MR spectroscopy,
- Explain the crucial steps in performing and evaluating a MRS examination,
- Enumerate potential pitfalls in the clinical application of MR spectroscopy,
- List diagnostic and patient management situations in which there is a clinically significant justification for a MRS examination,
- Summarize recent clinical uses of *in vivo* MRS and
- Create and implement an appropriate MRS protocol for a clinical or research study.

PROGRAM

Introduction and Methodology

08:30 **Basics of MR Spectroscopy**

Chris Boesch

09:00 **Localization Techniques**

Markus von Kienlin

09:30 **Detectable Metabolites and their Significance**

Robert J. Gillies

10:00 Break- Meet the Teachers

10:30 **Metabolite-Selective MRS**

Robin A. de Graaf

11:00 **Prescan and Shimming**

Daniel M. Spielman

11:30 **Data Processing and Fitting**

Andrew A, Maudsley

12:00 **Quantification and Artifacts in Clinical MRS**

Roland Kreis

12:30 Break

12:30 - 13:00- Meet the Teachers

Clinical Applications

13:45 **Clinical MRS: Tumors and Masses in Brains**

Franklyn A. Howe

14:15 **Clinical MRS: MS and Inflammation**

David H. Miller

14:45 **Clinical MRS: Epilepsy**

Douglas L. Arnold

15:15 Break- Meet the Teachers

15:45 **Clinical MRS: Dementia**

Norbert Schuff

16:15 **Clinical MRS: Psychiatric Diseases**

Graeme F. Mason

16:45 **¹³C MRS in the Clinic and Clinical Research**

Brian D. Ross

17:15 **³¹P MRS in the Clinic and Clinical Research**

Kristen L. Zakian

17:45 - Adjournment- Meet the Teachers

18:00

MR ARTIFACTS AND PITFALLS

Kim Butts and Naeem Merchant, Organizers

Saturday, 7 May, 08:30 - 17:30

EDUCATIONAL OBJECTIVES

Upon completion of the course, participants should be able to:

- Recognize artifacts and pitfalls in clinical MR imaging;
- Identify the causes and cures for these problems;
- Recommend ways to deal with these artifacts when they are encountered in their practice;
- Recommend ways to improve their clinical imaging protocols; and
- Appraise their own image quality in terms of the artifacts seen.

PROGRAM

08:30 **Chemical Shift and Fat Suppression**

Scott B. Reeder

Body Artifacts

08:55 **Upper Abdomen Artifacts**

David J. Lomas

09:20 **Sense Artifacts**

Masoom A. Haider

09:40 **Pelvis Artifacts**

Caroline Reinhold

10:10 Break- Meet the Teachers

Cardiovascular Artifacts

10:35 **Cardiovascular MR Artifacts**

David N. Firmin

11:00 **Pitfalls in Gadolinium-Enhanced MRA**

James F.M. Meaney

11:25 **Infarct Imaging**

Raymond J. Kim

11:50 **SSFP Artifacts**

Bob S. Hu

12:15 Break

12:15 - 12:30- Meet the Teachers

Breast Artifacts

13:45 **Breast Artifacts**

Bruce L. Daniel

Musculoskeletal Artifacts

14:15 **The Postoperative Joint: Healing with Metal**

Mark Schweitzer

14:45 **Artifacts and Pitfalls Using Contrast Agents**

William B. Morrison

15:15 Break- Meet the Teachers

Neuro Artifacts

14:45 **Artifacts and Pitfalls with Diffusion MRI**

Denis Le Bihan

16:15 **3T Imaging Artifacts**

Matt A. Bernstein

16:45 **Spectroscopy Artifacts**

Sarah J. Nelson

17:15 - Adjournment- Meet the Teachers

17:30

CURRENT DEBATES AND RECENT ADVANCES IN FUNCTIONAL MRI

Peter Jezzard and Mark S. Cohen, Organizers

Sunday, 8 May, 08:15 - 17:45

EDUCATIONAL OBJECTIVES

Upon completion of the course, participants should be able to:

- Describe the way that cortical areas of the brain inter-communicate, both at the electrical and chemical level;
- Select the optimum experimental parameters to conduct a successful fMRI experiment;
- Explain the current theories of metabolic coupling in human brain activation, and the hemodynamic consequences of that activity;
- Define the characteristics of the fMRI signal and apply this understanding to analyze functional connectivity in the brain;
- Critique the emerging approaches for accessing brain activity directly using MRI methods;
- Explain the challenges of clinical fMRI and provide examples of its application in clinical practice.

PROGRAM

08:15 **Welcome**

Peter Jezzard, Mark S. Cohen

SESSION I: fMRI Primer

08:20 **Introduction to Neuronal Processing**

Bruce R. Rosen

09:05 **Practical Considerations for Successful fMRI**

Mark S. Cohen

09:50 Break- Meet the Teachers

continued

SESSION II: Metabolism and Flow Coupling During Brain Activation

- 10:15 **Neuroenergetics: The Importance of Astrocyte-Neuron Interactions**
Luc Pellerin
- 10:55 **Understanding Neuronal Metabolism: Insights from MRS**
Stephen R. Williams
- 11:30 **Current Theories of Flow-Metabolism Coupling with Neuronal Activity**
Martin Lauritzen
- 12:10 Panel Discussion
- 12:30 Break- Meet the Teachers

SESSION III: Properties of the fMRI Signal

- 13:45 **Linearity of the fMRI Response: Implications for Paradigm Design**
Douglas C. Noll
- 14:10 **Assessing Connectivity in the Brain**
Thomas Koenig
- 14:35 **Is it Possible to Detect Neuronal Activity Directly with fMRI?**
Peter A. Bandettini
- 15:00 Panel Discussion
- 15:15 Break- Meet the Teachers

SESSION IV: Clinical Applicability of fMRI

- 15:40 **Challenges and Approaches in Clinical fMRI**
John A. Detre
- 16:20 **Diagnostic fMRI Applications and Patient Treatment: Merits and Pitfalls Illustrated by Clinical Cases**
Andreas Bartsch
- 16:45 **Pre-Surgical Planning Using fMRI**
Susan Y. Bookheimer
- 17:10 Panel Discussion
- 17:30 - Adjournment- Meet the Teachers
- 17:45

EXPERIMENTAL METHODS IN MR OF CANCER

Robert N. Muller and Silvio Aime, Organizers

Sunday, 8 May, 08:00 - 17:15

EDUCATIONAL OBJECTIVES

Upon completion of the course, participants should be able to:

- Describe how MRS can demonstrate upregulation or inhibition of important pathways in cancer, in cell and xenograft models;
- Identify the likely MR changes resulting from apoptosis;
- Describe the role of choline in cellular metabolism, what MRS shows and how it may be affected by the cancer phenotype and treatment;
- Explain how contrast agents can be used to evaluate vascular function, and how physiological and other modelling parameters can be derived by the use of models;
- Describe the use of intrinsic contrast mechanisms to evaluate vascular function;
- Identify processes controlling vascular function and development, with relevance to cancer, and methods for probing these processes using MR;
- Describe hypoxia in the context of cancer, identifying methods of assessing hypoxia using MR;
- Recognize how MR changes can reflect changes in the cancer phenotype and its malignant potential, and how MR findings can be related to genotype and protein expression;
- Describe how MAS can be used to assess tumor; and
- Describe how diffusion measurements can provide information on cancer in experimental models and in patients, and how diffusion may change with treatment.

PROGRAM**SESSION I: Cellular Pathways and Processes as Cancer Targets**

- 08:00 **Pathways, Inhibition and Regulation: Cell Studies Using MRS**
Sabrina M. Ronen
- 08:30 **Pathways, Inhibition, and Regulation: Xenograft Studies Using MRS**
Yuen-Li Chung
- 09:00 **Apoptosis: MR Consequences**
Risto A. Kauppinen

- 09:30 **Choline Metabolism: Meaning and Significance**
Hadassa Degani
- 10:00 Break- Meet the Teachers

SESSION II: Tumor Vasculature in Development and Treatment

- 10:30 **Measuring Vascular Properties Using Contrast Agents**
Martin O. Leach
- 11:00 **Pharmacokinetic Models: Extracting Physiological Vascular Information**
David L. Buckley
- 11:30 **Measuring Vascular Properties Using Intrinsic Contrast Mechanisms (including BOLD)**
Gregory S. Karczmar
- 12:00 Break
- 12:00 - 12:30- Meet the Teachers
- 13:30 **Investigating Tumor Vasculature and Its Control**
Michal Neeman
- 14:00 **Hypoxia and Its Assessment**
Ralph P. Mason

SESSION III: New Methods for Diagnosis and Evaluation

- 14:30 **Associating MR Findings with MR Gene and Protein Expression**
Samira Guccione
- 15:00 Break- Meet the Teachers
- 15:30 **The Developing Cancer Phenotype: Grade and Invasion**
Zaver M. Bhujwala
- 16:00 **Diagnosis of Cancer Using MAS**
Ingrid S. Gribbestad
- 16:30 **Diffusion in Cancer: Apoptosis and Treatment**
Brian David Ross
- 17:00 - Adjournment- Meet the Teachers
- 17:15

MUSCULOSKELETAL IMAGING*Lynne S. Steinbach, Organizer***Sunday, 8 May, 08:00 - 17:45****EDUCATIONAL OBJECTIVES**

Upon completion of the course, participants should be able to:

- Identify key pathology as demonstrated on MRI regarding abnormalities related to shoulder instability and SLAP lesions, knee, hip, ankle, elbow, cartilage, wrist and hand;
- Design optimized protocols in musculoskeletal MRI;
- Apply new techniques in cartilage analysis with dGEMERIC, volumetric assessment, steady state free precession, and short TE sequences.

PROGRAM**Morning Session**

08:00 **Shoulder MR: Impingement and Rotator Cuff**

William E. Palmer

08:45 **Shoulder MR: Instability and SLAP Lesions**

Lynne S. Steinbach

09:30 **MRI of the Knee: Update**

Douglas P. Beall

10:10 Break– Meet the Teachers

10:30 **MRI of the Hip**

Christine Chung

11:15 **MRI of the Ankle**

Mark Collins

12:00 Questions

12:10 Break

12:10 - 12:30– Meet the Teachers

Afternoon Session I

13:30 **MRI of the Elbow**

William B. Morrison

14:15 **MRI of the Wrist and Hand**

Kimberly K. Amrami

15:00 Questions

15:10 Break– Meet the Teachers

15:30 **Cartilage Imaging Update**

*Thomas M. Link***Afternoon Session II: New Techniques in Musculoskeletal Imaging***Sharmila Majumdar, Moderator*

16:15 **Delayed Gadolinium-Enhanced MRI of Cartilage**

Deborah Burstein

16:35 **Current Experiences with DTI and Overview of Cartilage Volumetric Assessments**

Christian Glaser

16:55 **Steady State Free Precession and Short TE Sequences**

Garry E. Gold

17:30 - Adjournment– Meet the Teachers

17:45

ADVANCED NEURO MR*Robert C. McKinstry and William T.C. Yuh, Organizers***Sunday, 8 May, 08:15 - 17:45****EDUCATIONAL OBJECTIVES**

Upon completion of the course, participants should be able to:

- Describe fundamental principles of diffusion MR, perfusion MR, spectroscopy, MR evaluation of microcirculation/angiogenesis, and angiography;
- Describe the current status of high-field neuroimaging;
- Describe new advances in MR physics, including parallel imaging;
- Apply new techniques in stroke, infection/inflammation, epilepsy, and brain tumors;
- Critically evaluate strength and weakness of MR angiography vs. CT angiography, and MR head-and-neck imaging vs. CT head-and-neck imaging;
- Explain the role of various MR techniques in the diagnosis of diseases of the spine, and head and neck;
- Discuss the role of MR techniques in the workup of patients with stroke, infection, inflammation, and epilepsy; and
- Apply MR techniques in various pediatric diseases of the central nervous system.

PROGRAM

08:15 **Neuro MR Physics and Protocol Update**

Robert R. Edelman

08:45 **Diffusion Imaging Concepts**

Jeffrey J. Neil

09:15 **Perfusion Imaging Concepts**

Joshua S. Shimony

09:45 Break– Meet the Teachers

10:15 **Low Field to 7 Tesla**

Kamil Ugurbil

10:45 **Neuro MR Spectroscopy**

Robert E. Lenkinski

11:15 **Angiography: The Role of CTA and MRA**

Aquilla S. Turk

11:45 Break

11:45 - 12:15– Meet the Teachers

13:00 **Brain: Stroke Imaging and Intervention**

*Norman J. Beauchamp and**William T.C. Yuh*

13:30 **Brain MRI: Infection/Inflammation**

Judith D. Post

14:00 **Brain MRI: Tumor Evaluation**

Edmond A. Knopp

14:30 **Brain MRI: Microcirculation/Angiogenesis**

Michael V. Knopp

15:00 Break– Meet the Teachers

15:30 **Head and Neck Imaging: The Role of CT and MR**

Franz J. Wippold

16:00 **Spinal MRI: Current Clinical Use and Prospects for the Future**

Robert M. Quencer

16:30 **Epilepsy: The Role of MRI**

Howard A. Rowley

17:00 **Pediatric Neuroimaging: New Developments**

Robert C. McKinstry

17:30 - Adjournment– Meet the Teachers

17:45

CARDIAC MR

Andrew E. Arai and Hajime Sakuma, Organizers

Sunday, 8 May, 08:30 - 17:15

EDUCATIONAL OBJECTIVES

Upon completion of the course, participants should be able to:

- Explain basic image acquisition methods relevant to cardiovascular imaging;
- Describe the experimental and clinical validation studies supporting the use of cardiovascular MR for specific applications;
- Describe components of cardiac MR suitable for assessing ischemic heart disease;
- Recognize advantages and disadvantages of different types of cardiac MR stress tests; and
- Evaluate the strengths and weaknesses of MR for assessing atherosclerosis encroaching the vessel lumen and as it affects the arterial wall.

PROGRAM

- 08:30 **Coronary MRA**
Matthias Stuber
- 08:55 **MR Visualization of Cardiac Function**
Elliot R. McVeigh
- 09:20 **Delayed Enhancement to Image Myocardial Infarction**
Robert M. Judd
- 09:45 **Discussion**
- 10:00 Break- Meet the Teachers
- 10:30 **Myocardial Perfusion**
Juerg Schwitler
- 10:55 **Dobutamine Stress MR**
William G. Hundley
- 11:20 **Use of T₂ to Characterize Myocardial Diseases**
Matthias G. Friedrich
- 11:45 Discussion
- 12:00 Break
- 12:00 - 12:30- Meet the Teachers
- 13:30 **MR Angiography**
Martin R. Prince
- 13:55 **Imaging Atherosclerotic Plaque**
Zahi A. Fayad
- 14:20 **MR to Assess Arrhythmias and Cardiomyopathies**
David A. Bluemke
- 14:45 **Discussion**
- 15:00 Break- Meet the Teachers
- 15:30 **Congenital Heart Disease**
Scott D. Flamm
- 15:55 **Interventional CMR**
Robert J. Lederman
- 16:20 **3T vs 1.5T for Cardiovascular MR**
Gerhard Laub
- 16:45 **Discussion**
- 17:00 - Adjournment- Meet the Teachers
- 17:15

ADVANCED BODY IMAGING

Kimberly K. Amrami, Organizer

Sunday, 8 May, 08:30 - 17:00

EDUCATIONAL OBJECTIVES

Upon completion of the course, participants should be able to:

- Describe the indications for MRI for body (non-neuro, non-musculoskeletal) applications;
- Define the indications and requirements for dynamic and static bowel imaging with MRI;
- Apply parallel imaging and other fast MR imaging techniques appropriately for body imaging;
- Identify currently available applications for spectroscopy in body MRI;
- Identify options for contrast media in body MRI and make appropriate choices for specific indications;
- Describe the use of hyperpolarized gases for MRI of structural and functional lung disease; and
- Recognize the role and potential challenges of high field imaging (3T and higher) for clinical body MRI.

PROGRAM

- 08:30 Introduction, Announcements
- 08:40 **Liver and Biliary System**
James F. Glockner
- 09:10 **Large and Small Bowel**
David J. Lomas
- 09:50 **Kidney/Urinary Tract**
Peter L. Choyke
- 10:20 Break- Meet the Teachers
- 10:50 **Female Pelvis**
Kaori Togashi
- 11:20 **Male Pelvis**
Akira Kawashima
- 11:50 Break
- 11:50 - 12:10- Meet the Teachers
- 13:15 **Chest: Hyperpolarized Gas Imaging**
Sean B. Fain
- 13:45 **Contrast Agents for Body MRI**
Thomas Helmberger
- 14:15 **Ultrafast MR Imaging for Body Applications**
Adrian J. Knowles
- 14:45 Break- Meet the Teachers
- 15:15 **Spectroscopy for Body MR**
John Kurhanewicz
- 15:45 **Body MRI at 3T and Higher**
Robert R. Edelman
- 16:15 **New Horizons in Oncologic Imaging for Body MRI**
Hedvig Hricak
- 16:45 - Adjournment- Meet the Teachers
- 17:00

Opening Session

Monday, 9 May

WELCOME & AWARDS CEREMONY

07:45 - 08:20

**2005 LAUTERBUR LECTURE:
"Vision of MR"**

Britton Chance, University of Pennsylvania, Philadelphia, Pennsylvania, USA

Monday, 9 May, 08:20 - 09:00

Britton Chance is one of the world's leaders in transforming theoretical science into useful biomedical and clinical applications. His research interests include the use of imaging systems to detect breast tumors, hemorrhage deep within tissues and human brain function in cognitive activity, and he has published more than 500 scientific articles covering many fields of biochemistry, biophysics and physiology. The experimental methods and approach introduced by him dominate current research into the mechanism of intracellular respiration and photosynthesis.

**2005 MANSFIELD LECTURE:
"Fast Imaging Horizons in
Rapid MR Imaging"**

Jürgen Hennig, Universität Freiburg, Freiburg, Germany

Thursday, 12 May, 08:15 - 08:45

Magnetic resonance tomography (MRT) allows completely new insights into the human body and into numerous of its complex functions. Jürgen Hennig has paved the way for this imaging technology. He developed a technique called RARE which significantly speeds up the imaging process and has become—partly in a modified form—a worldwide standard procedure in MRT examinations. In addition, he is doing research into magnetic resonance interferography which enables specialists to investigate rapid movements of, say, the cardiac walls.

Monday, 9 May, 09:00 - 10:15

**THE FUTURE OF MR IN A
MULTIDISCIPLINARY WORLD**

Sebastián Cerdán and Vivian S. Lee, Organizers

OVERALL DESCRIPTION

This plenary session is intended to give consideration to the field of MRI in the context of competing or complementary fields such as nuclear medicine and computed tomography in biomedical imaging. It should enable attendees to assess the evolving role of magnetic resonance in the fields of neuro-psychiatry, cancer, and cardiac diseases.

PROGRAM**09:00 Imaging Psychiatric Disorders
in a Multidisciplinary World**

Marc Laruelle
Columbia University
New York, New York, USA

**09:25 Cancer and Immunodeficiency
Imaging in a Multidisciplinary
World**

Martin G. Pomper
Johns Hopkins University
Baltimore, Maryland, USA

**09:50 Cardiovascular Imaging
in a Multidisciplinary World**

Richard D. White
Cleveland Clinic Foundation
Cleveland, Ohio, USA

**MRI AT DIFFERENT SCALES
OVERALL DESCRIPTION**

Sebastián Cerdán and Vivian S. Lee, Organizers

OVERALL DESCRIPTION

The Tuesday through Friday plenary sessions will provide the audience with a cutting-edge overview of the impact of magnetic resonance from molecule to (wo)man. Work of different groups will emphasize advances in understanding of molecular, cellular, organ and whole-body biology and pathology made possible by magnetic resonance. These discussions will include presentations by speakers from outside the field of magnetic resonance to enable the audience to better comprehend the role and value of MR relative to advances in other biomedical disciplines.

Tuesday, 10 May, 08:15 - 9:30

**MOLECULAR IMAGING OF
TISSUE OXYGENATION**

Robert J. Gillies and Risto Kauppinen, Organizers

PROGRAM**8:15 EPR Measurements of Tissue
Oxygenation Status**

Harold M. Swartz
Dartmouth University
Hanover, New Hampshire, USA

**08:40 BOLD and its Relationship to
Brain Oxygenation**

Richard B. Buxton
University of California
San Diego, California, USA

**09:05 BOLD MRI and PET Imaging of
Tumor Oxygenation**

Anwar R. Padhani
Mount Vernon Hospital
Northwood, England, UK

Wednesday, 11 May, 08:15 - 9:30

STEM CELL TRACKING*R. Todd Constable, Organizer***PROGRAM**

- 08:15 **Introduction**
Joseph A. Frank
- 08:20 **Adult Stem Cells: Plasticity, Trafficking, and Therapeutic Placement**
Neil D. Theise
Beth Israel Medical Center
New York, New York, USA
- 08:45 **MR Tracking of Stem Cells Following Magnetofection**
Jeff W.M. Bulte
Johns Hopkins University
Baltimore, Maryland, USA
- 09:10 **Delivery and Tracking of Cardiovascular Stem Cells Using MRI**
Robert J. Lederman
National Institutes of Health
Bethesda, Maryland, USA

Thursday, 12 May, 08:45 - 10:00

ORGAN IMAGING*Joshua M. Farber and Lawrence M. White, Organizers***PROGRAM**

- 08:45 **Functional Neuro MRI**
Micheal D. Phillips
Cleveland Clinic Foundation
Cleveland, Ohio, USA
- 09:10 **Functional Cardiac Imaging**
Robert M. Judd
Duke University
Durham, North Carolina, USA
- 09:35 **Functional Skeletal Muscle Imaging**
Scott L. Delp
Stanford University
Stanford, California, USA

Friday, 13 May, 08:15 - 9:30

WHOLE BODY IMAGING*Vivian S. Lee and Steven M. Wright, Organizers***PROGRAM**

- 08:15 **Technical Considerations in Whole Body MR**
Steven J. Riederer
Mayo Clinic
Rochester, Minnesota, USA
- 08:40 **Whole Body PET/PET-CT for Oncologic Imaging**
Richard L. Wahl
Johns Hopkins University
Baltimore, Maryland, USA
- 09:05 **Whole Body MRA, Oncologic Imaging and Screening**
Stefan G. Ruehm
University Hospital Essen
Essen, Germany

MORNING CATEGORICAL COURSES

Tuesday, 10 May - Friday 13 May, 07:00 - 08:00

TECHNICAL ADVANCES AND THEIR IMPACT ON BODY MR

Neil M. Rofsky, Daniel K. Sodickson, and Bachir Taouli, Organizers

EDUCATIONAL OBJECTIVES

Upon completion of this course, participants should be able to:

- Evaluate new developments in MRI technology, including high field imaging, parallel imaging, high-performance gradients, and moving-table methods;
- Describe the basic operation of the various subsystems of MR scanners (main field, transmit and receive chains, gradients, patient table, etc.), and their role in the new developments described above;
- Identify the technical challenges associated with effective application of this new technology;
- Describe the potential applications of new technologies in body imaging, including areas such as diffusion MRI, fat-water separation, and MR spectroscopy.

PROGRAM

Tuesday, 10 May

MR System Overview and Innovations in High Field Imaging

07:00 **A Peek Inside the MR System**

Daniel K. Sodickson

07:10 **High Field Imaging: A Technical Perspective**

Douglas A.C. Kelley

07:35 **High Field Body Imaging: A Clinical Perspective**

Neil M. Rofsky

Wednesday, 11 May

Advances in Coil Design and Multichannel Imaging for Body MRI

07:00 **From Signal to Image to Diagnosis: The Life Cycle of MR Data**

Peter Boernert

07:20 **Coils, Receivers and Parallel Imaging: A Technical Perspective**

Daniel K. Sodickson

07:40 **Parallel Imaging: A Clinical Perspective**

Stefan O. Schoenberg

Thursday, 12 May

Advances in Gradient System and Table Motion

07:00 **What a Good Gradient Gets You: Gradient System Overview**

J. Paul Finn

07:30 **Moving Table Technology**

Charles L. Dumoulin

07:45 **Moving Table Applications**

Elizabeth Hecht

Friday, 13 May

Making Good Use of Technology: Frontiers in Body MRI

07:00 **Diffusion-Weighted MRI in Body Imaging**

Bachir Taouli

07:20 **Modern Approaches to Fat Suppression and Water-Fat Imaging**

Charles A. McKenzie

07:40 **MR Spectroscopy of the Prostate**

Fergus Coakley

NEW DEVELOPMENTS IN MR HARDWARE: TECHNICAL CONSIDERATIONS

Steve M. Conolly, Hiroyuki Fujita and Steven M. Wright, Organizers

EDUCATIONAL OBJECTIVES

Upon completion of this course, participants should be able to:

- Identify the principal components (i.e., main magnet, gradient coil, RF coil, spectrometer, computer) of the MRI scanner hardware and how they are designed;
- Describe the function and the type of main magnets used in the MRI scanner (e.g., superconducting, permanent, resistive magnets; horizontal, open/vertical);
- Describe the function and the type of gradient coils (i.e., x-gradient, y-gradient and z-gradient coils) and gradient power amplifier used in the MRI scanner;
- Explain the function of the transmitter RF coil and the receiver RF coil;
- Identify the type of RF coils (e.g., birdcage coil, phased array coil) and how they are designed from a point of view of circuit;
- Explain the basic RF chain used in the MRI scanner;
- Compare the low field MRI (~0.2 or 0.3T) with the high field MRI (up to 8T) and identify the advantages, the disadvantages and the technical challenges for both paradigms;
- Describe how the principal components are integrated and list siting considerations.

PROGRAM

Tuesday, 10 May

Static Systems

07:00 **A Systems Overview**

Gordon D. de Meester

07:30 **Main Magnet and Shim**

Johannes van Oort

Wednesday, 11 May

Gradient

07:00 **Gradient Coil Design**

Richard W. Bowtell

07:30 **Gradient Amplifier**

Greig C. Scott

Thursday, 12 May

RF System

07:00 **RF Chain/System**

Lawrence W. Wald

07:30 **Spectrometer Design for Dynamic/Real-Time Imaging**

Oliver Heid

Friday, 13 May

Parallel Imaging

07:00 **RF Coils for Parallel Imaging**

Mark A. Griswold

07:30 **Preamp Design (Basic to Advanced)**

George R. Duensing

HUMAN MRI AND MRS AT HIGH STATIC MAGNETIC FIELDS

David G. Norris and Dikoma Shungu, Organizers

EDUCATIONAL OBJECTIVES

Upon completion of this course, participants should be able to:

- Describe the general behavior of B_0 and B_1 fields in the human body when the Larmor frequency is of the order of or greater than 100 MHz;
- List the problems faced in trying to obtain a homogeneous B_0 field and a B_1 field;
- Recognize the challenges of developing RF coils for high field applications;
- Explain the basic principles of sodium imaging at high fields and recognize areas of potential applications;
- List recent methodological advances and biomedical insights in high field *in vivo* ^1H , ^{31}P and ^{13}C MR spectroscopy;
- Describe the benefits of high field for BOLD contrast;
- Describe the interaction between high magnetic fields and biological systems;
- List organizations responsible for regulating exposure to magnetic fields.

PROGRAM

Tuesday, 10 May

07:00 **Impediments to High Field MR—A Look at B_0 and B_1 Field Behavior**

David I. Hoult

07:30 **How to Do RF at High Fields**

J. Thomas Vaughan

Wednesday, 11 May

07:00 **High Resolution Imaging: Why Is It Important for Weighted Imaging, MRA and SWI?**

E. Mark Haacke

07:30 **Sodium MRI and High Fields: Technique and Applications**

Fernando E. Boada

Thursday, 12 May

07:00 **^1H and ^{31}P MRS at High Fields**

Hoby P. Hetherington

07:30 **The Power and Specificity of ^{13}C MRS at High Fields: Problems, Solutions and Insights**

Rolf Gruetter

Friday, 13 May

07:00 **Getting BOLDer with High Field fMRI**

Xiaoping P. Hu

07:30 **High Field Safety: Bioeffects and Regulation**

Penny A. Gowland

MORNING CATEGORICAL COURSES

Tuesday, 10 May - Friday 13 May, 07:00 - 08:00

ECHO MANAGEMENT

Kim Butts, R. Todd Constable, and
Scott Swanson, Organizers

EDUCATIONAL OBJECTIVES

Upon completion of this course, participants should be able to:

- Explain the basic principles of spin echo, gradient echo, and stimulated echo formation.
- Appreciate the complexity of coherence pathways that arise when two or more RF pulses are applied;
- Describe methods that investigators use to mitigate effects of multiple coherence pathways to assure formation of proper echoes;
- List and implement techniques used in steady-state free precession (SSFP) pulse sequences to minimize spurious echo formation;
- Integrate knowledge learned over the week of the different types of pulse sequences to decide which sequence will be appropriate for what clinical application.

PROGRAM**Tuesday, 10 May**

- 07:00 **Spin Echo and Stimulated Echo Imaging**
R. Scott Hinks
- 07:30 **FSE (Including CPMG, Phase Diagrams)**
David G. Norris

Wednesday, 11 May

- 07:00 **GRE**
Gary H. Glover
- 07:30 **Combines GRE and FSE (GRASE)**
David Feinberg

Thursday, 12 May

- 07:00 **Fully Refocussed SSFP**
Klaus Scheffler
- 07:30 **Exotic Gradient Echoes (PRESTO, MUSIC, COSESS and INSESS)**
Samuel Patz

Friday, 13 May

- 07:00 **FSE Stabilization in the CPMG and Non-CPMG Regimes**
Graeme C. McKinnon
- 07:30 **Burst etc. (QUEST, URGE, DANTE, OUFIS, DUFIS)**
Jürgen Hennig

CARDIOVASCULAR IMAGING

James F.M. Meaney and Qun Chen, Organizers

EDUCATIONAL OBJECTIVES

Upon completion of this course, participants should be able to:

- Implement a robust protocol for clinical evaluation of arteries with both non-contrast and contrast-enhanced techniques;
- Select a comprehensive time-efficient protocol incorporating anatomical and functional cardiac evaluation;
- Compare the strengths and weaknesses of 3T MRI over 1.5T MRI for cardiovascular assessment;
- Implement an accurate method for post-processing of both cardiac and vascular assessment;
- Recognize the strengths, and also the limitations of current techniques.

PROGRAM**Tuesday, 10 May**

- MR Angiography**
- 07:00 **Body and Peripheral MRA**
Thomas M. Grist
- 07:20 **Non-Contrast MRA**
Mitsue Miyazaki
- 07:40 **Coronary MRA**
Warren J. Manning

Wednesday, 11 May

- Cardiac MRI**
- 07:00 **MRI of LV Global and Regional Function**
Leon Axel
- 07:20 **MRI of Myocardial Viability**
Raymond J. Kim
- 07:40 **MRI of Myocardial Perfusion**
Steven D. Wolff

Thursday, 12 May

- Cardiovascular MRI- Is 3T Better than 1.5T?**
- 07:00 **MRA at 3.0T**
Robert R. Edelman
- 07:30 **Cardiac MRI at 3.0T**
J. Paul Finn

Friday, 13 May

- Cardiac MRI Post-Processing Workstation Demonstrations.** Experienced personnel involved in post-processing will demonstrate the diverse functionality offered by several vendors and will provide useful tips to enhance the users' ability to deal with complex multi-dimensional data effectively.

NEW HORIZONS IN MUSCULOSKELETAL MR IMAGING

Joshua M. Farber and Lawrence M. White,
Organizers

EDUCATIONAL OBJECTIVES

Upon completion of this course, participants should be able to:

- Describe the impact and potential advantages of new hardware and software developments on MR imaging of the musculoskeletal system;
- Explain the technical development and clinical applications of whole body MR scanning of the musculoskeletal system;
- Critically evaluate the relative advantages and limitations of MR and multidetector CT imaging of the postoperative orthopedic patient;
- Explain the role of morphologic and functional MR imaging techniques in the assessment of articular cartilage and skeletal muscle;
- Describe imaging techniques, protocol modifications and clinical applications of MR imaging of the musculoskeletal system using high field and mid-low field strength MR imaging systems.

PROGRAM**Tuesday, 10 May**

- 07:00 **Improved Gradients and Software and their Impact on MSK MR Imaging and the Development of Whole Body Scanning**
H. Cecil Charles
- 07:30 **Clinical Applications of Whole Body MR Scanning in the Musculoskeletal System**
Sandra L. Moore

Wednesday, 11 May

- 07:00 **Postoperative MR Imaging of the Musculoskeletal System: Pitfalls and Technique Optimization**
Lawrence M. White
- 07:30 **Postoperative Imaging of the Musculoskeletal System with Multichannel CT: An Adjunct or Replacement for MR?**
Joshua M. Farber

Thursday, 12 May

- 07:00 **Cartilage Imaging: Recent Advances and Clinical Applications**
Garry E. Gold
- 07:30 **Muscle Imaging: Beyond Form to Assessing Function**
Michael Conley

Friday, 13 May

- 07:00 **Imaging the Musculoskeletal System at 3T**
Timothy J. Mosher
- 07:30 **Imaging the Musculoskeletal System at .7T**
Mark Schweitzer

MORNING CATEGORICAL COURSES

Tuesday, 10 May - Friday 13 May, 07:00 - 08:00

QUANTITATIVE NEURO MRI

R. Todd Constable and Glyn Johnson, Organizers

EDUCATIONAL OBJECTIVES

Upon completion of this course, participants should be able to:

- Explain the basic principles of chemical exchange and magnetization transfer and describe how chemical exchange contrast agents may be used;
- Describe how the diffusion tensor is acquired, measured and mapped and how diffusion tensor data may be used to evaluate structural connectivity;
- Compare different MRI methods of evaluating neuronal function;
- Explain how dynamic imaging using contrast agents can be used to evaluate tissue hemodynamics.

PROGRAM

Tuesday, 10 May

07:00 **Chemical Exchange and Magnetization Transfer Imaging**
Peter van Zijl and A. Dean Sherry

Wednesday, 11 May

07:00 **Diffusion Tensor Imaging and Quantification**
Susumu M. Mori and Gareth J. Barker

Thursday, 12 May

07:00 **Functional Imaging: CBV and VASO**
Bruce Pike and Hanzhang Lu

Friday, 13 May

07:00 **Dynamic Contrast Enhanced Perfusion Imaging**
Fernando Calamante and Leif Østergaard

ANSWERING CLINICAL QUESTIONS WITH FMRI/DTI/PWI

Alberto Bizzi and Micheal D. Phillips, Organizers

EDUCATIONAL OBJECTIVES

Upon completion of this course, participants should be able to:

- Describe the main applications and contributions of fMRI, DTI and tractography and perfusion in clinical neuroscience;
- Identify when advanced MR studies should be used to assess diagnosis, prognosis and therapeutic strategies regarding the neurological diseases which are the focus of this course;
- Explain which are the requirements essential to perform robust, accurate and repeatable clinical functional MR studies in patients with neurological diseases;
- Recognize limitations, challenges and pitfalls of performing advanced MR studies to answer clinical questions in neurological patients;
- Implement Quality Assurance (QA) procedures necessary to run a reliable and successful advanced MRI clinic.

PROGRAM

Tuesday, 10 May

07:00 **PWI and DWI in Diagnosis and Therapy of Patients with Brain Tumors**
Soonmee Cha

07:30 **fMRI and DTI-Based Tractography in Evaluation of Patients with Brain Glioma**
Alberto Bizzi

Wednesday, 11 May

Stroke
07:00 **Diffusion and Perfusion in Patients with Cerebrovascular Diseases**
Jeffry R. Alger
07:30 **fMRI and DTI in Rehabilitation After Stroke**
TBA

Thursday, 12 May

Neurodegeneration: Aging, Parkinson and Alzheimer's Diseases
07:00 **fMRI and DTI of Aging**
Paul M. Matthews
07:30 **fMRI and DTI in Patients with PD and AD**
Micheal D. Phillips

Friday, 13 May

Child Development, Psychiatry
07:00 **DTI and fMRI in Children with Metabolic Diseases**
Elias R. Melhem
07:30 **fMRI of Emotion, Cognition and Personality Disorders**
Pietro Pietrini

MR IN THE MOTHER, FETUS AND NEWBORN

Petra S. Hüppi, Weili Lin, and Caroline Reinhold, Organizers

Monday, 9 May, 11:00 - 13:00

EDUCATIONAL OBJECTIVES

Upon completion of this course, participants should be able to:

- Describe the technique and the utility of MR in the assessment of adnexal masses, placenta accreta, and abdominopelvic pain in pregnancy;
- List parameters for performing a prenatal MRI on a fetus greater than 18 weeks gestation;
- Recognize when prenatal MRI can supplement a well performed prenatal US or is better than US;
- Recognize basic normal and abnormal fetal anatomy.

PROGRAM

Monday, 9 May

11:00 **MR of the Maternal Abdomen and Pelvis**

Deborah Levine

11:20 **Fetal MR: Body Applications**

Anne M. Hubbard

11:40 **Fetal Brain Imaging: Diagnosis and Prognosis**

Charles A. Raybaud

12:00 **Assessment of Cardiovascular Anatomy in Patients with Congenital Heart Disease**

Mark A. Fogel

12:20 **MRI/MRS in Neonatal Asphyxia**

Petra S. Hüppi

12:40 **Practical Considerations for Neonatal Imaging: Safety and Field Strengths**

Rolf Gruetter

IMAGING AT 3T

Christiane K. Kuhl and Neil Rofsky, Organizers

Tuesday, 10 May, 10:30 - 12:30

EDUCATIONAL OBJECTIVES

Upon completion of this course, participants should be able to:

- Describe physical properties that differ at 3.0T vs. 1.5T and how these differences influence imaging options;
- Detail ways in which SAR, magnetic susceptibility and chemical shift can be dealt with effectively;
- Identify ways in which high field systems can improve functional and structural neuroimaging;
- List the challenges and opportunities facing clinical implementation of cardiac and body MR at 3T.

PROGRAM

Tuesday, 10 May

10:30 **Technical Challenges for Whole Body 3T MRI**

Gerhard Laub

10:50 **3T for the Neurological Patient: Plain Structural, MRA, DTI, fMRI, Spine**

A. Gregory Sorensen

11:20 **Is 3T the New Platform for Cardiac MRI?**

Matthias Stuber

11:40 **Meet the Challenges: Latest and Greatest Body Imaging at 3T**

Robert R. Edelman and

Kimberly K. Amrami

12:20 **Discussion**

HOT TOPICS IN CLINICAL PRACTICE

Thomas M. Grist and Clifford Jack, Organizers

Tuesday, 10 May, 13:30 - 15:30

EDUCATIONAL OBJECTIVES

Upon completion of this course, participants should be able to:

- Describe five points that can be used to improve imaging strategies in important areas of clinical practice;
- Assess the applicability to clinical practice of three newer imaging techniques.

PROGRAM

Tuesday, 10 May

13:30 **MR Scanning and Pacemakers: Where Do We Really Stand Today—and Tomorrow?**

Emanuel Kanal

13:50 **Brain Perfusion/Diffusion Imaging: Update for Clinicians**

A. Gregory Sorensen

14:10 **Parallel Imaging of the Brain at High Field: Unparalleled Opportunities**

Christiane K. Kuhl

14:30 **Parallel Imaging in the Body—Protocols and Performance**

Stefan O. Schoenberg

14:50 **How I Use Time-Resolved MRA in Clinical Practice**

Frank J. Thornton

15:10 **How I Perform Musculoskeletal MRI at 3T**

Garry E. Gold

CURRENT TOPICS IN CARDIAC MRI*David A. Bluemke and J. Paul Finn, Organizers***Wednesday, 11 May, 10:30 - 12:30****EDUCATIONAL OBJECTIVES**

Upon completion of this course, participants should be able to:

- Describe the application of cardiac MR in patients with chest pain;
- Define uses for delayed enhancement MRI for fibrosis imaging;
- Describe the use of CMR in current clinical practice settings supported by recent clinical trials.

PROGRAM**Wednesday, 11 May****10:30 MRI in Chest Pain***Andrew E. Arai***11:00 Cardiac MRI in Clinical Trials: What Have We Learned?***Victor A. Ferrari***11:30 Cardiac MRI: Role in the Evaluation of Arrhythmia***Ken C-H. Wu***12:00 Cardiac MRI and Implantable Devices: Help, Hindrance and Where to Now?***Kalyanam Shivkumar***CANCER IMAGING***Michael V. Knopp, Organizer***Thursday, 12 May, 10:30 - 12:30****EDUCATIONAL OBJECTIVES**

Upon completion of this course, participants should be able to:

- Recognize the potential and limitations of advanced clinical applications of MRI and MRS in oncology;
- Recommend appropriate MR imaging approaches to detect disease and assess response to therapy;
- Interpret characteristic MR findings of response to anti-neoplastic therapies;
- Integrate morphologic and functional MR derived information to improve diagnostic value of MR exams.

PROGRAM**Thursday, 12 May***The final five minutes of each presentation will be reserved for questions.***10:30 Current Opportunities for MR in Diagnosis and Therapy Assessment***Peter L. Choyke***10:55 Methodological Capabilities of Current MR Systems and the Technical Challenges of MR and MRS Oncology Applications***Edward F. Jackson***11:20 MR to Assess Response, Clinical Opportunities and Applications***Bruno Morgan***11:45 Clinical Applications and Opportunities for MRS in Oncology***Heinz-Peter Schlemmer***12:10 Using MRI and MRS as a Biomarker- A Perspective from Clinical Trials***Patricia Cole*

Special Symposium: RESEARCH FUNDING: PROSPECTS, PEARLS, AND PITFALLS

Richard L. Ehman and Vivian S. Lee,
Organizers

Monday, 9 May, 14:00 - 16:00

OVERVIEW

This symposium will review current and emerging funding opportunities and provide a forum for sharing insights into the process of preparing research proposals. The first half will feature speakers from funding agencies who will discuss funding mechanisms and the prevailing trends that are affecting them. The second half will include a panel discussion of funded researchers who will share their wisdom about grantmanship.

EDUCATIONAL OBJECTIVES

Upon completion of this course, participants should be able to:

- Describe some of the current funding mechanisms that are available for MR researchers in the US and Europe;
- Appraise current trends in areas of emphasis for funding;
- Recognize strategies for preparing successful research proposals.

PROGRAM

Monday, 9 May

- 14:00 **Perspectives from the NIH and EC**
Eileen W. Bradley and TBA
- 15:00 **Panel Discussion**
TBA
- 16:00 Adjournment

MR PHYSICS AND TECHNIQUES FOR CLINICIANS

Frank R. Korosec and Joseph C. McGowan,
Organizers

Monday, 9 May, 16:30 - 18:30,
Tuesday, 10 May - Thursday, 12 May,
16:00 - 18:00

EDUCATIONAL OBJECTIVES

Upon completion of this course, participants should be able to:

- Define and describe the fundamental principles of MR imaging, including the definition of spin magnetization, the Larmor relationship, relaxation phenomena, and the process of using the spin magnetization to produce an image;
- Explain imaging pulse sequences based upon spin and gradient echoes, including fast spin echo and echo planar techniques;
- Design MR imaging protocols for diagnostic applications considering image contrast, spatial resolution, acquisition time, signal-to-noise ratio, and artifacts;
- Describe the principles and capabilities of various advanced MR techniques including diffusion, vascular and functional MRI and spectroscopy.

PROGRAM

Monday, 9 May

- 16:30 **Spin Gymnastics I**
Donald B. Plewes
- 17:10 **Spin Gymnastics II**
Walter Kucharczyk
- 17:50 **Hardware**
Richard G. S. Spencer
- 18:30 Adjournment

Tuesday, 10 May

- 16:00 **Spin Echo Imaging**
Bruce Pike
- 16:40 **Gradient Echo Imaging**
Michael Markl
- 17:20 **Fast Spin Echo Imaging**
Joseph C. McGowan
- 18:00 Adjournment

Wednesday, 11 May

- 16:00 **Imaging Features**
Frank R. Korosec
- 16:40 **Ultrafast Imaging**
Marcus Alley
- 17:20 **Diffusion Imaging**
Konstantinos Arfanakis
- 18:00 Adjournment

Thursday, 12 May

- 16:00 **Vascular Imaging**
Matt A. Bernstein
- 16:40 **Spectroscopy**
Ulrike Dydak
- 17:20 **fMRI**
M. Elizabeth Meyerand
- 18:00 Adjournment

SMRT and ISMRM Joint Forum: OPTIMIZING PULSE SEQUENCES AND PROTOCOLS

Gareth J. Barker and Todd Frederick,
Organizers

Monday, 9 May, 14:00 - 16:00

EDUCATIONAL OBJECTIVES

Upon completion of this course, participants should be able to:

- Recognize how pulse sequences are designed, and how the combination of scanner hardware and software determines what happens during a scanning session;
- Optimize imaging sequences and parameters for a particular application;
- Address imaging artifacts and problems;
- Identify the pulse sequences and imaging methods that are best used for a variety of anatomical areas.

PROGRAM

- 14:00 **Pulse Sequence Designer's Perspective on Sequence Optimization**
Gareth J. Barker
- 14:25 **MR Technologist/Radiographer's Perspective on Sequence Optimization**
Todd Frederick
- 14:50 **Neuro-Radiologist's Perspective on Protocol Optimization**
Achim Gass
- 15:15 **Body Radiologist's Perspective on Protocol Optimization**
Gary Israel
- 15:40 **Discussion**
- 16:00 Adjournment

Educational Stipends for Students, Postdoctoral, and Clinical Trainees

The ISMRM invites applications for educational stipends that offer support for the attendance of students, postdoctoral and clinical trainees to present abstracts at the Thirteenth Scientific Meeting in Miami Beach, Florida, USA. To be eligible for support, an applicant should either be (1) enrolled in a full-time undergraduate or graduate program or (2) enrolled in a full time clinical training program, or (3) a postdoctoral trainee who received a doctorate or equivalent degree after 31 July 2001. Those applicants who are first authors on the abstract will be given priority. Recipients of educational stipends who are not members of ISMRM will be required to submit an application for membership before the funds are disbursed. Stipend recipients are limited to three years of support.

APPLICATION PROCEDURE:

Applicants for support should submit the following:

- Printout of the electronically submitted abstract;
- Copy of email confirming online submission;
- A letter from the applicant requesting student/postdoctoral support and confirming his/her intention to attend the meeting;
- A *curriculum vitae* of the applicant;
- A supervisor/sponsor/training program director's letter confirming the applicant's eligibility for a student stipend. The Committee requests that the letter include comments on available funds for support. If a number of applicants from the same group are applying, the Committee would appreciate a unique comment on each applicant, since funding might be limited in this situation;
- Completed check sheet.

WHERE TO APPLY:

Jeffrey J. Neil, M.D., Ph.D., *Chair*
International Society for Magnetic Resonance in Medicine
Subcommittee on Student Stipends
2118 Milvia Street, Suite 201
Berkeley, California 94704, USA
FAX: +1 510 841 0106

DEADLINE:

Applications must be received no later than **22 November 2004**.

FOR OFFICE USE ONLY

CONFIRMATION NO.

DATE RECEIVED

Student Stipend Check Sheet

SEND COMPLETED CHECK SHEET AND ALL MATERIALS TO:

Send completed Check Sheet and all materials to:

Jeffrey J. Neil, M.D., Ph.D., *Chair*

International Society for Magnetic Resonance in Medicine

Subcommittee on Student Stipends

2118 Milvia Street, Suite 201, Berkeley, California 94704, USA

FAX: +1 510 841 0106

Applicant Name _____
Family Name Given/First Name

Degree _____

Institution _____

Institution Address _____

City _____

State/Province _____

Country _____

Postal Code/Zip+4 _____

Contact Phone Number _____

Home Phone Number _____

E-mail Address _____

Supervisor _____

I have previously applied for a Student Stipend. YES NO

If yes, state the year(s) you have received support _____

Have you submitted an Abstract to the ISMRM as the first author?

YES NO

Please identify your status:

PhD candidate MD clinical trainee

MD/PhD trainee Postdoctoral fellow

DO NOT release my CV to corporate sponsors.

Recipients of Student Stipends will be required to submit an application for membership in the ISMRM before the funds are disbursed.

ENCLOSED:

Student's Application Letter

Student's *Curriculum Vitae*

Abstract and confirmation of online submission

Supervisor's Letter/Eligibility Verification

Membership Application (for nonmembers only)

E.K. Zavoisky Stipend Program

The ISMRM invites applications for stipends from the E.K. Zavoisky Program, established to support the attendance of scientists and clinicians at the ISMRM Thirteenth Scientific Meeting in Miami Beach, Florida, USA. The program is named in honor of E.K. Zavoisky, pioneer in MR research from the former USSR (see below). The purpose of the program is to support scientists and clinicians who do not have access to the financial means to attend the ISMRM Thirteenth Scientific Meeting. Applicants eligible for the Educational Stipend Program (undergraduate and graduate students and postdoctoral and medical trainees) are not eligible for the Zavoisky Program. Those applicants who are first authors on the Abstract submission will be given priority.

APPLICATION PROCEDURE:

Applicants for support should submit the following:

- A printout of the electronically submitted abstract;
- Copy of email confirming online submission;
- A letter of application;
- A *curriculum vitae*;
- A letter from an appropriate person at their institution (supervisor, head of department, etc.) certifying that no alternative funds are available. If a number of applicants from the same institution are applying, the Committee would appreciate a unique comment on each, since funding might be limited in this situation.
- Completed check sheet.

WHERE TO APPLY:

Donald M. Hadley, M.B., Ch.B., Ph.D., Chair
International Society for
Magnetic Resonance in Medicine
E.K. Zavoisky Stipend Committee
2118 Milvia Street, Suite 201
Berkeley, California 94704, USA
FAX: +1 510 841 0106

DEADLINE:

Applications must be received no later than **22 November 2004**.

About E.K. Zavoisky

E.K. Zavoisky from Kazan, Tatarstan, is nowadays acknowledged as the inventor of Electron Spin Resonance. There is also strong support for the thesis that he was the first to observe a NMR signal as early as 1941, but he could not detect the signal reproducibly with the very basic apparatus he was able to build with the limited means available to him.

Due to the political situation at that time, Zavoisky's work remained largely unnoticed in the west. Although unquestionably the first to observe spin resonance, the Nobel Prize Committee did not further consider his contribution due to the lack of follow-up papers and his move to other fields.

It is interesting to note that the CV of Zavoisky explicitly reports his first trip to an international conference (1961). There is little doubt that the history of spin resonance would be seen from a different perspective if Zavoisky had been able to pursue his work within the awareness of an international scientific community.

It seems, therefore, to be more than appropriate to name a program established to help scientists from around the world to communicate their achievements in the memory of E.K. Zavoisky.

FOR OFFICE USE ONLY

CONFIRMATION NO.

DATE RECEIVED

E.K. Zavoisky Stipend Check Sheet

SEND COMPLETED CHECK SHEET AND ALL MATERIALS TO:

Donald M. Hadley, M.B., Ch.B., Ph.D., Chair
International Society for
Magnetic Resonance in Medicine
E.K. Zavoisky Stipend Committee
2118 Milvia Street, Suite 201, Berkeley, California 94704, USA
FAX: +1 510 841 0106

Applicant Name _____
Family Name Given/First Name

Degree _____

Institution _____

InstitutionAddress _____

City _____

State/Province _____

Country _____

Postal Code/Zip+4 _____

Contact Phone Number _____

Home Phone Number _____

E-mail Address _____

Supervisor _____

Have you submitted an Abstract to the ISMRM as the first author?

YES NO

ENCLOSED:

- E.K. Zavoisky Program Application Letter
- Curriculum Vitae*
- Abstract and confirmation of online submission
- Supervisor's Letter

New Entrant Stipend Award

To encourage new entrants to research in areas of interest to the ISMRM, the Society invites applications for a New Entrant Stipend Award. This program is aimed at students, trainees, or researchers who are new to the field and might not be funded under the main educational stipend program. Each awardee will receive US\$400 toward the costs of attending the Thirteenth Scientific Meeting in Miami Beach, Florida, USA. Upon request, an awardee may be paired with a senior member of the ISMRM who will be the awardee's mentor during the Scientific Meeting, providing the opportunity for reviews and discussions of important scientific and clinical developments presented at the meeting. Recipients of stipends who are not members of the ISMRM will be required to submit an application for membership before funds are disbursed.

ELIGIBILITY CRITERIA:

- Applicants must be already actively involved or about to be actively involved in some aspect of research related to the ISMRM;
- Applicants cannot be first or presenting authors on abstracts submitted to the ISMRM program and do not need to submit an abstract to the meeting;
- Applicants are required to attend at least 4 days of the ISMRM meeting, including at least one day of the weekend educational courses.

PROGRAM DESCRIPTION:

- Awardees will have the opportunity to be paired with a mentor from the ISMRM community, with whom they will meet on a daily basis.
- Mentors will subsequently be available to the awardees for advice and discussion regarding scientific and career issues in the field of magnetic resonance.

APPLICATION PROCEDURE:

- Applicants should send a letter including a brief statement of their interest in attending the Scientific Meeting and explain how this will relate to their own work.
- A letter of support from the Department Chair is required stating that the student or trainee either will be given the time off to attend and be supported for the remaining cost of the meeting, or will use vacation time and personal funds as needed.
- A *curriculum vitae* must accompany the application.
- Completed check sheet.

WHERE TO APPLY:

Jeffrey J. Neil, M.D., Ph.D., Chair
International Society for Magnetic Resonance in Medicine
New Entrant Stipend Committee
2118 Milvia Street, Suite 201
Berkeley, California 94704, USA
FAX: +1 510 841 0106

DEADLINE:

Applications must be received no later than **31 January 2005**.

FOR OFFICE USE ONLY

ID NO.

DATE RECEIVED

New Entrant Stipend Check Sheet

SEND COMPLETED CHECK SHEET AND ALL MATERIALS TO:

Jeffrey J. Neil, M.D., Ph.D., *Chair*
International Society for Magnetic Resonance in Medicine
New Entrant Stipend Committee
2118 Milvia Street, Suite 201, Berkeley, California 94704, USA
FAX: +1 510 841 0106

Applicant Name _____
Family Name Given/First Name

Degree _____

Institution _____

Institution Address _____

City _____

State/Province _____

Country _____

Postal Code/Zip+4 _____

Contact Phone Number _____

Home Phone Number _____

E-mail Address _____

Supervisor _____

Recipients of New Entrant stipends will be required to submit an application for membership in the ISMRM before the funds are disbursed.

ENCLOSED:

- New Entrant's Application Letter
- New Entrant's *Curriculum Vitae*
- Department Chair's Letter
- Eligibility Verification
- Membership Application (for nonmembers only)

From The SMRT President

Riding the Waves of MR Excellence is the theme for the 14th Annual Meeting of the Section for Magnetic Resonance Technologists to be held in conjunction with the 13th ISMRM Annual Meeting in Miami Beach, Florida, USA. The SMRT was established to provide superior educational opportunities for technologists/radiographers as well as a forum for members to collaborate with and learn from each other. This meeting furthers that mission. As technologists, we all strive to provide the best possible patient care and services to the radiologists and referring physicians. The 2005 SMRT Annual Meeting program is dedicated to providing numerous tools and resources to help us accomplish these important professional aspirations. See the SMRT preliminary program on page 24.

As technologists, we need to know that our employers support our education as much as we aspire to be educated. As professionals we want to know that we are considered to be part of the healthcare team within our organizations. Many of you are our employers, our colleagues, and the member of the healthcare team that we as technologists look up to. It is important to know that each one of you supports us and our mission to be the very best technologists that we can be for our patients! With that being said, I would like to encourage each and every physician, physicist, scientist, and MR professional to support the educational needs of the technologists that you work with day in and day out. One way you can show your support is by promoting this upcoming meeting in Miami. Please take a copy of the program to work and share it with the technologists. Encourage the technologists to become members of the SMRT. You could even go a step further and help provide the financial means for your technologists to attend this meeting or become members of the SMRT!

The SMRT offers so many member benefits. We have published over 25 issues of our premier *SMRT Educational Seminars* home study program, and more are in the works for release. The SMRT publishes four home studies per year and renews the continuing education credit yearly so they can be used by new members year after year. All back issues can be purchased by SMRT members. *SMRT Signals* newsletter is published quarterly and features articles on MR Safety to protocol optimization and artifact review. The articles change from issue to issue but are always subjects that are important and up to date on MRI/S techniques. There is always news about SMRT current events and other educational opportunities in *Signals*. This past fiscal year the SMRT hosted Regional Seminars in North Carolina, Boston, Cleveland, Bethlehem, Ottawa, Atlanta, and New York. Already in this fiscal year the SMRT has hosted Regionals in Boston, Charleston, and Stanford, and five more are scheduled. SMRT members receive reduced rates to attend these meetings. There are so many reasons to belong to the SMRT! For the price of dinner and a movie (\$75), your technologists can have these benefits and the opportunity for quality MR education. Please share this opportunity with your technologists.

The SMRT has accomplished so much this year and we are on a mission to become the premier provider of MR technologist/radiographer education throughout the world. Just like the ISMRM, we too are working on a strategic plan for the future. All the SMRT Standing Committees have been at work setting goals and planning strategies to reach those goals in the next five to ten years. We are also working with other healthcare organizations so we can impact the career path of MR technology as it relates to us as technologists and radiographers. The SMRT is devoted to quality education, and we want to be on the forefront of any issue that impacts quality and educational standards of MR technologists. As you are aware, numbers speak louder than words. We need the voice of all MR

technologists to really make an impact on these issues that face our profession. Please join us in the "Each One, Reach One" membership campaign by sharing the SMRT with your technologists and join us as we **Ride the Waves of MR Excellence** in Miami!

— Cindy T. Hipps, SMRT President



From The SMRT Program and Education Chairs

The SMRT 2005 Program and Education Committees would like to invite technologists from around the world to attend the 14th Annual Meeting of the Section for Magnetic Resonance Technologists. This meeting will be held 6 to 8 May 2005 in conjunction with the Thirteenth Scientific Meeting and Exhibition of the International Society for Magnetic Resonance in Medicine at the Miami Beach Convention Center. The goal of the SMRT is to provide quality educational opportunities for the MR technologist/radiographer and to establish and maintain a high level of professionalism in the field. MR technologists are faced with many challenges: keeping abreast of advancing technology, the ever expanding field of MR, coping with day-to-day problems of technologist shortages and a continuously increased workload. MR technologists must strive to maintain a high standard of performance in addition to continuing to provide optimal patient care. All levels of MR technologists will surely find something of interest in this year's program, and will greatly benefit from the opportunity to network among fellow colleagues.

Two of the most regarded and effective components of the meeting continue to be the proffered papers and poster presentations. We widely encourage technologists from around the world to submit abstracts for oral or poster presentation. Abstracts with either a clinical or research focus will be accepted until 17 January 2005. Online abstract submissions will be available on the SMRT Website: www.ismrm.org/smrt

The meeting will commence on Friday evening 6 May 2005 at 18:30 with a Poster Exhibit and Walking Tour Reception. The poster reception, one of the highlights of the meeting, provides an engaging atmosphere where attendees get a chance to meet the authors and ask questions about the many emerging technological advances displayed.

Following the opening events, two days of superior technologist education will be offered during which selected proffered papers will be presented. On Saturday morning, the didactic portion of the program will begin. At lunchtime, after several hours of accredited lectures and proffered papers, the SMRT Business Meeting will take place and awards will be given to the most outstanding papers and posters submitted in both the clinical and research arenas. The didactic portion of the meeting will then resume and the day will conclude with a cardiac forum and roundtable discussion. On Sunday morning, the incoming President of the SMRT, Karen Bove-Bettis, will open the meeting by greeting all attendees. The didactic program will follow for the remainder of the day and will include a special section tailored for MR educators. Plans are underway for the first SMRT Past President's Reception on Saturday, 7 May, 19:30, at the Miami Loews

Hotel. Come join your colleagues for an exciting evening of food, fun, and entertainment the "Miami way!"

The SMRT and ISMRM Joint Forum Presentation will be held at 14:00, Monday, 9 May 2005. Your registration for the SMRT Annual Meeting allows you to attend this forum. This year the forum topic will be titled "Optimizing Pulse Sequences and Protocols," chaired by Gareth J. Barker, Ph.D. and Todd Frederick, R.T. (R)(MR). The two-hour forum will present the process of developing and optimizing pulse sequences and protocols from various perspectives: a physicist may be interested in modifying the software which controls the scanner hardware; a MRI technologist/radiographer may be concerned with the impact of parameter choices on image quality and patient compliance; for a clinician, the most important factor is likely to be whether the resulting images will allow for better patient management. The forum by design is a grand collaboration of energy and talent between the ISMRM and the SMRT, which continuously promotes the highest quality of education in the MR field.

The SMRT was established to provide superior educational opportunities for technologists/radiographers as well as a forum for members to collaborate with and learn from each other. This meeting

further that mission. As technologists, we all strive to provide the best possible patient care and services to the radiologists and referring physicians. The 2005 SMRT Annual Meeting program is dedicated to providing numerous tools and resources to help us accomplish these important professional aspirations.

As Chairs of the 2005 Education and Program Committees, we are pleased to invite you to join us in Miami for what promises to be a highly distinguished and uniquely relevant educational event.

— **Nanette Keck,**
Program Chair
John Christopher,
Education Chair



SMRT PRELIMINARY PROGRAM: RIDING THE WAVES OF MR EXCELLENCE

FRIDAY, 6 May 2005, 18:30-20:30

Poster Exhibit, Poster Presentations, and Poster Walking Tour Reception

SATURDAY, 7 May 2005, 07:45-17:00

07:45 - 08:00 Welcome
Cindy T. Hipps, B.H.S., R.T. (R)(MR),
SMRT President 2004-2005
Announcements
Nanette Keck, R.T. (R)(MR), 2005 Program Chair

Morning Moderator— Muriel Cockburn, D.C., R.B.Sc. (Hons.) P.Gd. Cert. MRI

08:00 - 08:30 **MR Arthrography of the Shoulder:
Direct and Indirect Approaches**
Michael Zlatkin, M.D.

08:35 - 09:05 **Lower Extremity MR**
John Crues, M.D.

09:10 - 09:40 **Body MRA**
Frank Thornton, M.D.

09:40 - 09:55 Break

09:55 - 10:25 **Clinical Scanning Techniques**
William Faulkner, B.S., R.T. (R)(MR)(CT)

10:30 - 11:10 **Proffered Papers**

11:15 - 11:45 **MR Artifacts**
Greg Brown, R.T.

11:45 - 13:00 SMRT Business Meeting and Awards Luncheon

Afternoon Moderator – Robin Avison, R.T. (N)(MR), C.N.M.T.

13:00 - 13:30 **Breast Imaging**
Todd Frederick, R.T. (R)(MR)

13:35 - 14:05 **Proffered Papers**

14:10 - 14:45 **Registry Readiness**
Carolyn K. Roth, R.T. (R)(MR)(CT)(M)(CV)

14:45 - 15:00 Break

15:00 - 17:00 **Cardiac Forum— Roundtable Discussion**
Moderator— Michael Kean, R.T.

General Anatomy and Imaging
Michaela Schmidt, R.T.

Diseases and Abnormalities
Peter Hunold, M.D.

Advantages and Pitfalls of 3 Tesla Cardiac Imaging
William Woodward, A.R.M.R.I.T.

19:30 SMRT Past President's Reception— Miami Loews Hotel

SUNDAY, 8 May 2005, 07:45-17:00

07:45 - 08:00 Welcome
Karen Bove Bettis, R.T. (R)(MR), President 2005-2006
Announcements
Nanette Keck, R.T. (R)(MR), 2005 Program Chair

Morning Moderator – James J. Stuppino, B.S., R.T. (R)(MR)

08:00 - 08:30 **Neuro Imaging at 3T**
Steven Falcone, M.D.

08:35 - 09:05 **Neuro MRA**
Elke Gizewski, M.D.

09:10 - 09:40 **HIV Dementia MRI and MRS**
Robin Avison, R.T. (N)(MR), C.N.M.T.

09:40 - 09:55 Break

09:55 - 10:25 **Proffered Papers**

10:30 - 11:00 **Pediatric Cardiac/Abdomen**
Michael Kean, R.T.

11:05 - 11:35 **Pediatric/Neuro**
Susan Blaser, M.D.

11:40 - 11:55 **President's Award Proffered Paper**
11:55 - 13:00 Lunch

Afternoon Moderator – Carolyn Bonaceto, B.S., R.T. (R)(MR)

13:00 - 13:30 **Comprehensive Assessment of Disease
with Large Anatomic Coverage**
Silke Bosk, R.T.

13:35 - 14:05 **The Current State of Imaging in the Abdomen
at 1.5T and 3T**
Herbert Y. Kressel, M.D.

14:05 - 14:20 Break

14:20 - 15:00 **MR Safety**
Frank Shellock, Ph.D.

15:00 - 17:00 **MR Educators Update**
Moderator— Todd Frederick, R.T. (R)(MR)

Course Accreditation
Luann Culbreth, R.T. (R)(MR)(QM) M.Ed.

Teaching Methods and Techniques
Carolyn K. Roth, R.T. (R)(MR)(CT)(M)(CV)

Current Issues in MR Education
Todd Frederick, R.T. (R)(MR)

17:00 Meeting Adjournment

Travel Information

Miami Beach, Florida, USA



In South Beach, Miami, Florida, USA, the sun is warm, the sky is blue, and the possibilities are as endless as the waves crashing onto its white, sandy shores. A worldwide destination famous for its lively nightlife, stunning beaches, exquisite shopping, and delectable food, South Beach is jam-packed with things to do and see.

Adventurous spirits looking for an adrenaline rush can choose between parasailing, kayaking, and scuba diving; sea-lovers who prefer to stay dry can catch a boat tour, charter a yacht, or embark on a deep-sea fishing expedition; and visitors planning on leaving their sea legs at home can spend their sunny days on terra firma at the Miami Seaquarium, the Metrozoo, the Cultural Center, or at one of Miami's popular adventure parks. Golfers in search of a challenge need look no further than South Beach and its surrounding area. Beautifully tended courses, both well-settled and those built using the latest technology, deliver miles of some of the best greens in the United States. Of course, there is always the beach— 63.26 miles of it, in fact—and with an average annual temperature of 75.3° (F) and an annual surf temperature of 74° (F), South Beach offers up a generous dose of paradise. But, the enchantment doesn't stop there.

A tropical haven by day, the city comes alive at sunset, ushering visitors into a world filled with music, dancing, and indulgence. Diners are treated to an incomparable array of irresistible cuisines ranging from Greek to Colombian, New World Caribbean to Vietnamese, Mexican to



Mediterranean, not to mention the seafood. And for those with energy to spare, there are dozens of late-night clubs, discos, and live concerts to sample. South Beach, brimming with exciting opportunities both day and night, has something for every visitor!

Climate The Florida peninsula receives breezes from both the Gulf of Mexico and Atlantic Ocean. South Florida, exposed to daytime onshore breezes, enjoys comfortable temperatures during much of the year. In South Beach, Miami, the average low temperature in May is 72 degrees, with an average high of 87.2 degrees. The sun shines during 72% of May's daytime hours and the average precipitation rate is 5.52 inches.



Many hotels offering a range of quality, rates, and amenities have been reserved by the Society for the meeting in Miami Beach, Florida, USA. **Convention Housing Management (CHM) has been appointed to coordinate all hotel reservations for delegates and exhibitors. In order to receive the special convention rate, delegates and exhibitors must make their reservations through the official housing bureau, CHM.** More detailed information on the various hotels and the hotel reservation form are included in this brochure. Do not contact the hotels directly in Miami Beach as reservations are to be made only through the official housing bureau, CHM. Official Society hotels will not honor direct requests for hotel rooms at the special convention rates. Again this year, you may book your reservations online! Visit the ISMRM Website at www.ismrm.org for more information.

Customs/Visa All visitors traveling from outside the United States must have a passport for entry into the United States that is valid for six months after international travel concludes. Note that citizens of countries participating in the Visa Waiver Program must present a machine-readable passport upon entry to the United States, otherwise a visa is required. Entry visas are required for travel from some countries. The visa application process must be started as soon as travel to the United States is considered, and at least three to four months in advance of departure date. Please verify the entry documents necessary by contacting your local U.S. Consulate office, or your local travel agent. Detailed visa information is available on the ISMRM Website at www.ismrm.org/05/visainfo.htm. Please review this information carefully to determine whether or not you need to apply for a visa.



Currency The money system in the United States is based on dollars (\$) and cents. International currency exchange services are located at banks throughout the city. The closest banks to the Miami Beach Convention Center are:

Suntrust Bank: 111 Lincoln Road, Miami Beach, Florida 33139 USA Phone: +1 305 591 6000
Colonial Bank: 301 41st Street, Miami Beach, Florida 33140 USA Phone: +1 305 535 9143

Voltage The electrical voltage system in the United States is 110 volts. If you are traveling from a country outside of North America, you will need a proper voltage converter and adapter in order to operate your electrical appliances.

Transportation Located in the heart of South Florida in world-renowned Miami Beach, the Miami Beach Convention Center is conveniently situated only minutes from the Miami International Airport via State Road 112 and US195, downtown Miami and the Port of Miami via I-395, Fort Lauderdale and the Palm Beaches via both Interstate 95 and the Florida Turnpike to the Julia Tuttle Causeway (US195). Spanning four city blocks of Miami Beach, the Center is bounded by Washington Avenue on the east, Convention Center Drive on the west, Dade Boulevard on the north, and 17th Street on the south. The Center is only moments from one of America's most spectacular beaches and the South Beach Art Deco district, easily within walking distance.

Taxi services in Miami Beach include:
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Yellow Cab: Phone: +1 305 444 4444
Metro Taxi: Phone: +1 305 888 8888

Airport shuttle service:
Super Shuttle: Phone: +1 800 874 8885

Methods for Quantitative Diffusion MRI of Human Brain

13 - 16 March 2005

The Fairmont Chateau Lake Louise
Lake Louise, Alberta, Canada



This workshop is designed to compare and contrast currently used approaches for quantitative diffusion measurements in the central nervous system of human subjects. The emphasis will be on stimulating active discussions among participants with the goal of identifying optimal strategies for acquisition, analysis, and interpretation of data in specific brain disorders. An important outcome of this workshop will be proposing standards for acquiring and reporting diffusion MRI data that would facilitate comparison of studies from different centers.

POINTS OF FOCUS (PRELIMINARY LIST):

- 1. Clinical Applications of Quantitative Diffusion MRI**
(Neurodevelopment and Pediatric Disorders, Tumors, Stroke, Aging, Psychiatric, and Neurodegenerative Disorders)
- 2. Acquisition Sequences**
(Single- versus Multi-Shot Techniques, Parallel Imaging, and Standardization of Acquisition)
- 3. Experimental Design**
(Optimization of Acquisition Strategies, Artifacts, Physiological Noise)
- 4. Post Processing**
(Image Motion/Distortion Correction, Tensor Estimation, Spatial Normalization, Statistical Analysis, Atlasing)
- 5. Tractography**
(Anatomical Validation, Clinical Application of Tractography, and Clinical Applicability of High Angular Resolution Acquisitions)

WORKSHOP ORGANIZING COMMITTEE

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- **Christian Beaulieu, Ph.D.**, University of Alberta, Edmonton, Alberta, Canada
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Bill Negendank Award Fund

In memory of William George Negendank, M.D., his colleagues in the ISMRM MR of Cancer Study Group have established the *Bill Negendank Award Fund* to recognize outstanding young investigators in the field of Cancer MR (see *MR Pulse*, Vol. 3, No. 3, page 6). To make your tax-deductible contribution, please send your check made payable to the ISMRM or submit your Visa, MasterCard, American Express, or Eurocard number, expiration date, and amount you wish to donate to the following address:

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