Signals

Number 46

2003 Issue 3

NEWSLETTER OF THE SECTION FOR MAGNETIC RESONANCE TECHNOLOGISTS

IN THIS ISSUE

SMRT 12th Annual Meeting Program Report

Laurian Z. Rohoman, A.C.R., R.T. (R)(MR), 2003 Program Committee Chair

After a two-month delay the SMRT 12th Annual Meeting finally became a reality on 9-11 July 2003 at the Metro Toronto Convention Centre in Toronto, Ontario, Canada. Two hundred and forty-one technologists from 17 different countries attended the 2-day educational meeting. The theme of this year's meeting was *"Excellence through World-Class Education"* and it certainly was. The topics presented by the faculty speakers together with the abstract presentations by the technologists indeed promoted excellence through world-class education.

The meeting started off with the 5th Annual Poster Exhibit and Walking Tour Reception on Wednesday evening. Our thanks to Mallinckrodt, Inc. for sponsoring this event. The attendees were able to meet and interact with their peers in a relaxed and informal atmosphere. Thirty-seven poster presenters were on hand to display their work and share the results with the attendees. A lot of hard work goes into putting together these poster presentations and we commend all the poster presenters for their commitment and dedication. This year a new event was added to the Poster Exhibit. Four poster presenters were selected to give a brief oral presentation of their work. The oral poster presentations were well received and we hope to continue this event at future meetings, allowing more poster authors the opportunity to present their work.

The didactic portion of the meeting began very early Thursday morning, with Laurian Rohoman, 2003 Program Chair welcoming the attendees and introducing the moderator of the morning session, Muriel Cockburn from Glasgow, Scotland. Anne Sawyer-Glover, B.S., R.T., (R)(MR) started off the program sharing her expertise on *"Basics of Functional Neuro Imaging."* Next Naeem Merchant, M.D., discussed *"Cardiac Imaging,"* which was well appreciated by the audience. After the break, William Faulkner, B.S., R.T. (R)(MR)(CT) talked about *"New Pulse Sequences"* and kept the audience well entertained. Next on the agenda were proffered papers.

John Koveleski passes the gavel to incoming SMRT President, Maureen Ainslie.

The SMRT Business Meeting was held during the lunch hour. John Koveleski, President of the SMRT called the meeting to order. The Executive Committee members were introduced as well as the current and new Policy Board members. Next the committee chairs each gave a brief report and then it was on to the awards presentations. The Fellows Award was presented to Robin Greene-Avison by Heidi Berns, Robin sent her regrets as she was unable to attend the rescheduled meeting. The Honorary Membership Award was presented to Dr. Frank Shellock and the Distinguished Service

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Editor's Letter

Julie Strandt-Peay, B.S.M., R.T. (R)(MR)

Greetings.

In this issue of *Signals* you will find expanded coverage of the SMRT 12th Annual Meeting with Program Chair, **Laurian Rohoman** leading off. The editor would like to thank **Anne Sawyer-Glover** for once again providing most of the photographs relating to the annual meeting. You will hear from and about our new President, **Maureen Ainslie**. Education Chair, **Julia Lowe** announces the award winning abstract presenters and details about the educational program. Abstracts are printed for your educational information, and more will be included in the next issue of *Signals*. **Nanette Keck** chaired this year's SMRT Forum at the ISMRM meeting and shares that event.

Kelly Baron brings us news on the latest offering of the *SMRT Educational Seminars* Home Study program. Past-president, **John Koveleski**, chairs the Nominating Committee and reminds us that it is time to vote for the candidate of our choice. SMRT Regional Seminars are an important component of the educational offerings. Check out all the upcoming events and take note of chair, **Cindy Comeau's** message about how YOU could host a seminar. Low- and Mid-Field columnist, **Bill Faulkner** shows an interesting case study. **Frank Shellock** addresses the potential of excessive heating and burns in his safety column. There is also information about the Institute for Magnetic Resonance Safety, Education, and Research.

Plans are already underway for the SMRT 13th Annual Meeting in Kyoto, Japan. **Jim Stuppino** is Program Chair and has his committee hard at work. Has your work place been featured in "Highlight Your Site"? Information is available for you and your colleagues to become world known. The SMRT continues to strive to increase the educational offerings and opportunities for MR professionals. Note the items in *Signals* and be sure to visit the SMRT Website often.

And, lastly, and exciting opportunity for customers of **MRI Devices**!
See the back cover for details! ●

Meet the New SMRT President: Maureen Ainslie, M.S., R.T. (R)(MR)

Julie Strandt-Peay, B.S.M., R.T. (R)(MR)

Signals: Maureen, can you highlight for us your career in MR?

Maureen: I was fortunate to be one of the technologists chosen to work on one of the first 1.5 Tesla magnets installed at the Brigham and Women's Hospital in Boston, Massachusetts. It was quite a challenge as not only was the field of MR a new avenue for all of us, the magnet was operated as a consortium magnet with three user groups. A large level one trauma center, a cancer center and a pediatric hospital all shared time on the system. We prepared by visiting another MR facility in an academic institution that had a magnet for several years. We then diligently studied MR physics while watching the install team bring up our system. I still remember the feeling of panic when our applications specialist left after the final day of our on-site training. I held a variety of challenging positions over the next few years in MR and eventually managed the division. As my career progressed I had the opportunity to work on the 0.5 T open magnet specifically designed for use in the surgical environment. That project brought together two areas in which I possessed significant interest and experience and remains one of my cherished experiences. Throughout my career I have looked for additional challenges. This thirst for knowledge eventually led me to pursue an advanced degree. While working full time I managed to complete a Masters of Science Program. This investment clearly opened doors for me. Armed with my degree, I was chosen to manage the Duke Image Analysis Lab in Durham, N.C. in 1997. My work allows me to interact with technologists on a daily basis while helping maintain the highest standards in image quality for use in clinical trials. I am extremely fortunate to be able to combine my love of imaging with a professional career that is stimulating and full of potential.

Signals: When did you first become involved in the SMRT?

Maureen: I was sponsored by Squibb to attend a SMRT meeting in San Francisco in 1991. That experience was so positive, I decided to become a member. I submitted my first abstract for the SMRT Annual Meeting in 1993 and was delighted to receive the President's Award for best abstract. This was the first time this award had been given. I was elected to the Policy Board in 1997 and served as chair of the Regionals Committee. This was a rewarding experience as the Committee worked to support Regional meetings for local technologists. I then served as Program Chair for the Annual Meeting held in Denver in 2000. It is truly satisfying to work with such a dedicated group of volunteers who strive to provide quality educational opportunities and promote MR professionalism across the globe.

Signals: What would you like to see the SMRT accomplish in this upcoming year?

Maureen: The Executive Committee and Policy Board are committed to increasing the educational opportunities available for MR technologists around the world. I would like to see more MR professionals take advantage of the educational opportunities and the SMRT technologists' network by becoming a member of this unique organization. Finally, along with support from the Berkeley office, SMRT will continue to pursue avenues to expand our global presence.

Signals: There seems to be a lot of SMRT educational activity in the near future. How will you, as President, try to maintain that momentum?

Maureen: There is a great deal of excitement stirring in the SMRT member ranks. I believe it is important to communicate your expectations and inspire members to contribute to their organization through newsletter submissions, hosting Regional Seminars or soliciting new membership. Each individual's contribution increases the added value SMRT membership brings to technologists worldwide and provides a voice for MR technologists. ●

President's Letter

Maureen Ainslie, M.S., R.T. (R)(MR)

ISMRM President Michael E. Moseley and SMRT President Maureen Ainslie at the SMRT Poster Walking Tour and Reception in Toronto.

The SMRT held a successful 12th Annual Meeting in Toronto, Ontario, Canada, on 9-11 July 2003. Many thanks to Program Chair **Laurian Rohoman** and her committee for their time and effort in preparing for this meeting and handling the rescheduling process with determination and grace. Thanks also to **Julia Lowe** and the Education Committee for their support for the annual meeting. The 2nd Annual SMRT Forum was held during the ISMRM 11th Scientific Meeting on Saturday, 12 July 2003. Executive member Nanette Keck served as chair of the forum.

The Regionals Committee has six Regional Educational Seminars scheduled throughout North America, according to Chair, **Cindy Comeau**, and additional Regionals are in the planning stages for 2004 worldwide. I would personally like to thank all the regional chairs for hosting a regional in their area. Regional Seminars provide opportunities for technologists to benefit from local speakers expertise and a chance to get together with your fellow MR professionals. In addition, you can earn Category A Continuing Education credits for attending a Regional Seminar. If you are interested in hosting a Regional in your area, please contact Cindy for additional information.

Our focus this year is increasing our growing SMRT membership of 1500 and the educational opportunities for technologists worldwide. Towards this end, we have instituted a campaign to reach out to technologists around the globe and make them aware of the educational opportunities the SMRT provides. **Todd Richards**, our new Membership Chair, is leading these efforts. Please contact him regarding SMRT membership information.

Plans for the SMRT Annual Meeting in Kyoto in May 2004 are underway. **Jim Stuppino**, the 2004 Program Chair has met with members of the Japanese Society of Radiographic Technologists and the ISMRM Scientific Program Committee to design a program that will serve a global audience. Please contact Jim directly with input or suggestions. Executive member **John Christopher** along with members of the SMRT/ISMRM Forum Subcommittee have selected *"Artifacts and Corrections"* as the topic for the forum traditionally held on Monday afternoon at the ISMRM Annual Meeting.

The External Relations Committee, chaired by **Maureen Hood** continues to interact and build relationships with other healthcare organizations. The SMRT as part of the Associated Sciences Consortium of the Radiological Society of North America (RSNA) works to produce educational seminars of interest to technologists and other medical science areas of diagnostic imaging for the RSNA meeting each year. The SMRT is also involved with groups interested in promoting professionalism and opportunities for healthcare professions such as the Alliance for Quality Medical Imaging and Radiation Therapy, and the Health Professions Network. Both of these organizations are working to promote quality and education for allied health professionals while at the same time addressing the current workforce shortages in certain health care fields. The SMRT is committed to promoting education and professional values globally and has expanded its efforts to reach out to groups around the world through the establishment of a Global Relations Subcommittee chaired by **Muriel Cockburn**. Two additional Local Chapters of the SMRT, Central Virginia and Central Georgia have been formed, bringing the total to ten. Local Chapters meet periodically throughout the year, offering additional educational opportunities for MR technologists in their area.

A new opportunity for MR technology students to present an abstract or learning experience for review and posting on the SMRT Website is rolling out in September under the direction of **Denise Davis**, Student Scope Subcommittee Chair. We anticipate this program will provide SMRT exposure to MR technologists entering our field. Along these lines, the MR technologist listserve, which has grown to 800 members world wide, has proven to be a positive association as list members have greater exposure to SMRT-sponsored activities.

The *SMRT Educational Seminars* "Home Study" program continues to be a success. These self-study articles provide Category A Continuing Education credits for technologists and an opportunity to enhance their technical proficiency and broaden their knowledge on a variety of topics.

The SMRT looks forward to an exciting year. The Policy Board and Executive Committee are dedicated to our goal of providing quality MR educational opportunities and promoting MR professionalism around the world.

I am excited to be working with this experienced team of qualified individuals. I encourage all members to offer suggestions to the members of the Policy Board as we work to provide membership benefits that will increase your knowledge and enhance your experience as an MR professional. Feel free to contact me directly, or the chairs and Policy Board Members as listed on the SMRT Website. I look forward to serving as your President this year. ●

Education Committee Report on the 2003 SMRT Annual Meeting in Toronto, Ontario, Canada

Julia B. Lowe, B.S., R.T. (R)(MR), SMRT 2003 Education Committee Chair

Because of the dedication and hard work of everyone involved with the SMRT the 2003 Annual Meeting was a huge success. Despite the challenges we faced we managed to pull together to make this meeting happen. Thanks to all of the SMRT committee members, especially the Program Committee, and to the technologists that worked so hard to submit quality abstracts, and also to the meeting attendees and speakers. We also appreciate those of you that were unable to attend but still volunteered your time and contributions to this meeting.

Preparation for this meeting began months ago. One of the first events was the Call for Papers requesting MRI technologists to formally write up clinical or research abstracts. There was an amazing response from technologists, which yielded a total of 64 abstracts submitted from 17 countries.

Reviewers that were selected from the Education Committee worked diligently to score the abstracts. The reviewers score content, clinical or research focus criteria, and overall quality of presentation for each abstract. The scores are totaled to determine the highest scoring abstracts in each category so that the technologists can be recognized at the annual meeting. The initial categories are separated into clinical and research. Technologists choose upon submission to present their work orally or in a poster fashion, which make up the other two categories.

This year Eva Wembacher, R.T., achieved the highest overall scoring abstract and received the President's Award at the SMRT Business Meeting and Awards Luncheon for her work entitled *"Combined Small and Large Bowel MR Imaging in Patients with Inflammatory Bowel Disease."* Her work was included in the program agenda as a proffered paper. Other technologists with high scoring abstracts were invited to present proffered papers as well. Mercedes Pereyra, R.T., was awarded first place in the clinical category for her work titled *"Quantitative Assessment of Global LV Function Using Sensitivity Encoding (SENSE) Accelerated Balanced FFE."* Claudio Arena, R.T. (CT)(MR), was awarded second place in the clinical category for her work titled *"Robust Small Field-of-View, High Resolution Contrast Enhanced MRA (CE-MRA) of Renal Arteries Using Sensitivity Encoding in Two Dimensions (2D-SENSE)."* Eva Wembacher, R.T., also received the third place clinical award for her work entitled *"Comparison of Different Techniques for MR-Colonography."* Other proffered papers included in the program agenda were those awarded in the research category for oral presentation. Heather Ducie, B.Sc. (Hons) R.T. (R)(MR), was awarded first place for her work entitled *"Analysis of Perfusion MRI Data in Patients with Severe Cerebrovascular Disease."* Due to tying scores, second place was awarded to both Jane Francis, D.C.R. (R), D.N.M., for her work entitled *"Cardiovascular Magnetic Resonance in the Pre- and Post Operative Assessment of Patients Undergoing Left Ventricular Reduction Surgery"* and Wendy Strugnell, B.Sc., R.T., for her work entitled *"Cardiac MRI Analysis of RV Function–A New Approach."* The technologists' presentations are an important part of the agenda and provide us all with the current international interests and techniques. This year for the first time meeting attendees acquired continuing education credits for the technologists' proffered paper presentations.

Also new this year was the addition of oral poster presentations. Four technologists were selected to stand by their posters and give a brief talk to the informal gathering during the poster tour. The first presenter was Silke Bosk who gave a short presentation on *"Thromboembolic Disease Assessment with Whole Body MR Venography."* Next Steven Williams talked about his poster *"Imaging Cartilage at 1.5T Standard and Novel Techniques."* Bobby Lewis then presented her work on *"Does Angle matter in MRSI"?* Our last presenter was Susan Ryan who explained her poster *"Using the Roolie for Peripheral Run Off MRAs."*

SMRT President, John Koveleski, presents the President's Award to Eva Wembacher, R.T. for her work entitled "Combined Small and Large Bowel MR Imaging in Patients with Inflammatory Bowel Disease."

The Poster Walking Tour and Reception is the first event of the meeting and began Wednesday evening. We would like to thank Mallinckrodt, Inc. for hosting the event. Attendees can browse the original work of technologists in a relaxing and social atmosphere while enjoying food and drinks. Thirty-seven of the 54 accepted poster abstracts were displayed for all the attendees to view, some not making the trip due to rescheduled meeting date.

The reviewers from the Education Committee completed the final poster scores during the Poster Walking Tour. The poster scores are averaged with the original abstract score and the winners are determined before the Business Meeting Luncheon and Awards Ceremony. I would like to thank all of the reviewers for such dedication. Scoring 64 abstracts in two weeks and reviewing 37 posters in an evening is no small feat and is much appreciated!

In the clinical category, the first place poster presentation was awarded to David Stanley, B.S., R.T. (R)(MR) for his worked entitled *"Evaluation of 3D FRFSE and 3D Fiesta MRCP."* The second place award was presented to Sandra Massing, R.T., for her worked entitled *"Phase-Contrast Cardiac MR Imaging for Absolute Quantification of*

Continued on page 5

Mitral Valve Regurgitation." Third place was also awarded to David Stanley, B.S., R.T. (R)(MR), for his work entitled *"Evaluation of Abdominal Veins using 2D Fiesta."* In the research category, the first place poster presentation was awarded to Renee Hill, R.T. (R)(MR), for her work entitled *"Optimization of High Resolution 3D Volumetric Scans to Differentiate Gray Matter and White Matter at 1.5 Tesla."* Due to tying scores second place was awarded to both Karen Bove Bettis, R.T. (R)(MR), for her work entitled *"Appearance of Calcification Artifact in the Falx Cerebri on Phase Maps Using a High Resolution Venogram Technique at 3 Tesla"* and Randy Earnest, B.S., for his work entitled *"Magnetic Resonance Angiography with Blood Pool Agent MS-325: Results From a Phase III Clinical Trial."*

The Safety Forum was extremely helpful and provided current and updated information. Technologists interacted with the Safety Forum speakers by asking questions and offering comments and suggestions to us all. The information learned from the Forum will be disseminated to MR sites by the attendees that will effectively increase safety awareness.

Once again I would like to thank all of those involved with the meeting. The speakers gave excellent talks on a wide range of topics and the technologists demonstrated efficient new MR techniques and ideas. The SMRT Annual Meeting brings us together from many places of the world to share ideas, to educate, and to remind us of what an important role we have as technologists in caring for patients. The Toronto meeting was one of the most educational and successful meetings to date! Please, join us next year in Kyoto, Japan to continue the mission of the SMRT. ●

SMRT Forum: MR Purchase Decisions at the ISMRM Annual Meeting

Nanette Keck, R.T., SMRT Forum Organizer and Moderator, SMRT Executive Committee Member

The *SMRT Forum* is a great way to bring together people from all over the globe and all phases of the MR world. *MR Purchase Decisions* was the topic for this year. We were fortunate to have three such speakers to give us their insight.

(l. to r.) Gary H. Glover, Ph.D., Nanette Keck, R.T. (R)(MR), Clare Sims, R.T., and James Stuppino, B.S., R.T. (R)(MR)

Clare Sims, R.T., was the first speaker. She is the Chief MR Technologist and Business Manager of the MR unit in Addenbrooke Hospital, Cambridge, UK. She has been involved in several new MR system installations and upgrades over the years. In her presentation, she gave several options toward the analytical approach to purchasing equipment, financing, compatibility, and site preparation.

The next speaker was James Stuppino, B.S., R.T. (R)(MR). Jim is the Administrative Director and Co-Owner of Valley Advanced Imaging in Bethlehem, Pennsylvania, USA. In his position, he oversees all aspects of facility operations and has been involved in start up situations for several years. He gave us several reasons why we should use dedicated versus whole body imaging. He also spoke about how to make decisions on 1.5T versus low-field systems. These are all very important issues that could be costly if the wrong decision is made.

Gary Glover, Ph.D., Professor of Radiology, Stanford University, was the third speaker. Dr. Glover has been involved in MR since the early 1980s and currently in research exploring the rapid scanning methods using spiral and other ways to dynamically image brain function. His experience with 3T has shown how this will be possible not only in the research setting, but in the clinical setting as well.

I want to thank the above speakers for giving their time and knowledge to the *SMRT Forum*. I feel fortunate to have been part of this group to present options for *MR Purchase Decisions* and thank those that asked me to participate. ●

The Section for Magnetic Resonance Technologists would like to thank the following donors for their generous support of the SMRT Twelfth Annual Meeting:

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SMRT would also like to thank:
MRI Devices Corporation
for its support of the *SMRT Educational Seminars* Home Studies.

2003 Oral Presentation Award Winners at the SMRT Annual Meeting

2003 President's Award–
Eva Wembacher, R.T.
Department of Diagnostic and Interventional Radiology, University Hospital Essen, Essen, Germany
"Combined Small and Large Bowel MR Imaging in Patients with Inflammatory Bowel Disease"
See page 5 *Signals* Number 44 2003 Issue 1.

1st Place Award, Oral Clinical Focus–
Mercedes Pereyra, R.T.
Department of Diagnostic Radiology, St. Luke's Episcopal Hospital, Houston, Texas, USA
"Quantitative Assessment of Global LV Function Using Sensitivity Encoding (SENSE) Accelerated Balanced FFE"
See page 4 *Signals* Number 45 2003 Issue 2.

2nd Place Award, Oral Clinical Focus–
Claudio Arena, R.T. (CT)(MR)
Department of Diagnostic Radiology, St. Luke's Episcopal Hospital, Houston, Texas, USA
"Robust Small Field-of-View, High Resolution Contrast Enhanced MRA (CE-MRA) of Renal Arteries using Sensitivity Encoding in Two Dimensions (2D-SENSE)"
See page 10.

3rd Place Award, Oral Clinical Focus–
Eva Wembacher, R.T.
Department of Diagnostic and Interventional Radiology, University Hospital Essen, Essen, Germany
"Comparison of Different Techniques for MR-Colonography"
See page 13.

1st Place Award, Oral Research Focus–
Heather Ducie, R.T. (MR)
Institute of Child Health, and Great Ormond Street Hospital for Children, London, England, UK
"Analysis of Perfusion MRI Data in Patients with Severe Cerebrovascular Disease"
See page 5 *Signals* Number 45 2003 Issue 2.

2nd Place Award-Tie, Oral Research Focus–
Wendy Strugnell, B.Sc., R.T.
Cardiac MRI Centre, The Prince Charles Hospital, Brisbane, Queensland, Australia
"Cardiac MRI Analysis of RV Function– A New Approach"
See page 11.

2nd Place Award-Tie, Oral Research Focus–
Jane Francis, D.C.R., (R)(DNM)
Department of Cardiovascular Medicine, The John Radcliffe Hospital, Oxford, England, UK
"Cardiovascular Magnetic Resonance in the Pre- and Post-Operative Assessment of Patients Undergoing Left Ventricular Reduction Surgery"
See page 12.

2003 SMRT Fellows Award

Robin Greene-Avison, R.T. (N)(MR) C.N.M.T.

2003 SMRT Honorary Membership Award

Frank Shellock, Ph.D.

2003 SMRT Distinguished Service Award

Richard Helsper, R.T.

2003 SMRT Crues-Kressel Award

Gregory Brown, R.T.

Invited Speakers

(l. to r.) Silke Bosk, R.T., Petrina Causer, M.D., William Faulkner, B.S., R.T. (R)(MR)(CT), Richard Frayne, Ph.D., Garry Gold, M.D., Thomas Lauenstein, M.D., Donald W. McRobbie, Ph.D., and Naeem Merchant, M.D.

(l. to r.) Anne Sawyer-Glover, B.S., R.T. (R)(MR), and Eric Outwater, M.D., Richard Semelka, M.D., Frank G. Shellock, Ph.D., Erin Simon, M.D., A. Gregory Sorensen, M.D., David Stanley, B.S., R.T. (R)(MR), and Lawrence Wald, M.D.

Award went to Richard Helsper. The Crues-Kressel Award for outstanding contributions to the education of magnetic resonance technologists was awarded to Gregory Brown for his devotion to MR technologist's education over the years and since 1996 through his Adelaide MR Website. The Paper Awards for the Clinical and Research Focus were presented by Laurian Rohoman, Program Chair. Julie Lowe Education Chair presented the Poster Awards for the Clinical and Research Focus.

Outgoing President John Koveleski then passed the President's gavel to Maureen Ainslie, SMRT President 2003-2004. Maureen Ainslie awarded John Koveleski the President's Plaque for his dedication and hard work over the past year as President of the SMRT. Maureen Ainslie gave her introductory talk to the attendees. The meeting was then adjourned.

Incoming President Maureen Ainslie moderated the afternoon session. Dr. Petrina Causer gave an excellent talk on *"Breast Imaging,"* in which she discussed the indications for breast cancer evaluation, MR technique, diagnostic criteria and breast biopsies.

Garry Gold, M.D., then presented *"Pulse Sequences and Protocols in Musculoskeletal MRI,"* he talked about coil selection, described key sequences for MSK MR imaging and compared the1.5 Tesla to the 3T system.

After a short break, the afternoon program continued with the President's Award winning paper by Eva Wembacher, R.T., entitled *"Combined Small and Large Bowel MR Imaging in Patients with Inflammatory Bowel Disease."* Erin Simon, M.D., presented *"Pre- and Postnatal Pediatric Neuroimaging: How and Why."* She discussed techniques, safety, and common indications for both fetal as well as post natal neuro imaging.

Tomas Lauenstein, M.D., ended this first day of the meeting with his talk on *"The Assessment of Gastrointestinal Disorders,"* discussing his experience with bowel imaging.

The sessions continued on Friday morning with Julie Lowe, Education Chair moderating. Lawrence Wald, Ph.D., presented *"Functional MRI: Past, Present, and Future."* Our thanks to Dr. Wald for being able to give this talk on very short notice. Richard Frayne, Ph.D., then spoke on *"Stroke Imaging"* and gave an excellent overview of modern MR techniques for stroke imaging.

The program continued with *"Contrast Enhanced MR of the Abdomen: Contrast Agents, Techniques and Findings"* presented by Richard Semelka, M.D., who discussed liver imaging techniques and the use of non-specific extra cellular contrast agents as well as hepatocyte-selective contrast agents.

The Safety Forum was held over the lunch hour, there were some speaker changes due to the rescheduled meeting. Frank Shellock, Ph.D., moderated the forum and introduced the first speaker, Bill Faulkner, B.S., R.T. (R)(MR)(CT) who spoke on *"Technologists Responsibilities."* Next Dr. Shellock presented *"MR Safety Guidelines and Recommendations."* A. Gregory Sorensen, M.D., then talked on *"MR Contrast Agent Safety,"* and Frank Shellock gave the final talk on *"MR Procedures: Implants and Devices Update."* The audience had many questions for all the speakers and again the Safety Forum proved to be a valuable part of the meeting.

Program Chair, Laurian Rohoman, moderated the final session of the meeting. The afternoon program started off with proffered papers. Donald McRobbie, Ph.D., then explained parallel imaging with his topic *"Talking Sense and Non-Sense in Parallel Imaging."* After a short break, Eric Outwater, M.D., presented *"MRI of the Female Pelvis: Emphasis on Technique"* in which he

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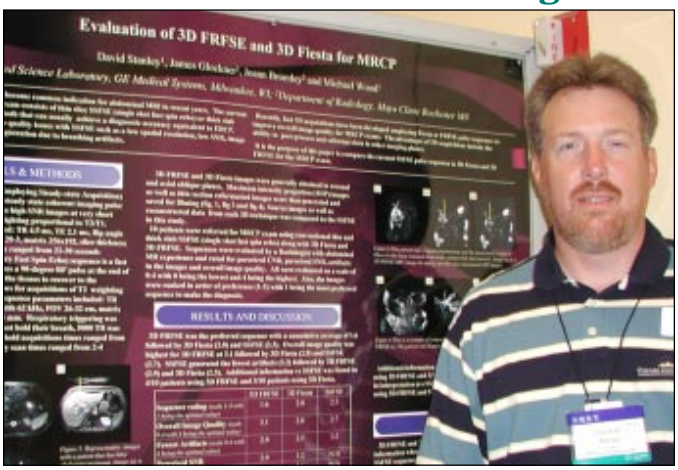
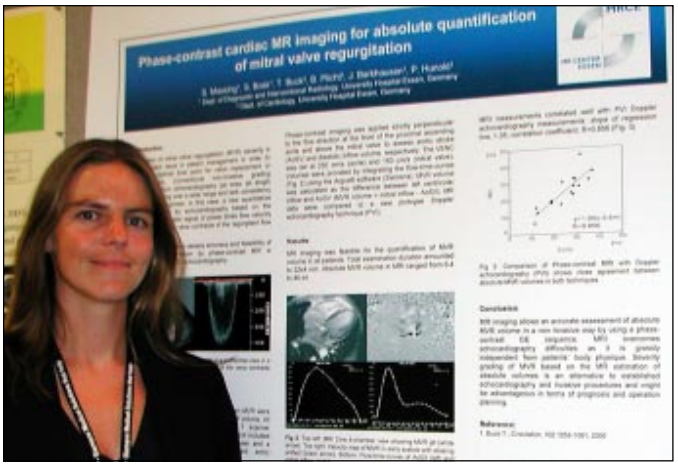
Award Winning Clinical Focus and Research Focus Poster Presenters at the SMRT Annual Meeting

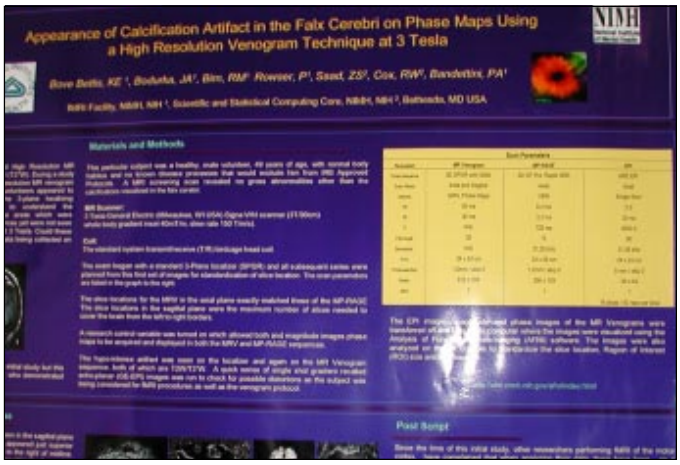


2003 1st Place Clinical Poster– **David Stanley,**
Applied Science Laboratory, GE Medical Systems, Milwaukee, Wisconsin, USA, *"Evaluation of 3D FRFSE and 3D Fiesta for MRCP"*

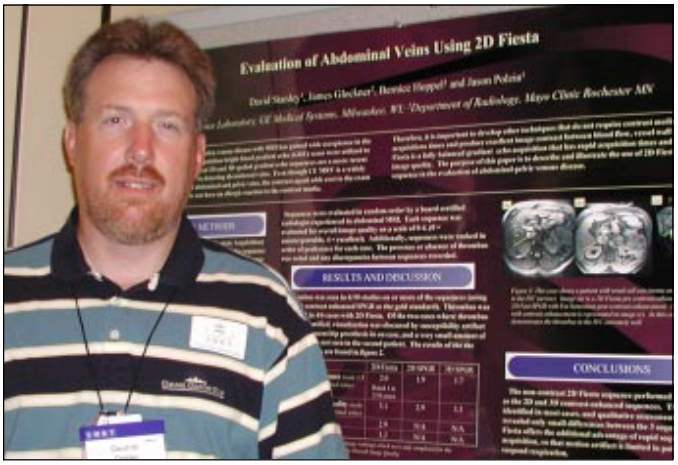
2003 1st Place Research Poster– **Renee S. Hill,**
MRI Research Facility, NINDS National Institutes of Health, Bethesda Maryland, USA,*"Optimization of High Resolution 3D Volumetric Scans to Differentiate Gray Matter and White Matter at 1.5 Tesla"*



2003 2nd Place Clinical Poster– **Sandra Massing,**
University Hospital, Department of Diagnostic and Interventional Radiology, Essen, Germany, *"Phase-Contrast Cardiac MR Imaging for Absolute Quantification of Mitral Valve Regurgitation"*



2003 2nd Place-Tie Research Poster– **Karen Bove Bettis,**
FMRI Core Facility, NIMH, NIH, Bethesda, Maryland, USA
"Appearance of Calcification Artifact in the Falx Cerebri on Phase Maps Using a High Resolution Venogram Technique at 3 Tesla"



2003 3rd Place Clinical Poster– **David Stanley,**
Applied Science Laboratory, GE Medical Systems, Milwaukee, Wisconsin, USA, *"Evaluation of Abdominal Veins Using 2D Fiesta"*

2003 2nd Place-Tie Research Poster– **Randy Earnest,**
EPIX Medical Inc., Cambridge, Massachusetts, USA,
"Magnetic Resonance Angiography with Blood Pool Agent MS-325: Results from a Phase III Clinical Trial"

SMRT Board Members.
Seated in front, l to r: Cindy Comeau, Laurian Rohoman, and Anne Sawyer-Glover. Seated l to r: Muriel Cockburn, Heidi Berns, Judy Wood, Maureen Ainslie, Denise Davis, Gina Greenwood, Bobbie Burrow, Silke Bosk, and Julia Lowe. Standing l to r: William Faulkner, Maureen Hood, Marcia Gervin, Gregory Brown, Julie Strandt-Peay, Andrew Cooper, James Stuppino, Raymond Cruz, Scott Kurdilla, John Koveleski, Nanette Keck, Kelly Baron, and Cindy Hipps. (not pictured: John Christopher, Todd Frederick, and Bart Schraa).

discussed protocols and techniques used in female pelvic imaging. The next presenter was David Stanley, B.S., R.T. (R)(MR) who spoke on *"Why 3T?"* showing the advantages and disadvantages of 3T systems. The program ended with the final three proffered papers.

In closing I would like to thank all the Program Committee members for their help and support in putting together this program and making this meeting a successful one and also thank Julia Lowe, Education Chair and her committee of reviewers for scoring all the abstracts and posters. Special thanks to Jennifer Olson and the ISMRM Office staff for their support.

Again this year we had generous donations from our sponsors and we thank them for their continued support and contribution to the MR technologists continuing education (please see acknowledgents on page 5). Door prizes were donated by Magmedix and Dr. Frank Shellock and we thank them for their generosity. This meeting however, could never have been as successful without you, the attendees, we thank you for your participation and for your support. The feedback and suggestions you have given by filling out the evaluation forms are very much appreciated and will be taken into consideration when planning the 2004 Annual Meeting.

2003 SMRT Poster Walking Tour and Reception. Seated l to r: Tom McKinley, Kathy Robichau, and Judy Fuller. Standing l to r: Dave Stanley, Jason Polzin, Melissa Polzin, Gina Greenwood, and Lynette Frye. More meeting photos appear on pages 15 and 20.

For those who were unable to attend this year's rescheduled meeting, please note that several Regional Educational Seminars will be held this fall (see the calendar on page 28), some perhaps in your area that you may be able to attend and obtain your CE credits. We hope you continue your active membership and look forward to seeing you at the next SMRT Annual Meeting, which will be held on 15-16 May 2004 in Kyoto, Japan. ●

(Editor's note: For those of you not able to attend the SMRT 12th Annual Meeting, there are syllabi available through the SMRT Office. Call or see the SMRT Website for details).

2003 2nd Place Oral Presentation, Clinical Focus–

Robust Small Field-of-View, High Resolution Contrast Enhanced MRA (CE-MRA) of Renal arteries using Sensitivity Encoding in Two Dimensions (2D-SENSE)

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Introduction

Contrast Enhanced MRA (CE-MRA) is now routinely used in clinical practice for vascular imaging.[1] Recent studies have shown that when combined with fluoroscopic triggering, and centric phase encode ordering schemes, CE-MRA can be used to visualize renal arteries with good spatial resolution and minimal venous contamination.[2,3] The highest spatial resolution that can be obtained is constrained primarily by physiologic variables such as the arterial-to-venous transit time, and patient breath-holding ability.[2,3] In other words, the total number of phase encoding steps acquired within these constraints (in-plane (ky) and through-plane (kz)), ultimately determine the maximum achievable spatial resolution for a given coverage. Therefore, there is a need for traversing the k-space as rapidly as possible within these physiologic constraints. The traditional approach to traverse k-space faster is the use of high-performance gradients to reduce the echo time (TE), and repetition time (TR). It is also well known that such brute force reductions in TR and TE also adversely affect signal-to-noise ratio (SNR), and contrast-to-noise ratio (CNR) of CE-MRA.[4] In this respect, a recently described, parallel acquisition technique, Sensitivity Encoding (SENSE), traverses k-space faster by skipping phase-encoding steps by a factor proportional to the SENSE acceleration factor.[5] The resulting deliberate aliasing is removed during reconstruction with the knowledge of coil sensitivity function. To date, in CE-MRA, SENSE acceleration has been primarily in the in-plane phase encoding direction.[6,7] The purpose of this work is to describe an small FoV approach where SENSE was applied along both phase encoding directions in a 3D CE-MRA acquisition (slice-select, and the in-plane phase encoding) with a net acceleration factor of three, to acquire a large volume, with high-resolution isotropic voxel size.

Materials and Methods

All images were acquired on a 1.5T Philips Gyroscan NT-Intera scanner running at Release 8.1.x level. A 0.2 mmol/kg of Gd-DTPA was administered at an injection rate of 2 cc/sec. A fluoroscopic acquisition was used to trigger the high-resolution 3D acquisition upon contrast bolus arrival.

Study Protocol and Patient Population

SENSE accelerated CE-MRA protocol was approved by our Institutional Review Board for the evaluation of renal artery stenosis. Conventional 3D CE-MRA was used to image 12 of 24 patients (age: 59+/-15 years, 5 male) without using SENSE. The rest of the patients (12/24, age: 52+/-11 years, 4 male) were imaged using the 2D-SENSE CE-MRA protocol. The acquisition parameters in Table 1.

Image Analysis

Quantitative Analysis: The data was transferred to EasyVision Workstation (Rel. 4.x) for image analysis. Regions of interest were drawn on the source images on the aorta, and inferior vena cava. A representative image is shown in Figure 1. Air space was not available for conventional noise measurements because of the small field-of-view acquisition used in the 2D-SENSE protocol. As a surrogate measure, noise was estimated from the standard deviation (SD) of the signal intensity in the IVC ROI. The aortic SNR was computed as the ratio of the mean signal intensity of the aorta and noise.

Qualitative Analysis: The images were evaluated qualitatively for the following parameters: (i) Renal artery overall image quality on a scale of 1 to 4 (1: Excellent, 2: Good; 3: Fair, and 4: Poor); (ii) Artifact levels were assessed for renal artery ringing (RA-Ring) and renal artery blurring (RA-Blur), and renal parenchymal ringing (RP-Ring) on a scale of 1 to 4

Figure 1. *2D-SENSE accelerated 3D CE-MRA. The coronal and sagittal maximum intensity projections are depicted above. Note the increased volume of coverage and high spatial resolution of the 2D-SENSE making it possible to visualize the full extent of SMA and its branch vessels.*

Table 1.

Acquisition Parameter	Conventional CE-MRA	2D-SENSE CEMRA
Technique	3D-T1FFE	3D-T1FFE
Field-of-View (xFOV x yFOV) (mm)	400x320	256x256
Matrix	384x263	224x224
Acquired slice thickness/# of slices	3.0 / 25	2.2 / 40
Reconstructed slice thickness/# of slices	1.5 / 50	1.1 / 80
AP volume of Coverage (mm)	**75**	**88**
Fold-over suppression	No	Yes
TR (msec)/TE (msec) /Flip angle (deg)	4.6 / 1.5 / 40°	4.6 / 1.5 / 40°
Bandwidth per pixel (Hz)	310	310
Phase encoding order	CENTRA	CENTRA
Fluroscopic Triggering	Yes	Yes
SENSE	No	Yes
In-plane SENSE factor *(Along ky)*	–	1.7
Through-plane SENSE factor *(Along kz)*	–	1.7
Acquired Voxel Volume (mm^3)	**4.8** (1x1.56x3)	**2.6** (1.1x1.1x2.2)
Scan Time (sec)	31	31

(1: none, 2:mild, 3:moderate, and 4: severe); (iii) SENSE artifact affecting clinical diagnosis on a four point scale (1: Significant and non-diagnostic, 2: Moderate but diagnostic; 3: Minimal and diagnostic; 4: Insignificant and not a factor), and (iv) Reader confidence in diagnosis was assessed using a three point scale (1: Certain; 2: Moderate; and 3: Poor). All data is presented as Mean +/-SD.

Results

Qualitative Results: A total of 57 renal artery segments were evaluated. In the case of conventional 3D CE-MRA, 31 renal artery segments (including 7 accessory renal arteries) were evaluated, and 26 renal artery segments (including 4 accessory renal arteries) were evaluated. Differences in renal artery overall image quality, artifact level, and reader confidence were not found to be statistically significant. Representative images in Figure 1.

Quantitative Results: The aortic SNR for the conventional and 2D-SENSE CE-MRA acquisitions was: 21.4+/- 10.7 and 22.1 +/- 11.1 respectively. The AVR for the conventional and 2D-SENSE acquisitions was: 9.1 +/- 6.5, and 10.1 +/- 6 respectively.

Discussion

To date, SENSE has been primarily used to improve the speed of CE-MRA acquisition. However, when using SENSE it is also necessary to plan the acquisition volume carefully to avoid any intrinsic aliasing. For example, while in conventional CE-MRA some aliasing (e.g., arms) can often be tolerated, with SENSE such aliasing should be eliminated either by requesting the patient to keep his arms above his/her head or by choosing a large enough field-of-view (FOV) to avoid aliasing. In this work, we deliberately chose a small FOV (256 x 256 mm), which allowed us to use a smaller matrix and still attain high spatial resolution. The penalty of additional scan time required for oversampling to avoid foldover artifact was minimized using an in-plane SENSE acceleration factor of 1.7. The thicker imaging volume makes it easy to plan the volume and include the evaluation of both renal and mesenteric arteries. Qualitative and quantitative results show that it is possible to obtain a small field-of-view, high-resolution CE-MRA images using 2D SENSE with the same breath-hold duration as the conventional 3D CE-MRA acquisition without any penalty. ●

References

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2003 2nd Place-Tie Oral Presentation, Research Focus–

Cardiac MRI Analysis of RV Function – A New Approach

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Purpose

Inherent difficulties exist in the current standard method of CMR analysis of right ventricular (RV) volumes. The current accepted technique for measuring RV volumes uses a series of left ventricular (LV) short axis cine acquisitions prescribed from a vertical long axis acquisition and acquired perpendicular to a line from the centre of the mitral valve to the apex of the left ventricle. Using this image data set for RV analysis assumes that the tricuspid valve lies in the same plane and position as the mitral valve. Our experience indicates that the use of this imaging plane makes analysis problematic as the tricuspid valve is not in-plane in the slice and the atrio-ventricular margin is difficult to distinguish. This leads to inaccuracies in measurements at the base of the RV and miscalculation of the RV volume. We developed a novel technique to improve visualisation of the tricuspid and pulmonary valves with the aim of increasing the accuracy of RV analysis by CMR.

Methods

We undertook a prospective study of fifty post cardiac transplant patients to evaluate the new technique. A series of LV short axis multi-slice cine acquisition FIESTA images were acquired using the current standard technique. From this data set, LV and RV stroke volumes were derived on an Advantage Windows workstation using planimetry of the endocardial and epicardial borders in end-systole and end-diastole. Our new technique involved obtaining a set of multi-slice cine acquisition FIESTA images in a plane perpendicular to a line from the centre of the pulmonary valve to the apex of the RV. Planimetry of the RV was then performed and a stroke volume calculated using the same method of analysis. Physiologically the left and right cardiac outputs are equal. RV stroke volumes obtained from both techniques were compared with LV stroke volumes.

Results

On the images acquired with the new technique, the tricuspid and pulmonary valves were more easily visualised leading to more accurate and reproducible planimetry of ventricular borders. RV stroke volumes using the new method showed a higher correlation with LV stroke volumes (r=0.94) than with the current method (r=0.85). RV stroke volumes were consistently under-calculated by up to 10% using the current standard method.

Conclusions

RV function is assuming greater importance in clinical management of cardiac patients. Accurate reproducible quantification of RV function will expand treatment strategies and potentially assist in achieving the ultimate goal of improving patient management. This new method improves visualisation of the tricuspid and pulmonary valves and makes analysis easier and less prone to operator error. Serial RV assessments could be undertaken with greater confidence in diagnostic accuracy and reproducibility. ●

2003 2nd Place-Tie Oral Presentation, Research Focus–

Cardiovascular Magnetic Resonance in the Pre- and Post-Operative Assessment of Patients Undergoing Left Ventricular Reduction Surgery

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Purpose

Myocardial infarction can cause large areas of akinetic, scarred myocardium (sometimes with aneurysm formation), which may result in a marked change in shape of the ventricle and reduction in ejection fraction. The endoventricular patch plasty technique was developed by Dor et al [1] to improve left ventricular (LV) shape and function at the time of coronary artery bypass surgery. It involves resection of the akinetic segment or aneurysm and insertion of a circular patch, which allows a more physiologically shaped left ventricular cavity. Cardiovascular magnetic resonance (CMR) with its multi-planar ability allows accurate delineation of the cardiac anatomy and extent of the akinetic segment, both pre and post surgery. Ventricular function can be calculated and areas of infarcted myocardium delineated [2] following injection of a gadolinium chelate, thus allowing the surgeon a guide to margins of excision. We report the use of CMR in a small group of patients referred to our centre for consideration of left ventricular reduction surgery.

Method

Four patients (2 male, 2 female) aged 62-73 (mean 65.5 yrs) who were considered for LV reduction surgery had CMR prior to surgery to assess the extent of the infarcted tissue, accurately define LV shape and calculate left ventricular function, including left ventricular ejection fraction (LVEF) and volumetric analysis. Imaging was performed on a Siemens (Erlangen, Germany) Sonata 1.5T scanner with gradient performance 40mT/m and gradient slew rate of 200T/m/ms. All scans were ECG gated and performed supine using a six element spine array coil combined with a two channel flex array placed anteriorly over the chest. Localiser images were performed in three orthogonal planes followed by vertical long axis (VLA), horizontal long axis (HLA) and short axis (SA) pilots to determine the atrio-ventricular groove and the true long axis of the ventricle. TrueFISP (Fast imaging with steady state free precession) cine images were then obtained in VLA, HLA for overall global function and SA planes from base to apex to calculate LVEF and LV volumes. Imaging parameters: matrix 256 x 164, TR = 45.3ms, TE 1.51 ms, flip angle 60° slice thickness (ST) 7mm, 15 segments, 11-17 phases per cardiac cycle breathold time of 8-12 seconds. Following intravenous injection of 0.1mmol/kg body weight of Omniscan™ (Nycomed Amersham, Amersham, UK), 2D segmented turboflash images with a non- selective inversion pulse were acquired in the same planes as the functional images to delineate the extent of infarction. Imaging parameters: matrix 256 x 115, TR variable depending on heart rate- ECG triggered every second heartbeat, shifted to diastole. Flip angle 25°; inversion time (TI) 310-400 ms. Imaging started at 8-10mins post injection. LVEF and LV volumes were calculated using Siemens ARGUS™ software and the amount of myocardial enhancement was assessed qualitatively. Two patients (1 male 73 yrs and 1 female 62 yrs) have undergone LV reduction surgery with dramatic effect and had repeat CMR.

Results

All patients were able to tolerate CMR. LVEF was 3-18% (mean 14%) and end diastolic volume (EDV) 294-1425mls (mean 617mls) pre-op. LVEF increased from 3-54% in one case and from 16-38% in the second post-operatively. Figure 1a shows the HLA of a 73-year-old male patient with a huge LV aneurysm pre-op. Figure 1b shows the SA view after contrast showing the extend of infarction and Figure 1c shows the HLA 12 days post op Dor procedure. The table shows the LV volumes pre and post-op of the same patient.

Conclusions

CMR is a valuable aid in the assessment of patients undergoing LV reduction surgery using the Dor procedure. It can provide an accurate measurement of LVEF and LV volumes both pre and post surgery and delineate the extent of myocardial infarction. We are planning study this unique group of patients over time to quantify changes in ventricular geometry and function. ●

References

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2. An improved MR imaging technique for the visualization of myocardial infarction. Simonetti OP et al *Radiology* 2001 218(1): 215-23.

	Pre Op	Post Op
EDV (mls)	1425	167
ESV (mls)	1380	77
SV (mls)	43	90
EF %	3	54

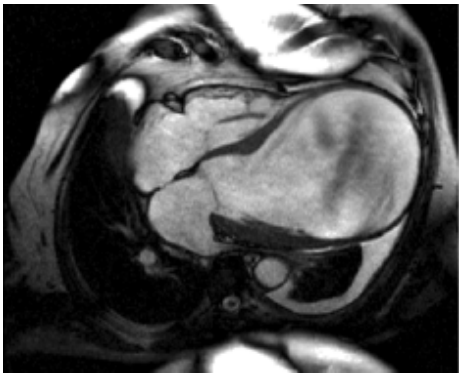

Figure 1a.

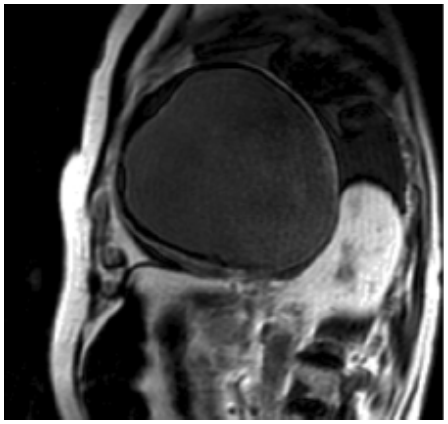

Figure 1b.

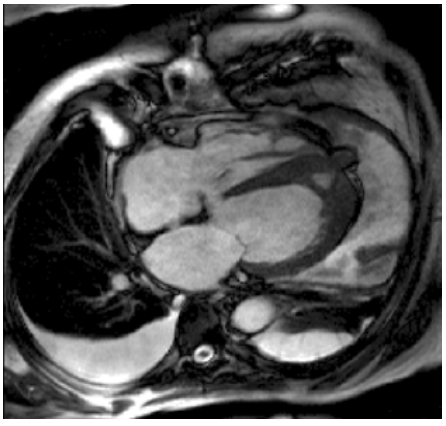

Figure 1c.

2003 3rd Place Oral Presentation, Clinical Focus–

Comparison of Different Techniques for MR-Colonography

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Purpose

MR colonography (MRC) is an appropriate diagnostic tool for detecting colorectal polyps exceeding 8mm in size. Different techniques of MRC have been described. "Dark lumen" MRC is based on the administration of a rectal water-enema combined with the intravenous injection of paramagnetic contrast. On 3D GRE data sets the colonic wall as well as masses arising from it show bright enhancement. Thus, bowel wall and colorectal masses can easily be delineated against the background of the dark colonic lumen. With "bright lumen" MRC colorectal lesions are visualized as dark filling defects within the bright colonic lumen. This can be achieved by administering a rectal enema containing paramagnetic contrast [1]. On 3D gradient echo data sets only the contrast-containing colonic lumen is bright whereas the surrounding tissues including colonic wall and polyps remain low in signal intensity. A new approach for "bright lumen" MRC is based on the acquisition of TrueFISP sequences. Using a rectal water-enema, the contrast mechanism is comparable to that of the approach in conjunction with a paramagnetic contrast enema and the acquisition of T1-weighted GRE sequences. Since the TrueFISP technique neither requires the administration of intravenous nor rectal paramagnetic contrast medium, it appears economically attractive. The purpose of this study was to compare dark lumen MRC with the described TrueFISP based bright lumen technique for the detection of colorectal masses.

Method

31 patients with suspected colorectal lesions were included in this study. MR examinations were performed on a 1.5 T MR system (Magnetom Sonata, Siemens Medical Systems, Erlangen, Germany). The colon was filled with 2000ml of tap water. The TrueFISP sequence was acquired both in supine and prone position (TR/TE: 4.45/2.23ms, flip angle 70°, field of view (FOV) 400 x 400mm, slice thickness 3mm, acquisition time 21sec). For the dark lumen technique, data acquisition was performed with the patient in prone position only. For the 3D GRE sequence the following parameters were used: TR/TE: 1.64/0.6 ms, flip angle 15°, field of view (FOV) 400 x 400 mm, effective slice thickness 1.57mm, acquisition time 23 sec. Paramagnetic contrast (Gd-BOPTA, Multihance, Bracco, Italy) was administered i.v. at a dose of 0.2 mmol/kg and a flow rate of 3.0 ml/s. After a delay of 75sec, the 'pre-contrast' 3D acquisition was repeated with identical imaging parameters. In addition to MRC all patients underwent conventional colonoscopy on the same day of the MR examination.

Results

Conventional colonoscopy detected 20 colorectal polyps in 11 patients and three colorectal cancers in three patients. Based on dark-lumen MRC, all polyps >5mm were correctly diagnosed (Figure 1), whereas 4 polyps <5mm were missed. Thus, sensitivity of dark-lumen MRC amounted to 83%. There were no false-positive results: residual stool could correctly be differentiated from polyps due to the lack of contrast enhancement. TrueFISP based bright lumen MRC, however, failed to detect seven polyps (all <10mm). In addition, bright lumen MRC showed false positive findings in 5 patients (Figure 2). Bright lumen MRC reached a sensitivity of 74% for the detection of polyps/masses.

Conclusions

A particular advantage of bright-lumen MRC with TrueFISP is that no paramagnetic contrast neither for intravenous nor rectal administration is needed. In addition, the sequence is rather insensitive to motion artifacts. However, in this study even polyps larger than 5mm were missed, and there was a considerable number of false positive findings due to the problem differentiating between residual stool and colorectal masses. The dark lumen MRC in conjunction with intravenous application of paramagnetic contrast proved to be superior for the detection of even small polyps. Polyps could be clearly identified based on the uptake of contrast agent. Thus, false positive findings were not seen. However, further developments such as the use of 3D TrueFISP sequences or the employment of potential sequence strategies for a better differentiation of residual stool vs. polyps might enhance the impact of a bright lumen imaging approach based on TrueFISP. ●

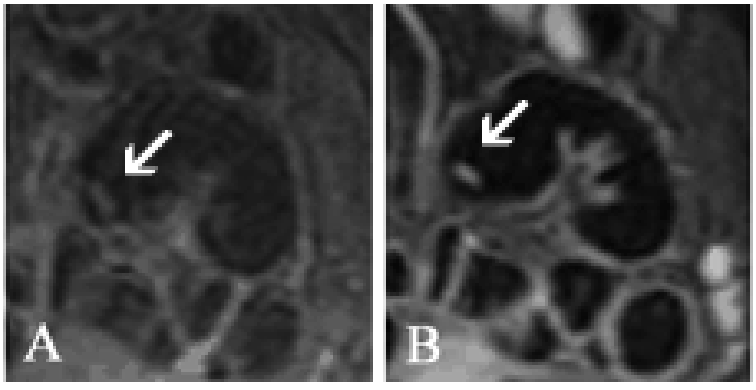

Figure 1. *3D T1w GRE scan shows 8mm polyp in the sigmoid colon. Lesion can be distinguished from residual stool due to contrast enhancement comparing native (A) and post contrast scan (B).*

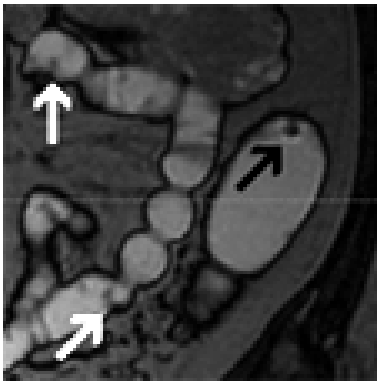

Figure 2. *7mm polyp (black arrow) detected on TrueFISP data set. It is difficult to differentiate between polyps and residual stool (white arrows) due to similar contrast characteristics.*

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2003 1st Place Proffered Paper– Clinical Poster

Evaluation of 3D FRFSE and 3D Fiesta for MRCP

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Purpose

Biliary imaging has become a common indication for abdominal MRI in recent years. Most protocols for MRCP include thin slice SSFSE (single shot fast spin echo), thick slab SSFSE or a combination of both techniques that can provide diagnostic accuracy similar to ERCP. However, SSFSE images can be limited by low spatial resolution, low SNR, image blurring and or image misregistration due to breathing artifacts. Recently, fast 3D acquisitions have been developed employing Fiesta or FRFSE pulse sequences to improve overall image quality for MRCP exams.

It is the purpose of this paper to compare the SSFSE pulse sequence to 3D Fiesta and 3D FRFSE for the MRCP exam.

Method

3D Fiesta (Fast Imaging Employing Steady-state Acquisition) sequence is a fully balanced steady state coherent imaging pulse sequence designed to produce high SNR images at very short repetition times (TR) with weighting proportional to T2/T1. Sequence parameters included: TR 4.5 ms, TE 2.1 ms, flip angle 45°, bandwidth 83 kHz, FOV 28-36, matrix 256x192, slice thickness 1.6-3mm. Acquisitions times ranged from 22-30 seconds.

The 3D FRFSE (Fast Recovery Fast Spin Echo) sequence is a fast spin echo sequence that utilizes a 90-degree RF pulse at the end of the TR period to cause all of the tissues to recover to the longitudinal plane. This allows for T2-weighted acquisitions with relatively short TR. Sequence parameters included: TR 1200 ms, TE 530 ms, bandwidth 62 kHz, FOV 26-32 cm, matrix 256x192, and a slice thickness of 1.4-3 mm. Respiratory triggering was used for patients who could not hold their breath, and 5000 TR was used for these cases. Breath hold acquisitions times ranged from 28-32 seconds and respiratory-triggered scan times range from 3-4 minutes.

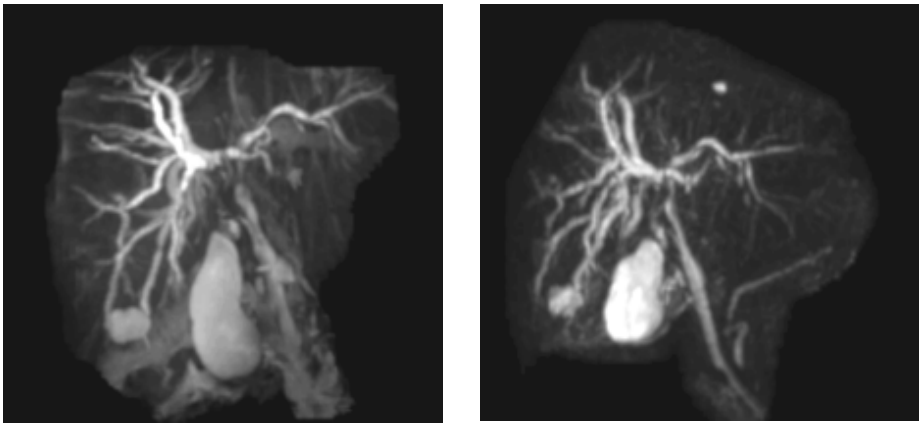

Figure 1. *Maximum intensity projection images from 3D Fiesta (left) and 3D FRFSE (right) acquisitions in a patient with hilar cholangiocarcinoma.*

Ten patients were referred for MRCP exam (Signa 1.5T, GE Medical Systems Milwaukee, WI) using conventional thin and thick slab SSFSE along with 3D Fiesta and 3D FRFSE. Sequences were evaluated by a radiologist with abdominal MR experience and rated for perceived CNR, perceived SNR, artifacts in the images, and overall image quality. All sequences were evaluated on a scale of 0 (poor) -4 (excellent). Also, the images were ranked in order of preference 1-3 with 1 being the most preferred sequence to make the diagnosis.

Results

3D FRFSE was the preferred sequence with a cumulative average of 1.6 followed by 3D Fiesta, (2.0) and SSFSE, (2.3). 3D FRFSE sequences also had the highest image quality rating at 3.1, followed by 3D Fiesta, (2.8) and SSFSE, (2.7). SSFSE generated the fewest artifacts (3.2) followed by 3D FRFSE (2.9) and 3D Fiesta (2.5). Additional information (vs SSFSE) was found in 4/10 patients using 3D FRFSE and 3/10 Patients using 3D Fiesta. Additional confidence in interpretation (vs SSFSE) was found in 8/10 patients when using 3D FRFSE and 5/10 using 3D Fiesta.

Conclusions

3D FRFSE and 3D Fiesta sequences provided additional information in most cases when compared to conventional thin and thick slab SSFSE sequences. 3D MRCP sequences were also the sequences of choice in this exam. 3D FRFSE and 3D Fiesta show great potential for improving the standard MRCP exam. ●

2003 1st Place Proffered Paper– Research Poster

Optimization of High Resolution 3D Volumetric Scans to Differentiate Gray Matter and White Matter at 1.5 Tesla

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Purpose

High-resolution MR images are critical for accurate co-registration of functional data. Tissue contrast and resolution vary with changes in scan timing parameters. The purpose of this study is to investigate the optimum scan parameters needed to maximize Gray /White Matter contrast-to-noise using 3D Inversion-prepared fast spoiled gradient echo recalled (FSPGR) sequences.

Method

The scans were acquired on three normal volunteers using a GE 1.5 T SIGNA (Twin Gradient Coil, 9.0 software). Scan parameters were as follows: 3D axial FSPGR -IR prep, TR12ms, TE 5.1ms, matrix 256 x 256, FOV 260, 3/4 phase FOV, slice thickness 1mm, 124 slices, 15.63kHz bandwidth. Data were acquired at four inversion times (TI): TI 150 (scan time: 5:53), TI 300 (scan time: 6:51), TI 450 (scan time: 7:48), and TI 600 (scan time: 8:46). For each TI, the flip angle was changed from 15° - 55° in 5° increments. The flip angle was changed in a random fashion to reduce any systematic error. The receiver gain was adjusted and held constant so that no signal over ranging occurred for any combination of TI/flip angle. Data for each TI were obtained on different sessions. The standard GE head coil was used to acquire all data.

The slice that best visualized the basal ganglia was selected for measurements. Mean signal intensity of gray matter (left and right within head of caudate) and white matter (frontal white matter (left and right) and forceps major (left and right)) were measured using small regions of interest (ROI). The standard deviation (SD) of noise was measured using two ROI's outside the image. Contrast to noise ratios (CNR) were calculated by dividing the difference in signal between GM/WM by the noise SD.

Results

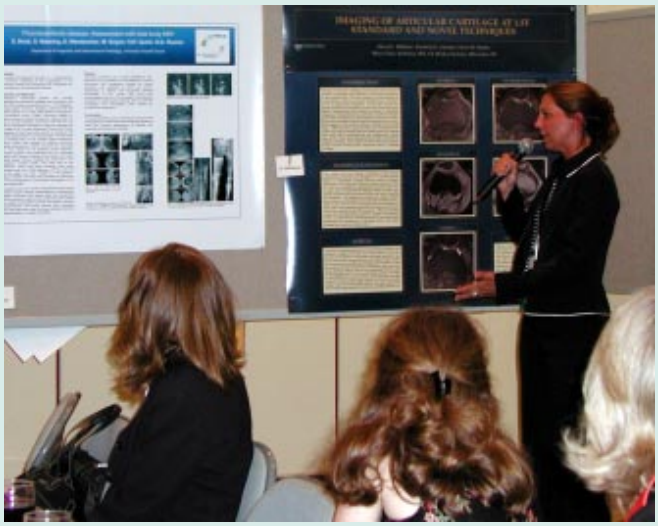
There was a general increase in mean signal for each increase in TI and flip angle. However, an increased level of image blurring was observed for all TI values at flip angles greater than 30°. The CNR was similar for TI 450 and 600 at all flip angles, and approximately a factor of 2 higher than for CNR at TI 150 and 300.

Conclusions

Results indicate that optimum contrast and image resolution is obtained with minimum scan time at TI 450 and flip angle 25°.

With these parameters, 1.5T high resolution (1mm isotropic), whole brain scans can be performed with a GM/WM CNR value~ 8 in ~ 8 minutes.

2003 SMRT Poster Walking Tour and Reception



This year a new event was added to the Poster Exhibit Reception, four selected poster authors gave short oral presentations of their work during the poster exhibit. Shown above (l.) Silke Bosk describes in detail aspects of interest in her poster entitled, " Thromboembolic Disease: Assessment with Whole-Body MR Venography." (r.) Steven Williams discusses his poster entitled "Imaging Articular Cartilage at 1.5T Standard and Novel Techniques." The two other oral poster presentations were by Susan Ryan, "Using the Roolie for Peripheral Run Off MRAs," and Bobbi K. Lewis, "Does Angle Matter in Acquiring MRSI?"

2003 2nd Place Proffered Paper– Clinical Poster

Phase-contrast Cardiac MR Imaging for Absolute Quantification of Mitral Valve Regurgitation

S. Massing, S. Bosk, J. Barkhausen, P. Hunold
University Hospital, Department of Diagnostic and Interventional Radiology, Essen, Germany

Purpose

Estimation of mitral valve regurgitation (MVR) severity is an important issue in patient management in order to meet the optimal time point for valve replacement. Established non-invasive grading parameters from echocardiography are differing over a wide range and lack consistency with patient prognosis. Aim of the study was to assess accuracy and feasibility of MVR volume estimation by phase-contrast MRI in comparison to 3D echocardiography.

Methods and Materials

18 patients with echocardiographically proven MVR were included into the study for quantification of mitral regurgitation volume. All MR exams were performed on a 1.5 T scanner (Magnetom Sonata, Siemens). The MR protocol included TrueFISP cine studies in standard long axes and a through plane phase-contrast GE sequence (TR, 25 ms; TE, 4.8 ms). Phase-contrast imaging was applied strictly perpendicular to the flow direction at the level of the proximal ascending aorta and above the mitral valve to assess left ventricular stroke (LVSV) and diastolic inflow volume, respectively. The VENC was set at 250 cm/s (aorta) and 150 cm/s (mitral valve). Volumes were provided by integrating the flow-time-curves using the Argus® software (Siemens). MVR volume was calculated as the difference between left ventricular inflow and LVSV (MVR volume = inflow - LVSV). MR data were compared to a new prototype Doppler echocardio-graphy technique (Phase Velocity Integral).

Results

MR imaging was feasible for the quantification of MVR volume in all patients. Examination duration amounted to 22±4 min. MVR volume in MRI ranged from 6.4 to 46 ml. MRI measurements correlated well with Doppler echocardiography measurements: slope of regression line, 1.05, correlation coefficient, R=0.856 (Table1).

Conclusion

MR imaging allows an accurate assessment of absolute MVR volume in a non invasive way by using a phase-contrast GE sequence. MRI overcomes echocardiography difficulties as it is grossly independent from patients' body physique. Severity grading of MVR based on the MR estimation of absolute volumes is an alternative to established echocardiography and invasive procedures and might be advantageous in terms of prognosis and operation planning.

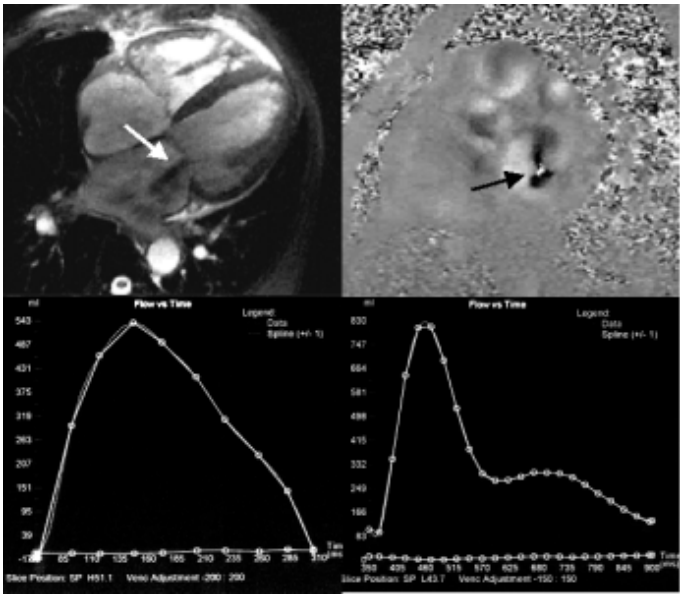


Figure 1. *Top left: Cine four chamber view showing MVR jet (white arrow). Top right: Velocity map of MVR in early systole with aliasing artifact (black arrow). Bottom: Flow-time-curves of LVSV (left) and mitral inflow (right).*

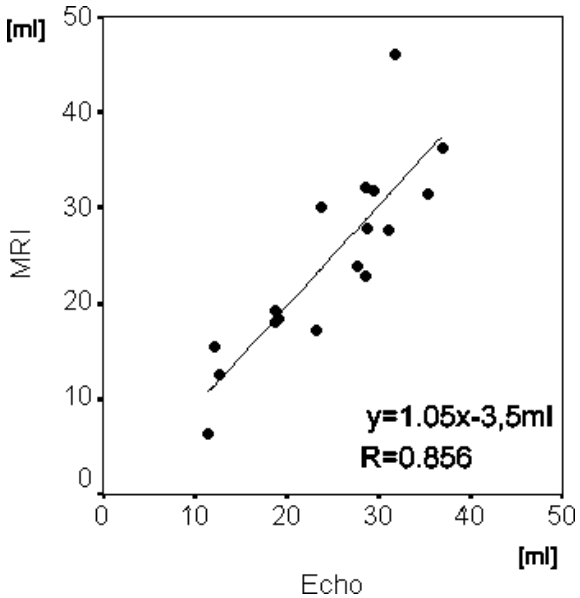


Table 1. *Comparison of Phase-contrast MRI with Doppler echocardiography shows close agreement between absolute MVR volumes in both techniques.*

2003 2nd Place-Tie Proffered Paper– Research Poster

Appearance of Calcification Artifact in the Falx Cerebri on Phase Maps Using a High Resolution Venogram Technique at 3 Tesla

Bove Bettis, KE[1], Bodurka, JA[1], Birn, RM[1], Rowser, P[1], Saad, ZS[2], Cox, RW2, Bandettini, PA[1]
[1]FMRI Core Facility, NIMH, NIH, [2]Scientific and Statistical Computing Core, NIMH, NIH, Bethesda, Maryland, USA

Purpose

To understand the significance of hypo-intensity artifacts as seen on gradient echo sequences of a particular subject, not seen on T1-weighted (T1W) sequences, nor to this degree on other subjects at 3 Tesla. Though calcifications within the falx cerebri with MRI are certainly common, it has been unusual at our institution to see this degree of distortion.

Material and Methods

We studied a healthy male volunteer, 49 years of age, with no known disease processes that would exclude the subject from IRB Approved Protocols. The subject is 72 inches in height and weighed 175 lbs. Two studies were performed over a two-day period on a 3 Tesla General Electric Signa VH/i MRI scanner (3T/90cm, whole body gradient inset 40mT/m, slew rate 150 T/m/s). The standard system transmit/receive birdcage head coil was used. On both days, the exam began with a standard 3-Plane localizer (SPGR) and all subsequent series were planned from this first set of images for standardization of slice location. The T1W 3D Magnetization Prepared Rapid Gradient Echo (MP-RAGE) sequence (Figure E) parameters were as follows: plane orientation axial, TE: MinFull, TI: 725ms: flip angle 60, bandwidth: 31.25kHz, FOV 24cm x 24cm, slice thickness 1.2mm skip 0mm, 128 locations, matrix size 256 x 192, NEX =1. The High Resolution MR Venogram was acquired in the axial plane on day one and in the sagittal plane the following day. Parameters as follows: sequence SPGR, scan modes: 3D, with gradient moment nulling (Flow Comp), TR: 50ms, TE: 30ms, flip angle 200, FOV 24cm x 24cm, slice thickness 1.2mm skip 0. The slice locations in the axial plane exactly matched those of the MP-RAGE. The slice locations in the sagittal plane numbered 112, and were the maximum number of slices needed to cover the brain from the inferior to superior borders. Matrix size was 512 x 256, NEX =1. A research control variable that allowed both and magnitude images phase maps to be displayed was turned on. A quick series of single shot gradient recalled echo-planar (GE-EPI) images was run to check for possible distortions if the subject were to be considered for fMRI procedures. Parameters were as follows: TE: 30ms, TR 2s; flip angle 90°, FOV 24cm x 24cm, matrix 64x64, slice thickness 5.0, skip 0 for 18 locations with 60 repetitions per slice location. The EPI images, magnitude and phase images of the MR Venograms were transferred off-line to a Linux computer where the images were post-processed using the Analysis of Functional Neuro-Imaging (AFNI) software. The images were also analyzed on the LX console to standardize the slice location, Region of Interest (ROI) size and ROI location.

Results

In the sagittal plane of the 3-plane localizer, there appeared to be three hypo-intense regions that were seen just superior to the corpus callosum at midline and to the right of midline. The largest of these artifacts was visualized in the sagittal plane of the MR venogram (Figure 1A). The phase map showed distortion from L2.2 to R12.2 (Figure 1B) and from S 44.5 to S 63.7 (Figure 1C) in the axial plane. Figure 1D demonstrates the EPI distortion, which ranged from S45.5 to S65.5. This artifact is not visible on the MP-Rage (Figure 1E).

Discussion

While falcine calcifications are considered common, these calcifications contain varying amount of bone marrow and might present benignly or to the extent as seen in this subject. If a subject is scheduled for a heavily weighted T2W/T2*W study such as EPI, High Resolution Venogram etc., and significant signal loss is seen on the localizing scans, it might be prudent to run a heavily T2*W sequence with phase maps in order to quantify and qualify possible artifacts that could distort and even disqualify the data. ●

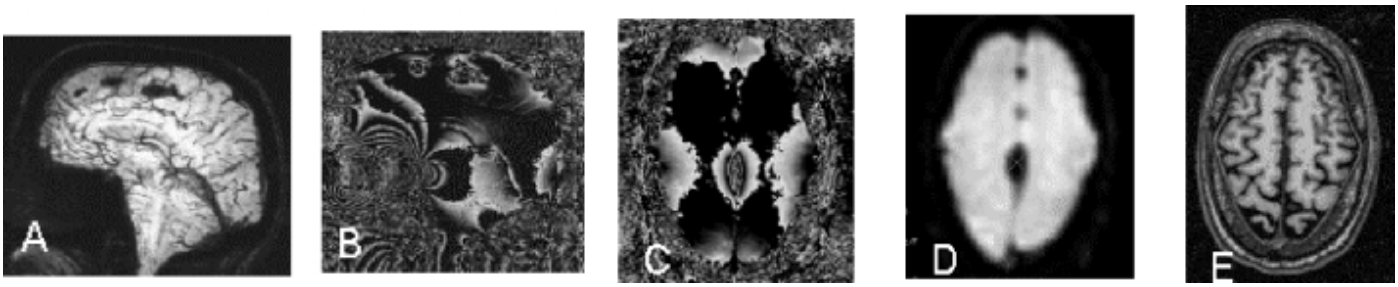


Figure 1a-e.

2003 Clinical Focus and Research Focus Oral and Poster Presenters

Carol Awde,
Department of Diagnostic Imaging, St. Joseph's Healthcare, Hamilton, Ontario, Canada
"Takayasus Arteritis– The Role of MRI in Its Diagnosis"

Catherine Blaesing,
Department of MRI Radiology, University of Michigan Hospital, Ann Arbor, Michigan, USA
"Challenging Voxel Placement for Brain MR Spectroscopy"

Silke Bosk,
Department of Diagnostic and Interventional Radiology, University Hospital Essen, Essen, Germany
"Thromboembolic Disease: Assessment with Whole-Body MR Venography"

Karen Bove Bettis,
FMRI Core Facility, NIMH, NIH, Bethesda, Maryland, USA
"Demonstration of Cerebral Venous Vasculature Using a High Resolution Venogram Technique at 3 Tesla"

JoAnn Bromley,
Mayo Clinic, Rochester, Minnesota, USA
"Improving Efficiency in MRI by Utilizing Non-Technologist Personnel"

Gregory Brown,
Department of MRI Radiology, Royal Adelaide Hospital, Adelaide, Australia
"Initial Experience with R2 Mapping to Measure Liver Iron Concentrations: A Practical Tool for Managing Iron Overloaded Patients"

Cindy Comeau
Advanced Cardiovascular Imaging, Cardiovascular Research Foundation, Lenox Hill Hospital, New York, New York, USA
"The Preoperative Assessment of Mitral Regurgitation by MRI: A Series of Six Patients"

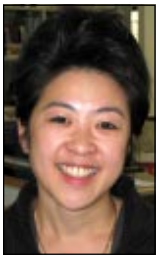
Andrew Cooper,
MRI Unit, Queen's Medical Centre, Nottingham, England, UK
"Imaging of Deep Vein Thrombosis using Magnetic Resonance Direct Thrombus Imaging (MRDTI), A Mobitrack Technique"

Denise Davis,
MR Research Center, University of Pittsburgh, Pittsburgh, Pennsylvania, USA
"Considerations for Development of 3T Clincal Protocols"

Filip De Ridder,
Department of Radiology, Free University of Brussels, Belgium
"Improvement in the Selection of Stereotactic Biopsy Target in Intracere-bral Gliomas Using T2 Perfusion"* and *"Evaluation of Crohn's Disease Activity with MRI"*

Randy Earnest,
EPIX Medical, Inc., Cambridge, Massachusetts, USA
"How to Survive Clinical Trials? A Technologist Perspective"

Dorothea Happ,
Department of Radiology, University of Michigan Health System, Ann Arbor, Michigan, USA
"Gadolinium Enhanced T1-Weighted 3D-SPGR Breath-Hold Excretory MR Urography"



Jane Ho,
Institute of Child Health, University College London, London, England, UK
"Functional MRI in Patients with Language Deficits: The Role of Covert and Overt Language Activation Paradigms"

Hina Jaggi,
MRI Unit, Department of Radiology, NYU Medical Center, New York, New York, USA, USA
"Advanced Cardiac Imaging to Evaluate Cardiac Viability"

Bobbi K. Lewis,
Experimental Neuroimaging Section, LDRR, NIH, Bethesda, Maryland, USA
"Does Angle Matter In Acquiring MRSI?"

Michael Macilquham,
MRI Department, Cabrini Hospital, Malvern, Victoria, Australia
"Prostate Magnetic Resonance Imaging and Spectroscopy– A Clinical Review"

Sandra Massing,
Dept. of Diagnostic and Interventional Radiology, University Hospital Essen, Essen, Germany
"Late Enhancement in Cardiac MRI of Myocardial Infarction and the Prediction of Functional Recovery after Bypass Surgery"

Susan O'Flahavan,
Advanced MRI Section, LFMI, NINDS, NIH, Bethesda, Maryland, USA
"SNR Improvements Using a 16-Channel Head Coil"

2003 Clinical Focus and Research Focus Oral and Poster Presenters

Cheryl Richardson,
Royal Marsden NHS Trust, London, England, UK
"Techniques and Trouble-Shooting in High Spatial Resolution Thin Slice MRI for Rectal Cancer"

Suzan Rohrer,
Department of Radiology, University of Michigan Health System, Ann Arbor, Michigan, USA
"MR Spectroscopy Differentiating Between Recurrent Brain Tumor and Non-Neoplastic Therapy Related Changes"

Paula Rowser,
FMRI Core Facility, NIMH, NIH, Bethesda, Maryland, USA
"Effects of SNR on Intracranial MR Angiography Images on a 3T Magnet vs. 1.5T"

Susan Ryan,
Department of Radiology, LaGrange Hospital, LaGrange, Illinois, USA
"Using the "Roolie" for Peripheral Run Off MRAs"

Sue Rysted,
Mayo Clinic, Rochester, Minnesota, USA
"Modified SSFSE to Reduce Image Blurring: Comparison with the Standard Sequence"

Annica Sandberg,
MRI Unit Department of Neuroradiology, Karolinska Hospital, Stockholm, Sweden
"Perfusion Weighted MRI in Research and Clinical Routine"

Ann Sisak,
Department of Diagnostic Imaging, St. Joseph's Healthcare, Hamilton, Ontario, Canada
"3D Fiesta IACs– Effective Screening Tool?"

David Stanley,
Applied Science Laboratory, GE Medical Systems, Milwaukee, Wisconsin, USA
"Dynamic Contrast-Enhanced Bilateral Breast Technique"
and *"Real-Time Delayed Enhancement"*

Kathryn Tyler,
Walton Centre for Neurology and Neurosurgery, Liverpool, England, UK
"MRI Spin Echo Sequence for the Demonstration of the Subthalamic Nucleus for Deep Brain Stimulation in Patients with Parkinson's Disease"

Steven Williams,
Mayo Clinic, Rochester, Minnesota, USA
"Imaging Articular Cartilage at 1.5T Standard and Novel Techniques"

Photos unavailable

Clinical Focus authors:
Teresa Almandoz, *"Staging of Gastric Adenocarcinoma by MRI: Protocols, Opportunities and Limitations"*
Pablo Buzzi, *"Cranial Trauma: Hemorrhagic Endocranial Complications"*
Tsukasa Doi, *"Evaluation of Coronal Image Used Grappa in Parallel Imaging"*
Sei Young Kim, *"Diffusion Tensor MRI and Fiber Tractography Using Multichannel SENSE Head Coil: Clinical Feasibility in the Evaluation of CNS Anomaly"*
Emil Nordby, *"Functional Magnetic Resonance Imaging (fMRI) of the Brain as a Tool for Surgical Planning"*
Erma Owens, *"Implementation of Magnetization Transfer Ratios in Characterization of Demylelinating Disease in Clinical Practice"* and *"Development and Design of Clinical Ladder for MRI Technologists"*
Byung-Rae Park, *"Classification of Fall in Sick Times of Liver Cirrhosis using MR Images and Neural Network"*
George Tezapsidis, *"Indirect MR Arthography: Applications in Assessing Knee Diseases"* and *"Direct MR Fistulography: Comparison Study with DSA"*
Mary Watkins, *"Making Clinical Sense of Cardiac MR: A Full Functional Exam in Five Plus One Minutes"*

Research Focus authors:
Anne Dorte Blankholm, *"Comparison of 3D SPGR (Inversion Prepared Spoiled Grass) and 3D FIESTA (TRUE FISP) at C2 Level in the Assessment of Multiple Sclerosis"*
Ho Yong Jung, *"A Study on the Changes of Signal Intensity of Water in Relation to TE Changes"*
Joji Kato, *"MR Myelography Using Fast Recovery Fast Spin Echo (FRFSE)"*
Yong Moon Lee, *"Study and Consideration of Localized in vivo ^{1}H MR Spectroscopy (MRS) for Human Brain"*
Jung Woo Lee, *"Four Dimensional (Time-Resolved) MRA Using SENSE Technique: Preliminary Report"*
Dae Keon Seo, *"A Phantom Study of Image Distortion for Accuracy of Stereotactic Localization in the Magnetic Resonance Imaging"*
Bjarte Snekvik, *"Stimulated Echo for Diffusion Imaging at 3T"*
Yvonne van der Meulen, *"Possibility to Differentiate between Metastasis and Radiation Necrosis by MR Spectroscopic Imaging"*

Update on *SMRT Educational Seminars*

Kelly D. Baron B.S.R.T. (R)(MR)

The *SMRT Educational Seminars* group is hard at work finishing up the last issue of the year. Enclosed with this issue of *Signals* you will find *"Advances in Interventional MRI."* The issue is composed of two articles, the first entitled *"Transnasal and Transphenoidal MRI-Guided Biopsies of Petroclival Tumors."* I know that sounds painful, but authors Thomas Schultz and colleagues have shown that MRI offers an "interactive, one-step method of localization, targeting, and tissue sampling and retrieval… which is minimally invasive for the patient." Their research reviews the set-up of the operative suite, the procedure and instruments used for the biopsy, clinical findings of the patients and correlating pathologic findings.

The second article of this issue, entitled *"Integration of Interventional MRI with Computer-Assisted Surgery"* reveals how computer-based techniques are enhancing the ability of Interventional MRI to detect and identify a potential abnormality, as well as localize and target an abnormality for therapy purposes. This article by Dr. Jolesz and colleagues is very cool and very techy, reviewing the latest in computer techniques to analyze imaging data. The text reviews the applications in the fields of neurosurgery, liver cryosurgery, and ultrasound therapy. If you are not performing these procedures, it will give you a glimpse of things to come and to look forward too!

The last issue of the year will be entitled *"Diffusion-Weighted Imaging of the Pediatric Brain,"* and will again be composed of two articles. The first will address the changes seen in water diffusion in the brain during the 1st year of life. The second will reveal the differences in diffusion patterns in the normal brain compared to that of brains with various white matter diseases. ●

Information Sharing during Breaks and at the Poster Walking Tour and Reception

There is opportunity to meet colleagues, old friends, and new friends to compare MR practices around the world.

Again this year we want to thank Mallinckrodt, Inc. for their generous support in funding the SMRT Poster Walking Tour and Reception.

SMRT Members: Remember to Vote

John A. Koveleski, R.T. (R)(MR), Past-President and Chair, Nominating Committee

It is that time of year when you have the opportunity to participate in the future of the SMRT. As a voting member you not only have the privilege but the responsibility to vote for the individuals who will become the President-Elect and the new Policy Board Members. As your ballot arrives please take some time to review the qualities and experience of the candidates and select those individuals whom you think will serve you and the SMRT well.

This is your chance to determine the future leadership of the SMRT. You will also have the occasion to select the recipient of the Crues-Kressel Award.

The President-Elect position is a three-year commitment, beginning as President-Elect followed by President and then Past President. As a member of the Executive Committee, the President-Elect is mentored for one year and then becomes the President. During the year as President, this leader represents the SMRT to the parent society, ISMRM, and presides over all of the business of the SMRT. This includes contact with all twelve standing committees, as well as any other pertinent issues that arise. As Past President this person serves on the Executive Committee to ease the transition from one year to the next and is Chair of the Nominating and Awards Committees.

Policy Board members are elected for a three-year term, and are expected during that time to chair at least one of the standing committees and serve on others as needed. Those elected to the Policy Board are expected to be highly motivated, concerned individuals who will complete those tasks necessary for the SMRT to have ongoing success. Face to face meetings are rare, because members of any given committee may be from a variety of countries. Communication among Policy Board and committee members is generally conducted through electronic mail, which is both efficient and economical. It is a tribute to those many volunteers who have already completed terms on the Policy Board as well as those being considered for election, that the SMRT continues to evolve into a recognized professional organization for MR technologists around the world. By carefully selecting your choices, you will ensure the SMRT will thrive for years to come.

You will also be asked to select a recipient of the Crues-Kressel Award. This award was established in honor of Drs. John Crues and Herbert Kressel for their support in establishment of the SMRT. The person nominated to receive this award is someone who is recognized "for outstanding contributions to the education of magnetic resonance technologists." For a listing of those who have received this award in previous years please check the SMRT Website.

Included with the ballot are brief biographical histories for all the candidates. Please review them and mark your choices. As a reminder, only those voting members in good standing, with annual dues paid, are eligible to vote. Follow the directions carefully to sign and mail your ballot or it may not be counted. Ballots will be mailed **15 October 2003**. The postmark deadline is **1 December 2003** and the ballots must be received no later than **8 December 2003**. The ballots will be counted and the results announced in a future issue of *Signals*. If you have any questions about the election procedure or your eligibility to vote, please contact me at: jak3264@aol.com or at my work telephone number of +1 717 975 0444, or the SMRT office at: +1 510 841 1899. ●

Regional Committee Update

Cindy Comeau, B.S., R.T. (R)(MR), SMRT Regionals Committee Chair

Have you been looking for a way to promote MRI education? Are you looking for a way to network with other people in your field? Perhaps you attended a SMRT Regional Seminar recently and wondered how to become more involved. If you have answered "YES" to any of these questions then hosting an SMRT Regional Seminar may be the answer for you!

In keeping with the mission of promoting technologist education the SMRT/ISMRM organization needs your support. The process of hosting a SMRT Regional Seminar begins with the identification of a local chairperson who will coordinate the local event. With support from the SMRT/ISMRM Berkeley office you select a venue and local speakers. You may also contact with local vendors interested in providing support for your local meeting. Jennifer Olson will send you a Regional packet and brief you on the process. In this packet you will find a timeline and a wealth of information to get you started. Also as recognition of your efforts in hosting an SMRT Regional your SMRT membership fee is waived for one year!

The SMRT sincerely thanks all of the local chairs for the six SMRT Regional Seminars scheduled in September and October 2003. So please take a moment and review SMRT Calendar on page 28. You can also visit the SMRT Website (http://www.ismrm.org/smrt) to view this information and to register. If you would like a brochure mailed to you, please contact the Berkeley office by e-mail smrt@ismrm.org or call +1 510 841 1899.

Please pass this information on to your fellow MRI technologists. We look forward to seeing you at a SMRT Regional Educational Seminar soon and perhaps hosting one yourself! ●

Journal Subscriptions Rate Increase

At the ISMRM Board of Trustees meeting in Toronto this past July it was moved, seconded, and carried that the cost of journals be increased from US$90 to US$100 for SMRT members who choose to subscribe to a journal starting in 2004. ●

Precessing in a Vertical Field: Knee Case Study

William Faulkner, B.S., R.T. (R)(MR)(CT)

I started this column writing on one topic but then this interesting case came up while working with a site to optimize the knee protocol on their 0.2T system. I thought I'd do something a little different and just present this as a case study to show how some newer imaging options available on low-field systems can be utilized. I'd like to thank Dr. Glen Strome of Associates in Diagnostic Radiology and the technologists of Chattanooga Imaging for their assistance. This is a 15-year-old male with knee pain (you'll see why shortly).

The first sequence is a conventional spin echo (please stop calling it "true spin echo"). The parameters are: TR 1050, TE 27. The sagittal images through the medial meniscus demonstrate the tear (figure 1). The midline images show what is often referred to as the "double PCL sign" (figure 2). This indicates a bucket-handle tear and the "extra PCL" signal is really a big piece of the torn meniscus.

The next series is a Fast Spin Echo utilizing a "driven equilibrium" option (Fast Recovery Fast Spin Echo). Additionally it utilizes a fat/water separation option and the images displayed are the water images (figure 3). This produces Proton Density weighted fat suppressed images (yes – this is a 0.2T system). The parameters are TR 3000, TE 46.

The fat suppressed FSE sequence also provides good contrast between the cartilage and fluid in the joint. Again, the meniscal tear is well seen.

The same sequence is repeated in the coronal plane both with and without the "fat suppression" option. The images without fat suppression show the piece of the meniscus laying in the joint space near the PCL (figure 4), as well as demonstrate the meniscal tear again (figure 5).

Figure 1.

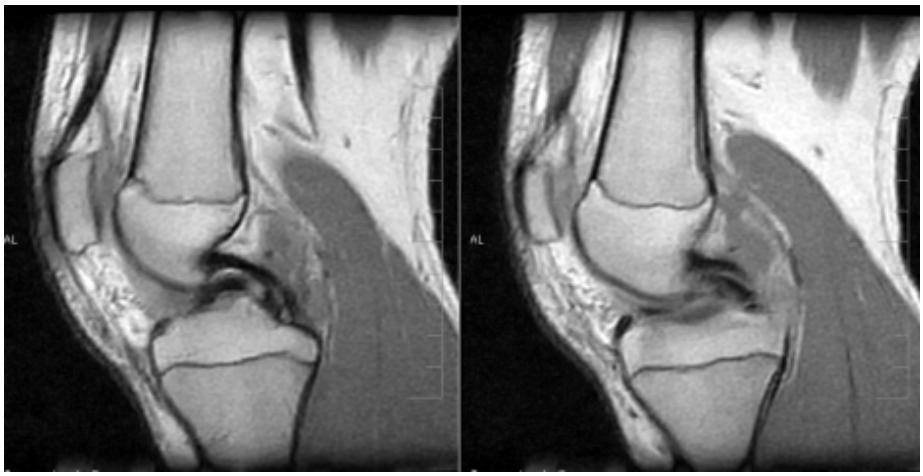


Figure 2.

You don't always get lucky and get a cooperative patient with well-defined pathology when working to optimize your protocols. In fact, it's usually just the opposite. You get an uncooperative or very sick patient with absolutely no pathology. The docs want to know why the images look so crummy and they doubt the changes will show the pathology as good as the old protocol since they don't see any abnormalities.

Since everything worked in my favor this time, I thought I'd use this opportunity to show some interesting pathology and demonstrate what can be done on a low-field system in 2003. ●

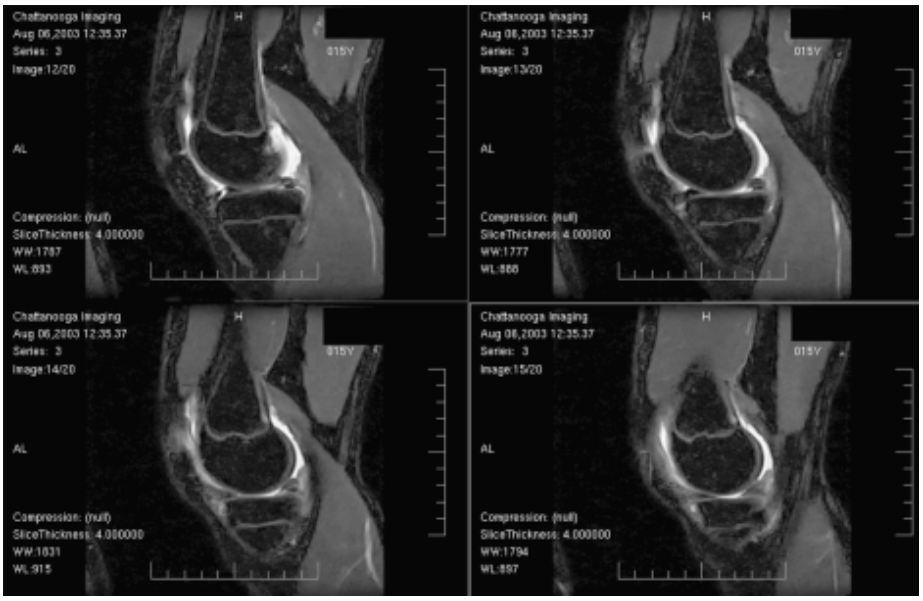


Figure 3.

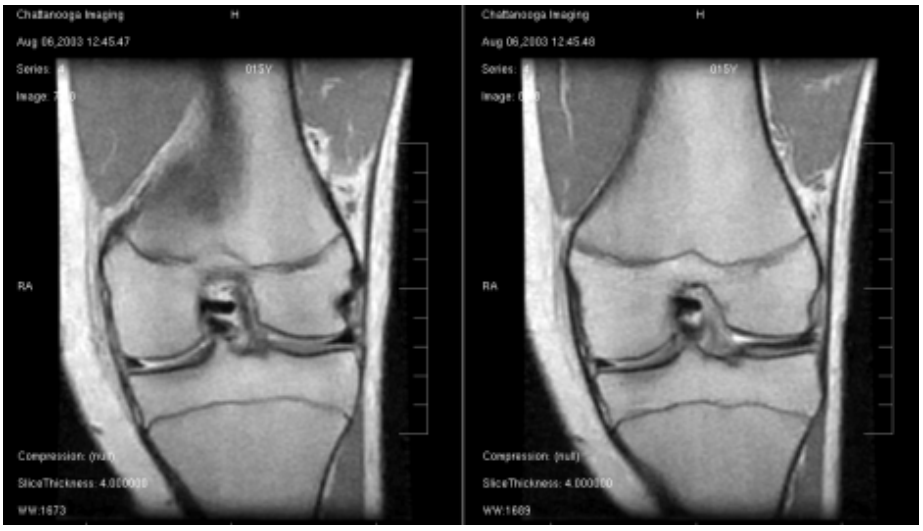


Figure 4.

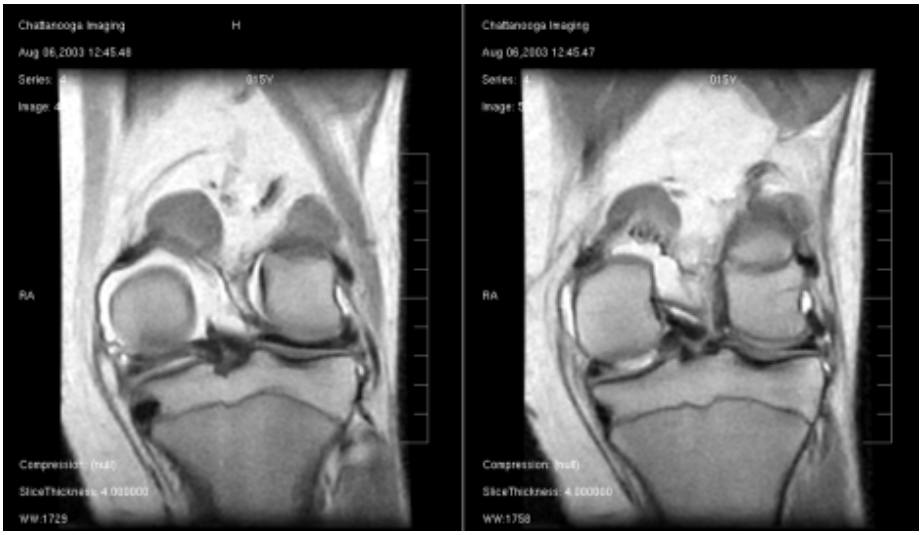


Figure 5.

Institute for Magnetic Resonance Safety, Education, and Research

The Institute for Magnetic Resonance Safety, Education, and Research (IMRSER) is an independent, multidisciplinary, professional organization devoted to promoting awareness, understanding, and communication of magnetic resonance (MR) safety issues through education and research.

One of the functions of the Institute for Magnetic Resonance Safety, Education, and Research is to develop MRI safety guidelines and to disseminate this information to the MR community in order to help ensure safety for patients, healthcare workers, and other individuals in the MR environment. The development of guidelines is achieved by the Medical, Scientific, and Technology Advisory Board and the Corporate Advisory Board of the IMRSER utilizing pertinent peer-reviewed, evidence-based literature and by relying on each member's extensive clinical, research, or other appropriate experience.

The Medical, Scientific, and Technology Advisory Board is comprised of recognized leaders in the field of magnetic resonance (MR), including diagnostic radiologists, clinicians, research scientists, physicists, MRI technologists, MR facility managers, and other allied healthcare professionals involved in MR technology and safety. In addition, the Food and Drug Administration has assigned a Federal Liaison to the IMRSER's Medical, Scientific, and Technology Advisory Board. The Corporate Advisory Board is comprised of representatives from the MR industry including MR system manufacturers, contrast agent pharmaceutical companies, RF coil manufacturers, MR accessory vendors, medical product manufacturers, and other related corporate organizations.

Notably, MRI safety guidelines developed by the IMRSER consider and incorporate information provided by the International Society for Magnetic Resonance in Medicine (ISMRM), the American College of Radiology (ACR), the Food and Drug Administration (FDA), the National Electrical Manufacturers Association (NEMA), the Medical Devices Agency (MDA), and the International Electrotechnical Commission (IEC).

The IMRSER's rigorous development and review process for MRI safety guidelines ensures that authoritative and relevant information is produced in a timely manner for rapid dissemination to the MR community.

It should be noted that the MRI safety guidelines developed by the IMRSER are educational in nature and not specifically intended to be legal standards of care. Accordingly, these MRI safety guidelines may be modified as determined by individual circumstances, currently available resources, differences or changes in technology, and other relevant information. ●

MRI SAFETY

MRI Safety Guideline Developed by the Institute for Magnetic Resonance Safety, Education, and Research.

Guidelines to Prevent Excessive Heating and Burns Associated with Magnetic Resonance Procedures

Frank G. Shellock, Ph.D., Adjunct Clinical Professor of Radiology, University of Southern California; Founder, Institute for Magnetic Resonance Safety, Education, and Research; President, Magnetic Resonance Safety Testing Services, Los Angeles, California, USA
www.MRIsafety.com www.IMRSER.org

In general, magnetic resonance (MR) imaging is considered to be a relatively safe diagnostic modality. However, the use of radiofrequency coils, physiologic monitors, electronically-activated devices, and external accessories or objects made from conductive materials has caused excessive heating, resulting in burn injuries to patients undergoing MR procedures. Heating of implants and similar devices may also occur in association with MR procedures, but this tends be problematic primarily for objects made from conductive materials that have elongated shapes such as leads, guidewires, and certain types of catheters (e.g., catheters with thermistors or other conducting components).

Notably, more than 30 incidents of excessive heating have been reported in patients undergoing MR procedures in the United States that were unrelated to equipment problems or the presence of conductive external or internal implants or materials [review of data files from U.S. Food and Drug Administration, Center for Devices and Radiological Health, Manufacturer and User Facility Device Experience Database, MAUDE, http://www.fda.gov/cdrh/maude.html and U.S. Food and Drug Administration, Center for Devices and Radiological Health, Medical Device Report, (http://www.fda.gov/CDRH/mdrfile.html)]. These incidents included first, second, and third degree burns that were experienced by patients (Figure 1). In many of these cases, the reports indicated that the limbs or other body parts of the patients were in direct contact with body radiofrequency (RF) coils or other RF transmit coils of the MR systems or there were skin-to-skin contact points suspected to be responsible for these injuries.

MR systems require the use of RF pulses to create the MR signal. This RF energy is transmitted readily through free space from the transmit RF coil to the patient. When conducting materials are placed within the RF field, the result may be a concentration of electrical currents sufficient to cause excessive heating and tissue damage. The nature of high frequency electromagnetic fields is such that the energy can be transmitted across open space and through insulators. Therefore, only devices with carefully designed current paths can be made safe for use during MR procedures. Simply insulating conductive material (e.g., wire or lead) or separating it from the patient may not be sufficient to prevent excessive heating or burns from occurring.

Furthermore, certain geometrical shapes exhibit the phenomenon of "resonance" which increases their propensity to concentrate RF currents. At the operating frequencies of present day MR systems, conducting loops of tens of centimeters in size may create problems and, therefore, must be avoided, unless high impedance is used to limit RF current. Importantly, even loops that include small gaps separated by insulation may still conduct current.

To prevent patients from experiencing excessive heating and possible burns in association with MR procedures, the following guidelines are recommended:

Figure 1. *Third-degree burn experienced by a patient during an MR procedure. This burn was unrelated to equipment malfunction or the presence of internal or external conductive materials.*

(1) Prepare the patient for the MR procedure by ensuring that there are no unnecessary metallic objects contacting the patient's skin (e.g., metallic drug delivery patches, jewelry, necklaces, bracelets, key chains, etc.).

(2) Prepare the patient for the MR procedure by using insulation material (i.e., appropriate padding) to prevent skin-to-skin contact points and the formation of "closed-loops" from touching body parts.

(3) Insulating material (minimum recommended thickness, 1-cm) should be placed between the patient's skin and transmit RF coil that is used for the MR procedure (alternatively, the RF coil itself should be padded). For example, position the patient so that there is no direct contact between the patient's skin and the body RF coil of the MR system. This may be accomplished by having the patient place his/her arms over his/her head or by using elbow pads or foam padding between the patient's tissue and the body RF coil of the MR system. This is especially important for those MR examinations that use the body coil or other large RF coils for transmission of RF energy.

(4) Use only electrically conductive devices, equipment, accessories (e.g., ECG leads, electrodes, etc.), and materials that have been thoroughly tested and determined to be safe and compatible for MR procedures.

(5) Carefully follow specific MR safety criteria and recommendations for implants made from electrically-conductive materials (e.g., bone fusion stimulators, neurostimulation systems, etc.).

(6) Before using electrical equipment, check the integrity of the insulation and/or housing of all components including surface RF coils, monitoring leads, cables, and wires. Preventive maintenance should be practiced routinely for such equipment.

Continued on page 25

(7) Remove all non-essential electrically conductive materials from the MR system (i.e., unused surface RF coils, ECG leads, cables, wires, etc.).

(8) Keep electrically conductive materials that must remain in the MR system from directly contacting the patient by placing thermal and/or electrical insulation between the conductive material and the patient.

(9) Keep electrically conductive materials that must remain within the body RF coil or other transmit RF coil of the MR system from forming conductive loops. Note: The patient's tissue is conductive and, therefore, may be involved in the formation of a conductive loop, which can be circular, U-shaped, or S-shaped.

(10) Position electrically conductive materials to prevent "cross points." For example, a cross point is the point where a cable crosses another cable, where a cable loops across itself, or where a cable touches either the patient or sides of the transmit RF coil more than once. Notably, even the close proximity of conductive materials with each other should be avoided because some cables and RF coils can capacitively-couple (without any contact or crossover) when placed close together.

(11) Position electrically conductive materials to exit down the center of the MR system (i.e., not along the side of the MR system or close to the body RF coil or other transmit RF coil).

(12) Do not position electrically conductive materials across an external metallic prosthesis (e.g., external fixation device, cervical fixation device, etc.) or similar device that is in direct contact with the patient.

(13) Allow only properly trained individuals to operate devices (e.g., monitoring equipment) in the MR environment.

(14) Follow all manufacturer instructions for the proper operation and maintenance of physiologic monitoring or other similar electronic equipment intended for use during MR procedures.

(15) Electrical devices that do not appear to be operating properly during the MR procedure should be removed from the patient immediately.

(16) Closely monitor the patient during the MR procedure. If the patient reports sensations of heating or other unusual sensation, discontinue the MR procedure immediately and perform a thorough assessment of the situation.

(17) RF surface coil decoupling failures can cause localized RF power deposition levels to reach excessive levels. The MR system operator will recognize such a failure as a set of concentric semicircles in the tissue on the associated MR image or as an unusual amount of image non-uniformity related to the position of the RF coil.

The adoption of these guidelines will help to ensure that patient safety is maintained, especially as more conductive materials and electronically-activated devices are used in association with MR procedures. ●

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For more information on safety related issues, please visit:

MRIsafety.com

This website was created and is maintained by Frank G. Shellock, Ph.D.

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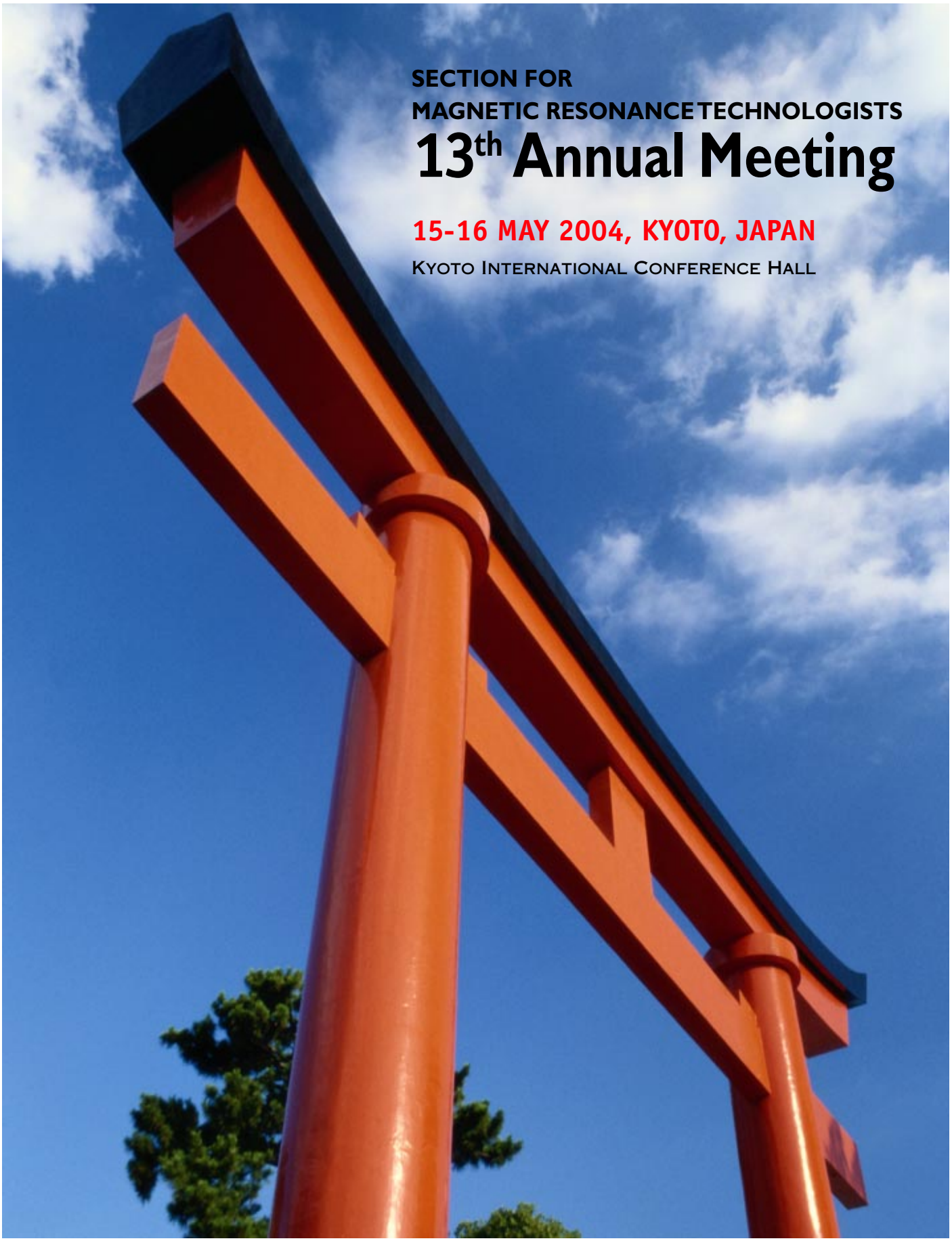
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13th Annual Meeting of the Section for Magnetic Resonance Technologists

James J. Stuppino, B.S., R.T. (R)(MR), 2004 SMRT Program Committee Chair

The SMRT invites technologists from around the world to attend the Thirteenth Annual Meeting of the Section for Magnetic Resonance Technologists. This meeting will be held 15 to 16 May 2004 in conjunction with the Twelfth Scientific Meeting and Exhibition of the International Society for Magnetic Resonance in Medicine at the Kyoto International Conference Hall in Kyoto, Japan.

The goal of the SMRT is to provide quality educational opportunities for the MR technologist 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, implementation of new applications, and a continuously increasing workload. We continue to strive to maintain a high standard of performance while providing quality patient care.

The Meeting will commence with a Poster Exhibit and Walking Tour Reception at 18:30 on Friday evening, 14 May 2004. This will be a great way to learn about new and innovative clinical and research studies that are being performed by our colleagues worldwide. It also provides a great opportunity to interact with the poster authors and to meet and share ideas with fellow technologists from around the world.

An important aspect of the meeting remains the submission of abstracts for oral and poster presentations by technologists. Proffered papers will be interlaced throughout the sessions.

We strongly encourage all technologists to participate in the meeting by submitting an oral or poster abstract. For assistance, please see instructions posted on the SMRT Website. The deadline for SMRT abstract submissions will be **21 January 2004**. Online abstract submission will be available on the SMRT Website: http://www.ismrm.org/smrt. The proffered papers and posters have been one of the highlights of past SMRT meetings.

The SMRT Annual Business Meeting will be held on Saturday, 15 May, giving members a chance to actively participate in and contribute ideas to your professional MR organization.

As Chair of the 2004 Program Committee, it is my pleasure to invite you to attend this meeting and to join the SMRT in bringing to technologists, an exciting, quality educational weekend in the wonderful city of Kyoto. ●

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... is published by the International Society for Magnetic Resonance in Medicine, 2118 Milvia Street, Suite 201, Berkeley, CA 94704, USA.

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9-11 October 2003
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ISMRM Workshop on MR in Drug Development: From Discovery to Clinical Therapeutic Trials
2-3 April 2004
Hilton McLean Tysons Corner, McLean, Virginia, USA

ISMRM 12th Scientific Meeting & Exhibition
15-21 May 2004
Kyoto International Conference Hall, Kyoto, Japan

SMRT Northwest Regional Seminar
27 September 2003
Fred Hutchinson Cancer Research Center, Seattle, Washington, USA

SMRT Northeast Regional Seminar
28 September 2003
University of Pittsburgh Medical Center, Pittsburgh, Pennsylvania, USA

SMRT President's Regional Seminar
18 October 2003
Duke University Medical Center, Durham, North Carolina, USA

SMRT Northeast Regional Seminar
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