Signals
Number 61
2007 Issue 2
NEWSLETTER OF THE SECTION FOR MAGNETIC RESONANCE TECHNOLOGISTS

Meet your new SMRT President

Carolyn Bonaceto, B.S., R.T., (R)(MR)

• ***Signals:*** ***Carolyn, when did you first get involved with MRI?***

• ***Carolyn:*** Since its inception as a diagnostic imaging tool, I was interested in being a part of MRI. In late 1990, an opportunity to learn MRI at New England Baptist Hospital in Boston became available. At the time I worked part-time evenings as a CT technologist. Even though accepting the new position meant going to work fulltime, I was excited about learning this new technology. I was very fortunate to learn MRI from the early days. I often tell people that when I started MRI, we tuned coils by hand with long rods and a routine brain scan took an hour to acquire three sequences. In my current position I have the benefit of visiting many MR Centers helping them to become familiar with new protocols.

It is always a challenge to convince technologists with fewer years in the field that it is possible for a patient to hold still for a six minute sequence! There are huge advantages to having learned the modality since its infancy. We learned about new sequences and techniques as they were developed. I am very sympathetic to those technologists who are new to the field of MRI. Having to absorb all of the information developed over the last 20 years in a very short time must be very challenging.

• ***Signals:*** ***Was that a good experience, what did you learn, how did it help your career?***

• ***Carolyn:*** During my years at New England Baptist Hospital, I was very fortunate to work with Kathleen Casey B.S.R.T., (R)(MR), one of the first MRI Technologists in Boston. She demonstrated an exceptional ability to understand the process of image acquisition and we had a great time working together. She is still one of my best friends.

New England Baptist Hospital is known to be the premier orthopedic hospital in New England. That experience has been invaluable to my current role as Imaging Support Manager for Conformis, Inc. Conformis makes patient specific knee implants that are designed from MR and CT images. Because much of the work at NEBH involved extremity imaging, I have a solid background in musculoskeletal imaging and anatomy.

• ***Signals:*** ***When did you first become a member of SMRT?***

• ***Carolyn:*** I only became a member of SMRT 6 years ago. At the time I was MR Manager at Beth Israel Deaconess Hospital in Boston. Dr. Herbert Kressel was the Radiology Department Chair. He encouraged me to join. At the annual meeting in Toronto, I was incredibly impressed by the program and the people who were involved with SMRT. That year I was nominated for and elected to the policy board. I always thought it was unfortunate that I missed so many years worth of MR

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education focused for technologists. When I discovered what I had been missing, I became very enthusiastic about getting the word out about what SMRT had to offer.

• ***Signals:*** ***How have you seen the SMRT evolve?***

• ***Carolyn:*** SMRT continues to attract dynamic people from many countries. Next year, our first non US President ***Wendy Strugnell, B.Sc.*** from Australia, takes the reins. Her election speaks volumes about the growth of the organization and the people that we are reaching. I look forward to being part of that growth.

• ***Signals:*** ***As president, what do you see as your major goal in this coming year?***

• ***Carolyn:*** Expanding membership is every President's goal and I intend to focus much of our time and resources on reaching more technologists worldwide. The year is off to a very encouraging start. We had attendees at our recent annual meeting in Berlin from six continents. My own experience helps me to understand that once an MRI technologist is introduced to the SMRT, they find that membership has significant value to their work. Our challenge is to make sure every individual who is performing the duties of an MR technologist becomes aware of the SMRT and our mission. To that end, the Policy Board, especially its international members under Wendy's leadership, are working diligently finding ways to participate in a variety of off-shore technologist meetings.

Another goal for this year is to explore the possibilities of offering more web based education. The membership has made it clear that they want easy access to our learning materials.

The SMRT continues to support the CARE bill. Seeing this bill pass during my Presidency is another goal of mine. The goal of this US legislation is to ensure that our patients will have the benefit of knowing that the professional responsible for their scan has met minimum educational requirements. Education will help ensure a safe environment and reduce healthcare costs. I would also like to focus on the nurses' role in the MRI Department. Their knowledge and expertise is essential to quality care, especially in large academic medical centers.

• ***Signals:*** ***What can the members do to help the SMRT reach its goals?***

• ***Carolyn:*** Share the message of the SMRT! Participate! Explore your local chapters! Our mission statement says it all:

"The Section for Magnetic Resonance Technologists (SMRT) was founded to provide a forum for education, information, and research in the field of magnetic resonance. The primary objective of the SMRT is to advance the education and training for MRI technologists worldwide. The SMRT is committed to promoting the communication and dissemination of information regarding current and emerging technological advances to its members."

I am looking forward to a wonderful year. I have the benefit of working with a tremendously talented and enthusiastic group of individuals who make up the leadership of SMRT. They will make sure SMRT continues to move forward as the premier organization for those technologists who are truly interested in expanding their knowledge of MR and transitioning the information gained to their everyday work.

Share the message of the SMRT! Participate! Explore your local chapters! Our mission statement says it all:

"The Section for Magnetic Resonance Technologists (SMRT) was founded to provide a forum for education, information, and research in the field of magnetic resonance.

The primary objective of the SMRT is to advance the education and training for MRI technologists worldwide.

The SMRT is committed to promoting the communication and dissemination of information regarding current and emerging technological advances to its members."

CHANGE HAPPENS.

Editor's Letter

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

Change happens. Change is difficult. "In a higher world it is otherwise, but here below to live is to change, and to be perfect is to have changed often." In other words: Only through change can there be progress or improvement.

***Change has provided an innovative look for* Signals.** You may have noticed the change in appearance due to the labors of newly hired Mary Keydash, Publications Director. We welcome her aboard and look forward to a long working relationship with her and her creative and productive efforts.

Change for the SMRT is implementing a transformation for your publication, the* Signals *Newsletter. In an effort to be more timely and accessible we are in a transition to put into effect all electronic newsletters. By not printing and mailing hard copy we hope to have a more regular schedule of the issues for you, closer to a true calendar year. We are also striving, over time, to increase the frequency of the *Signals* newsletter to six times per year. The content will continue to cover the news and activities of the Section as well as articles with Safety and other practical information you can use. The SMRT views this as a win, win situation for all those who currently receive the *Signals* and those new members who will not have to wait for a mailing, but can view up to date information on the SMRT web-site. Stay tuned as we work this conversion through and feel free to express your comments to me at: jpeay@wi.rr.com with *Signals* in the subject line.

Change involves new events and activities. Be sure to check out the calendar of upcoming workshops and educational opportunities.

Change happens every year at the SMRT Annual Meeting as we install new officers and Policy Board members. You have the opportunity to learn about your new President, ***Carolyn Bonaceto, B.S., R.T., (R)(MR)*** with her answers to questions about her career and her goals for the SMRT.

Change in venue for the 16th SMRT Annual Meeting from Barcelona to Berlin did not deter Program Chair, ***Vera Kimbrell Miller, B.S., R.T., (R)(MR)*** and her committee from providing an excellent selection of speakers and educational information. See her report for a summary of the didactic sessions; paper and poster presentations; and the special award recipients. ***Charles Stanley, B.S., R.T., (R)(MR)*** co-chaired the joint forum held in conjunction with the ISMRM covering the topic of Interventional MRI. See report by ***Cindy Comeau, B.S., R.T., (N)(MR); Janice Fairhurst, B.S., R.T., (R)(MR); and Maureen Hood, MS, RN, R.T., (R)(MR).***

Change in Policy Board members occurs each year as we elect five new members. See the call for nominations by chair, ***Cindy Comeau B.S., R.T., (N)(MR)***. She also explains the process for awards.

Change in SMRT Local Chapters is reported by ***Pam Vincent, M.P.A., R.T., (R)(CT)(MR)***, chair, as she describes the success of the International Forum at the Annual Meeting as well as other Chapter news from around the globe.

Change in hats from MRI Technologist to co-chair of the President's Regional Seminar is evidenced by the report from ***Cindy Comeau, B.S., R.T., (N)(MR)*** describing the successful New York City meeting.

Change of location for each Annual Meeting results in two consecutive years of the meeting held in North America with the third year "off shore." Therefore, in 2008 we will return to North America and are invited to Toronto for the 17th SMRT Annual Meeting. The program chairs for this meeting are: ***Anna Kirilova, M.R.T., (R)(MR), Caron Murray, M.R.T., (R)AC (CT)(MR),*** and ***Nancy Talbot M.R.T., (R)(MR).***

Change is constant in MRI. ***Anne Marie Sawyer, B.S., R.T., (R)(MR)***, Editor, keeps us up to date with those changes by announcing the latest offering of the SMRT Educational Seminars, home study series.

Change in the manufacture and use of implants and devices mean we must be aware of the need to consistently review and update our knowledge of MR safety. Expert ***Frank Shellock, Ph. D.*** shares information with us about orthopedic implants.

Change in the field of MR allows technologists and radiographers opportunity to share their work as they maneuver the evolution of technology and its application. Included in the issue are abstracts of some of the presentations from the Annual Meeting.

Change involves new events and activities. Be sure to check out the calendar of upcoming workshops and educational opportunities.

2007 Annual Meeting Report

Vera Kimbrell Miller, B.S., R.T., (R)(MR), Chair, Program Committee

The 16th SMRT Annual Meeting was held in Berlin, Germany 19 and 20 May, 2007. Berlin is a wonderful city full of historical sites and great food! In between meetings most of us enjoyed some of the local sites and spent our euros on delicious German food and drink.

SMRT President, Cindy Comeau, B.S., R.T., (N) (MR)

Mercedes Pereyra, R.T. (R) (MR)

Mercedes Pereyra, R.T., (R)(MR) moderated the first didactic session on Saturday morning. After a welcome by our President, ***Cindy Comeau, B.S., R.T., (N)(MR)***, the meeting began with a Safety Forum. MR Safety is the number one priority of every MR technologist and radiographer making it a fitting way to begin our meeting. ***Hans Engels, Ph.D.*** explained the hazards we encounter daily and ways to minimize them. ***Julie Strandt-Peay, B.S.M., R.T., (R)(MR)*** told us how to implement a MR safety training program in the workplace

Donald McRobbie, Ph.D. completed the session with a discussion of parallel imaging. He took a very complicated subject and helped us to understand the physics and the concepts in this relatively new method of imaging. Who knew there was a K-x space? Oh boy…

The first proffered papers presented covered the topic of Emerging Pulse Sequences and brought to us wonderful research focus material. Awards are given for the top three papers as judged by the abstracts submitted for review by MR technologists and radiographers. This was a stellar year for submissions. We learned about BOLD Imaging in the liver with the first place award paper by ***Jay Neadles, R.T., (R)(MR)*** and also in *Chronic Compartmental Syndrome* by the third place (tie) award paper by ***Toni Cormier, M.R.T., (MR)***. *Susceptibility Weighted Imaging (SWI) in Breast Imaging MR*, third place (tie) paper, by ***KellyAnne McGorty, B.S., R.T., (R)(M)(MR)*** completed this triad. Each presentation by the author was well done and really interesting!

Toni Cormier, M.R.T., Jay Neadles, R.T., (R) (MR), and KellyAnne McGorty, B.S., R.T., (R) (M) (MR)

Anna Kirilova, BSc., R.T., (R) (MR)

Invited speaker, SMRT Policy Board member ***Anna Kirilova, BSc., R.T., (R)(MR)***, finished the morning session with *Imaging Fusion*. Her offering nicely demonstrated the importance of MR in Fusion Imaging and how the technology will play a bigger role for

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Radiation Therapy in the future.

During the lunch break in the program, the SMRT annual business meeting was held. Each of the standing committee chairs gave a brief report of activities this past year. President ***Cindy Comeau, B.S., R.T., (N)(MR)*** passed the gavel to incoming President ***Carolyn Bonaceto, B.S., R.T., (R)(MR)***. Each year the attendees are invited and encouraged to participate in this open session of the SMRT leadership. It gives the membership an opportunity to learn for themselves what is happening in the section and to ask questions or participate in discussion.

Cindy Comeau, B.S., R.T., (N)(MR), Carolyn Bonaceto, B.S., R.T., (R)(MR)

Newly elected SMRT Policy Board member ***Sonya Belville, B.S., R.T., (R)(MR)*** moderated the afternoon session. ***Robert Herfkins, M.D.*** began by presenting his view of MR artifacts and the issues MR technologists and radiographers deal with on a daily basis. He provided us with tools to help recognize and handle these artifacts as they occur.

The next invited speaker was ***Joshua Farber, M.D.*** After kind and much appreciated comments about the SMRT, Dr. Farber spent fifty minutes enlightening us on the basics of musculoskeletal imaging. A significant amount of that time was used discussing scanning parameters. This is a subject near and dear to the technologist's heart and we enjoyed this lecture.


Joshua Farber, M.D.

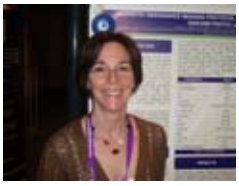
After a break, ***Michael Moseley, Ph.D.*** took on the sometimes difficult subject of Molecular Imaging. This is a new tool in our profession. The role of molecular imaging and MR is evolving and Dr. Moseley did a wonderful job putting everything into prospective.


Michael Moseley, Ph.D.

The last lecture of the day on Saturday was given by ***Caroline Reinhold, M.D.*** who held the audience's attention with very useful information about Pelvic Imaging. She spent time exploring techniques that involve chronic problems for MR technologists and radiographers like bowel and respiratory motion. We all left with new tools in our bag for scanning the pelvis.


Caroline Reinhold, M.D.

The day ended with Poster awards in both research and clinical focus categories. Those selected for presentation were offered the podium and allowed to prepare slides to explain their work. Although this is the first time this format was implemented, and based on the positive response from attendees it may continue. In previous years the author spoke next to the displayed traditional poster making the access to the presentation more limited for attendees. The well received oral poster presentations were followed by the SMRT Poster Tour Reception. Always a favorite with the attendees, this event allows MR technologists and radiographers to showcase their excellent work. It is also a great way to socialize and network with your peers worldwide.


Susan Crisp, R.T., (NM)(MR)


Alain Theoni


Anne Dorte Blankholm, M.Sc., R.T.


Biraget Ucan, R.T.


Caron Murray, M.R.T., (R)AC, (CT)(MR)

SMRT Policy Board member, ***Pam Vincent, B.S., R.T., (R)(MR)*** was the Sunday morning moderator at the ICC Convention Center. We began with "Proton Pilates" by invited speaker ***Elizabeth Moore, Ph.D.*** Dr. Moore walked us through our morning physics exercises and cleared up some "misconceptions" about relaxation.


Pam Vincent, B.S., R.T., (R)(MR)


Racquel Del Carpio-O'Donovan, M.D.

Racquel Del Carpio-O'Donovan, M.D. presented a wonderful case study of Neuro and Central Nervous System (CNS) lesions. The cases were interesting and the correlation with MR images was very informative.


Michael Kean, R.T.

The President's Paper Award this year went to former SMRT Policy Board member ***Michael Kean, R.T.*** This award is for the best overall score of submitted abstracts. Mr. Kean's paper discussed his work with the new BLADE technique and the application of this method in Neonatal Imaging of the Brain.


Greg Brown, R.T.

Greg Brown, R.T., newly elevated Fellow of the Section, spoke next and he explained Liver Iron

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Imaging. He demonstrated the use of MR to measure and image the liver in disease processes.

Protocol Optimization was the topic for ***Candi Roth, R.T., (R)(MR)(CT)(M)(CV)*** and she helped us to understand and manipulate our scanning parameters. ***Lawrence Wald, Ph.D.*** explored the methods we now use for Functional MR Imaging and what we may use in the future. *MR Elastography* is a works in progress and ***David Stanley, B.S., R.T., (R)(MR)*** gave us an overview of this new technique.

Lawrence Wald, Ph.D.

During the lunch break we had the awards ceremony for the newly elevated Fellows, Honorary Member Award, and the Distinguished Service Award. Fellow status was granted to ***Greg Brown, R.T.*** and ***Cindy Hipps, BHS, R.T., (R)(MR)***. Outgoing External Relations Chair, ***Julia Lowe, B.S., R.T., (R)(MR)*** was presented with the Distinguished Service Award for her efforts. ***Michael E. Moseley, Ph.D.*** was presented with the Honorary Member Award for his extraordinary achievement and exceptional level of service and support for the SMRT. In addition the International Forum was conducted allowing MR technologists and radiographers from different regions of the world to come together and find commonality as MR professionals. This was a meaningful exercise that will add direction to the future activities of the SMRT.

Cindy Hipps, B.H.S., R.T., (R)(MR), Michael Moseley, Ph.D., Greg Brown, R.T., Julia Lowe, B.S., R.T.(R)(MR)

Andrew Arai, M.D.

Wendy Strugnell, B.Sc.

The final afternoon session was moderated by SMRT Policy Board member ***Anne Dorte-Blankholm, M.Sc., R.T.(MR)***. The first offering was the Cardiac Forum with ***Andrew Arai, M.D.*** and ***Mercedes Pereyra, B.S., R.T., (R)(MR)***. They provided us with both the techniques used for cardiac MR imaging and how the studies are used to diagnose disease.

Attendees gathered in groups by geographical regions to discuss how the SMRT may better serve their educational needs during the international forum.

Maureen Hood, M.S., R.N., R.T., (R)(MR) and Filip DeRidder, R.N

New this year was a Nursing Forum with ***Maureen Hood, M.S., R.N., R.T., (R)(MR)*** and ***Filip DeRidder, R.N.*** participating. They explained how nurses are integrated into our MRI departments both in the United States and Europe.

Michael Kean, R.T, Cindy Comeau, B.S., R.T., (N)(MR), Kai B. Reiter, R.T.

Clinical Focus proffered papers followed in the program. These presenters were the top three papers submitted with a clinical focus. This session was entitled "Exploring Advanced Imaging Techniques" and included: first place author ***Cindy Comeau, B.S., R.T., (N)(MR)*** discussing Cardiac MR; second place author ***Seong-Phil Go, R.T.*** demonstrating use of Contrast Media; and third place author ***Kai B Reiter, R.T.*** presenting, the New TWIST Technique. Again, wonderful and insightful work by all authors!

Seong-Phil Go, R.T.

Leif Ostergaard, M.D., Ph.D.

Perfusion Imaging was the subject chosen by ***Leif Ostergaard, M.D., Ph.D.*** He did a great job of demonstrating this technique with MR images and showed us the importance of rapid treatment for the patient.

The final didactic presentation was on MR contrast past, present, and future. ***Fredrik Giesel, MD., MBA***, led us through the history of gadolinium and into the present day use of contrast media.

I would like to thank everyone on my behalf and the entire program committee for their efforts! It was a great Annual Meeting and it was good to see the truly international attendance. We look forward to Toronto!!!

Editor's note: Thanks to the members who provided Annual Meeting Photographs for this issue: Karen Bove Bettis, Randy Earnest, Bobbi Lewis, Ellen Candon, and Mark Spooner.

SMRT
16th Annual Meeting
Attendees by Country
300 Meeting Attendees

16 Australia
5 Belgium
22 Canada
7 China
23 Denmark
18 Finland
2 France
10 Germany
1 Ghana
1 Greece
8 Iceland
2 India
1 Italy
9 Japan
7 Korea
2 Kuwait
3 New Zealand
11 Norway
3 Scotland
4 Singapore
4 Spain
21 Sweden
4 Switzerland
20 Netherlands
3 Turkey
30 United Kingdom
62 USA
1 Venezuela

Report on the 2007 SMRT/ISMRM Joint Forum

By Cindy Comeau, B.S., R.T., (N)(MR); Janice Fairhurst, B.S., R.T., (R)(MR); and Maureen Hood, MS, RN, R.T., (R)(MR)

The SMRT/ISMRM Joint Forum held Monday afternoon 21 May 2007 was rated very highly by all of the attendees. Forum Co-Chairs were ***Clare Tempany, M.D.*** and SMRT Executive member ***Charles Stanley, R.T., (R)(CT)(MR)***, who also moderated the panel discussion at the conclusion of the presentations. The audience was a mix of technologists/radiographers and physicians from around the globe. The topic for this year's forum was "Preparing for MRI and MR Guided Interventions." The purpose of the joint forum is to allow the interaction between SMRT and ISMRM membership regarding important clinical topics. The objective of the forum was to provide participants with current information regarding new approaches that ensure a safe MR environment; how to prepare the patient for complex MRI examinations and how to deal appropriately with MR Guided Interventional cases.

The first speaker was ***Angela Kanan, R.N., (BSN)(CNOR)(CRN)*** from Brigham & Women's Hospital, Boston, Massachusetts, U.S.A., who started the session with Interventional case presentations. The case studies that Angela presented were all very excellent examples of the complexity of patients that are referred for interventional MR procedures. She outlined the patient's history and the appropriate procedure that the patient was referred for.

The second speaker was ***Derek Hill, Ph.D.*** from IXICO, London, England, who presented very timely information concerning MR safety. He covered pertinent and important aspects concerning MR safety from both the patients, technologists and physicians point of view.

Our third speaker was ***Janice Fairhurst, B.S., R.T., (R)(MR)*** from Brigham & Women's Hospital, Boston, Massachusetts, U.S.A. and newly elected SMRT Policy board member. Janice's talk included imaging techniques and guidance on performing MR-Guided Interventional Procedures. She really did demonstrate the high skill level that

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Thank You Corporate Members!

The Section for Magnetic Resonance Technologists gratefully acknowledges the following ISMRM Corporate Members for their continuous support of the SMRT educational activities:

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Thank You Donors!

The Section for Magnetic Resonance Technologists gratefully acknowledges the following donors for their generous support of the SMRT Sixteenth Annual Meeting:

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Remember Your Vote is Important!

Call for Nominations & Awards

Remember Your Vote is Important!

2007 - 2008

By Cindy Comeau, B.S., R.T., (N)(MR), Chair,
Nominating and Awards Committees

The purpose of the SMRT Policy Board is to ensure that SMRT achieves its stated purpose and objectives. This cannot be accomplished unless dedicated members volunteer their time to enhance the mission of the SMRT. It is my honor as Past President to Chair the Awards and Nominations Committees. You, as the membership, nominate the individuals you think will make the best policy board members thereby enriching and shaping the Section's growth. Elected Policy Board Members serve a three-year term beginning May (2008) in Toronto and are responsible for various committee activities within the SMRT. I invite everyone to visit the SMRT website as a overview of the functions of the current SMRT committees are listed. MRI Technologists/Radiographers are faced with new challenges daily. The SMRT Policy Board is constantly addressing new issues as they effect our profession. Do you know someone who loves to take on new horizons? Participating as a SMRT Policy Board member may be for them!

Ballots must be postmarked by 1 December 2007 and received in the ISMRM/SMRT Business office by 7 December 2007

All Policy Board and Award nominations should be submitted directly to Jennifer Olson (Jennifer@ismrm.org) in the ISMRM/SMRT Business Office or to Cindy Comeau (ccomeau@mrict.com) by close of business on 1 September 2007

The Nominations Committee will work to compile a list of nominees; verify that the nominees are SMRT voting members in good standing; verify that the applicants actually want to run for office, collect biographies and then present a slate of candidates to the membership for vote. Ballots containing the nominations presented by the Nominating Committee and/or nominations made by direct Member petition shall be mailed to all voting Members no later than 15 October 2007.

The SMRT Membership also nominates candidates for the office of President Elect. The President Elect serves a three-year term as President Elect, President and Past President, representing a significant commitment to the SMRT. Qualified individuals include SMRT members in good standing who have the ability to lead the organization and must have served as an at-large member on the Policy Board.

The Past President also chairs the Awards Committee. The Award nominations are yet another responsibility of the SMRT membership. Members submit the names of qualified individuals to the Awards Committee. The Crues-Kressel Award is presented to an individual for his/her outstanding contribution to the education of MR technologists. The SMRT awards also include the Honorary Membership given in recognition for extraordinary achievement and service. The Distinguished Service Award given for outstanding contribution for the operation of SMRT and the Fellow of the Section Award given for significant participation in SMRT functions.

All Policy Board nominations should be submitted directly to Jennifer Olson (Jennifer@ismrm.org) in the ISMRM/SMRT Business Office or to me, Cindy Comeau (ccomeau@mrict.com) by close of business on 1 September 2007. This allows time for a list of candidates to be compiled, ballots to be printed and then mailed to the membership no later than 15 October 2007.

Please consider becoming more involved with SMRT activities by running for Policy Board. Nominate yourself or another individual to the Policy Board, the Crues-Kressel Award or for the office of President Elect. Remember to consider those individuals you think will best reflect the membership and the mission of the SMRT.

Ballots must be postmarked by 1 December 2007 and received in the ISMRM/SMRT Business office by 7 December 2007.

Remember Your Vote is Important!

Pam Vincent, MPA, R.T., (R)(M)(CT)(MR)
Chair, Local Chapters Committee

Chapter Chat

SMRT International Forum News

The International Forum, planned to address the needs of all members worldwide, was held during the recent SMRT Annual Meeting in Berlin, Germany. The forum was a huge success. The SMRT is truly an international organization. Our goals of providing quality education and communication on a global scale were explained to everyone in attendance. One of the ways to meet this goal is through local chapters. Recognizing that the requirement for MR technologists and radiographers to practice varies between countries, it was emphasized that chapters should be organized and planned to meet the needs of your local MR technologists and radiographers. This may include conducting chapter meetings in your native language rather than English, the language used by the parent organization, the International Society for Magnetic Resonance in Medicine (ISMRM).

The representation from Europe, Scandinavia, Asia, Australia, and the Middle East was remarkable. We were so happy to welcome MR technologists representing Singapore and Kuwait for the first time at an SMRT meeting. North American MR technologists were also well represented with attendees from both Canada and the United States.

Interest was generated in starting several new chapters, including Canada, a Northern European chapter, a chapter in Belgium, Luxembourg and the Netherlands, and an Asian chapter based in Singapore. Hopefully the United States will also be adding more chapters soon. If you see a chapter that interests you, or you would like to start a chapter in your area, please contact Pam Vincent (vincentp@nhlbi.nih.gov) for more information. The SMRT is your organization. This is only one of the ways you can take advantage of its many benefits. The local chapter's packet is always available online at http://www.ismrm.org/smrt/chapters, and contains information on how to get started.

Chapter Updates

The Australia-New Zealand Chapter was privileged to have ***Dr. Frank Shellock*** visit Australia in April to present an update on MRI Safety. The meetings were held in Sydney and Brisbane and were well-attended with over 100 MR radiographers, nurses and radiologists at each meeting. As always Dr. Shellock was both entertaining and informative and lively discussions followed the presentations. All meeting attendees were given a complimentary copy of Dr. Shellock's book "Reference Manual for Magnetic Resonance Safety, Implants and Devices: 2007 Edition." The ANZ Chapter would like to thank Dr. Shellock for generously donating the books and his time and also thank Siemens Medical and GE Healthcare for sponsoring the meetings.

Plans are well under way for the ANZ Chapter Regional Meeting which will be held in Melbourne on Saturday 17th and Sunday 18th November 2007.

Michael Macilquham from the John Fawkner Hospital in Melbourne will be taking over as President of the ANZ Chapter for the last six months of ***Wendy Strugnell***'s term to allow her to concentrate on her duties as SMRT President-Elect 2007-2008. He can be contacted at Michael.Macilquham@i-med.com.au. Nominations will shortly be called for the two-year terms (2008/2009) for the President, Secretary and Treasurer of the Chapter. Plans are well under way for the ANZ Chapter Regional Meeting which will be held in Melbourne on Saturday 17th and Sunday 18th November 2007. We hope you can join us for a fun and educational weekend in beautiful Melbourne.

The Section for Magnetic Resonance Technologists

invites you to Travel Toronto for

"MR Education Unlimited!"

at the 17th Annual SMRT Meeting
3-4 May, 2008 Toronto, Ontario, Canada

Be sure to check the SMRT website: http://www.ismrm.org/smrt for up-to-date program information as it is available and for the "Call for Papers" details.

Plans for the 17th Annual SMRT Meeting have already begun and the Program Committee is working to provide you with an outstanding educational opportunity. The meeting will be held in conjunction with the 16th Scientific Meeting and Exhibition of the International Society for Magnetic Resonance in Medicine (ISMRM). The Toronto program will be designed to fulfill the needs and desires of MR technologists and radiographers in both the clinical and research settings.

The goal of the program is to provide the best possible forum for MR education and understanding of the principles and clinical applications of MR. Topics and speakers are selected based on the evaluation forms completed at the previous Annual Meeting and from suggestions from members of the SMRT. By designing the program in this manner, the information will be appropriate and timely for all who attend. As a SMRT member, you are welcome to offer ideas for educational presentations at the Annual Meeting or at any of the Regional Educational Seminars.

An important aspect of the Annual Meeting is the submission of abstracts for oral or poster presentations by MR technologists and radiographers. This aspect of the meeting continues to grow with increasing numbers each year. We hope that you and your peers will consider sharing your work for the advancement of MR throughout the world.

During the Annual Meeting, awards will be presented to the most outstanding papers and posters submitted in the areas of both clinical and research. In addition, the Business Meeting will enable you to learn about the work that the Section has been doing throughout the year. The Annual Meeting is just one of the many things that the Section is doing on your behalf, and the business meeting is one way you can learn about these activities and take part in valuable discussions regarding your profession. New officers are also introduced and installed during this meeting.

We would like to thank the following SMRT members who have so graciously volunteered their time to serve on the Program Committee this year: ***Carolyn Bonaceto, Vera Miller, Dave Stanley, Muriel Cockburn, Mercedes Pereya, Todd Fredericks, Cindy Comeau, Laurian Rohoman, Steve Shannon, Silke Bosk, Pam Vincent*** and ***Sonja Robb-Belville.***

"As Chairs of the 2008 Program Committee, it is our pleasure to invite you to attend this meeting and to join us for an exciting, educational weekend in the wonderful city of Toronto."

- Anna Kirilova, B.Sc., R.T., (R)(MR)
- Caron Murray, M.R.T., (R)AC, (CT)(MR)
- Nancy Talbot, M.R.T., (R)(MR)

Report on the SMRT President's Regional Educational Seminar

Cindy R. Comeau, BS, R.T., (N)(MR)
Regional Co-Chair,
SMRT President 2006-2007

and

Carol Finn, R.T., (R)(MR)
Regional Co-Chair

The SMRT New York City Presidents Regional was held at the Morgan Stanley Children's Hospital of New York-Presbyterian in New York City on Saturday 10 March, 2007. The venue, donated by the New York Life Foundation Wintergarden Programming Series, received very high remarks from the attendees. With some very prestigious speakers on the agenda it was a great day of education for all technologists who attended!! First off, I have to sincerely thank my co-chair ***Carol Finn*** as if it wasn't for her this meeting would not have happened. Carol is also very dedicated in organizing technologists training, not only for her staff but also in for assisting me in all planning stages for this meeting. Carol was instrumental in organizing the faculty as presenters for the meeting. Carol and I would especially like to thank ***Dr. Frank Shellock*** who provided his 2007 Safety book to all of the attendees. The program was approved for eight Category-A Credits by the SMRT.

NY Regional SMRT attendees having lunch in the atrium area in the Morgan Stanley Children's Hospital of New York Presbyterian

After a very busy morning of organization and greeting the attendees the meeting promptly started with ***Dr. DeLaPaz***, Director Neuro-Radiology at the New York-Presbyterian Columbia Campus who presented a very informative presentation on *Stroke Imaging*. Following on the agenda was ***Bill Faulkner BS, R.T., (R)(MR)(CT)***. Bill did an excellent and timely review of contrast media, and the group certainly appreciated this information. Bill also presented on new techniques for musculoskeletal work. This was a very interesting lecture on dedicated MRI systems used for extremity imaging. The next speaker was ***Charles Stanley CRA, R.T., (R)(CT)(MR)*** the Imaging Manger – Divisions of MRI, CT 3D Imaging at the University of VA Health System in Charlottesville, Virginia presenting MRI Media Myths. Charles has quite a collection of clips on this subject which the attendees found to be very interesting. Charles did an excellent job in pointing out some very important safety considerations when working in the MRI environment.

Bill Faulkner keeping the NY Regional attendees attentive with his presentations on contrast media and musculoskeletal imaging

Before the lunch break ***Cindy Comeau, B.S., R.T., (N)(MR)*** presented a quick review of cardiac MRI scan planes. This was a warm up for ***Dr. Steven Wolff*** presenting on Cardiac MRI Applications. The attendees enjoyed a terrific lunch out in the atrium area and were also able to obtain product information from Berlex and Bracco. After lunch the session opened with ***Dr. Wolff, M.D., Ph.D.*** from Advanced Cardiovascular Imaging, NY, NY who "wowed" the group with the current capabilities of Cardiac MRI. Dr. Wolff presented an array of cardiac MRI applications that are currently used today in clinical practice.

Next was ***Dr. Martin Prince, M.D.*** from Cornel and Columbia Universities who presented some fabulous cases demonstrating new scanning techniques that have been introduced by vendors within the last year for MRA applications. Dr. Prince is certainly a group favorite on this topic. The next topic on *Basic and Advanced Pediatric Neuro Imaging* was presented by ***Dr. William S. Millar, M.D.*** the Director of Pediatric Neuro-Radiology at the Children's Hospital of New York in New York City. Dr. Millar outlined some very detailed information for use when scanning the pediatric patient. He emphasized that children are not

Continued on page 12

little adults and special details to the scanning protocols need to be incorporated.

Our last presenter of the session was ***Dr. Kevin Mennitt, M.D.*** the Chief of Body MRI from Weill Cornell Medical College. Dr. Mennitt definitely kept the group on track with his very interesting presentation on MR imaging of Emergency Patients. He even shared some excellent protocol information for the group. Dr. Mennitt's energetic presentation style was very much appreciated by all the attendees.

We had tremendous sponsor support for this meeting. I would like to especially thank ***Berlex Laboratories, Inc., Bracco, Institute for Magnetic Resonance Safety, Education and Research, Medrad*** and ***ONI Medical Systems, Inc.*** The SMRT would also like to thank all the speakers who took time out of their busy schedules to participate and all of the attendees for spending their Saturday learning and advancing their knowledge. Lastly, we need to thank Jennifer Olson at the ISMRM office for her assistance with organizing this meeting as she truly makes it a very rewarding experience!

ISMRM/SMRT Joint Forum *continued from page 7*

this applications needs. Her presentation included pictures of the first MR Interventional suite, the GE .5T Signa double donut magnet. Her presentation included topics for positioning patients for MR guided interventions, artifacts associated with introducing needles, probes and such in the interventional setting and various techniques to either minimize or enhance these artifacts to benefit the procedure. Some of the MR guided interventions included Craniotomies, Cryotherapy, Prostate Brachytherapy, MR-guided Focus Ultrasound and Biopsies.

Next up was ***Maureen N. Hood, M.S., R.N., R.T., (R)(MR)*** from Uniformed Services University of the Health Sciences in Bethesda, Maryland, who presented information concerning patient preparation and care needs for performing Cardiac Stress MRI. She pointed out that education is the biggest key for both the patient and the MRI department before performing these types of examinations. The patient needs education and instruction in advance of the MRI procedure for optimal outcomes. The patient needs education on how to prepare for the stress MRI exam and what to expect during and after the exam. The multidisciplinary stress MRI team needs to be prepared for an emergency and be well trained to care for the cardiac patient in the MRI environment.

Ms. Hood explained that due to the added risks of the types of patients needing cardiac MRI and the pharmacologic stress agents used, such as Adenosine and Dobutamine, specialized personnel such as a cardiac trained MR technologist, registered nurse, and physician must be present during the examination. In addition, sites performing stress MRI need specialized equipment such as monitoring equipment, medication pumps, power injectors and 12-lead ECG machines in order to properly care and monitor the patient. Stress MR imaging is safe and feasible when the proper interdisciplinary team, equipment and protocols are followed.

" ... all the attendees walked away with a greater understanding of what Interventional MR is currently capable of and the role of technologists/ nurses and physicians have in working together as one team."

To close out the afternoon session ***Angela Kanan, R.N., (BSN)(CNOR)(CRN)***, completed the follow-up on the cases that she presented at the beginning of the session by elaborating on techniques used to over come difficult cases in the MR guided interventional suite. This was followed by a question and answer session that included all panel members. It was a terrific conclusion to see the positive outcome that MRI Guided Interventions had on the cases she presented. This application is becoming a more standard option to monitor various treatments and can offer excellent clinical outcomes for patients.

Charles Stanley did an excellent job of engaging the panelists and the attendees on important questions concerning this topic. Overall it was an afternoon that was well spent by all the attendees. Hopefully all the attendees walked away with a greater understanding of what Interventional MR is currently capable of and the role of technologists/nurses and physicians have in working together as one team.

SMRT Educational Seminars • Volume 10, Number 2

MR Imaging Artifacts: Appearance, Cause & Cure

Anne Marie Sawyer, B.S., R.T., (R)(MR)
Editor,
SMRT Educational Seminars
Home Study Program

We are pleased to present the SMRT Educational Seminars, Volume 10, Number 2: "MR Imaging Artifacts: Appearance, Cause & Cure." This is the thirty-sixth home study developed by the SMRT, exclusively for the SMRT members.

With every advance in MR imaging, we encounter new artifacts. The most sophisticated software, the most complex, progressive hardware and higher field strengths all generate new artifacts often requiring a better design or unique invention to remedy. In addition, despite the growth of this medical imaging technology, many artifacts continue to plague us year after year without hope that they will soon be resolved. Often, it is the most subtle of the MR imaging artifacts that can prove to be the deadliest, mimicking minute contrast enhancement. Increased signal can be the cash we use to purchase greater resolution and/or speed. It can also increase the artifacts that obstruct diagnostic image interpretation.

Understanding is key to recognizing the artifacts as artifacts and to developing methods of prevention or clever workarounds. Thorough knowledge of the most fundamental MR imaging physics and principles allow us to utilize our MR system to its fullest capability, using every tool in the toolbox to generate images that are not severely compromised by artifacts.

As ***Greg Brown*** says (http://www.users.on.net/~vision/): "Artefacts are an image of the process, not the object. The predictable interaction of an imaging method and real world objects." To address and alleviate imaging artifacts in MR, we must clearly understand the process and the interaction.

"Understanding is key to recognizing the artifacts as artifacts and to developing methods of prevention or clever work-arounds.

Thorough knowledge of the most fundamental MR imaging physics and principles allow us to utilize our MR system to its fullest capability, using every tool in the toolbox to generate images that are not severely compromised by artifacts."

We would like to express our appreciation to ***Nancy Hill Beluk*** (Pittsburgh, Pennsylvania, USA) and ***Bobbie Burrow*** (Atlanta, Georgia, USA) for writing the questions that compose the quiz. Thank you to ***Brian Hargreaves, Ph.D.*** (Stanford University School of Medicine, Department of Radiology, Stanford, California, USA) for participating as our expert reviewer.

Thanks also to ***Bobbi Lewis***, outgoing SMRT Publications Chair, ***Paul McElvogue***, incoming SMRT Publications Chair and in the Berkeley, California, USA office of the ISMRM/SMRT, Jennifer Olson, Associate Executive Director and the staff for their insight and long hours supporting these educational symposia.

Finally, we would like to thank ***John Wilkie*** and all of the wonderful people at Invivo/MRI Devices Corporation who support our home studies program, SMRT Educational Seminars. Their continuing support of technologist and radiographer education brings quality continuing education to the SMRT membership worldwide.

MRI Safety and Orthopedic Implants

Most orthopedic implants are made from nonferromagnetic materials and, therefore, tend to be acceptable for patients undergoing MRI examinations. In vitro testing has been conducted at 1.5- and 3-Tesla, verifying the safe aspects of orthopedic devices with regard to magnetic field interactions (see www.MRIsafety.com for a summary of this information). To date, only the Perfix interference screw used for reconstruction of the anterior cruciate ligament has been found to be highly ferromagnetic. Because this interference screw is firmly imbedded in bone for its specific application, it is held in place with sufficient retentive forces to prevent movement or dislodgment. Patients with Perfix interference screws have safely undergone MR pro-cedures using MR systems operating at 1.5-Tesla.

The presence of the Perfix interference screw causes extensive image distortion during MR imaging of the knee. Therefore, interference screws made from materials with low magnetic susceptibility should be used for reconstruction of the anterior cruciate ligament if MRI is to be utilized for subsequent evaluation of the knee.

Since the metals used for orthopedic implants are good conductors, MRI-related heating is a concern. In some cases, due to the length or formation of a conductive loop, MRI-related heating may be substantial, posing a potential hazard for a patient undergoing an MRI procedure. This is especially problematic for external fixation systems.

by Frank G. Shellock, Ph.D.

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Director for MRI Studies of Biomimetic MicroElectronic Systems

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External Fixation Systems

External fixation systems comprise specially designed frames, clamps, rods, rod-to-rod couplings, pins, posts, fasteners, wire fixations, fixation bolts, washers, nuts, hinges, sockets, connecting bars, screws and other components used in orthopedic and reconstructive surgery. Indications for external fixation systems are varied and include the following treatment applications:

- Open and closed fracture fixation;
- Pseudoarthroses of long bones (both congenital and acquired);
- Limb lengthening by metaphyseal or epiphyseal distraction;
- Correction of bony or soft tissue defects; and
- Correction of bony or soft tissue deformities.

The assessment of safety issues for external fixation systems is particularly challenging because of the myriad of possible components (many of which are made from conductive materials) and configurations used for these devices. The primary concern is MRI-related heating which is dependent on particular aspects of the external fixation system. Importantly, the MRI conditions (field strength, RF field, RF transmit coil, pulse sequence, body part imaged, etc.) used greatly impacts the safety aspects of scanning patients with external fixation systems.

In order to ensure patient safety, guidelines must be implemented on a case-by-case basis. Therefore, MRI users are referred to product labeling approved by the Food and Drug Administration for a given external fixation system. Notably, the safe MRI conditions typically apply to the specific configuration(s) used in the evaluation of a given fixation device, ONLY. Other configurations may be unsafe.

Vibration of Orthopedic Implants Associated With MRI Procedures

Graf et al. reported that torque acting on metallic implants or instruments due to eddy-current induction in associated with MRI can be considerable. Larger implants (such as orthopedic fixation devices) made from well-conducting materials are especially affected. Gradient switching was shown to produce fast alternating torque. Significant vibrations at off-center positions of the metal parts may explain why some patients with metallic implants sometimes report feeling sensations of heating during MRI examinations.

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Neonatal Brain Imaging at 3 Tesla
Comparative Study of Standard Transverse 2D TSE T2 and Non Motion Corrected BLADE

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Purpose

Conventional Turbo Spin Echo (TSE) sequences using rectilinear k-space sampling techniques are currently the gold standard for the evaluation of the neonatal brain. New TSE sequences with reduced sensitivity to in-plane motion (BLADE, PROPELLOR) have been demonstrated to have a clinical role in the evaluation of un-sedated or distressed children. We evaluated the diagnostic accuracy of standard TSE when compared with the **non-motion** corrected variants of the BLADE sequence to determine if there were significant variations in image quality or diagnostic confidence.

Method

We retrospectively reviewed the T2 weighted imaging of 30 consecutive neonatal brains acquired at 3 Tesla using a standard TSE T2 weighted with RESTORE sequence and a works in progress (WIP) version of BLADE with RESTORE. Any patient who failed to complete both sequences were excluded from the study. All patients were scanned using a Siemens Trio (Erlangen Germany) operating with software version MR2006T using the standard 12 Channel Matrix head coil.

The BLADE sequence was optimized to reflect as accurately as possible the TR, TE and spatial resolution of our standard TSE sequence. BLADE (4500, 127ms, 3mm/0mm,1 Acq, 2 concatenations, ESP 9.76, turbo factor 27, resolution 0.6 x 0.6 x 3mm) and the TSE sequence (4800, 135ms, 1 Acq 2 concatenations, ESP 10.3, turbo factor 23 resolution 0.6 x 0.5 x 3mm).

The images were reviewed by two pediatric MR Radiologists, a Neonatologist and senior MR technologist. The image analysis was divided into two sections (a) general image quality performed by MR technologist using a side by side analysis to ensure accurate representation of the regions of interest (ROI). Signal to noise (SNR) measurements were obtained in the anterior white matter (AWM),cerebro spinal fluid (CSF), Thalamus, Putamen, posterior white matter (PWM) and cortical grey matter (CGM), contrast to noise (CNR) calculations involved the comparision of AWM vs Thalamus, CSF vs AWM, CSF vs Thalamus and CGM vs AWM. The images were also reviewed for specific absorption rate (SAR) comparisions, image artefacts (truncation, vascular pulsations and flow voids, CSF flow and pulsations.) (b) diagnostic image quality was performed by two experienced pediatric MR radiologists and a neonatologist blinded to the results of the other reviewers. The images were all read and graded (0-5, with 0 = not applicable and 5 = excellent image quality) using a standard set of image quality criteria and specific anatomical locations that represent regions of potential abnormalities in neonatal brain injury. In addition to grading locations such as the basal ganglia, germinal matrix zones, white matter signal , posterior and anterior limbs of the internal capsule the reviewers also looked at sulcation, appropriate level of myelination, differentiation of GM vs WM, haemorrhage , calcification and peri-vascular spaces. The reviewers made an assessment of the overall image quality and their level of diagnostic confidence in the ability of both sequences to adequately demonstrate pathology.

Results

The differentiation of the majority of cerebral structures are adequately displayed by both sequences and as such have a high degree of diagnostic confidence in both series. The apparent spatial resolution and the definition of small structures such as peri-vascular spaces and germinal matrix zones have a higher conspicuity on BLADE images. The SNR and CNR analysis shows that due to the over sampling of the central components of k-space the influence of CSF based analysis (AWM vs CSF, GM vs CSF etc) favours the BLADE acquisition which may enhance the visibility of subtle pathologies. No significant differences in the differentiation of GM and WM was demonstrated between the two sequences. An occasional truncation artifact that appears superiorily at GM/ CSF interface was identified on the BLADE images, believed to result from the TE and central lines of k-space not being centered (46% on the BLADE vs 50% on TSE) but did not influence the diagnostic accuracy of the sequence.

Conclusions

The use of non-motion corrected BLADE produces images of a diagnostic accuracy similar to standard TSE sequences with an apparent higher resolution making it a viable alternative for general neonatal brain imaging.

Functional Liver Evaluation Using Blood-Oxygen Level Dependent (BOLD) Imaging

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Introduction: BOLD (blood oxygen level dependent) contrast is well known as the basis behind brain fMRI O_2 demand changes with activation. In non-brain tissues changing O_2 supply (e.g. by breathing 100% O_2) also leads to modulation of BOLD contrast **[1]**. BOLD modulation has previously been demonstrated in liver following certain challenges **[2]**, including intake of a standardized meal **[3]**. Therefore, we proposed the liver may exhibit different hyperoxia-modulated BOLD signal behaviors when comparing fasted to postprandial states.

Methods: In a study approved by our local institutional IRB, healthy fasted human subjects (n=12) were scanned using a GE Signa HDX 3T short-bore MR scanner (GE Healthcare, Milwaukee, WI, USA) and 8-channel torso phased array coil and respiratory bellows. Respiratory motion/position was digitized every 4 ms and recorded using an MRIx data acquisition computer (Thulborn Associates, Chicago, IL, USA). Following localization of the hepatic portal bifurcation, a sagittal multiphase T2*-weighted GRE EPI sequence was employed (_=90°, 1 NEX, TE=35ms, TR=1000ms, 24cm FOV, 64x64 matrix, 8mm thick, 1248 phases, 12 discarded acquisitions, total time=21minutes) before and 15 minutes following a controlled meal (235mL of Ensure Plus, Ross Prod. Div., Abbott Labs, Saint-Laurent, Que., Canada). A sagittal acquisition was chosen to minimize through-plane liver motion and allow free breathing during the scan **[4]**. To modulate liver BOLD contrast, 100% O_2 (15L/min) was cycled with medical air (21% O_2) in three cycles during each BOLD scan. Image post-processing first involved motion correction, based on the correlation coefficient template matching algorithm **[5]**, followed by respiratory noise reduction through a band-stop digital filter. The motion-compensated BOLD image sets were analyzed using a pixel-wise cross-correlation with a *sawtooth* model function. The calculated correlation coefficient (***cc***) scaled between -1 and 1 (where 0 indicated uncorrelated). Any pixel time-course with ***cc >0.35*** was considered an "activation".

Results: Two liver 'types' were observed: 8 subjects showed clear positive (+Ve) enhancement with hyperoxia cycling (44.62±21.11% significant activation) while 2 enhanced strongly negatively (-Ve) (23.39±14.88% significant). This was hypothesized to be related to alteration in blood flow with hyperoxia (**Table 1**). Repeat scans on different days gave consistent responses (i.e. either –Ve or +Ve). No matter if the response was –Ve or +Ve, both liver types showed diminished significant enhancement in the postprandial state (**Fig. 1**). This decrease was most significant (P<0.036, paired t-test) in +Ve livers (diminished to 13.41±12.61%).

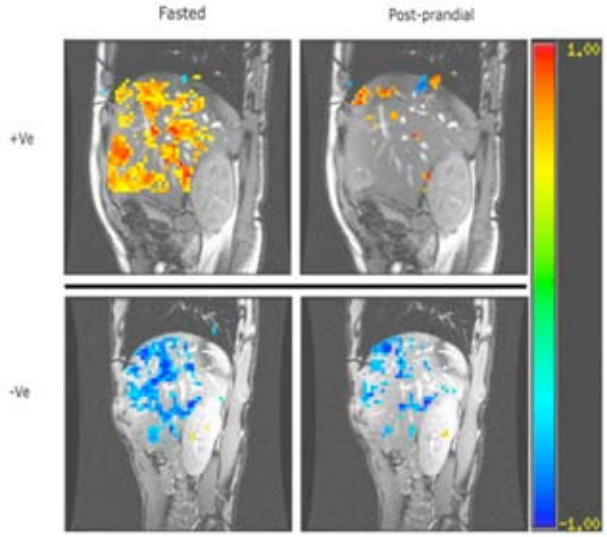

Figure. 1. *Positive (top) and negative (bottom) enhancing livers in the pre- and postprandial states.*

Subject	Type	Fasted Medical Air (mL/min)	Fasted O_2 (mL/min)	Change (%)
1	+	1373.2±27.5	1659.1±27.5	↑ 20.8
4	+	589.8±15.7	525.5±33.4	↓ 10.9
9	-	945.9±10.0	781.4±5.7	↓ 17.4
10	-	1379.6±4.5	1078.9±2.6	↓ 21.8
11	-	794.2±22.0	558.5±9.6	↓ 29.7

Table 1. *Blood flow values measured using 2D phase contrast velocity encoding in hepatic portal vein, during medical air and hyperoxia (100% O_2) breathing.*

Discussion: The blocked design and sawtooth model function appeared feasible to reveal functional-active regions in liver parenchyma. The postprandial decrease in activated voxels could have been due to the elevated state of metabolism and thus O_2 extraction (+Ve livers). But, 100% O_2 was hypothesized to increase liver BOLD signal due to elevated blood oxyHb, providing everything else remains constant. However, negative enhancement with hyperoxia indicated that other BOLD related factors might also change, for example blood flow. Previous work showed blood flow from gut to the liver via the hepatic portal vein increased following a meal **[6]**. In our study diminished enhancement following a meal provided evidence that a meal may alter the proportions of arterial and portal venous blood, and the influence of arterial blood on BOLD signal change under hyperoxic conditions can be accordingly lowered. The significant diminution occurred in +Ve livers may indicate a pronounced alteration in blood supply. In addition, more subjects appeared to be +Ve's and the resting-state BOLD signal was usually lower in –Ve livers. It is therefore proposed that the concept of "activation percentage" may be a more reliable parameter for function investigation of +Ve livers rather than –Ve livers. Further work is required to verify the utility of this approach.

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Validation of an Automated Left Ventricular Segmentation Technique for Quantifying Stroke Volume

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Purpose

Many consider MRI the imaging test of choice for quantifying left ventricular (LV) end-diastolic volume, end-systolic volume, stroke volume (SV), and ejection fraction (EF). Typically, volumes are derived by segmenting the LV endocardial border on serial short axis images. However, this method has several problems: 1) the endocardial contours are of low spatial frequency and papillary muscles and trabeculations are often included in the ventricular cavity; 2) it is difficult to determine the precise position of the LV base due to poor spatial resolution in this dimension (spatial resolution = slice thickness, which is typically ~8 mm); 3) if segmentation is performed manually, the number and location of the endocardial borders is subjective. The purpose of this study was to assess whether a new, commercially-available software, could provide more accurate and more reproducible quantification of LV volumes and ejection fraction.

Methods

We retrospectively analyzed 20 cardiac MRI studies in patients without valvular disease, performed on a 1.5T HDx scanner (GE Healthcare, WI). All MRI studies included a series of contiguous, prospectively ECG gated short-axis cines through the left ventricle and a 2-chamber long-axis cine (FIESTA pulse sequence:TR/TE,3.1/1.4, BW=125, matrix=192x160 FOV=35-38, views-per-segment=24, 20 reconstructed phases per cardiac cycle). Prospectively ECG gated phase contrast images of the aorta were acquired at the aortic root 1-2 cm distal to the aortic valve (TR/TE, 7.2/2.9, BW=31, matrix= 256x128, field-of-view=35-40, views per segment=8, 30 reconstructed phases per cardiac cycle). LV volumes and ejection fraction were derived using 2 distinct methodologies. Method 1 (Manual): The subendocardial contours were drawn manually at end-diastole and at end-systole. The cardiac base was determined subjectively, as the most basal slice where myocardial tissue comprised more than 50% of the circumference of the blood pool. Method 2 (Semi-automated): LV volumes were determined using the semi-automated analysis in ReportCARD3.0™ (GEHealthcare, WI). The ReportCARD™ software produces endocardial borders with high spatial frequency, thereby excluding papillary muscles and trabeculations from the LV cavity. It also determines the basal and apical extent of the LV on short axis images, based on user input of these locations on a 2-chamber long-axis cine. Stroke volumes were calculated using these two methodologies and compared to the aortic flow as assessed from the phase-contrast images. In these patients without valvular disease, the LV SV should equal the aortic flow.

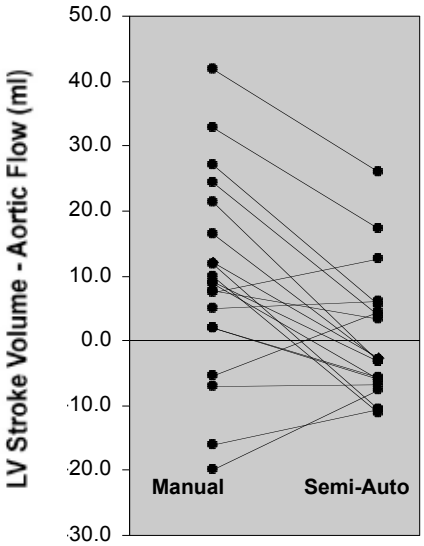

Figure 1

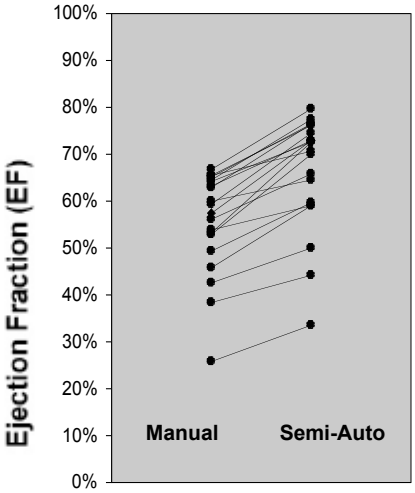

Figure 2

Results

The difference between LV SV and aortic flow was 10 ± 15 ml using manual traces and 0 ± 10 ml using the semi-automated method of ReportCARD™ (mean ± standard deviation; $p<0.02$). Figure 1 shows the difference between LV SV and aortic flow for each method. The average EF was 56 ± 11% using the manual method and 66 ± 12% using the semi-automated method of ReportCard™ ($P<0.01$) shown in Figure 2.

Conclusion

The semi-automated method of ReportCARD™ gives a more accurate measurement of SV, based on better concordance of SV with aortic flow. This is most likely because of more accurate endocardial segmentation and better assessment of the precise location of the LV base. The semiautomated method also yields higher EFs, indicating that manual tracing underestimates the true EF.

Predicting Response to Chemotherapy in Locally Advanced Breast Cancer by Diffusion Weighted MRI: A Pilot Study

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Introduction

Breast cancer is the most common life-threatening malignancy in women. Predicting a patient's response to neoadjuvant, or preoperative, chemotherapy is difficult. Because standard mammographic procedures do not accurately measure changes in tumour volume, monitoring response is usually repeated on a 3-6 month interval. For patients with an aggressive disease, this time frame may lead to months of ineffective therapy, permanent and irreversible losses in quality of life and early mortality. Thus an early, noninvasive and reproducible method to determine a tumour's responsiveness to a particular therapy would greatly benefit these patients. Diffusion weighted MRI (DW-MRI) is a noninvasive imaging technique that is used to detect changes in the apparent diffusion coefficient (ADC). The ADC value is an indicator of the movement of water within a tissue giving an average value of the flow and the distance the water molecule has moved. The decreased ADC in breast cancer reflects the underlying pattern of densely packed tumour cells, which inhibit effective motion of water molecules and restricted their diffusion

Purpose

To investigate the use of Breast DW-MRI and the associated ADC to provide a non-invasive early indication of tumour response to chemotherapy.

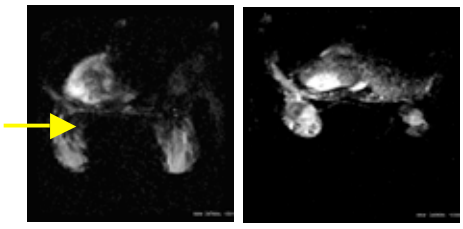
Materials and Methods

Under IRB approval, a longitudinal series of four Breast MRI studies was performed: a baseline prior to the start of chemotherapy, followed by scans performed one week, four weeks and eight weeks after commencement of chemotherapy. Imaging was performed on a GE Signa 1.5T CVi scanner (v12) with a dedicated breast coil. Contrast enhanced T1 weighted imaging was acquired to provide detailed anatomic information and tumour localization. Diffusion-weighted SS-EPI images were obtained in the axial plane through the entire volume of both breasts. Image parameters for the DW SS-EPI were as follows: TR= 2600 ms, TE= minimum, 256 x 192 Matrix, FOV = 36 cm, 16 NEX, RBW = 100 kHz, and 4 mm slice thickness with 0 mm spacing. Diffusion weighting was applied in the superior/inferior direction with b=0 and 600 sec/mm^2 with a acquisition time of 2:47 minutes. ADC maps were generated and region-of-interest (ROI) measurements were calculated for each time point. The response to neoadjuvant treatment was monitored by the change in the ADC between its baseline value at 0 days (ADC_0) and its value at 7, 28 and 56 days (ADC_7, ADC_{28}, ADC_{56}).

Results

On the pre-chemotherapy scan, contrast enhanced breast MR imaging demonstrated a 4cm x 4cm x 2.4cm lesion which was confirmed on biopsy to be an invasive ductal carcinoma. The tumour responded to the neoadjuvant chemotherapy by decreasing in size during the first 8 weeks of treatment. The apparent diffusion constant (ADC) value of the ROI representing the lesion was measured and compared over the four exams from diagnosis through treatment. The ADC measured, in 10^{-3}mm^2/s, prior to treatment was 0.71, while the values over the course of treatment were: ADC_7=0.89, ADC_{28}=0.93 and ADC_{56}=0.98. As expected for an invasive ductal carcinoma, all of these values were significantly lower than the observed ADC value of 1.8 x10^{-3}mm^2/s for normal tissue on the unaffected breast. One week after the start of treatment, the ADC had increased by 25.35% compared to its pretreatment value, at four weeks it had increased by 30.98% and by eight weeks, it had increased by 38.03%. These data indicate that diffusion MRI can predict response by 7 or 28 days after commencement of therapy.

Figure 1. IDC lesion on diffusion maps done at week 0 and week 8.



Conclusions

DW-MRI and ADC mapping may help be useful in predicting the early response of breast tumours to effective chemotherapy.

Magnetic Resonance Imaging Protocol Optimization for Detection of Endometriotic Lesions

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Purpose: The gold standard for the diagnosis of endometriosis is laparoscopy, an invasive procedure requiring a general anaesthetic. Magnetic resonance imaging has shown great promise as a non invasive diagnostic tool, but has been limited by its difficulty in detecting small endometrial lesions. The purpose of this study was to optimize patient preparation and imaging parameters to achieve sub millimetre resolution of endometrial lesions, and to compare the results with laparoscopy.

Materials and Methods: Eighteen patients identified as being at high risk for endometriosis, were scheduled for laparoscopy. Prior to laparoscopy, patients fasted for 6 hours, and then were scanned using MRI. Immediately preceding image acquisition, patients drank 1-2 glasses of water, and received 20mg of Buscopan to diminish colon motility. Standard pelvic images were acquired including: three plane T2 FRFSE FS, as well as an axial T1 FSPGR with FS. Additionally, a high resolution, 3D coronal volume optimized for lesion detection was obtained. This technique employed a T1 weighted 3D fast spoiled gradient echo sequence previously shown to detect the intraplaque hemorrhage in carotid plaques (1). The methemoglobin in the intraplaque hemorrhage shortens T1 resulting in increased signal intensity on T1-weighted imaging, providing endogenous contrast (1). As endometrial lesions are often hemorrhagic, this pulse sequence was used to detect endometrial lesions containing a variable amount of blood breakdown products. Image parameters for the sequence were: TR/TE/θ/TI/BW/NEX 7.0/1.7/15∞/22/31.25/3 with a matrix of 352X352, slice thickness of 2mm, FOV of 350 mm, and ZIP2 yielding isometric resolution of 0.994 mm. Fat suppression was achieved using the *SPECIAL (*Spectral Inversion At Lipids) GE propriety technique.

Results: All patients were found to be positive for endometriosis on laparoscopy and histopathology. While MRI did not detect all of the lesions found on laparoscopy, the sensitivity in this select population for the diagnosis of endometriosis utilizing MRI was 94.4%. Large endometriomas were easily detected on both volume acquisition (Figure A) and standard axial TIW FS imaging (Figure B). However, the high resolution 3D volume sequence detected lesions < 5mm (arrow - Figure C) that were often missed on standard T1W FS imaging (dotted oval - Figure D). Volume acquisition was especially beneficial, as was partial filling of the bladder in providing improved delineation of the uretero-vesical fold. Limitations were observed in that bright fecal matter could obscure or mimic endometriomas. Other characteristic features of endometriosis such as sclerotic lesions and powder burns were not visualized on MR imaging.

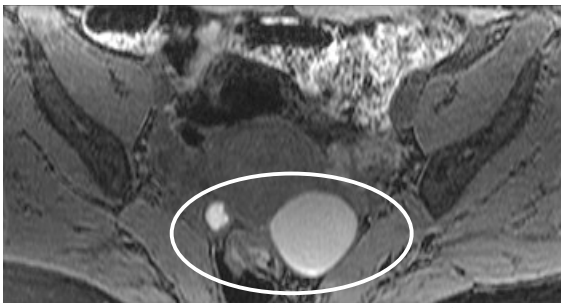

Figure A: Volume Acquisition - axial reformat

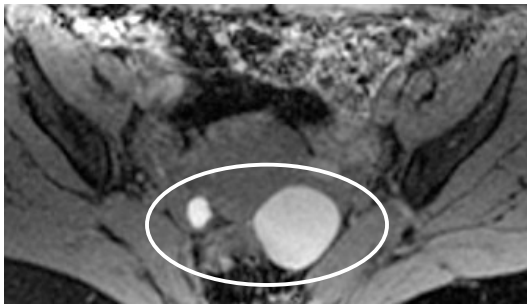

Figure B: Axial T1W FS

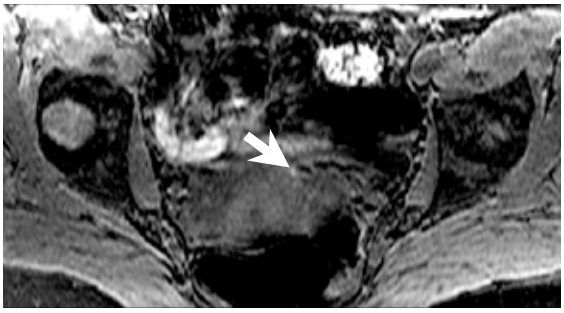

Figure C: Volume Acquisition - axial reformat

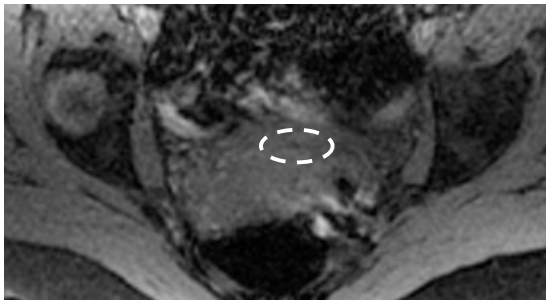

Figure D: Axial T1W FS

Conclusion: An optimized magnetic resonance imaging protocol allows improved endometrial lesion detectability. Prior knowledge of lesion location assists surgeons in rapidly locating areas of treatment during laparoscopy. Endometrial lesions located in the bowel requiring intervention can be treated at the same time by coordinating the services of the appropriate specialist to be present, minimizing the need for a patient to undergo repeated surgeries in the treatment of endometriosis.

References: 1. Moody AR *et al*. Circulation 2003;107:3047

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Calendar of Events

25 August — **John A. Koveleski Memorial Regional Educational Seminar**
The Penn State University Milton S. Hershey Medical Center, Hershey, Pennsylvania, USA

22 September — **Southeast Regional Educational Seminar**
St. Joseph's Hospital, Atlanta, Georgia, USA; Hosted by the SMRT Atlanta Chapter

13 October — **Northeast Regional Educational Seminar**
SUNY Upstate Medical University, Syracuse, New York, New York, USA

20 October — **Eastern Canada Educational Seminar**
Montreal Children's Hospital, Montreal, Quebec, Canada, and video-conference to Toronto General Hospital, Toronto, Ontario, Canada

27 October — **SMRT South Carolina Chapter Meeting**
GE Healthcare Florence Operations, Florence, South Carolina, USA

3 November — **President's Regional Educational Seminar**
Foxwoods Resort Casino, Mashantucket, Connecticut, USA;
Hosted by the SMRT New England Chapter

10 November — **Northeast Regional Educational Seminar**
University of Maryland Medical Center, Baltimore, Maryland, USA

17-18 November — **SMRT 2nd Annual Meeting of the Australia New Zealand Chapter**
ZINC at Federation Square, Melbourne, Australia

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Annual Meeting Updates and Information

Guidelines for you to initiate a Local Chapter or Regional Seminar

Access to the previous Annual Meeting program lectures

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