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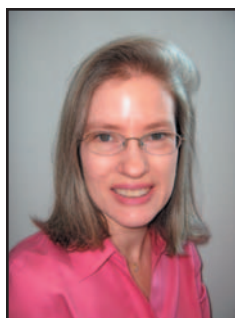
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## Message from the President

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



A true indication of dedication recently came to my attention as I came across the 1998 winter issue of *Signals* while doing some cleaning in my New York apartment. As I stopped for a moment to browse through this issue, I saw the names of many technologists whom I have had the opportunity to meet and who have inspired me to become an SMRT member and carry out the mission of the SMRT. In that issue, SMRT President Kelly Baron announced the creation of the *SMRT Educational Seminars*.

Kelly has been instrumental and continues driving the SMRT mission of advancing the education and training for MRI technologists as the *SMRT Educational Seminars* are certainly one of the highlights of being an SMRT member. Our current *SMRT Educational Seminars* Editor, Anne Marie Sawyer, works many hours in preparing home study material for publication and I feel very fortunate to have been able to work with Anne on two past Home Study issues. For those of you who may have a knack for writing or happen to come across articles that capture your interest, these would probably be of interest to other technologists as well. We invite you to submit your ideas whether from a published article or something that you are writing that would be of interest from an educational perspective. The SMRT continues to explore other avenues to enhance our offering of continuing education credits in keeping with the mission of promoting quality education within our field.

As I continued to look through the 1998 issue, SMRT Regionals were reported on around the country. For some of us, hosting an SMRT Regional may not present itself, but sometimes this can change as I found out a couple of years ago as I was compelled to organize a regional in New York City. Working in an outpatient facility, however, was a bit of a limitation in providing a location, but just mentioning my dilemma in finding a low-cost venue to my local GE service representative was perfect timing. That is how I got in contact with Carol Finn who is the MRI Manager at New York Presbyterian Hospital in New York City, as she had the resources to donate a meeting room for the meeting. Since both Carol and I are in the stages of confirming our topics and speakers for our March 2007 regional, I was curious to read further in this issue about the topics presented back then. It was very interesting to find out that quite a few of the topics that were on the agendas then are still applications that we

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are learning about today. Advances in MR angiography, breast, neuro, and cardiac imaging applications are ever evolving and the educational offerings of the SMRT make it possible for us as MR technologists and radiographers to keep ourselves informed of these new advancements. Possibly there are some of you who also work in an outpatient facility and would like to plan an SMRT regional. My advice: Reach out and make contact with other MRI technologists at larger institutions in your area, and see if you can work together as team. From my experience, this works well for Carol and I as she is very busy running a very large MRI department, so I take care of all of the small details for the meeting.

The report from the North Central Regional in Springfield, Illinois, USA caught my eye as there was a very inventive presentation given by Kelly on cardiac anatomy. To demonstrate the hearts plumbing system, she actually passed out potatoes to the attendees, who divided the potato into the four chambers of the heart. She then used colored sticks to teach the circulatory system! This was most certainly a very creative presentation as now I'm wondering what the cost of potatoes was back then!

As in 1998, the SMRT today is a strong professional organization dedicated to enhancing our knowledge of MRI. However, dedication does not just come from one person as it has to come from many working as a team. The organization of our home studies, regionals and annual meetings are the work of many MRI professionals among us. Though I haven't found the time to find out how much potatoes cost in 1998, there have been increased costs that have affected the budget of the SMRT in past years. Hopefully, everyone has received a letter along with your annual dues renewal

form announcing the small increase in dues. This small adjustment will help offset some of the increased costs so that the SMRT can continue to enhance the educational offerings to you, the membership. Please take the time to submit your renewal fee as your continued and timely support is very important so that the SMRT can continue to explore other avenues of offering approved continuing education credits.

I also just want to congratulate all of the nominees for SMRT Policy Board; the SMRT ballot should have arrived at your mailboxes. It is truly an honor to obtain this peer recognition and I encourage everyone to take the time to read over the candidates' bios and select those whom you think would serve the SMRT mission the best.

The upcoming season is a busy one for the SMRT Policy Board with our recent meeting at RSNA as this is one of two meetings scheduled by the SMRT. The current SMRT Committee Chairs are all responsible to prepare progress reports. The RSNA meeting also served as preparation for our annual meeting in Berlin. The SMRT Business meeting held on Saturday, at the annual meeting will provide SMRT members important information regarding the activities of the past year. I'm very fortunate to have the opportunity to work with a terrific group of SMRT professionals as we are all dedicated to enhancing the SMRT global mission of offering quality MRI education to all MRI technologists. Whether it's casting your vote, mailing in your dues, running for SMRT Policy Board, hosting or attending an SMRT meeting; participating in any of these activities is clearly the dedication needed from all of our members! ●

## Editor's Letter

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



This 2006 fourth quarter issue comes to you at the close of a very productive calendar year for the SMRT. As you read about the activities and events reported here, keep in mind the literally hundreds of volunteer hours expended by your fellow SMRT members on your behalf. Besides the eleven standing committees, the ad hoc committees, and the sub-committees, we have SMRT members who volunteer to write articles for this newsletter, contribute to the home study program with articles or question writing and many who offer to review our publications so that you receive quality material. We

begin this issue with a message from **President Cindy Comeau** who shares her reminiscence and reflects on how the SMRT has grown these past years. She emphasizes the importance of building relationships in the field of MR and how valuable they become as the years go by, both personally and professionally. Cindy recognizes those who have agreed to serve by accepting nomination to the Policy Board. **Anne Marie Sawyer** introduces the thirty-second offering of the *Educational Seminars* home study program with an update of breast MRI. Continuing education credit for this program is currently recognized by the American Registry of Radiologic Technologists (ARRT) in the United States and by the

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Australian Institute of Radiography (AIR) in Australia.

The 2007 Annual Meeting Program committee chaired by **Vera Kimbrell Miller** relates the progress of their work. Note the changes in format from past meetings intended to provide quality educational sessions, opportunities to network and socialize and to share in the business of the SMRT. The proposed didactic schedule is included for your reference. It is not too late to submit an abstract of your work or plan to attend this SMRT Annual Meeting in a most interesting venue.

New to the SMRT is the recognition of those who serve dual roles of MR Technologist / Radiographer and nurse. **Maureen Hood**, past External Relations Committee Chair and **Angela Kanan** have taken the lead to establish a list server for these specially trained individuals. Details are given in their respective reports.

The External Relations Committee Chaired by **Julia Lowe** has been extremely busy attending meetings of organizations within healthcare that have a direct bearing on the field of MR. Assisting Julia was **Carolyn Bonaceto**, Education Committee Chair and SMRT President-Elect who attended the Alliance for Quality Medical Imaging and Radiation Therapy meeting and reports on those activities. **Gina Greenwood**, External Relations Committee Co-Chair elect attended the Health Professions Network meeting

and shares her experience there. The Ad-Hoc Educational Standards Committee report on their recent meeting is presented by Co-Chair, **Mark Spooner**.

**Wendy Strugnell**, Global Relations Chair describes plans for a Regional SMRT Seminar in Australia and the forming of a new local chapter. It is the hope of the SMRT to establish local chapters and to host regional meetings as a means of providing quality MR education through out the world. Within North America two SMRT Regional Seminars were held.

**Cindy Hipps**, SMRT Past-President and Co-Chair of the Southeast Regional details the event held in Greenville, South Carolina, U.S.A. Further north **Caron Murray** Regional Seminars Committee Chair tells us of the successful venture in Toronto, Canada with video conferencing to Montreal, Canada. **Laurian Rohoman**, SMRT treasurer was the local chairperson in Montreal.

MR Safety expert **Frank Sherlock** brings us up to date with MRI contrast agents and potential adverse reactions. Information about breast MRI is brought to you by the abstract submission at the 2006 SMRT Annual Meeting that earned the President's Award. The first place proffered paper in the clinical category is printed on page 15 for your information.

Rounding out this issue is the calendar of events. Please note those of interest to you. Happy Reading! ●

## Update on SMRT Educational Seminars

Editor, Anne Marie Sawyer, B.S., R.T. (R)(MR)



We are pleased to present the SMRT Educational Seminars, Volume 9, Number 4: "MRI of the Breast: Update II."

This is the thirty-second home study developed by the SMRT, exclusively for the SMRT members.

As the number of clinical MRI examinations of the breast continues to grow worldwide, it is apparent the investment being made by health care institutions, manufacturers of MR systems, and third party vendors of biopsy systems and computer-assisted software has made a difference. In addition, research studies and education being conducted by knowledgeable, hardworking individuals such as the authors featured in this SMRT home

study, have provided significant justification for this increase despite the many challenges of this particular area of MR imaging.

A very special thank you is expressed to the authors for contributing to this home study publication: Michael Coles, R.T.(R)(MR), Christiane K. Kuhl, M.D, and Elizabeth A. Morris, M.D. Articles by Drs. Kuhl and Morris have been previously published in peer-reviewed medical journals. The article from Michael Coles was written especially for this SMRT publication. We are extremely fortunate to have these individuals participate given their on-going support of education and training for technologists and radiographers.

In addition, we would like to

express our appreciation to Anna Kirilova, Joanne Muldoon, and Nancy A. Talbot for writing the quiz questions. Thank you to Debra M. Ikeda, M.D for participating as our expert reviewer.

Thanks also to Bobbi Lewis, Jennifer Olson, Sara Vasquez, and the SMRT staff for their insight and long hours supporting these educational symposia.

Finally, we would like to thank Tom Schubert, John Wilkie, and all of the superb 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. ●



## 2007 Annual Meeting Progress Report

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



**G**uten Tag! Our 16th Annual Meeting of the SMRT is being held 19 and 20 May 2007 in the scenic and historic city of Berlin, Germany. We encourage you to make plans to join us! The location will be the ICC Convention Center. Please check the Web site (<http://www.ismrm.org/smrt>) for updates and information. We have tried to gear the

meeting towards technologists of all experience levels. We know that our membership is varied and from every part of the world. The purpose of this section is education and to that end we continually strive to reach technologists and provide them with interesting and pertinent lectures. I think you will enjoy the offerings being planned for this year.

The program format for the annual meeting has changed slightly from previous years. Please check the schedule for the oral poster presentation as it will take place on Saturday as part of the session and extend into a reception afterwards. Every year, the abstracts and posters bring a wonderful element to our meeting and allow technologists to present their work and ideas to a worldwide audience. I eagerly look forward to this year's presentations and encourage you to consider adding your work to this event. We have both clinical and research categories represented, showcasing the incredible work our technologists are performing in their daily duties. Even if you don't contribute, please make time to take a look at this wonderful body of work. I know you'll find something to learn and enjoy! Take a look at the Web site for deadlines and instructions.

Cindy Comeau, B.S., R.T.(R)(MR), will open the meeting beginning at 7:45 a.m. Saturday, 19 May. We will start with a Safety forum, because, after all, Safety is the #1 subject in all technologists' minds! Hans Engels, Ph.D. and Julie Strandt-Peay, B.S.M., R.T.(R)(MR) are the speakers for this forum. Parallel Imaging with Donald W. McRobbie, Ph.D. will be followed by a short break. Oral presentations will be given by technologists and radiographers from selected abstract submissions, then Fusion Imaging by Anna Kirilova, Bsc. R.T.(R)(MR). The annual SMRT Business Meeting will be held during lunch. The Business Meeting is your chance to hear what is going on in your professional organization. Your newly elected officers will be introduced and

installed. Please join us for lunch and important business session. After lunch will be a Cardiac Forum, with lectures by Andrew E. Arai, M.D. and Mercedes Pereyra, R.T.(R)(MR). The rest of the afternoon, we have Musculoskeletal MR, by Joshua M. Farber, M.D.; Molecular Imaging, by Peter L. Choyke, M.D.; and Female Pelvis, by Caroline Reinhold, M.D. Oral posters will be presented after the didactic session with the reception to follow. Please plan to join us to view posters and mingle with your fellow technologists from around the world.

Sunday, Carolyn Bonaceto, B.S., R.T.(R)(MR) the incoming President and current education chair will open the meeting. The Sunday program will begin with Physics. Don't groan! Elizabeth A. Moore, Ph.D. will make it fun for us. Raquel Del Carpio-O'Donovan, M.D. will then present a neuro topic followed by Cindy Comeau, B.S., R.T.(N)(MR) on Liver Iron, and Carolyn Roth, R.T.(R)(MR) on Protocol Optimization. Lawrence L. Wald, Ph.D. will speak on fMRI and David W. Stanley, B.S., R.T.(R)(MR) will speak on MR Elastography. Sunday during lunch, awards will be presented for outstanding contributions members have made to the society. Immediately following this will be a break-out session for International members to get together and exchange information. In the afternoon, we have a Nursing Forum by Maureen Hood, M.S., R.N., R.T. (R)(MR) and Filip DeRidder, R.N. Robert J. Herfkens, M.D. will enlighten us on MR Artifacts, followed by another proffered paper presentation. Contrast Media issues will be addressed by Marco Essig, M.D. and Ph.D. Leif Ostergaard, M.D., Ph.D. will teach us more about Perfusion in the stroke patient.

The program committee worked hard over this past year to put together an interesting and educational meeting. Please join us in Berlin! We know you'll be glad you did! Your participation allows us to continue our mission to provide Education without Borders to the worldwide body of MR technologists. ●



# SMRT 16th Annual Meeting • 19-20 May 2007 • Berlin, Germany

## MR Education Without Borders *Preliminary Program*

### Day One, Saturday, 19 May 2007

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

**08:00 Safety Forum**

Hans Engels, Ph.D.

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

**09:30 Parallel Imaging**

Donald W. McRobbie, Ph.D.

**10:40 Proffered Papers**

**11:10 Fusion Imaging**

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

**12:25 SMRT Business Meeting & Luncheon**

Moderator – Pam Vincent, R.T. (R)(MR)

**13:00 Nursing Forum**

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

Filip DeRidder, R.N.

**14:00 Musculoskeletal MR**

Joshua M. Farber, M.D.

**14:50 Functional and Molecular Imaging  
with MR Contrast Agents**

Peter L. Choyke, M.D.

**15:30 Female Pelvis**

Caroline Reinhold, M.D.

**16:20 SMRT Oral Posters**

**17:30 SMRT Reception & Poster Walking Tour**

### Day Two, Sunday, 20 May 2007

Moderator – Sonya Belville, R.T. (R)(MR)

**08:00 MR Physics**

Elizabeth A. Moore, Ph.D.

**08:50 Neuro/CNS Lesions**

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

**10:05 Liver Iron**

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

**10:35 Protocol Optimization**

Carolyn Roth, R.T. (R)(MR)

**11:05 fMRI**

Lawrence L. Wald, Ph.D.

**11:35 MR Elastography**

David W. Stanley, B.S., R.T. (R)(MR)

**12:00 Awards Luncheon**

Moderator- Anne Dorte Blankholm, R.T. (R)(MR)

**12:20 Forum for International Attendees**

Anna Dorte Blankholm, R.T. (R)(MR)

Wendy Strugnell, B.Sc.

**13:00 Cardiac Forum**

Andrew E. Arai, M.D.

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

**13:50 Artifacts**

Robert J. Herfkens, M.D.

**14:55 Proffered Papers**

**15:20 Contrasts – How, When and Why**

Marco Essig, M.D., Ph.D.

**16:10 Perfusion/Stroke Imaging**

Leif Østergaard, M.D., Ph.D.

**17:00 Adjourn**



# Nursing Roles in MRI

Angela Kanan, B.S.N., R.N., C.N.O.R., C.R.N.



Health care worldwide is a dynamic entity. Countries around the globe differ in both the application of technology and the roles of healthcare personnel. These differences not only vary country to country but also from region to region in a given country. In the past 30 years, the field of MRI has grown tremendously from the test nobody had ever heard of to a routine test explained by commentators on televised football when a player gets an injury.

Cardiac imaging, MR-guided procedures such as open brain tumor surgery, spine surgery, thermal ablation, breast and percutaneous biopsies, and most recently, focused ultra sound ablation are performed at medical centers around the world. It is evident that MR has become more interdisciplinary in nature as the field of MRI continues to evolve. MR personnel now include nurses, anesthesiologists and surgeons in addition to radiologists, technologists, and researchers. The purpose of this article is to cover the roles nurses are playing in MR (primarily from a U.S. perspective) and to start raising the awareness of how nurses and technologists can work together to provide continuity of care to patients. It should be noted that the role of the MR technologist is also expanding both in the U.S. and other countries into areas traditionally considered for physicians and nurse practitioners. It is prudent to grow with these changes and learn to work together in this dynamic field as we care for our patients. In most countries, MR technologists are the scanner operators, managers, and comprehensive care providers. However, in some countries, nurses play some or all of these MR roles. In addition, personnel with a wide variety of science and health care backgrounds and degrees are conducting MR research all over the world. What is of paramount

importance is that the safety and quality of care to the patient – whether human or animal – is held to high standards. How do we do this? We work together as a health care team.

In the United States, the role of nurses in MR has typically been placing intravenous catheters, providing sedation, and monitoring patients. As MR has progressed toward working with patients with higher acuity levels, the development of interventional/surgical MR suites and cardiovascular stress imaging, the role of the nurse in MR has grown tremendously. The role of the MR nurse now may include patient preparation, medication administration, examination coordination, circulating or scrubbing for open surgery, infection control, performing patient and staff education, risk management, and crisis management. The roles of nurses are as varied as the MR settings and the areas they are located. Unfortunately, nurses have had a difficult time finding educational opportunities that fit with the MR nursing roles. The ISMRM/

SMRT, is announcing the start of a Web list serve site for nurses who work in all capacities in the field of MR, which is similar to the MR technologist list serve. The purpose of the nurse list serve is to have a forum for nurses working in the MR environment to communicate and a means to reach out to nurses to find out where they are, what roles they are performing, and what are their specific educational needs? The ISMRM/SMRT should be the Society to provide MR education for all health care personnel.

We encourage nurses everywhere to join this list serve and share ideas. The SMRT MR Nurses list serve ([smrt\\_NurseMR@ismrm.org](mailto:smrt_NurseMR@ismrm.org)) can be joined through completing the “online form” link found at [http://www.ismrm.org/smrt/Nurses\\_List.htm](http://www.ismrm.org/smrt/Nurses_List.htm). In addition, interested persons may also contact Angela ([akanan@partners.org](mailto:akanan@partners.org)) or Maureen ([mhood@usuhs.mil](mailto:mhood@usuhs.mil)).

Thank you in advance for helping to establish this important MR communication. ●

## Nurses List Server

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



A list server is a simple system that allows persons with like or similar interests to actively communicate with one another via e-mail. There is no cost other than having an e-mail account. There are thousands of lists available that reach across all walks of life and ranges of interest. Many are “open” to anyone interested, and there are no requirements to provide information prior to joining. Others are “closed” and require specific information to be eligible to join, and the subscriber can be removed from the list by the list owner at any time. The list server works by distributing all messages sent to it

to all subscribers of the list. Responses can be made back directly to the specific person who posed the questions, or to the whole list allowing everyone to benefit from the answers.

To subscribe to the [smrt\\_NursesMR](mailto:smrt_NursesMR) List Server, just fill out the online form. Be sure to fill out the form completely to ensure placement on the list serve. We require information regarding your place of employment and contact information, especially if you are attempting to join using an e-mail account that is not part of a corporate domain. Please allow two weeks for processing. Vendors are not discouraged from joining, but are required to follow additional rules such as NO solicitations allowed for services, products, etc. Failure to follow the rules means immediate cancellation of membership. ●



## External Relations Committee Report

Julia Lowe, B.S., R.T. (R)(MR), Chair, External Relations Committee



The External Relations Committee (ERC) has been busy preparing for the Radiological Society of North America (RSNA) annual meeting that will take place 26 November through 1 December of this year. In fact, the ERC was originally implemented so that the SMRT would have a means to liaise with the Associated Sciences Consortium (ASC) of RSNA. The ASC is responsible for organizing refresher courses and a special symposium presented during RSNA. SMRT members have served as faculty and moderators of the sessions. The ASC announcement is published in the third quarter issue of *Signals* which contains a complete listing of refresher courses and the symposium. Your support of these activities ensure they will continue in future years of the RSNA.

The committee has also been busy attending meetings with other groups in the allied health field. The Health Professions Network met in Phoenix

in September to discuss education and other issues related to allied health. Gina Greenwood of the ERC attended this meeting (see report on page 8).

In August, Gina Greenwood and Carolyn Bonaceto attended the Alliance of Quality Medical Imaging and Radiation Therapy meeting in San Francisco. The Alliance has created guidelines that will accompany the Consumer Assurance of Radiologic Excellence act or CARE bill once the bill is made into a law. The group met in San Francisco to continue to improve on the guidelines and had a very successful session. We are pleased to report that the United States Senate Health Education, Labor and Pensions Committee, under the leadership of Chairman Mike Enzi (R-WY), voted unanimously to approve S. 2322, the Consumer Assurance of Radiologic Excellence Act or RadCARE bill as it is recognized in the Senate. The bill will now move to the full Senate where we hope to have it considered before Congress adjourns later this year. This is wonderful news! The SMRT and

others have worked for years to get the CARE bill adopted as a law and our efforts may soon be rewarded. The Alliance will meet again in March of 2007. SMRT representatives will attend and continue to report on the progress of the CARE bill.

I would like to report on some exciting news concerning the Global Relations Committee, a sub-committee of the External Relations Committee. Wendy Strugnell, Chair of this committee, is organizing an informal networking meeting that will take place during the SMRT Annual Meeting in Berlin, Germany in 2007. The "Forum for International Attendees" is designed to attract SMRT attendees that are from countries other than North America. The goal is to socialize and create an international network within the SMRT. Wendy will announce the "Forum" time and place during the Business Meeting on Saturday in Berlin. Please, plan to attend this informal event and meet other SMRT members that share the same motivation and desire to gain "MR Education without Borders". ●

## Update: Alliance for Quality Medical Imaging and Radiation Therapy– Fall 2006 Meeting

Carolyn Bonaceto, B.S., R.T. (R)(MR), Chair, Education Committee



From 25 through 27 August the most recent meeting of the Alliance for Quality Medical Imaging and Radiation Therapy met at the Omni Hotel in San Francisco, California, U.S.A. The Alliance is a coalition of groups representing medical imaging and radiation professionals dedicated to the common goal of ensuring that patients in the United States are provided safe, high quality medical imaging and therapeutic imaging procedures. They seek to meet this goal by supporting legislation that ensures minimum standards of education for individuals in the diagnostic imaging

and therapeutic imaging fields. The House of Representatives version, HR 1426, the Consumer Assurance of Radiologic Excellence (CARE) bill and the Senate version, S. 2322, known as the RadCARE bill (to avoid conflict with another piece of legislation) would enforce regulations established in 1981 under the Consumer-Patient Radiation Health and Safety Act.

First convened in Albuquerque in 1999, along with the founding members, the American Society of Radiologic Technologists (ASRT) and the Society of Nuclear Medicine-Technologists Section (SNM-TS), the coalition includes the following charter members: the American Association

of Medical Assistants (AAMA), the American Association of Medical Dosimetrists (AAMD), the American Association of Physicists in Medicine (AAPM), the American College of Medical Physics (ACMP), the American Registry of Radiologic Technologists (ARRT), the Association of Educators in Imaging and Radiologic Sciences (AEIRS), the Association of Vascular & Interventional Radiographers (AVIR), the Cardiovascular Credentialing International (CCI), the Conference of Radiation Control Program Directors (CRCPD), The Joint Review Committee on Education in Cardiovascular Technology (JRCCVT), The Joint Review Committee on Education in Nuclear Medicine Technology (JRCNMT), the

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Joint Review Committee on Education in Radiologic Technology (JRCERT), the Nuclear Medicine Technology Certification Board (NMTCB), the International Society for Magnetic Resonance in Medicine, Section for Magnetic Resonance Technologists (SMRT), Society of Invasive Cardiac Professionals (SICP), the Society of Diagnostic medical Sonography (SDMS), the Society of Radiation Oncology Administrators (SROA), the American College of Radiology (ACR), the American Healthcare Radiology Administrators (AHRA), the American Society of Therapeutic Radiation Oncology (ASTRO), and the Joint Review Committee on Education in Diagnostic Medical Sonography (JRCDEMS). Most of these organizations were represented by at least one individual at this meeting. Gina Greenwood, B.S., R.T., (R)(MR), SMRT Secretary and incoming External Relations Co-Chair and Carolyn Bonaceto, B.S., R.T., (R)(MR), SMRT 2006-2007 Education Committee Chair and President-Elect were in attendance

on behalf of the SMRT.

The attendees had the opportunity to get reacquainted and meet new delegates at a reception held at the hotel on Friday evening. On Saturday morning, after welcoming statements by Christine Lung, Director of Government Relations for ASRT, and Hugh Cannon of the SNM-TS gave everyone at the table an opportunity to introduce themselves and state the organization they represented.

Following introductions, Bill Finerfrock, Legislative Counsel for the ASRT and David Goch, Legal Counsel for the ASRT, gave summaries of the status of the CARE and RadCARE bills. Bill reported there was a potential for a mark-up of the senate bill in September 2006. Medical imaging is on the agenda for the end of the month and it's anticipated there may be a lame duck session. Dave reported that there was an all-time high of 130 co-sponsors on the house bill. Both encouraged each organization to push their grass-roots network members to contact legislators.

A decision was made to invite the American Registry of Magnetic Resonance Imaging Technologists (ARMRIT) to the next meeting. ARMRIT has publicly opposed the CARE bill. The Alliance membership felt it would be beneficial to provide ARMRIT with an opportunity to give a presentation outlining the reasons for their opposition.

The rest of the meeting was spent on the tedious process of reviewing the regulations that will be sent to the Secretary of Health and Human Services upon passage of the bill. There are many issues that need to be resolved including seemingly simply issues such as how to define certain words, to more complicated issues revolving around minimum education standards in the face of fusion imaging capabilities like PET/CT and PET/MRI. Prior to the next meeting, each organization is expected to bring suggestions and solutions for problems identified in the current document. The location and date of the next meeting are still pending. ●

## Health Professions Network Report

Gina Greenwood, B.S., RT(R)(MR), Co-Chair, External Relations Committee



Phoenix, Arizona was the locale for the Health Professions Network (HPN) Fall 2006 meeting. Hot weather and collaborative energy were constant throughout the meeting that took place from 28 September through 1 October!

The HPN is a group of volunteers representing health professional associations interested in interdisciplinary communication, discussion, and collaboration in the United States. Participants meet at least annually to engage in discussion of issues relating to health care and to serve as a conduit for interdisciplinary problem solving and preparation for future health care delivery.

The Fall 2006 meeting centered around the theme of "Reaching Across the Professions to Support Quality Care Initiatives." The keynote presentation was given by Marge Keyes, the Patient Safety Team Leader for the Department of Health and Human Services (DHHS), and the Agency for Healthcare Research and Quality (AHRQ). Marge's presentation was entitled "Medical Errors and Patient Safety: Seven Years Later and Where Are We?" and discussed efforts that have taken place and are ongoing since the publication of the Institute of Medicine's (IOM) 1999 report entitled "To

Err Is Human: Building a Safer Health System." Diane Pinakiewicz, President of the National Patient Safety Foundation (NPSF), delivered a presentation describing a "Multi-Stakeholder approach to Patient Safety," in which the role each type of care-provider plays in ensuring safe patient encounters was explored.

Real-world examples of efforts to improve health care delivery were also presented. Carole Stacey and Ann Benson, the Directors for the Michigan Center for Health Professions presented "An Overview of the Michigan Center for Health Professions." Barbara Weber-Averyt of the Arizona Hospital and Healthcare Association discussed Arizona's Statewide Patient Safety Initiative which is entitled "Safe and Sound."

The HPN recently became incorporated, and this meeting was historic in nature as Bylaws were voted upon and approved and new Committees were formed. A good part of the meeting involved discussing these operational aspects of the HPN.

The HPN is the premier network of Health Professions working to positively influence the delivery of quality health care. It provides a forum for collaboration among allied health professions on issues of common interest, and advocates on

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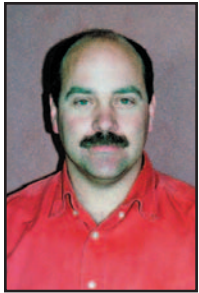


behalf of allied health to the public, professional associations, federal and state policy makers. The HPN affirms that effective collaboration among health care professions is based on the values of commitment to the HPN, cooperation, integrity, accountability and respect of diversity. Participating in the

Health Professions Network increases the recognition of the SMRT as the organization representing MRI technologists and provides a unique opportunity for our organization to network and collaborate with other health care professional organizations. ●

## Educational Standards Ad-Hoc Committee Update

Mark Spooner B.P.S. R.T.(R)(MR)(CT), Co-Chair, Education Standards Ad-Hoc Committee



A group of six committee members met at the AERS/ASRT Annual Meeting in Denver. We consulted with members of the ASRT and ARRT throughout the weekend.

Luann Culbreth and I attended a meeting with the board members of the American Educators in Radiological Sciences (AERS) and discussed common goals concerning MR Education. They support our

efforts and look forward to utilizing the curriculum guidelines. The AERS changed the name of their society to the Association of Educators in Imaging and Radiologic Sciences. This change better reflects the diversity of the imaging sciences, specifically non-ionizing modalities such as MRI and Ultrasound.

The committee members continue to work independently on the project and consult by e-mail. More information will be forthcoming as it is available. ●

## Australia – New Zealand Local Chapter News

Wendy Strugnell, B.Sc., Chair, Global Relations



The Victorian MRI User Group Meetings have been re-established by coordinator Glenn Cahoon and got off to a great start with close to 70 attending

the August meeting at the Melbourne Royal Children's Hospital sponsored by Schering Pharmaceuticals. Dr. Michael Ditchfield and Glenn Cahoon (pictured) gave excellent presentations on Clinical Cardiac MRI. The topic for the October meeting is "Diffusion and Perfusion MRI" and will be held at the Brain Research Institute. Information about MRI User Group Meetings in Victoria and Queensland is posted on the

Australia – New Zealand Local Chapter page at [www.ismrm.org/smrt/anz.htm](http://www.ismrm.org/smrt/anz.htm). SMRT User Group meetings are allocated 1 AIR CPD credit per hour. If you would like help coordinating User Group Meetings in your state or in New Zealand, please contact me at [wendystrugnell@internode.on.net](mailto:wendystrugnell@internode.on.net).

The first Regional Meeting of the Australia – New Zealand Local Chapter was held in Brisbane on 18 and 19 November 2006 and it was an excellent educational opportunity. These meetings will be an annual event with the 2007 meeting planned for Melbourne. We are also establishing a list serve for ANZ MRI radiographers to facilitate

the dissemination of information and the coordination of MR education and learning in the Australasian region. Keep an eye on our Web page for updates and news on the SMRT activities in your local region. ●



Dr. Michael Ditchfield and Glen Cahoon shared their cardiac expertise.

## Southeast Regional Educational Seminar Report

Cindy Hipps, B.H.S., R.T.(R)(MR), Co-Chair



The SMRT Southeast Regional Educational Seminar was held on 14 October 2006 at the Greenville Hospital System's Patewood Medical Office Building. There were 70 registered attendees from thirteen different states. The meeting was well-received and deemed a success by all those participating. The South Carolina

(SC) SMRT Chapter hosted the meeting and the organizers were Melonee Elrod, Cindy Hipps, Carol Lee, and Wendy Porter. Sheryl Peace was instrumental in obtaining the meeting location that was appreciated by the technologists and

vendors in attendance.

After the continental breakfast, the meeting started promptly at 8:00 AM with the first speaker, Dr. Jeff Wienke, a musculoskeletal radiologist from Greenville Radiology, in Greenville, South Carolina. He spoke on MRI of the Hand, Wrist and Elbow. He gave the attendees many tips to recognize the musculoskeletal anatomy as well as how to best remember particular structures with acronyms. Dr. Wienke was followed by the Musculoskeletal Director at Greenville Radiology, Dr. Frank Hayden, who presented MRI of the Foot and Ankle. Dr. Hayden began his presentation by stressing to the attendees how important it is for the technologist and

Continued on page 10 ➡

radiologist to talk the same language in regards to positioning the foot and ankle and the different planes in which the anatomy lies. He was emphatic in pointing out what is standard practice.

After a short break, Cindy Comeau, SMRT President, presented Cardiac MRI-Technical Pointers. She did an excellent job explaining the basics of cardiac imaging to the meeting attendees. Cindy has a warm and genuine personality that is well-received and respected in the field of MRI. She is a positive role model and represents the SMRT in a professional manner. We were fortunate to have her speak at our Southeast Regional!

After an early morning flight from New York City, Dr. Martin Prince arrived just in time to WOW the attendees with his vast knowledge of MR Angiography. He was given high marks by the technologists and praised for his delightful demeanor. He brought books for everyone, "MRI from Picture to Proton" in which he sat and personally signed each during the lunch break. We are so thankful to Dr. Prince and his company, Top Spins, for providing the books to the attendees.



*Dr. Martin Prince shared his MRA expertise.*



*(Left to Right) Wendy Porter, Melonee Elrod, Cindy Hipps, Cindy Comeau, and Tom Schubert.*



*Meeting attendees take notes during presentations.*



*(Left to Right) Organizers: Cindy Hipps, Melonee Elrod, Carol Lee and Wendy Porter.*

During the lunch break, each attendee was asked to obtain answers to questions submitted by the vendors. There were more than one dozen vendor displays and the answers could be obtained from these displays or presenters on hand. The completed form was entered into the drawings for the many door prizes the organizers had obtained for the meeting. The meeting organizers would like to thank all the supporters of the meeting. As we all know, vendor support helps to ensure we have the opportunity to provide quality SMRT programs. We express our sincere thank you to: Beekley Corporation, Berlex Imaging, Bracco Diagnostics, GE Healthcare, Greenville Hospital System, Greenville Radiology, PA, Insight Health Corp., Institute for Magnetic Resonance Safety, Education and Research, Invivo Corporation, MEDRAD, Inc., MidWest RF, LLC, National Medical Associates, LLC, ONI Medical Systems, Palmetto Health Baptist Easley, PRS-Professional Radiology Solutions of SC, Top Spins, Tyco Healthcare Mallinckrodt and West Physics Consulting, LLC.

The meeting continued with even more powerful presentations. We were privileged to have Tom Schubert of Invivo Corp. provide us with a presentation on Surface Coil Technology. Tom was entertaining and a pleasant surprise from the engineer mind we have all come to know and respect. He provided the attendees with a look into the technology we all take for granted on a daily basis. Maybe this could be a new career path for Tom!

Two of our own SMRT members wrapped up the day with exciting presentations.

Jim Stuppino gave a talk on MR Spectroscopy. It was noted that not many Technologists in attendance were using this technology so Jim was able to provide a basic understanding of spectroscopy to the meeting attendees. Jim's impeccable smile and fun-loving attitude is always a pleasure to have around! Charles Stanley, current SMRT Policy Board Member presented MRI: Media Myths-MRI in Popular Culture which was a fun and interesting method of presenting MR Safety! This presentation concentrated on how the field of MRI is portrayed to the public through the media. Some of his clips of actual television coverage were amazing to see. It really made one think about the important role we play as technologists in protecting the patient and MR Safety! It was a great way to end the day.

The South Carolina Chapter will be hosting a chapter meeting on 14 April 2007 with Bill Faulkner presenting "A Registry Review." We encourage all students and technologists preparing to sit for the ARRT Advanced MR registry examination to attend. Look for more details on the SMRT Web site as they become available. ●



# Eastern Canada SMRT Regional Educational Seminar

Rhonda Walcarius, MRT(R), MRT(MR)



On 4 November 2006, the MRI Research Technologists at Sunnybrook Health Sciences Centre along with Laurian Rohoman from the McGill University Health Centre - Montreal General Hospital (by videoconference,) were pleased to host the Eastern Canada SMRT Regional Educational Seminar. Local chairpersons from Sunnybrook Health Sciences Centre were Caron Murray, Garry Detzler and Rhonda Walcarius. Laurian Rohoman from the Montreal General Hospital was the local chairperson for the Montreal videoconference. The educational event was a great achievement with approximately 125 attendees.

Caron Murray, moderator for the day, started things off by welcoming all to Sunnybrook Health Sciences Centre and by thanking the sponsors who generously contributed to making the day the huge success it was.

The first speaker, Dr. Carrie Betel from Sunnybrook Health Sciences Centre, presented an overview of breast MR. From pulse sequences to contrast injection; Dr. Betel's talk covered the basics of breast MR.

The next speaker, Dr. Susan Blaser from the Hospital for Sick Children in Toronto, focused on fetal MR and its various applications in a clinical setting. Dr. Blaser stressed that this type of imaging will become routine for all MR sites in the future. After a short break, Carolyn Kaut-Roth, Imaging Education Associates, Philadelphia, gave an animated talk on advanced pulse sequences. Starting from the most basic of pulse sequences, Candi led the audience, through foot race examples, to unraveling the more complex fast imaging techniques. We appreciate that Bracco Canada sponsored Candi for this

event. Our fourth speaker of the day, Dr. Louis Wu, St. Michael's Hospital, Toronto, spoke to the audience on Cardiac MR. Anatomy, pulse sequences, how to set up slices for various views, examples of pathology, Dr. Wu was able to teach the audience a lot about cardiac MR in a short period of time. From the new technologist to the more experienced technologist, everyone walked away having learned something about cardiac MR.

After a satisfying lunch where attendees were able to mix and mingle, Sharon Saberton, Registrar of the College of Medical Radiation Technologists of Ontario, Toronto, gave a presentation on medical directives and how they impact on our daily work. Sharon explained the differences between controlled acts and medical directives and drove home the importance of having medical directives in place so that technologist's actions are defensible. After the last break of the day, Dr. Raymond Goh, Rouge Valley Health Systems, was sponsored by Berlex Canada to give a talk on CE-MRA. Dr. Goh spoke about CE-MRA on all body parts and on how to change imaging parameters when using Gadovist as opposed to Magnevist to obtain the most optimal images. Dr. Goh feels that everyone working as a team helps to create the best possible results. The last speaker of the day was SMRT policy board member Nancy Talbot from University Health Network – The Princess Margaret Hospital, Toronto, Ontario. Nancy spoke on MR-guided focused ultrasound. Using product video, Nancy showed the audience how an actual exam is performed and explained the challenges faced by both the patient and the operators in performing these procedures.

We received very positive feedback on all aspects of the day and were very happy to have been given the opportunity to videoconference this educational session to Montreal. ●



*Everyone enjoying lunch and new friends!*



*Co-chairperson Garry Detzler "working" the room!*



*Yes, everyone was paying attention and taking notes! Perhaps it was the threat of a post session quiz!*



*Attendees gather to network before the morning session.*



## MRI Contrast Agents and Adverse Reactions\*

Frank G. Shellock, Ph.D., FACC, Adjunct Clinical Professor of Radiology and Medicine, Keck School of Medicine  
 Director of MRI Studies of Biomimetic MicroElectronic Systems (BMES) Implants, National Science Foundation  
 BMES Engineering Research Center, University of Southern California and Institute for Magnetic Resonance Safety,  
 Education, and Research: [www.MRIsafety.com](http://www.MRIsafety.com), [www.IMRSE.org](http://www.IMRSE.org)



This article represents the views of its author only and does not reflect those of the International Society for Magnetic Resonance in Medicine and are not made with its authority or approval.

Gadolinium chelates have been approved for parenteral use since the late 1980s. Although these agents can be differentiated on the basis of stability, viscosity and osmolality, they cannot be differentiated on the basis of efficacy. These contrast media are extremely well tolerated by the vast majority of patients in whom they are injected. Adverse reactions are encountered with a much lower frequency than is observed after administration of iodinated contrast media.

### Adverse Reactions to Gadolinium Contrast Agents

The frequency of all adverse events after an injection of 0.1 or 0.2 mmol/kg ranges from 0.07–2.4 percent. The vast majority of these reactions are mild, including coldness at the injection site, nausea with or without vomiting, headache, warmth or pain at the injection site, paresthesias, dizziness, and itching. Reactions resembling an “allergic” response are very unusual and vary in frequency from 0.004–0.7 percent. A rash, hives, or urticaria are the most frequent of this group, and very rarely there may be bronchospasm. Severe, life-threatening anaphylactoid reactions are exceedingly rare (0.001–0.01 percent). In an accumulated series of 687,000 doses there were only 5 severe reactions. In another survey based on 20 million administered doses there were 55 cases of anaphylactoid shock. It would appear that, to date, only one published death has been clearly related to the administration of gadolinium-based contrast. Other deaths in other series have been ascribed to other diseases or

to other drugs, or were thought to be coincidental. Clearly, fatal reactions to gadolinium agents are very rare.

### Risk Factors

The frequency of adverse reactions to gadolinium contrast agents is about 2.3–3.7 times higher in patients with a history of reactions to iodinated contrast material and about 8 times higher in patients with a previous reaction to gadolinium-based contrast agents. Second reactions to gadolinium-based compounds tend to be more severe than the first. Persons with asthma and various allergies are also at greater risk, with reports of adverse reaction rates as high as 3.7 percent.

In the absence of any widely accepted policy for dealing with patients with prior contrast reactions (especially to gadolinium-based compounds) and the need for subsequent exposure to MR agents, it does seem prudent to at least take precautions. It should be determined if contrast material is necessary, if a different MR contrast agent could be used, and if 12–24 hours of premedication with corticosteroids and antihistamines could be initiated. This is particularly applicable in patients with prior moderate to severe reactions.

### Nephrotoxicity

Gadolinium agents are considered to have no nephrotoxicity at approved dosages for MR imaging. They can be used in azotemic patients and are dialyzable. MR with gadolinium has been used instead of contrast-enhanced CT in those at risk for developing worsening renal failure if exposed to iodinated contrast material.

Gadolinium agents are radiodense and can be used for opacification in CT and angiographic examinations instead of iodinated radiographic contrast agents. However, there is controversy over whether gadolinium contrast agents are less nephrotoxic at equal-attenuating doses. Caution should be used in extrapolating the lack of nephrotoxicity of intravenous gadolinium at MR dosages to the use of gadolinium for angiographic procedures, including direct injection into the renal arteries. No assessment of gadolinium versus iodinated contrast nephrotoxicity by randomized studies of equal-attenuating doses is currently available.

### Pregnancy

At doses considerably higher than recommended in humans, gadopentetate dimeglumine has been shown to retard fetal development in rats, double the incidence of post-implantation loss, and to increase the incidence of spontaneous abortion. It may also have an adverse effect on embryo-fetal development. Therefore, MR contrast using any chelate should only be performed if the potential benefit justifies the potential risk, and then only after obtaining written, informed consent.

### Treatment

Treatment of moderate or severe adverse reactions to gadolinium-based contrast media is similar to that for moderate or severe reactions to iodinated contrast media. In any facility where contrast material is injected, it is imperative that personnel trained in recognizing and handling reactions and the equipment and medications to do so be on site or immediately available.

*Continued on page 13 ➔*

Most MR facilities take the position that patients requiring treatment should be taken immediately out of the imaging room and away from the magnet so that none of the resuscitative equipment becomes a hazard.

### Extravasation

The incidence of extravasation in one series of 28,000 doses was 0.05 percent. Laboratory studies in animals have demonstrated that both gadopentetate dimeglumine and gadoteridol are much less toxic to the skin and subcutaneous tissues than are equal volumes of iodinated contrast media. For these reasons the likelihood of a significant injury resulting from extravasated MR contrast agent is extremely low.

### Serum Calcium Determinations

Some evidence has developed that gadolinium-based MR contrast material might interfere with total serum calcium values determined with standard colorimetric methods (Roche, Dade and Olympus). This interference is not seen using dry slide technology (Vitros). A warning from Roche Diagnostics suggested that colorimetric determination might be erroneously low, especially in patients with impaired renal function who have recently received gadolinium. It appears that the linear chelates Gd-DTPA-BMA (gado-diamide) and Gd-DTPA bis(methoxyethyl) amide (gadoversetamide) are much more likely to cause this artifact than Gd-DTPA (gadopentetate dimeglumine) or the macrocyclic chelates such as Gd-DOTA (gadoterate meglumine).

If an unexpectedly low result for serum calcium is obtained, it should be repeated two days later or checked with atomic absorption spectroscopy which is not affected by gadolinium chelates.

### Off-Label Usage

Radiologists commonly use contrast media for a clinical purpose not contained in the labeling and thus commonly use contrast media off-label. Examples include MR angiography, cardiac applications, pediatric applications in patients less than two

years of age, and usage in patients with renal failure.

[\*American College of Radiology, Manual on Contrast Media, 5th Edition, 2004; Reprinted with permission of the American College of Radiology. No other representation of this article is authorized without express, written permission from the American College of Radiology.]

### REFERENCES

1. Cochran ST, Bomyea K, Sayre JW. Trends in adverse events after IV administration of contrast media. *AJR* 2001; 176:1385-1388.
2. Cohan RH, Ellis JH, Garner WL. Extravasation of radiographic contrast material: recognition, prevention, and treatment. *Radiology* 1996; 200:593-604.
3. Cohan RH, Leder RA, Herzberg AJ et al. Extravascular toxicity of two magnetic resonance contrast agents: preliminary experience in the rat. *Invest Radiol* 1991; 26:224-226.
4. Goldstein HA, Kashanian FK, Blumetti RF, et al. Safety assessment of gadopentetate dimeglumine in U.S. clinical trials. *Radiology* 1990; 174:17-23.
5. Haustein J, Laniado M, Niendorf HP, et al. Triple-dose versus standard-dose gadopentetate dimeglumine: a randomized study in 199 patients. *Radiology* 1993; 186:855-860.
6. Jordan RM, Mintz RD. Fatal reaction to gadopentetate dimeglumine. *AJR* 1995; 164:743-744.
7. Lin J, Idee JM, Port M, et al. Interference of magnetic resonance imaging contrast agents with the serum calcium measurement technique using colorimetric reagents. *J Pharm Biomed Anal* 1999; 21:931-943.
8. McAlister WH, McAlister VI, Kissane JM. The effect of Gd-dimeglumine on subcutaneous tissues: a study with rats. *AJNR* 1990; 11:325-327.
9. Murphy KJ, Brunberg JA, Cohan RH. Adverse reactions to gadolinium contrast media: a review of 36 cases. *AJR* 1996; 167:847-849.
10. Murphy KP, Szopinski KT, Cohan RH, et al. Occurrence of adverse reactions to gadolinium-based contrast material and management of patients at increased risk: a survey of the American Society of Neuroradiology Fellowship Directors. *Acad Radiol* 1999; 6:656-664.
11. Niendorf HP, Brasch RC. Gd-DTPA tolerance and clinical safety. In: Brasch RC, Drayer BP, Haughton VM, et al, eds. *MRI contrast enhancement in the central nervous system: a case study approach*. New York, NY: Raven, 1993:11-21.
12. Niendorf HP, Haustein J, Conelius I, et al. Safety of gadolinium-DTPA: extended clinical experience. *Magn Reson Med* 1991; 22:222-228.
13. Nelson KL, Gifford LM, Lauber-Huber C, et al. Clinical safety of gadopentetate dimeglumine. *Radiology* 1995; 196:439-443.
14. Nyman U, Elmstahl B, Leander P, et al. Are gadolinium-based contrast media really safer than iodinated media for digital subtraction angiography in patients with azotemia? *Radiology* 2002; 223:311-318.
15. Olukotun AY, Parker JR, Meeks MJ, et al. Safety of gadoteridol injection: U.S. clinical trial experience. *J Magn Reson Imaging* 1995; 5:17-25.
16. Omohundro JE, Elderbrook MK, Ringer TV. Laryngospasm after administration of gadopentetate dimeglumine. *J Magn Reson Imaging* 1992; 2:729-730.
17. Runge VM, Bradley WG, Brant-Zawadzki MN, et al. Clinical safety and efficacy of gadoteridol: a study in 411 patients with suspected intracranial and spinal disease. *Radiology* 1991; 181:701-709.
18. Runge VM. Safety of approved MR contrast media for intravenous injection. *J Magn Reson Imaging* 2000; 12:205-213.
19. Runge VM. Safety of magnetic resonance contrast media. *Top Magn Reson Imaging* 2001; 12:309-314.
20. Salonen OL. Case of anaphylaxis and four cases of allergic reaction following Gd-DTPA administration. *J Comput Assist Tomogr* 1990; 14:912-913.
21. Shellock FG, Hahn HP, Mink JH, et al. Adverse reaction to intravenous gadoteridol. *Radiology* 1993; 189:151-152.
22. Spinosa DJ, Kaufmann JA, Hartwell GD. Gadolinium chelates in angiography and interventional radiology: a useful alternative to iodinated contrast media for angiography. *Radiology* 2002; 223:319-325.
23. Takebayashi S, Sugiyama M, Nagase M, et al. Severe adverse reaction to IV gadopentetate dimeglumine. *AJR* 1993; 160:659.
24. Tardy B, Guy C, Barral G, et al. Anaphylactic shock induced by intravenous gadopentetate dimeglumine. *Lancet* 1992; 339:494.
25. Tishler S, Hoffman JC. Anaphylactoid reactions to IV gadopentetate dimeglumine. *AJNR* 1990; 11:1167.
26. Weiss KL. Severe anaphylactoid reaction after IV Gd-DTPA. *Magn Reson Imaging* 1990; 8:817-818.
27. Witte RJ, Anzai LL. Life-threatening anaphylactoid reaction after intravenous gadoteridol administration in a patient who had previously received gadopentetate dimeglumine. *AJNR* 1994; 15:523-524.

# Intermittent Fat Saturation and k-Space Reordering in Breast MRI



## Purpose

Breast magnetic resonance imaging (MRI) is a useful tool for the detection and characterization of breast disease, assessment of local extent of disease, evaluation of treatment response, and guidance for biopsy and localization. It has been shown to have high sensitivity for cancer detection and is increasingly used following mammography and ultrasound to evaluate suspicious breast lesions. Although there has been great controversy over the details of breast MRI technique, there are a number of principles that are generally accepted: a minimum field strength of 1.5T; high and low spatial resolution scans for examining contrast kinetics and lesion morphology; some form of fat suppression which attempts to null any signal from the fat that appears isointense to Gd-DTPA enhanced regions in T1-weighted images; contrast injection to differentiate benign from malignant masses; high temporal resolution for lesion characterization; and a dedicated breast MR coil.<sup>1</sup>

Several methods have been developed to achieve fat suppression, including subtraction, chemically selective fat saturation and variations of the Dixon method. Fat saturation is preferable due to its robustness to small movements, and relatively small extensions to imaging time. However, this increase in imaging time is not negligible since the chemically selective RF pulse and spoiler gradient adds approximately 10 ms to every TR. This is obviously detrimental to imaging applications that have strict temporal requirements, such as dynamic contrast enhanced MRI. We compare two methods of intermittent fat suppression based on elliptic centric acquisition with associated k-space reordering which both significantly reduce the imaging time required to produce clinically acceptable fat suppressed breast MRI images.

## Method

After ERB approval and obtaining informed consent, imaging was performed on healthy volunteers using a 1.5T Signa CVMR Magnet (GE Healthcare, Milwaukee, Wis.) and dedicated breast coil. A 3D FSPGR pulse sequence with the following parameters was used: TR/TE/FA= 7.8ms/3.2ms/10, 20cm FOV, matrix of 256x256, BW=31.25, slice thickness 2.0-3.0mm and 32 locations.

Subjects were first scanned using a truncated fat suppression or elliptic centric (EC) biphasic technique.<sup>2</sup> The elliptic centric view ordering provides the capability to suppress the fat signal during the acquisition of data from the centre of k-space. The acquisition starts at the centre of ky-kz plane and moves steadily outward. A fat saturation pulse is applied at every k-space point within a predetermined area of k-space (from 1%-100%), while those points outside of the area have none. Figure 1 demonstrates k-space with a 25% fat suppression.

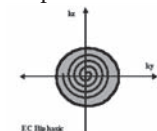
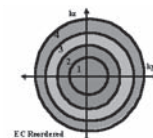


Figure 1.

In order to perform the Elliptic Centric reordered technique, the number of TR periods between applications of fat suppression is chosen depending on the temporal resolution desired. The EC ordering allows the ky- kz points to be

ranked or ordered according to their contribution to fat suppression. Figure 2 illustrates a 25% fat suppression. The number assigned to each area specifies the number of TR periods that have passed since the initial fat saturation pulse. Figure 2. Those points that are most centrally located will be acquired first. Increasing the number of areas to N changes the percentage of fat saturation to 1/N. The order of k-space acquisition no longer moves outward steadily from the centre but cycles through the different areas 1-4. The order of acquisition is as follows: a fat saturation pre-pulse, image a point in area 1, then points in 2,3 and 4, then repeat. The central points in ky-kz are still fully fat suppressed. However, the points in areas 2-4 still have some residual fat suppression unlike in EC Biphasic. The sequences were scanned with a wide range of percentages of fat saturation (from 1-100%). The EC Biphasic and EC reordered images were then compared and evaluated.



## Results

The EC reordered sequence achieves significantly better fat suppression for lower numbers of fat saturation pulses compared to the biphasic sequence. By using the EC reordered method, we can achieve excellent fat suppression even when the saturation prepulse is applied to every 100th TR or to the centre 1% of k-space. This corresponds in a time reduction for performing fat suppression of approximately 99%. We have achieved a

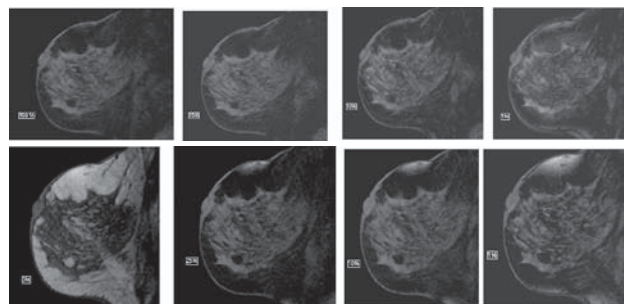


Figure 3. Top row-EC Biphasic 3D FSPGR images with 100%, 25%, 10% and 1% fat suppression. Bottom row - EC reordered 3D FSPGR images with 0%, 25%, 10% and 1% fat suppression. 100% and 0% images are shown for reference.

substantial improvement in temporal resolution for 3D FSPGR fat suppressed images. The 3D FSPGR images are shown for comparison in Figure 3. Images with 25%, 10% and 1% fat saturation can be compared for both methods.

## Conclusion

We have developed a novel method to append fat saturation to the elliptical centric view ordering technique, and have assessed the feasibility of its use on breast MR techniques. This technique could improve the temporal resolution of DCE 3D images obtained as part of our breast cancer screening study.

## References:

1. ACR Practice Guidelines for Breast MRI (2004);
2. Murray, C et al. SMRT Proceedings (2004)



# Comparison of Parallel Imaging Methods for Breath-Hold Abdominal Imaging



## Purpose

Parallel imaging techniques can be applied to abdominal imaging to increase the spatial resolution and/or volumetric coverage possible within a breath-hold, improving the diagnostic value of the scan. While several types of parallel MRI reconstruction methods exist, they all require knowledge of the spatial

sensitivity from the coil array, which is generally acquired during an extra "calibration" step. The purpose of this work was to compare two parallel MRI approaches for abdominal imaging: 1) externally calibrated parallel imaging, in which a calibration scan is performed during a *separate* breath-hold before the accelerated scan, and 2) self-calibrated parallel imaging, in which the calibration data is acquired during the *same* breath-hold as the accelerated scan itself.

## Methods

Image data was collected from 30 patients during routine clinical abdominal imaging on a GE 1.5T scanner (GE Healthcare, Waukesha, WI) using an 8-channel body array coil. The protocol included 2D in/out-of-phase fast gradient echo (FGRE) imaging and 3D T1-weighted spoiled gradient echo (SPGR) imaging using LAVA (Liver Acquisition with Volume Acceleration) pre- and post-contrast injection. All pulse sequences were performed during a breath-hold.

The FGRE and LAVA scans were performed with both ASSET (Array Spatial Sensitivity Encoding Technique, SENSE-based parallel imaging [1]) and a new prototype reconstruction method known as ARC (Autocalibrating Reconstruction for Cartesian sampling). Whereas the ASSET scan was externally calibrated, requiring a low-resolution, fully sampled calibration scan in a separate breath-hold, the ARC scan was self-calibrated, obtaining a small amount of extra calibration data during the accelerated scan itself.

Imaging parameters for the 2D FGRE in/out-of-phase scans were: FA=90°, TR=150ms, TE=2.2/4.3ms, BW=±100kHz, 384x256, NEX=1, slice thickness=8mm, 40 slices, scan time=17s. Imaging parameters for the LAVA scans were: FA=16°, TR=6.4ms, TE=2.9ms, BW=±62kHz, slice thickness=4mm, 320x224, NEX=1, 48 slices, fat sat, scan time=26s. All parameters were identical for both the ASSET and ARC scans except the ARC scan time was slightly longer (~2-5s) due to the extra time required to acquire the calibration data. Images obtained using both reconstruction methods were evaluated for the presence of image artifacts.

## Results

Figure 1 compares sample LAVA imaging results obtained with the ASSET vs. ARC reconstructions. In the ASSET image (Fig. 1a), characteristic block artifacts are visible at the dome of the liver (arrow) due to incorrect calibration information at that location. Because ASSET incorporates coil sensitivity information from the calibration scan to unwrap aliasing in the accelerated scan, if the two scans do not match due to different breath-hold

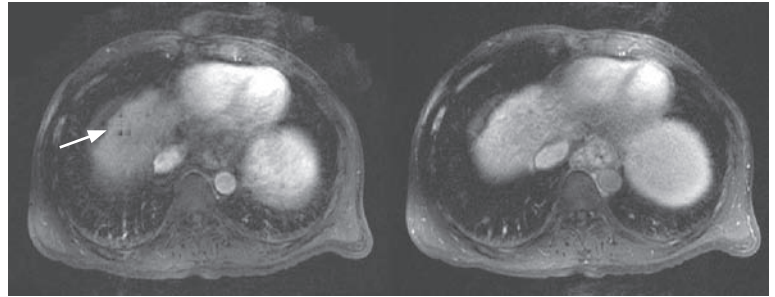


Figure 1. a) LAVA with ASSET shows block artifacts in dome of liver (arrow) due to a mismatch between the calibration scan and ASSET scan. b) LAVA with ARC shows good image quality due to better calibration.

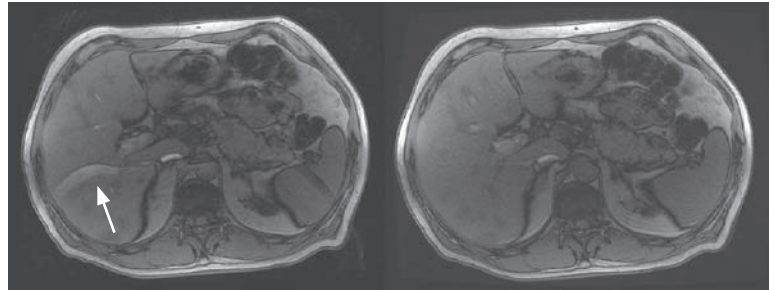


Figure 2. a) 2D FGRE out-of-phase image with ASSET shows wrap artifact in liver (arrow). b) Same image acquired with ARC reveals good image quality and absence of image artifacts.

positions, a mis-mapping of data can occur, causing artifacts in the resultant image. On the other hand, ARC acquires its calibration information during the accelerated scan itself, so there is no possibility for a mismatch of breath-hold positions, and the corresponding ARC image in Fig. 1b contains no artifacts. Similar results are seen in the out-of-phase images shown in Fig. 2. In the ASSET image (Fig. 2a), a wrap artifact is visible in the liver (arrow), whereas the ARC image in Fig. 2b shows no artifact.

## Conclusion

These results demonstrate that externally calibrated parallel MRI can cause artifacts in abdominal breath-hold imaging, while self-calibrated parallel MRI eliminates artifacts with a minimal increase in scan time.

Parallel imaging can be applied to nearly any pulse sequence utilizing a multi-channel array coil. The applications for this technique will continue to grow as increased numbers of receive channels become available. This work demonstrates the value of a self-calibrated reconstruction algorithm to improve image quality for abdominal imaging.

## References

- [1] Pruessman et al. MRM 42:952-962, 1999.

# SMRT/ISMRM **CALENDAR**

## **ISMRM Workshop on Cruising into Molecular and Cellular Imaging**

**4-9 February 2007**

Rhapsody of the Seas by Royal Caribbean International  
Western Caribbean Cruise from Galveston, Texas, USA to Cozumel, Mexico

## **ISMRM Workshop on MR Physics & Techniques for Clinicians**

**11-15 February 2007**

The Fairmont Chateau Lake Louise  
Lake Louise, Alberta, Canada

## **ISMRM Workshop on Non-Cartesian MRI**

**25-28 February 2007**

Enchantment Resort  
Sedona, Arizona, USA

## **SMRT Regional Educational Seminar**

**March 2007**

Venue TBA  
Boston, Massachusetts, USA

## **SMRT Regional Educational Seminar**

**March 2007**

Venue TBA  
Denver, Colorado, USA

## **SMRT President's Regional Educational Seminar**

**10 March 2007**

Morgan Stanley Children's Hospital  
New York, New York, USA

## **ISMRM Workshop on Advances in High-Field MR**

**25-28 March 2007**

Asilomar Conference Center  
Pacific Grove, California, USA

## **SMRT 16th Annual Meeting**

**19-20 May 2007**

Berlin, Germany

## **Joint Annual Meeting ISMRM-ESMRMB 2007**

**19-25 May 2007**

Berlin, Germany

# Signals

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