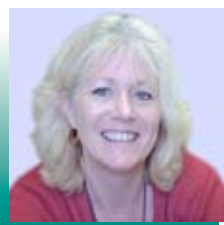


SMRT

President's Message



"I am in awe of the people I have been fortunate enough to get to know during my years with the SMRT."

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

IN THIS ISSUE

3 Editor's Letter

ANNUAL MEETING UPDATES

3 Education Committee Report

4 Annual Meeting Program

6 President's Award Paper

REGIONAL & GLOBAL NEWS

7 Regional News

Chapter Chat

8 Grand Rapids Regional

10 Denver Regional

11 Global Relations Report

INFORMATION FOR YOU

12 Nephrogenic Systemic Fibrosis Update

13 Educational Seminar

14 MRI Safety

UPCOMING EVENTS

15 Call for Nominations

20 ISMRM/SMRT Educational Programs

This is my final letter to you as the SMRT President. It really doesn't seem possible. The last year has been one of the best and busiest of my life. I hope you won't mind if I use this opportunity to thank and acknowledge a few people who have made such a difference to me, as I have made my way into the SMRT leadership. I am in awe of the people I have been fortunate enough to get to know during my years with the SMRT.

From the minute I walked into my first meeting as a newly elected Policy Board member in Kyoto, Japan, **Cindy Hipps** was an inspiration. Developing a friendship with Cindy has been one of the most rewarding results of my involvement with SMRT. Cindy is a dynamo, can do, make it happen woman. In addition to her work with SMRT, she works with her local Crime Stoppers group and she sits on the board of a local girls' home. All of this, she manages while working as a technologist and raising a budding baseball star, Tucker, with her husband Gary. Her organizational skills are unmatched. With Cindy around, there is no other possible outcome. Thank you Cindy, from the bottom of my heart.

At that same meeting in Kyoto, Japan, I met **Bobbie Burrows**. Bobbie is one of the most wonderful individuals on earth. We have had so much fun at so many meetings. Make no mistake; Bobbie knows when to have fun and when to work hard. And work

hard on your behalf she does. For many years she has been a major influence in organizing annual SMRT regional seminars for MR technologists in the Atlanta area. These regionals are always well attended and much appreciated. The Atlanta area is very lucky to have Bobbie and her team. And on a personal level, I am very lucky to have Bobbie. On more than one occasion I have called Bobbie to ask advice or just vent some minor frustration. She is ever willing to lend me a hand. Thank you Bobbie, you have no idea how much I have appreciated your support.

Just like most people, from the moment I met **Candi Roth**, I thought she was a star. Candi has provided me with so much insight. She has been with SMRT since the beginning and over the years she has shared that history with me. Knowing where you have been is incredibly important to shaping the future of an organization. The SMRT wouldn't be where it is now without Candi. We all owe her an enormous debt for her tireless dedication to technologist education. Candi has demonstrated that she is there for me as a person too. Her willingness to share her personal experiences, the highs and the lows, has been instrumental in helping me to appreciate my own strengths and work on my weaknesses. Candi, I am forever grateful for all you have done.

Over the last year, there was more than one occasion when I thought I just can't do this.

Cindy Comeau was always there to bring me back down to earth and gently guide me in the right direction. Cindy is an expert in her field. She has given her time selflessly, leaving her beloved dogs behind, to lecture all over the world, sharing her knowledge, and representing SMRT. Cindy, you are a tough act to follow. Thank you so much for all the help, guidance and support. I would not have made it without you.

On many an occasion, Jennifer Olson, from the home office has been my glue. When the edges have started to gently pop, signaling an explosion on the horizon, Jennifer uses a deft hand to put everything back in place and back in perspective. She's not a "know it all" but I guarantee she knows it all. When I need help, she is a phone call away. SMRT would be paralyzed without her. I am forever in your debt.

Julie Peay, what can I say? (Sorry, I couldn't help the rhyme!) Julie has what has to be one of the two most difficult jobs in the SMRT world, as Editor of the Signals. You have no idea how much work Julie puts into these publications. This is precious time Julie volunteers. Volunteers! The results are consistently phenomenal. Your work and dedication leave me awestruck. You have touched me deeply. Your kind words and encouragement have been a staple in my ability to reach my goals this year. I will carry the lessons you have taught me for the rest of my life. Thank you, Julie.

Anne Sawyer is another person who puts a phenomenal amount into ensuring that SMRT meets its educational goals. I am amazed by the *Educational Seminars* home studies she pulls together. She is like a world class figure skater. You know what they are doing takes a phenomenal amount of practice, talent and hard work, but you never see

them sweat. Anne puts so much of herself into those Homestudies and into SMRT as a whole. Anne, I am sure you have no idea how many times a one line e-mail from you can leave me rolling on the floor. They are the messages that I think about on a difficult day and just smile. Anne is tough. She gives her best and she expects the same. Without her, on many occasions, we could have slipped into mediocrity. Anne simply won't allow it. I am incredibly grateful to you for helping me push forward in what is not always the easiest direction but is always the right direction.

There is no doubt in my mind that SMRT will soar under **Wendy Strugnell's** leadership. She is a strong woman and an independent thinker. As SMRT's first non US President she brings a new perspective to the role. SMRT has always been an international organization, but our membership growth outside North America over the last year is something of which I am very proud and it would not have happened without Wendy's influence. She has rallied the Australian and New Zealand technologists. Wendy, thank you for all of your help and support during my tenure. I look forward to being a part of your Executive team.

Maureen Ainslie, Karen Bove Bettis, Gina Greenwood, Julie Lowe, and Heidi Berns have each taken time to give me their support and guidance. Thank you to each one of you. **Sony Robb Belville**, hang in there, the answer is yes, it's worth it. **Charles Stanley**, the SMRT membership has no idea what you do for the organization. Thank you for all the help you have given me. I am really looking forward to watching your continued success.

Carol Lee, Melonee Elrod, and Wendy Porter together with **Cindy Hipps** are the Carolina

Girls. It's true you know, all the women from the South are beautiful, strong and the loveliest people you could ever hope to meet. These women work with Cindy each year to host a stellar regional in South Carolina. Thank you for inviting me and always making me feel welcome. Thank you also to **Donna O'Brien**, who helps Bobbie with the Atlanta regionals. **John Posh** and **Jim Stuppino**, thank you for always being just an e-mail away with a quick answer to anything I ask. I look forward to seeing you all again soon.

My New England girls, **Vera Miller, Janice Fairhurst**, and **Maryanne Blaine**; you are rising stars. Thank you again for my fantastic President's Regional. I can't wait until its one of yours!

Thank you also to all the current Policy Board Members who I haven't already mentioned who have helped make this year such a great success; **Paul McElvogue, Filip DeRidder, Anne Dorte Blankholm, Randy J. Earnest, Jane M. Francis, Anna Kirilova, Caron Murray, Steven P. Shannon, David W. Stanley, Nancy Talbot**, and of course our newly elected President-Elect, **Pamela Vincent**. Pam, you'll be great!

Of course there are many more people who have influenced, supported, pushed and challenged me since I began my tenure with SMRT. Each and every person I have met has taught me in one way or another. So I would like each of you to consider sharing yourself with your fellow MR technologists and radiographers. Join a committee and offer to score the abstracts, review a home study, write some questions. You won't believe how much you'll learn and how many terrific people you'll meet. Get in the SMRT game. Everybody wins! [S]



Editor's Letter

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

Greetings!

This issue of *Signals* marks a significant change in the publication schedule

for your newsletter. SMRT members have requested that the newsletter committee publish *Signals* according to the calendar year, rather than four times per year based on the timing of the Annual Meeting. In previous years, the second issue of the year was not completed until after the SMRT Annual Meeting resulting in a long period between the first and second "quarter" issues and a shorter period between the other issues. It is our goal to provide a more consistent distribution of the news and events of the SMRT to you throughout the year.

The implementation of the electronic only format of *Signals* has been well received. News and information is available to you in a timelier manner when it is posted on the web-site rather than mailed in hard copy. It is the objective of the newsletter committee to proceed conscientiously by helping to preserve the global environment, by reducing paper use and carbon based distribution mechanisms. We also strive to remain fiscally responsible in these

challenging times.

We begin the second quarter of 2008 with a farewell message from SMRT President, **Carolyn Bonaceto** who expresses her appreciation to the many volunteers and staff who carry on the work of the organization. Leading into the latest news of the upcoming Annual Meeting in Toronto, Education Committee Chair **Sonja Robb-Belville**, explains the process of abstract submission scoring. She also announces that additional continuing education credits have been approved for selected ISMRM courses. The Program Committee Chairs **Anna Kirilova**, **Caron Murray**, and **Nancy Talbot** present the finalized schedule of speakers and events for the Annual Meeting. The ISMRM/SMRT Joint Forum content is described along with the expert speakers on the topic of Nephrogenic Systemic Fibrosis (NSF). To complete the pre-meeting information the President's Award Paper is included.

Janice Fairhurst, Chair of the Regional Committee, presents an overview of recent and upcoming seminars held in various areas of the globe. Chapter Chat returns with an update by Local Chapters Chair, **Pam Vincent**. The North Central Regional

SMRT Seminar held in Grand Rapids, Michigan is recounted by Co-Chair **Ronald Skorstad**. Across the United States in Denver, Colorado, **Betsy Sestina**, Co-Chair reports on the Regional Seminar held there.

Global Relations Co-Chair, **Anne Dorte Blankholm** shares exciting news about the European and Scandinavian efforts to offer quality SMRT Regional Seminars. She has invited colleague **Michael Pedersen** to share an update on Nephrogenic Systemic Fibrosis from the European perspective.

The importance of addressing Nephrogenic Systemic Fibrosis and the use of contrast media in MR imaging is the topic chosen by Editor **Anne Marie Sawyer** for this issue of the SMRT *Educational Seminars* home study offering. MR Safety expert **Frank Shellock** provides the latest information addressing MRI issues for Hemodynamic monitoring and temporary pacing devices.

Upcoming Educational opportunities are listed for you to plan accordingly. You are reminded to check the SMRT web-site often for updates and information. Your suggestions and comments are welcome!

Happy Reading!



Education Committee Report

Sonja K. Robb-Belville
B.S., R.T. (R) (MR)
Chair,
Education Committee

Abstract submission scoring for the 17th Annual SMRT Meeting "MR Education Unlimited" in Toronto, Canada 3-4 May has been completed by volunteers from the Education Committee. Fifteen reviewers and two alternates evaluated the content of the 55 submissions from 11 different nations, including Australia (1), Canada (5), Denmark (1), Germany (2), Japan (2), Korea (3), the Netherlands (3), Singapore (1), Sweden (2), the United Kingdom (5), and the United States of America (30).

The first round of scoring determines which abstracts will be presented as Proffered Papers at the Annual Meeting in Toronto. The President's Award is given to the best overall abstract, in addition to 1st, 2nd, and 3rd place awards for abstracts in the clinical focus and the research focus. Authors of abstracts not selected for presentation as an oral Proffered Paper are invited to submit their abstract as an e-poster, and an additional round of scoring is conducted by the reviewers to select the 1st, 2nd, and 3rd place posters in the clinical focus and the research focus. The award winning posters will be presented during the SMRT Reception and Poster Walking Tour beginning at 17:30 on 3 May. You don't want to miss

this excellent educational and networking opportunity!

Additional Continuing Education Credits Available in Toronto!

Several courses throughout the scientific portion of the 16th Annual ISMRM Meeting will award Category A Continuing Education Credit to MR Technologists/Radiographers. The low registration cost for SMRT members to attend the ISMRM Scientific Meeting makes this an excellent value. Please consider extending your stay in Toronto to take advantage of the excellent opportunity and stay tuned for future announcements on which courses will qualify! [S]



Anna Kirilova,
B.Sc., R.T., (R)(MR)



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



Nancy Talbot,
M.R.T., (R)(MR)

From the 2008 Program Committee Co-Chairs

The Annual Meeting is quickly approaching but it's not too late to join us at the Metro Convention Centre in Toronto, Canada for the 17th SMRT Annual Meeting. The Meeting will be held in conjunction with the 16th Scientific Meeting and Exhibition of the International Society of Magnetic Resonance in Medicine (ISMRM).

The Toronto programme has been designed to fulfill the educational needs and interests of both clinical and research MR technologists and radiographers worldwide. The goal of the SMRT is to provide quality educational opportunities while establishing and maintaining a high level of professionalism in the field of Magnetic Resonance Imaging.

Many of the topics for this year's invited speakers were chosen based on the comments and feedback received from the attendees of the previous Annual Meeting in Berlin, Germany. The Saturday programme starts off with the following exciting presentations: Radio Frequency and Specific Absorption Rate Considerations by **Dr. Joel Felmlee**, Clinical Cardiac MRI: Optimize your Workflow by **Cindy Comeau**, Challenges in Musculoskeletal MRI by **Dominic Kennedy**, Veterinary MRI by **James Stuppino**.

The SMRT Business Meeting will be held before the lunch break and we would like to encourage all to attend and participate. Following the lunch break we will be continuing the day with: Advances in Pulse Sequences/Molecular Imaging by **Dr. Michael Noseworthy**, Hot Topics in Breast MRI by **Dr. Thomas Helbich**, Imaging the Pregnant Patient by **Dr. Leena Mammen**. The winner of the President's Award will present her paper along with several of the abstract award winners in both clinical and research MR.

The day will conclude with the SMRT Reception and Poster Walking Tour. This is a great opportunity to not only learn about new and innovative clinical and research studies but to meet and interact with colleagues both new and old.

The Sunday programme kicks off with an educational bang with Vascular MRA (1.5T and 3T) by **Brian DeSouza**, Body MRI 2008: Tips and Techniques and New Advances by **Dr. Russell Low**, and Parallel

Program Committee Update

"MR Education Unlimited"
The 17th Annual SMRT Meeting
3-4 May 2008 Toronto, Ontario, Canada
Program and Category A CE Credits

Time	Saturday, 3 May	Credits	Sunday, 4 May	Credits
07:45	Welcome & Announcements Carolyn Bonaceto, B.S., R.T., (R) (MR) SMRT President 2007-2008 Anna Kirilova, B.Sc. R.T., (R) (MR) 2008 Program Co-Chair		Welcome & Announcements Wendy Strugnell, BAppSc (MIT), SMRT President 2008-2009 Nancy Talbot, M.R.T. (MR) (R) 2008 Program Co-Chair	
	Moderator: Charles Stanley, CRA, R.T., (R) (CT) (MR)		Moderator: Cindy Comeau, B.S., R.T., (N) (MR)	
08:00	Radio Frequency and Specific Absorption Rate Considerations Joel Felmlee, Ph.D.	1.0 CE	Vascular MRA (1.5 and 3T) Brian DeSouza, R.T., (MR)	1.0 CE
09:00	Clinical Cardiac MRI: Optimize Your Workflow! Cindy Comeau, B.S., R.T., (N) (MR)	1.0 CE	Body MRI 2008: Tips & Techniques & New Advances Russell Norman Low, M.D.	1.0 CE
10:00	Break		Break	
	Moderator: Anne Marie Sawyer, B.S., R.T., (R) (MR)		Moderator: David Stanley, B.S., R.T., (R) (MR)	
10:15	Challenges in Musculoskeletal MRI Dominic Kennedy, BAppSc (MIT)	.50 CE	Parallel Imaging Jason Polzin, Ph.D.	1.0 CE
10:45	Veterinary MRI James Stuppino, B.S., R.T., (R) (MR)	.50 CE		
11:15	SMRT Business Meeting		Proffered Papers	.50 CE
11:45			SMRT Awards Presentation and Luncheon	
12:00	SMRT Luncheon		Moderator: Steven Shannon, R.T., (R) (MR)	
	Moderator: Vera Miller, B.S., R.T., (R) (MR)			
13:00	Advances in Pulse Sequences/Molecular Imaging Michael D. Noseworthy, Ph.D.	1.0 CE	Safety Forum: MR Safety Update Emanuel Kanal, M.D., F.A.C.R.	1.0 CE
14:00	President's Award Proffered Paper	1.0 CE	Challenges & Opportunities for the MR Safety Officer John Posh, R.T., (R) (MR)	1.0 CE
14:15	Proffered Papers			
15:00	Break		Break	
	Moderator: Caron Murray, M.R.T. (R) (MR) (CT) 2008 Program Co-Chair		Moderator: Pamela Vincent, R.T., (R) (MR)	
15:15	Hot Topics in Breast MRI Thomas Helbich, M.D.	1.0 CE	Brain Imaging Medley Carolyn Roth, R.T., (R) (MR) (CT) (M) (CV)	1.0 CE
16:15	Imaging the Pregnant Patient Leena Mammen, M.D.	1.0 CE	Artifacts & Remedies Forum John Christopher, B.A., R.T., (N) (MR) Laurian Rohoman, R.T., (R) (MR), ACR	1.0 CE
17:15			Adjourn	
17:30	SMRT Reception Poster Walking Tour	Total: 7.0 CE		Total: 7.50 CE

ISMRM 16th Scientific Meeting & Exhibition ~ Toronto• 5–9 May

Courses Accredited for Technologists/Radiographers			
Time	Room	Course	Category A CE Credit(s)
Monday, 5 May 2008			
11:00-13:00	716 A/B	Body MRI by the Experts III: Bowel and Peritoneum	2
14:00-16:00	718 A	ISMRM & SMRT Joint Forum: Nephrogenic Systemic Fibrosis: A Multidisciplinary & Global Issue	1.5
16:30-18:30	Hall F	MRI Physics and Techniques for Clinicians	2
Tuesday 6 May 2008			
7:00-8:00	801 A/B	Safety Update – Contrast Agents	1
10:30-12:30	701 B	CMR of Myocardial Infarction	1.5
13:30-15:30	715 A/B	Image Processing	2
16:00-18:00	Hall F	MRI Physics and Techniques for Clinicians,	2
Wednesday 7 May			
7:00-8:00	801 A/B	Safety Update- RF Heating	1
10:30-12:30	701 A	Imaging CNS Autoimmune Diseases	1.5
13:30-15:30	715 B	Ethics in Imaging Research	2
16:00-18:00	Hall F	MRI Physics and Techniques for Clinicians	2
Thursday 8 May 2008			
7:00-8:00	801 A/B	Safety Update-Bioeffects of Static and Gradient Fields	1
10:30-12:30	716 A/B	Body MRI by the Experts IV: Female Pelvis	2
13:30-15:30	715 A/B	So You Want to Start an MRI Company? – What You Need to Know	1.5
16:00-18:00	801 A/B	MRI Physics and Techniques for Clinicians	2
Friday 9 May 2008			
7:00-8:00	801 A/B	Safety Update – Regulatory Position	1

ISMRM/SMRT Joint Forum

Monday, 5 May 2008

Nephrogenic Systemic Fibrosis - A Multidisciplinary and Global Issue

14:00–14:25 Emanuel Kanal, M.D., F.A.C.R

“NSF: Where have we been, where are we going”.

Review the history of MRI contrast agents linked to this disease. Provide an update on patient management recommendations.

14:25–14:45 Tim Leiner, M.D., Ph.D.

“NSF: Challenges of Gadolinium & NSF outside of North America.”

A global perspective of the challenges related to NSF and gadolinium.

14:45–15:05 Eric Williamson, M.D.

“Gadolinium and NSF: Risk factor screening and contrast administration.”

Discuss findings from an extensive review of patient files.

Review techniques for risk factor screening and alternative approaches to imaging in the “at risk” population.

15:05–15:30 Cindy Comeau, B.S., R.T., (N)(MR)

“NSF Management: A Technologist Perspective”.

Technologist perspective-implementation of new screening procedures, MRA protocol optimization, patient management.

15:30–16:00 Q&A session with panel discussion

Program Committee Update *continued from page 4*

Imaging by **Dr. Polzin** followed by the remaining proffered award-winning paper presentations. Prior to breaking for lunch, we will continue the meeting with the SMRT Awards presentations, again we encourage everyone to attend and congratulate all the winners. The afternoon sessions start off with the ever-applicable Safety Forum:

MR Safety Update with **Dr. Emanuel Kanal** and Challenges and Opportunities for the MR Safety Officer by **John Posh**. We will then move on to a Brain Imaging Medley by **Carolyn Roth** and conclude the day with Artifacts and Remedies Forum by **John Christopher** and **Laurian Rohoman**. As chairs of the Program Committee, it is

our pleasure to invite you all to attend this exceptional meeting in our hometown of Toronto. Please everyone, join us in bringing an exciting quality educational weekend to all MR technologists and radiographers. As proud Torontonians, we welcome you to stay and check out our wonderful multicultural city!



Violet Chua, BSc.

Evaluation of Territorial Arterial Spin Labeling in Acute Stroke Patients

Violet Chua GE¹, Esben Thade Petersen^{1,2}, Xavier Golay^{1,3}, Tchoyoson Lim¹

¹Department of Neuroradiology, National Neuroscience Institute, Singapore. ²CFIN, Department of Neuroradiology, Aarhus University Hospital, Aarhus, Denmark. ³Laboratory of Molecular Imaging, Singapore Bioimaging Consortium, Singapore.

Purpose: To evaluate the usefulness of arterial spin labeling techniques for measuring changes in perfusion and the vascular territories of the brain in the acute phase of first time stroke patients. In addition to providing information about Cerebral Blood Flow (CBF), which is an important parameter for the assessment of the tissue viability in acute stroke, ASL can also provide information such as transit times of blood traveling from the labeling plane to the region of interest as well as important information about perfusion territories and thereby collateral perfusion [1-3]. Arterial spins are inverted (labeled) in an artery upstream from the image region of interest, and as labeled blood flows into the imaging area there is an exchange of water between the microvascular and static tissue through the blood-brain barrier. The magnetization state of the tissue changes by an amount determined by blood flow and T1 relaxation. Two images are acquired (one with spin inversion and one without), and the subtracted of these two images results in a perfusion weighted image. ASL permits the absolute quantification of cerebral blood flow (CBF) without requiring the use of contrast agents or radioisotopes which is the case for traditional methods such as single photon emission computed tomography (SPECT), dynamic susceptibility contrast enhanced MRI, and positron emission tomography (PET). In this work, we compare information obtained with standard gadolinium-based perfusion methods to that obtainable using arterial spin labeling techniques in acute stroke patients with special focus on the feasibility of territorial imaging.

Method: 160 patients with first time stroke were recruited and perfusion was evaluated using the ASL techniques. All experiments were approved by the local ethics committee and the MRI investigations were performed using a 3T Philips Achieva whole body system. The protocol consisted of DSC-PWI imaging, DWI-imaging, T2 as well as TOF angiogram and two ASL scans. The first ASL scan measured global perfusion at multiple time-points [2] and the second was meant for vascular territory imaging (T-ASL), labeling the left- and right-internal carotid artery (ICA) as well as the posterior circulation. The planning of these territories was performed on the basis of the MIPs from TOF-angiograms (See Fig.1). ASL scan parameters were: TR/TE/ Δ TI/TI1=4000/23/300/40 ms, 64x64 matrix, 7 slices, FOV=240x240, flip-angle=35/11.7°, SENSE=2.5. V_{enc} =[∞ , 4 cm/s], 82 (48 @ V_{enc} =4cm/s, 24 @ V_{enc} = ∞ , 10 low flip angle) averages, all implemented in a single sequence. No vascular crushers were used for the territory imaging and all three territories were acquired within one scan. Total scan time for global ASL and T-ASL were 5:45 and 6:40 respectively.

Results: Territorial imaging was successful planned and acquired in 145 of the 160 cases. Figure 2 shows an example case showing how the perfusion territory of the stenotic left ICA (in green) has been taken over by collateral perfusion from contra lateral ICA (in red) and posterior (in blue). The red arrow shows extended MTT on PWI while cyan and orange shows delayed perfusion on ASL.

Discussion: Despite the complex anatomy of the vasculature which often makes it difficult to separate especially the labeling of the posterior circulation from the anterior, resulting in mixed blood flow from both territories, regional and possible collateral perfusion was successfully acquired in 145 or 91% of the patients. This makes a good estimate of the success rate of T-ASL in stroke patients a technique which requires good expertise during planning as well as being sensitive to motion from time of acquiring the TOF to actual scan. A potential strength of ASL in establishes collateral perfusion after a thromboembolic event is the improved assessment of the actual etiology with regards to territory involved and could therefore be of added value in the risk management of large vessel diseased stroke patients.

Conclusions: Arterial Spin Labeling was found promising for assessing vascular territories perfusion in acute stroke patient. Perfusion measurement with ASL appears sensitive to changes and alteration in cerebral blood flow during early stroke.

References: [1]Petersen et al, BJR 2006;79:688–701 [2]Petersen ET et al, MRM 2005;55:219-32 [3]Hendrikse et al., Stroke 2004;35:882-887

Acknowledgement: NNI patient recruitment team, Philips Medical Systems, NMRC/0919/2004

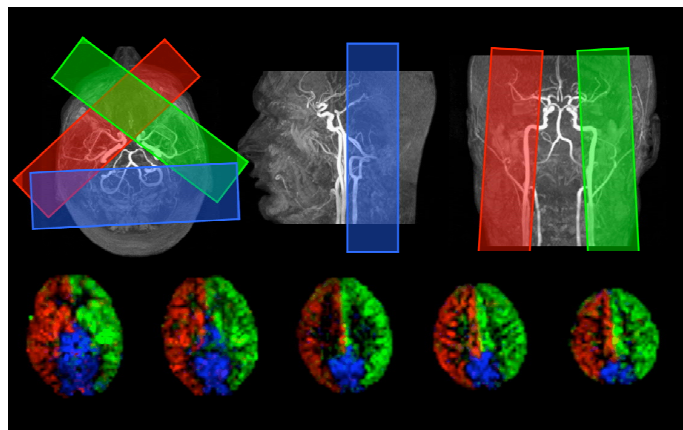


Figure 1. Planning of the territorial imaging based on time-of-flight images. Corresponding example images in a healthy volunteer is shown for the territories of right- & left-internal carotid artery and posterior circulation.

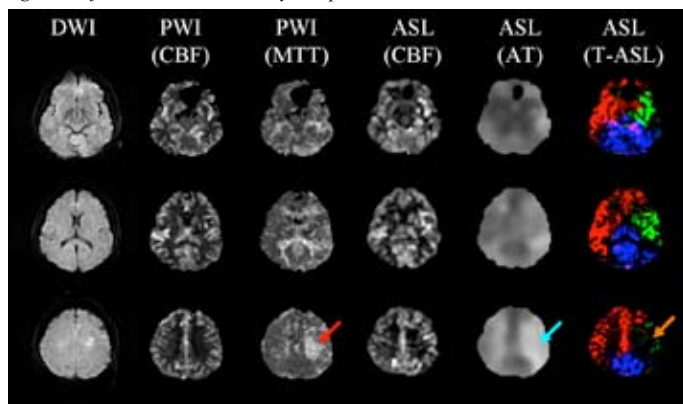


Figure 2. Three slices from multiple modalities. From left: diffusion weighted images, contrast based- Cerebral Blood Flow, Mean Transit Time, and ASL based- Cerebral Blood Flow, Arrival Time (from labeling plane to image region) and finally the vascular territories depicted as red-green-blue for right- & left-internal carotid artery and posterior circulation respectively.



Regional News

Janice Fairhurst, B.S., R.T., (R)(MR),
Chair, Regional Committee

“Show your support for your profession by either attending a local meeting or by hosting one of your own.”

2007 proved to be a very successful year for SMRT Regional Seminars. In the United States we held 8 SMRT regional educational seminars including Boston, Massachusetts; New York, New York; Hershey Pennsylvania; Foxwoods Resort, Connecticut; Atlanta, Georgia; Baltimore, Maryland; and Syracuse, New York. Internationally we had a very exciting year as Eastern Canada hosted their 5th Regional seminar in Montreal and video-conferenced to Toronto, while our Australian colleagues held their second, very successful meeting in Melbourne this past November. 2008 looks even busier with meetings planned for Brussels and Denmark; and discussion underway for our first SMRT regional to be

held in France!

One of the goals for the SMRT Regional Committee this year is to establish an efficient way to spread the word for our hosts. “Get the Word Out.” By devising a global list of MR sites and contacts to send our brochures and educational opportunity notices, we can ensure that more technologists and radiographers will have the opportunity to attend these sought after meetings.

Please help us establish this list by sending the names of hospitals and MR facilities in your area along with contact info for future SMRT regional notices. You can send your contributions to janfai@bwh.harvard.edu

Thanks to those of you who have already e-mailed, we hope that the list will continue to grow and in turn so will the number of technologists who will attend the SMRT Regional Seminars.

I can’t stress enough the importance of these educational seminars, the dedication and hard work that each one takes to plan, the commitment and enthusiasm of the guest speakers who bring cutting edge education locally so that technologists from all realms of the industry can stay on top of their game. Show your support for your profession by either attending a local meeting or by hosting one of your own. We’ll be happy to help!



Chapter Chat

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

***“Please join me in saying
Thank You for a job well done.”***

May is almost here and that means our annual meeting, this year in the beautiful city of Toronto, Canada. The meeting affords us the opportunity to continue our efforts to make the SMRT a more international forum. The annual meeting is a great time to network with fellow technologists. Why not take the time to connect with technologists from your local SMRT chapter? If there is no chapter near you, this is the time to meet technologists from your area and get one started. The Annual Meeting is also an opportunity to meet technologists from chapters around the world to see what they are doing. There is also time to meet and network with other chapter presidents.

Many new chapters are forming, and this is your chance to get involved. A Michigan chapter is in the process of confirming their formation. Our newest US chapter is in Savannah, Georgia. A European Chapter is also in process, in the Netherlands, Belgium and Luxembourg. There is also interest in starting a Scandinavian chapter.

Pam Vincent, the Local Chapters Chair will be in Toronto, and is more than happy to meet with anyone who has questions, or would just like help getting the process started. Don’t hesitate to look her up while there. Local chapters offer opportunities for networking and education. Being involved makes us stronger as an organization, and

as technologists.

Chapter Happenings

The Rocky Mountain Chapter recently held a very successful regional seminar. **Betsy Sestina** and **Tamara Greer** did an excellent job of organizing a full day of exciting educational topics. Congratulations for a job well done.

As this is my last column as Local Chapters Chair, I would like to thank all the chapters, especially all of the chapter officers for their dedication to the SMRT.

The SMRT is growing bigger and better because of all your hard work. Please join me in saying Thank You for a job well done.



Ronald B. Skorstad , R.T. (R)(MR)
Co-Chair

The first North Central Regional SMRT meeting had all the indications of a successful event with a good showing of online registrations. Despite west Michigan's notorious reputation for unfriendly weather particularly in late January there were many not to be held back by Mother Nature in their quest for knowledge, a days worth of quality education credits and some good refreshments.

We had a line up of cutting edge topics and some dynamic speakers hoping to draw in as many interested technologists as possible. There were thirty five total participants, eight speakers and twenty seven in the audience. Several even braved the wintry weather traveling in from Carol Stream, Illinois, one in from Brooklyn, Ohio and four from Port Huron, Michigan, on the eastern part of the state. We wish to thank those traveling in the bad weather for their support, it helped make this event a success.

Many thanks go out to Spectrum Health for hosting the event in their East Auditorium which proved to be a great venue for this meeting. We want to personally thank

Larry Genzink and **David Buzckowski** for their commitment to the MRI staff in achieving higher education through events like these.

Our first speaker for the day is from Advanced Radiology Services, PC was **Tammy Kreuzer, M.D.** She addressed MRI Guided Breast Biopsy and



Steve Zomberg, R.T. (R)(MR)

for each of the patients she works with, proves to be a comfort and an asset to our community.

Our next speaker was Spectrum Health's **Steve Zomberg, R.T. (R)(MR)**, who presented the topic of fMRI. Steve has been instrumental in getting the fMRI program up and running in collaboration with the Pediatric and Neuro-Radiologists at Spectrum Health. Steve provided unparalleled information from a complete start up and equipment needed, as well as the actual acquiring and post processing of data collected. He has worked in the operating room with the Neuro-surgeons and Radiologists perfecting potentially life altering techniques from image acquisition data. Steve had some really cool tractography images that showed the path of nerves throughout the brain. These images are used by surgeons to guide them to the tumor without disrupting non-invaded areas of tissue.

The next speaker was **Rod Bell, R.T. (R)(MR)**, from Bronson Hospital in Kalamazoo, Michigan. Rod also braved the West Michigan weather in his show of support for continuing education through the SMRT. He provided some insightful aspects to

Breast MRI. She gave compelling overviews of the technological advances that have made MRI the leader of modalities for breast imaging. As the Director of Breast Imaging at the Spectrum Health facilities, her display of knowledge, and most of all her care



Rod Bell, R.T. (R)(MR)

the necessity of different modalities working together in providing patient care. He spoke about MR Arthrography with and with out the administration

of contrast injected directly into the joint. The success of the study depends on the time efficiency of getting the patient from

the fluoroscopic guided injection to the MRI scanner before the contrast has a chance to dissipate out of the joint capsule.

Brad Betz, M.D. from Advanced Radiology Services and the Director of Pediatric Imaging at Spectrum



Brad Betz, M.D.

Health gave a heart warming lecture on how children and their families are cared for when they come in to the Pediatric Radiology Service at Spectrum. Dr Betz's passion and knowledge is a comfort to those families whose children are faced with a multitude of diseases that come in seeking help. He spoke about Spectrum's commitment to the community by purchasing one of ten in the world NISS systems. It is essentially a neo-natal ICU on wheels that can be used in the MRI scanner with complete reliable monitoring capabilities; it has a head coil and a body coil built in with high resolution imaging.



Tammy Kreuzer, M.D.



Mark Delano, M.D.

We want to thank Bracco Diagnostics for sponsoring **Mark Delano, M.D.** from Michigan State University, a welcomed addition to the Advanced Radiology Services team. Dr. Delano shared in his extensive clinical and research practice using different contrast agents available in the industry. He focused on the dilemmas we face using MRI contrast and the effects that it is having on a population of acute and chronic renal failure patients. As the awareness and the number of patients continue to grow that have been diagnosed with NSF (Nephrogenic Systemic Fibrosis) he offered several alternatives that some of the industries vendors are currently working on, better non-contrast pulse sequences.



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

During the lunch break SMRT Past-President, **Cindy Comeau, B.S., R.T., (N)(MR)**, spoke to the audience on behalf of the SMRT. She outlined the benefits in becoming a member of the SMRT: the online List Serve; the *Educational Seminars* home study offerings that are mailed to members enabling them to earn

CE credits; and the *Signals* newsletter as a wonderful means of staying in touch with the many activities of the SMRT.

On behalf of everyone at the meeting we wish to thank the SMRT for sponsoring Cindy to speak at our conference. Cindy's illumination of Cardiac MR is one of the most informative I've heard. Cindy covered all the

nuances from starting a Cardiac program and added helpful hints as well to those with existing programs. She informed us of changes being made to Reportcard, a GE supported post processing tool. She had a series of cases with varying pathologies and how to recognize them from a technologist's perspective.



Stuart Clarkson

His topic covered areas of construction and wiring of the coils and how GE is working on improving signal to noise ratios through design changes. Given the increased use of parallel imaging in MR he provided working techniques to the audience for optimizing protocols. Stuart also demonstrated new pulse sequence techniques for all aspects of MR imaging. The 3D IDEAL sequence is promising to decrease the amount of scanning we do with the ability to reformat in multiple planes.



Yong Zhou, Ph.D.

We would also like to thank GE Healthcare North Central Regional: Grand Rapids, Michigan, USA for sponsoring **Stuart Clarkson** who gave a dynamic presentation on new and existing coils in MRI.

Special thanks also go out to **Yong Zhou, Ph.D.** our onsite physicist who presented material on MRI safety. He gave an in depth explanation of dB/dt, SAR levels and the potential for patient discomfort while in the scanner

if a proper protocol was not followed. With the advent of newer and faster pulse sequences it is particularly important for first level scanning options when downloading these protocols. He also mentioned the necessity of padding the patient while in the scanner to prevent any burns. He stressed having the patient's arms by their side and not creating a loop for energy to be conducted. Dr. Zhou showed a complete schematic on the design of a magnet and all the components that it takes to generate images.



Leena Mammen, M.D.

Our last speaker of the day was Advanced Radiology Services **Leena Mammen, M.D.** who gave an energetic talk "Maternal Imaging with MRI." She described new and innovative ways using MRI

to image different pathologies ranging from appendicitis, placenta accreta, placenta previa and other problems that can arise during pregnancy. These new techniques result, in most circumstances, in higher resolution images and better penetration than Ultra Sound for these and other pathologies. She has worked with the staff at Spectrum in developing protocols that are quick enough to answer the question for ordering clinicians while limiting the amount of time the patient must lie flat.

Special thanks to my colleague **Becky Ruter** in assisting me in organizing this seminar. Thank you to the sponsors and to the SMRT staff in the Berkeley office for their assistance. At the end of the day, the general consensus of those participating was that they felt that it was a well planned and organized event. We again want to thank all those attending for their support. We look forward to planning our next meeting. [S]



Betsy Sestina, B.S. RT (R)(MR)(CT)(M),
Co-Chair

Rocky Mountain Regional: Denver, Colorado, USA

The Rocky Mountain SMRT Chapter Regional meeting was held on Saturday, 9 February 2008 at the Doubletree Hotel Denver Southeast, Aurora, Colorado. 85 attendees were treated to a variety of topics.

The event was co-chaired by **Betsy Sestina, B.S. R.T. (R)(MR)(CT)(M)** of the Colorado State University College of Veterinary Medicine and Biomedical Sciences and **Tamara Greer, R.T. (R)(MR)** of Denver, Colorado.

Shahid Hussain, M.D., Ph.D., sponsored by Bayer, started the day with a great session on Current Issues in Contrast Media, highlighting NSF issues. He provided attendees with a review of the fundamental properties of gadolinium-based contrast agents following up with the evaluation of the clinical aspects of gadolinium-based contrast agent's use in renal patients. Helpful information for all MR facilities!

Bill Faulkner B.S., R.T., (R)(MR)(CT), sponsored by Bracco, was next on the agenda with a discussion of the challenges, benefits, and issues when scanning at 3T. Bill addressed SAR management, pulse sequences, contrast, RF heating, as well as increases in T1-relaxation times, chemical shift and susceptibility. Great information for those with new 3T magnets and those anticipating one!

Susan Kraft, D.V.M., Ph.D. gave us a nice diversion and spoke to us about the research being done at Colorado State University College of Veterinary Medicine and Biomedical Sciences. Almost the entire room, with a show of hands, let it be known that they had pets and the response to her session was very positive. She treated us to lots of information about the research being conducted at the vet school. Dr. Kraft spoke to us about the types of research being performed at CSU involving the imaging of parameters important to treatment response such as tumor vascularity, hypoxia, perfusion and tumor metabolism.

Sponsored by the SMRT, **Cindy Comeau, B.S., R.T., (N)(MR)** shared her expertise in two sessions. She started with a discussion before lunch of Cardiac MRI at 1.5T: A Protocol Approach, which included how to get started in Cardiac MR, protocols for scanning the patient, analysis review and an applications protocol review. After lunch, Cindy continued with Advanced Applications of Cardiac MRI with a discussion of Obstructive Coronary Disease highlighting indications as well as coronary artery imaging challenges. Cindy's images and presentation were superb!

Stuart Clarkson, Americas MR Training Manager from GE Healthcare spoke to us

on the Pitfalls of Brain MRI. He covered the dynamics of flow in the brain, patient motion, image motion from flow, the two classes of parallel imaging methods, as well as pitfall causes, corrections and artifacts.

Bill Faulkner finished off the afternoon with Imaging of the Liver and ACR MR Accreditation Update. Thanks Bill for your best advice at the end of the ACR update... Follow the Directions!

The majority of the technologists were from the Denver area, but we did have two from Kansas and one that traveled from Scottsdale, Arizona to spend the day with us. It was great to see old friends and make some new ones as well.

The Rocky Mountain Chapter is very grateful to have the opportunity to host this Regional Meeting. We are looking forward to making this regional an annual event!

We also would like to thank the SMRT Berkeley office staff and acknowledge all the support from our sponsors, for without their support none of this would have been possible.

We look forward to seeing you all again next year!!!



Co-Chair Betsy Sestina addresses the attendees



Cindy Comeau and Betsy Sestina prepare for the next presentation



Speaker Bill Faulkner shares a moment with attendee Barbara Ash



Global Relations Committee Report

Anne Dorte Blankholm
M.SC., R.T., (MR)
Co-Chair

Since the last issue of *Signals* was posted, Europe has been a busy place on behalf of the SMRT. Two SMRT Regional Seminars in Europe have become a reality in the first quarter of 2008.

In September, 2007, I went to Sweden to have a meeting with Titti Owmann in order to plan a SMRT Regional Seminar in Denmark. The intention was to have the first SMRT Regional Meeting in Europe and we wanted it to be in the English language in order to reach as many MR technologists and radiographers as possible.

We have succeeded in getting some excellent speakers from USA, Sweden and Denmark and at this writing, the program looks very promising with a broad variety of subjects.

Despite attempts to reach Radiographers and MR Technologists we have not reached the numbers of registrations we had hoped for. Therefore the deadline for registration has been prolonged and we hope this will encourage a larger number of registrants to attend.

This response is rather surprising because at the international forum in Berlin MR technologists and radiographers expressed interest in attending a SMRT Regional Seminar in Europe.

After the Annual Meeting in Berlin a questionnaire was e-mailed to the European participants and 78% of the answers stated that they would be interested in participating in a SMRT Regional Seminar somewhere in Europe.

This causes reflection. Perhaps the SMRT members in Europe do not look at the SMRT web-site on a regular basis. It might be that it is difficult for radiographers and MR technologists to get the money for traveling or we are in competition with other courses.

What I think is that we do not know the right places and methods to advertise and to get the word out about the wonderful

educational opportunities that the SMRT is providing.

This brings me to say that it is more important than ever that we get a SMRT contact person in each country; who would know the places to advertise and who can take on the responsibility to contact people locally. At this time we have contact persons in some but not in all countries and it has not been formalized.

I think we should ask participants attending the next SMRT Annual Meeting to commit themselves to be contact persons to the SMRT Global Relations Committee in order to help the SMRT reach more radiographers and MR technologists who are seeking quality educational opportunities.

On a more positive note, the SMRT Regional Seminar to be held in Belgium, organized by Filip de Ridder looks more promising as far as the number of registrants. This seminar will be held in the Dutch language and it looks like lots of radiographers and MR technologists from the Benelux countries will be attending.

In the Global Relations Committee we really do hope that both seminars will be a success so that we will see many more SMRT Regional Seminars around the Globe in the future.



Nephrogenic Systemic Fibrosis Update



Michael Pedersen
M.Sc., Ph.D.

Editor's Note:

Global Relations Committee Co-Chair Anne Dorte Blankholm, M.Sc., R.T., (MR), has invited one of her colleagues to contribute to Signals. We welcome this timely information from the European perspective.

(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)

First identified in 1997, Nephrogenic Systemic Fibrosis (NSF) has been reported only in patients with acute or chronic severe renal insufficiency (glomerular filtration rate <30 ml/min/1.73 m²) or patients with renal dysfunction due to the hepatorenal syndrome or in the perioperative liver transplantation period. Patients with this condition develop fibrosis of the skin and connective tissues throughout their body. The skin thickening may inhibit flexion and extension of joints resulting in contractures. In addition, patients may develop widespread fibrosis of other organs. A skin biopsy is necessary to confirm the diagnosis. The condition may be debilitating or cause death. Its cause is unknown and there is no consistently successful treatment. NSF has been reported to affect people across a broad range of ages (8–86 years), the condition has no gender predilection, and has been identified in patients from a variety of ethnic backgrounds and from North America, Europe, and Asia. The exact etiology is currently unknown. Gadolinium alone is highly toxic in vivo because it distributes to bone and to the liver, where it rapidly produces liver necrosis.

Therefore, all MRI products that contain gadolinium are based on chelates, which modify its bodily distribution to overcome toxicity while maintaining its contrast enhancement. However, it is unlikely that free gadolinium alone causes NSF. Instead speculations have been made that contributory factors are involved to trigger this syndrome, including dialysate fluid (or a contaminant), erythropoietin, inhibitors of angiotensin-converting enzyme, and induced antibodies against phospholipids. All commercially available gadolinium-containing MR agents are designed as a single gadolinium atom chelated to a ligand with a high stability in vivo. They all possess equivalent paramagnetic properties,

but differ to some extent in their viscosity, osmolality, and ionic characteristics. These agents are usually excreted rapidly and almost completely via glomerular filtration. In renally diseased patients, however, the clearance of gadolinium-containing contrast agents is exceedingly prolonged compared to healthy humans.

NSF has prompted several initiatives. The US Food and Drug Administration (FDA), Danish Medicines Agency (DMA), United Kingdom Medicines and Healthcare products Regulatory Agency (MHRA), and American College of Radiology (ACR), among other organizations, have published recommendations regarding gadolinium use; and we refer to these authoritative bodies to recent updates and safety regulatives. Note that the FDA is the only agency to suggest that all gadolinium chelates are potentially linked to NSF, whereas the other three organizations mentioned above specifically implicate gadodiamide as being associated with the highest risk for NSF. This assertion is based on the fact that most cases of NSF are associated with this gadolinium preparation. Another initiative includes the foundation of the International Center for NFD/NSF Research (ICNFDR). The ICNFDR is a new appellation for a collaborating group of researchers based at Yale University who are involved with NSF research. The team consists of physicians and basic science researchers from several disciplines who have committed to working together in the search for the cause, treatment, and eventual eradication of NSF. Their NSF registry covers at least 215 cases. An early web-based medical advisory originating in Denmark claims that, since January 2002, approximately 400 patients with severely impaired renal function were administered gadolinium-based MR contrast material were diagnosed with NSF. New reports given by the manufacturers, the current (January,

2008) number of NSF cases is about 400. Another survey is currently taken place by the International Society of Magnetic Resonance in Medicine and their findings are presented in May 2008 at the annual ISMRM meeting.

Importantly, the number of cases known today strengthens the association between the administration of gadolinium-containing agents suitable for MRI and the development of the rare scleroderma-like disease NSF. It is important to stress that NSF has only been observed in a small percentage of exposed patients, predominantly involving patients with severe to end-stage renal insufficiency. Until the exact pathogenesis has been understood in parallel with thorough epidemiological surveillance and the development of NSF-specific animal models and investigation of causal effects of endogenous agents, therapeutic approaches will remain empirical. It is generally believed that NSF is caused by those agents having either the lowest chelate-binding stability or has a "linear" molecular configuration. However, fact is that stability has not been identified as a causative factor in NSF. For that reason, several issues have to be stressed: 1) claims on stability are based on laboratory in-vitro experiments, and are not matched by clinical evidence in humans; 2) agents with different stability constants have been implicated in NSF, suggesting that stability is not the only factor to be considered; and 3) reported cases have been reported with all major agents (both linear and macrocyclic). Consequently, FDA has asked manufacturers to include a new black-box warning on the product labeling of all gadolinium-based contrast agents (<http://www.fda.gov/cder/drug/infopage/gcca/default.htm>), and importantly, patients with NSF should be reported to the national medicines agencies and international registries with a special view on a history of



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

We are pleased to present the SMRT Educational Seminars, Volume 11, Number 2: "MR Contrast Media." This is the fortieth home study developed by the SMRT, exclusively for the SMRT members.

For almost two decades, the use of contrast agents in MRI has grown rapidly for a wide variety of applications targeting improvement in the detection and characterization of pathological processes. Quoting **Dr. Frank Shellock** from his 2008 edition of Reference Manual for Magnetic Resonance Safety, Implants, and Devices, "Although these agents can be differentiated on the basis of stability, viscosity, and osmolality, they cannot be differentiated on the basis of efficacy." Dr. Shellock continues by saying, "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."

It is well within the scope of our responsibilities as a fully competent MRI technologist or radiographer, to understand the mechanics of the contrast agents, the appropriate administration, and potential side effects, especially those that could become adverse events. In his article in this publication, **Bill Faulkner** reminds us that ACR guidelines state that we must be knowledgeable in the signs and symptoms of harmful reactions, closely monitor the patient for such and that a physician be prepared to treat. Despite the low incidence of adverse events in the use of MRI contrast media, the need for preparation

SMRT
Educational Seminars
Volume 11, Number 2

MR
Contrast
Media

is part of our responsibility as health care professionals.

A disease known as Nephrogenic Systemic Fibrosis (NSF) has been recently reported in patients with renal dysfunction, in which there is an emerging link to the administration of intravenous gadolinium contrast agents used in MRI examinations. These recent events involving NSF demonstrate how quickly we as medical professionals must change our approach to the administration of a contrast media, specifically the implementation of policies and procedures to critically evaluate our patients' condition to ensure their safety. While it is the physician's responsibility to determine if it is safe for contrast media to be administered to a patient, it is our responsibility to obtain accurate details concerning the patient's physical condition necessary to assist the physician in making the appropriate decision.

We would like to express our grateful appreciation to **Bill Faulkner** (Chattanooga, Tennessee, USA) and **Dr. Emanuel Kanal** (Pittsburgh, Pennsylvania, USA) for writing articles specifically for this publication. Special thanks goes to **Dr. Frank Shellock** (Los Angeles, California, USA) and **Dr. Val Runge** (Temple, Texas, USA) for participating in the selection of articles. A very big thank you goes to **John Posh** (Bethlehem,

Pennsylvania, USA) for acting as our expert reviewer.

Thanks also to **Paul McElvogue**, SMRT Publications Chair and in the Berkeley, California, USA office of the ISMRM/SMRT, Jennifer Olson, Associate Executive Director, Mary Keydash, Publications 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 great people at Invivo Corporation who support our home studies program, the SMRT *Educational Seminars*. Their continuing support of technologist and radiographer education brings quality continuing education to the SMRT membership worldwide.

The SMRT Educational Seminars home study program is expanding into an electronic format. What this means is increased accredited educational opportunities for SMRT members. The quarterly home study publication will continue to be mailed to members. The electronic versions will provide additional Category A credits easily and quickly accessed via the SMRT website. The first offering will be available to members in June.

Nephrogenic Systemic Fibrosis Update continued from page 12

gadolinium exposure. Additional and updated information about gadolinium-containing agents and the possible link to NSF can be

found from the website:

(<http://www.ismrm.org/special/FDA.htm> and <http://www.ismrm.org/special/EMEA3.pdf>).

MRI Issues for Hemodynamic Monitoring and Temporary Pacing Devices*

(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)

Cardiovascular catheters, such as pulmonary artery hemodynamic monitoring/thermodilution catheters [including the Swan-Ganz catheter (Edwards Lifesciences)], and temporary trans-venous cardiac pacing devices generally contain no ferromagnetic components but may incorporate nonferromagnetic, electrically conductive materials. Importantly, the MRI examination may induce sufficient voltages and currents in electrically conductive material so as to result in thermal injuries and burns to adjacent tissue (including myocardial tissue). Although the theoretical risk exists that MRI examination in patients with retained temporary epicardial leads, which consist of electrically conductive material, could lead to cardiac excitation or thermal injury, such retained leads are typically short in length, usually do not form large loops, and are generally not believed to pose a significant risk during MRI examinations.

Hartnell et al. reported on 51 patients with retained temporary epicardial pacing wires who underwent clinical MR examinations. Of those patients examined with electrocardiographic monitoring, no arrhythmias were noted, and for all patients, no symptoms suggestive of arrhythmia or other cardiac dysfunction were noted (although the anatomic region examined and the energies used in the examinations were not specifically described). To date, there is no report of complications related to the MR scanning of a patient with retained epicardial leads.

There is one report in the literature of a Swan-Ganz thermodilution catheter that "melted" at the skin entry site in a patient undergoing MRI examination. It was postulated that the RF fields transmitted by the MR system caused heating of the copper wires within the catheter.

The ex vivo study of temporary transvenous pacing leads reported temperature increases of up to 63.1°C. Preliminary results of a



by Frank G. Shellock, Ph.D.

*Adjunct Clinical Professor
of Radiology and Medicine,
Keck School of Medicine*

*Director for MRI Studies
of Biomimetic
MicroElectronic Systems*

*National Science Foundation,
Engineering Research Center,
University of
Southern California,
Los Angeles, California*

*President,
Shellock R&D Services, Inc.*

recent study confirmed that even unconnected temporary transvenous pacing (as well as permanent pacing) leads can undergo high temperature increases at 1.5-Tesla. In a chronic-pacemaker animal model undergoing MR examination at 1.5-Tesla, temperature increases of up to 20°C were measured, although pathological and histological examination did not demonstrate heat-induced damage of the myocardium. The MR imaging conditions that generated such elevated lead temperatures included use of the body RF coil to transmit RF energy over the area of the lead (e.g., an MRI examination of the chest/thorax).

Currently, there is no study that has assessed the safety of temporary pacemakers (intracardiac lead and external pulse generator). Unlike permanent cardiac pacemaker devices, temporary pacemakers use unfixed leads that are more prone to movement, longer leads that may be prone to induction of lead currents, and a less sophisticated pulse generator, which makes them likely more susceptible to electromagnetic interference.

RECOMMENDATIONS

Those few catheters that contain conducting wires and those few temporary transvenous pacing wires that have been tested have been labeled as "MR unsafe" (see www.MRIsafety.com). Patients with pulmonary artery hemodynamic monitoring/thermodilution catheters (such as the Swan-Ganz catheter) and similar catheters that have conductive wires or similar components should not undergo MRI examinations because of the possible associated risks, unless in vivo testing provides labeling information or instructions for use that permit examinations to be performed safely. Patients with nonferromagnetic pulmonary artery catheters that contain no electrically conductive pathways in the catheter may undergo MRI examinations. However, it must be emphasized that such conditions must be verified before such patients undergo MRI procedures.

Patients with retained temporary epicardial pacing wires are believed to be able to safely undergo MR procedures, and patients do not need to be routinely screened for the presence of such wires before scanning. Because of the possible risks involved with temporary-pacemaker external pulse generators, such generators should not be introduced into the MRI environment. Although temporary transvenous lead heating might be minimized or avoided by scanning anatomic regions above (e.g., head/brain) or below (e.g., lower extremities) the cardiac pacing leads, scanning of patients with temporary transvenous pacing leads (without the pulse generator) is not recommended. Furthermore, because the harsh electromagnetic environment associated with the MR system can alter the operation of an external pulse generator or damage it, it may not be possible to reliably pace the patient during the MRI examination, which makes the issue of scanning a patient with a temporary transvenous lead irrelevant in most cases.



Call for Nominations

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

Are you or is someone you know interested in shaping the future of MRI

Technologists worldwide? If so please give some consideration to serving as a member of the SMRT Policy Board. The SMRT invites its members to nominate members in good standing to be considered for election. Each year five SMRT members are elected to the board for a three year term. These individuals will be responsible for various committee activities within the SMRT. The SMRT standing committees are: Awards, Bylaws, Education, External Relations, Finance, Local Chapters, Membership, Nominations, Program, Publications, and Regionals Committee. In addition to responsibilities related to committee memberships, each policy board member is asked to help host a SMRT Regional in their local area. Hosting a regional is an incredibly rewarding experience.

Past and present SMRT Policy Board members who are members in good standing are also eligible for election to

the office of President-Elect. Election to this office involves a three year commitment. This candidate must provide leadership for the SMRT and strive to move the SMRT forward to respond to the challenges the future will bring in the health care field. The first year is spent as President-Elect during which this person assists the President in ensuring the needs of membership are met. As SMRT President during the second year this person oversees the activities of all the committees and is responsible for the general leadership and progress of the organization. The third year of the term the immediate Past President is spent assisting the President and mentoring the President and President-Elect, and helps maintain the continuity of the organization by serving as the Awards and Nominations Committee Chair.

In addition to choosing its future leadership, the SMRT membership has the opportunity to recognize one its members annually by nominating candidates for the Cruess-Kressel Award. This award is presented to an individual for his/her outstanding contributions to the education of MR

technologists and has been awarded to some very deserving individuals over the years.

Successful candidates for the offices of President Elect and the Policy Board Members elected this fall will assume their terms at the upcoming 18th Annual Meeting, 18 – 19 April 2009 to be held in Honolulu, Hawaii. What a beautiful place to assume a leadership role in the organization recognized as the leader in bringing MR specific education to the worldwide MRI technologist community.

All nominees should be submitted to the Nomination Committee by 1 September 2008. Please submit nominations to me directly at: carolyn.bonaceto@rcn.com or to Jennifer Olson at the Central Office at: Jennifer@ismrm.org

SMRT depends on each member to direct the future of our society and your voice should be heard – You can actively participate in your organization and exercise your right to nominate candidates for the SMRT leadership.

MRI Issues continued from page 14

*Excerpted with permission from Levine GN, Gomes AS, Arai AE, Bluemke DA, Flamm SD, Kanal E, Manning WJ, Martin ET, Smith JM, Wilke N, Shellock FS; American Heart Association Committee on Diagnostic and Interventional Cardiac Catheterization; American Heart Association Council on Clinical Cardiology; American Heart Association Council on Cardiovascular Radiology and Intervention. Safety of magnetic resonance imaging in patients with cardiovascular devices: an American Heart Association scientific statement from the Committee on Diagnostic and Interventional Cardiac Catheterization, Council on Clinical Cardiology, and the Council on Cardiovascular Radiology and Intervention: endorsed by the American College of Cardiology Foundation, the North American Society for Cardiac Imaging, and the Society for Cardiovascular Magnetic Resonance. *Circulation*. 2007;116:2878-91. Frank G. Shellock was the senior author of this paper.

Pertinent References

Shellock FG. Reference Manual for Magnetic Resonance Safety, Implants, and Devices: 2008 Edition. Los Angeles, Calif: Biomedical Research Publishing Group; 2008.

Shellock FG, Shellock VJ. Cardiovascular catheters and accessories: ex vivo testing of ferromagnetism, heating, and artifacts associated with MRI. *J Magn Reson Imaging*. 1998;8:1338–1342.

Hartnell GG, Spence L, Hughes LA, Cohen MC, Saouaf R, Buff B. Safety of MR imaging in patients who have retained metallic materials after cardiac surgery. *AJR Am J Roentgenol*. 1997;168:1157–1159.

Dempsey MF, Condon B. Thermal injuries associated with MRI. *Clin Radiol*. 2001;56:457–465.

Dempsey MF, Condon B, Hadley DM. Investigation of the factors responsible for burns during MRI. *J Magn Reson Imaging*. 2001;13: 627–631.

ECRI Institute. Health devices alert: a new MRI complication? May 27, 1988.

Achenbach S, Moshage W, Diem B, Bieberle T, Schibgilla V, Bachmann K. Effects of magnetic resonance imaging on cardiac pace-makers and electrodes. *Am Heart J*. 1997;134:467–473.

Shellock FG, Valencerina S, Fischer L. MRI-related heating of pacemaker at 1.5–3-Tesla: evaluation with and without pulse generator attached to leads. *Circulation*. 2005;112(suppl II):II-561.

Luechinger R, Zeijlemaker VA, Pedersen EM, Mortensen P, Falk E, Duru F, Candinas R, Boesiger P. In vivo heating of pacemaker leads during magnetic resonance imaging. *Eur Heart J*. 2005;26:376–383.

is published by the International Society for Magnetic Resonance in Medicine, and produced quarterly for the benefit of the SMRT membership.

SIGNALS NEWSLETTER COMMITTEE:

Julie Strandt-Peay, B.S.M., R.T., (R)(MR), Editor
 Anne Dorte Blankhom, M.Sc., R.T.
 Carolyn Bonaceto, B.S., R.T., (R)(MR)
 Cindy R. Comeau, B.S., R.T., (N)(MR)
 Janice Fairhurst, B.S., R.T., (R)(MR)
 Gina Greenwood, B.S., R.T., (R)(MR)
 Caron Murray, M.R.T., (R) AC, (CT)(MR)
 Anne Marie Sawyer, B.S., R.T., (R)(MR)
 Educational Seminars Editor
 Frank Shellock, Ph.D.
 Nancy Talbot, M.R.T., (MR)(R)
 Pam Vincent, MPA, R.T., (R)(M)(CT)(MR)

PUBLICATIONS COMMITTEE:

Paul McElvogue, R.T., (R)(MR) Chair
 Carolyn Bonaceto, B.S., R.T., (R)(MR)
 Greg Brown, R.T.
 Cindy R. Comeau, B.S., R.T., (N)(MR)
 Ellen Condon, R.T.
 Cindy T. Hipps, B.H.S., R.T., (R)(MR)
 Bobbi Lewis, B.A., ARMRIT
 Anne M. Sawyer, B.S., R.T., (R)(MR)
 Mark Spooner, B.P.S., R.T., (R)(MR)(CT)
 Julie Strandt-Peay, B.S.M., R.T., (R)(MR)
 Pamela Vincent, MPA, R.T., (R)(M)(CT)(MR)

ELECTRONIC SUBMISSIONS COMMITTEE:

Wendy Strugnell, B.Sc., Chair
 Carolyn Bonaceto, B.S., R.T., (R)(MR)
 Cindy R. Comeau, B.S., R.T., (N)(MR)
 Gina Greenwood, MBA, R.T., (R)(MR)
 Vera Miller, B.S., R.T., (R)(MR)
 Steven P. Shannon, R.T., (R)(MR)
 Charles Stanley, R.T., (R)(CT)(MR)
 David Stanley, B.S., R.T., (R)(MR)

OFFICERS:

President:

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

President-Elect:

Wendy Strugnell, B.Sc., Chair

Past-President:

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

Secretary:

Vera Miller, B.S., R.T., (R)(MR)

Treasurer:

Steven P. Shannon, R.T., (R)(MR)

ISM RM Executive Director: Roberta A. Kravitz
 ISM RM Associate Executive Director: Jennifer Olson
 ISM RM Publications Director: Mary Keydash

© 2007 by International Society for
 Magnetic Resonance in Medicine

Phone: +1 510 841 1899

Fax: +1 510 841 2340

E-mail: smrt@ismrm.org

SMRT Web Page: <http://www.ismrm.org/smrt>

3-4
MAY

SMRT 17TH ANNUAL MEETING

The Metro Toronto Convention Centre, Toronto, Ontario, Canada

3-9
MAY

ISM RM 16TH SCIENTIFIC MEETING & EXHIBITION

The Metro Toronto Convention Centre, Toronto, Ontario, Canada

13-14
JULY

ISM RM WORKSHOP: MR SAFETY: UPDATE, PRACTICAL INFORMATION & RESEARCH

Lisbon, Portugal

1-3
AUGUST

ISM RM WORKSHOP: PRACTICAL BODY MRI BY THE EXPERTS: IMPACT OF NEW TECHNOLOGY

Berkeley, California

9
AUGUST

2ND ANNUAL SMRT JOHN KOVELESKI MEMORIAL REGIONAL EDUCATIONAL SEMINAR

Penn State Hershey Medical Center, Hershey, Pennsylvania

See you in



Toronto!

17th Annual Meeting • 3-4 May 2008

“MR Education Unlimited!”



In conjunction with the 16th Scientific Meeting & Exhibition of the International Society for Magnetic Resonance in Medicine