Signals
Number 62
2007 Issue 3
NEWSLETTER OF THE SECTION FOR MAGNETIC RESONANCE TECHNOLOGISTS

A message from your SMRT President

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

Hope you all had a wonderful time this past quarter. The dedicated people, who make up the Committees and Policy Board of the SMRT, know how to mix fun with a lot of work. Although the Berlin meeting's success will be hard to top, the 2008 program chairs, ***Caron Murray***, ***Anna Kirilova***, and ***Nancy Talbot*** have been making great strides planning next year's annual meeting. Using the evaluation forms from Berlin and past meetings, the committee will work to put together a program that meets the membership's needs and expectations. Your opinions are valued and reflected in the final meeting program.

Thank you to everyone who filled out the evaluation forms. And for those of you who are considering attending next year's meeting, please share your education goals with the Program Committee for the Seventeenth Annual Meeting, to be held in Toronto, Ontario, Canada. The Program Committee has sent a list of outstanding suggestions for speakers and topics to the Policy Board for consideration. Deciding the theme each year is a crucial step in the process as it helps to define the focus of the meeting. The theme for the 2008 annual meeting will be:

"MR Education Unlimited!"

The annual meeting is just one of the many educational activities planned for the upcoming year. ***Anne Sawyer*** continues to do an exceptional job bringing the Educational Seminar Home Study series to the membership. She has several very relevant topics on deck for upcoming issues.

By the time this issue is published several of our regional meetings will have taken place. The John A. Koveleski Memorial Meeting is being held at the Penn State University Milton S. Hershey Medical Center. ***John Posh*** and ***Robin Kline*** have put together an outstanding program that touches on the basics and the more advanced MR applications meant to reach a varied audience.

Carolyn Brown, ***Bobbie Burrow***, and ***Donna O'Brien***, the SMRT Atlanta Local Chapter leadership, are co-chairing the Southeast Regional on 22 September 2007 at Saint Joseph's Hospital in Atlanta. These professionals have hosted several outstanding meetings in past years. The technologists in that area are very fortunate to have people willing to ensure that they have quality programs available to them annually.

In October, ***Mark Spooner*** will be hosting a regional at SUNY Upstate Medical University. Mark has also hosted several regionals demonstrating his dedication to the educational goals of the SMRT.

Cindy Hipps and the SMRT South Carolina Local Chapter will host a chapter meeting and GE Magnet Plant Tour in Florence, South Carolina on 27 October 2007. The opportunity to tour a facility that is responsible for the systems that provide us with our careers should be fascinating.

The New England Chapter under the leadership of ***Maryanne Blaine***, ***Janice Fairhurst***, and ***Vera Miller*** have done an exceptional job of arranging the President's Regional. The meeting will be held at the Foxwood's

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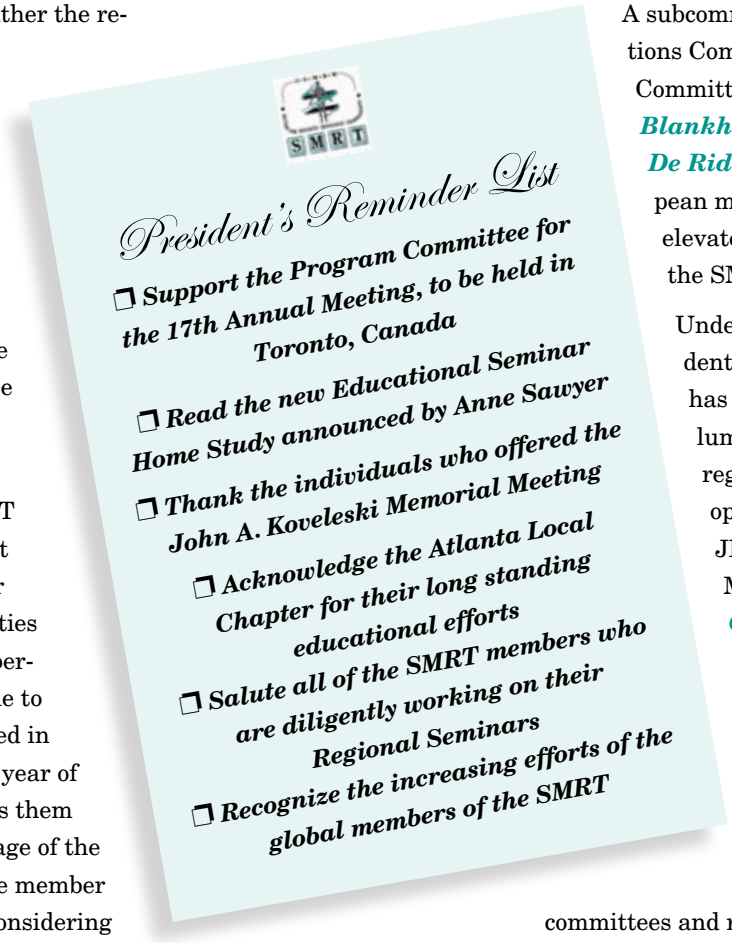
In this Issue

Resort Casino in Connecticut on 3 November 2007. ***Carlos Portillo*** will host the Northeast Regional meeting at the University of Maryland Medical Center on 10 November 2007. He has invited an impressive list of speakers.

The Program Co-Chairs, ***Michael Kean*** and ***Michael Macilquham*** have announced the 2nd Annual Meeting of the SMRT Australia and New Zealand Chapter which is being held on 17-18 November, 2007, in Melbourne, Victoria, Australia. Of special note, the co-chairs have also announced that they will be accepting abstracts in either the research or clinical focus. The authors of the six highest-scored abstracts will have the opportunity to present their work in an eight-minute oral presentation, with two minutes allocated for questions. The best presentation will receive First Prize, and free 2008 SMRT membership. Please see the web site announcement for additional information.



You need to be neither an SMRT member nor an MR technologist to attend and receive credits for any of the accredited opportunities SMRT offers. Non-voting membership status in SMRT is available to Individuals who have not worked in MRI or who have less than one year of experience in MRI. This enables them the opportunity to take advantage of the educational opportunities at the member rate. If you are a technologist considering a transition into MRI demonstrating your willingness to learn all you can about MRI by joining SMRT and taking advantage of all our educational opportunities will enhance your standing as a candidate to a hiring manager.

The SMRT strives to ensure that you are represented in the Health Care Community-at-Large. It was decided recently that in order to meet the needs of the membership, the role of external relations needed to be expanded. There are now two chairs of the External Relations Committee, ***Charles Stanley*** and ***Gina Greenwood***. They will be responsible for attending several US meetings this year. Over the course of the year either Charles or Gina, or in some cases both, will represent our interest at the following meetings, Alliance for Quality Medical Imaging and Radiation Therapy Meeting held twice annually. The focus of this group is to see that the CARE bill passes and to develop the regulations that will be sent to the Secretary when the bill passes. In January, Charles will attend the Associated Sciences Consortium Meeting. The focus of this meeting is RSNA Planning. Both chairs will also attend the two meetings of the Health Professions Network.

A subcommittee of the External Relations Committee is the Global Relations Committee, co-chaired by ***Anne Dorte Blankholm*** and ***Jane Francis***. ***Filip De Ridder*** is attending several European meetings. His presence will help elevate the international exposure of the SMRT.

Under the guidance of Past President, ***Cindy Comeau***, the SMRT has submitted an updated curriculum guide for MRI as a primary registry. This document was developed in conjunction with AERS, JRCERT, ASRT, and the ARRT. Members from the SMRT, ***Candi Roth***, ***Luann Culbreth***, ***Sony Belville***, ***Jacqueline Kralik***, and ***Mark Spooner*** contributed to this document. Congratulations and many thanks for all their hard work.

Information regarding our committees and regional meetings can be found on the web site. Take some time to explore and see what's new!

One final reminder for our members with voting status; please make an effort to participate in the upcoming elections. ***Cindy Comeau*** and the Nominations Committee have done an exceptional job of providing the membership with a list of candidates from varied backgrounds representing our international face. Please ensure that you are involved in choosing the SMRT leadership for the future.

Editor's Letter

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

Have you noticed how many things seem to be going on at the same time in your life? The SMRT is having that same experience as you will discover when reading this third quarter issue. We begin with a message from President ***Carolyn Bonaceto***, B.S., R.T., (R) (MR), who describes the various activities and events of the SMRT around the world. Because the mission of the SMRT is to provide educational opportunities, the majority of the efforts are toward that end. The SMRT is recognized worldwide as the leader in promoting the development of the MR professional.

The SMRT is recognized worldwide as the leader in promoting the development of the MR professional

Anna Kirilova, B.Sc., R.T., (R) (MR), ***Caron Murray***, M.R.T., (R) AC, (CT)(MR), and ***Nancy Talbot***, M.R.T., (R) (MR), Program Committee Co-Chairs, invite us to lovely Toronto, Canada for the 17th Annual Meeting of the SMRT. This important educational program will offer a wide variety of information and a chance for you to meet with your colleagues.

Membership Committee Chair, ***Filip DeRidder***, R.N. shares an update showing the distribution of SMRT members around the world. He encourages us to spread the word about the benefits of belonging to this professional organization. To clarify the various membership categories, Publication Committee Chair, ***Paul McElvogue***, R.T., (R)(MR) explains in detail what each of the categories mean and who is qualified for each.

The Regional Seminar Committee Chair, ***Janice Fairhurst***, B.S., R.T., (R) (MR), illustrates the upcoming schedule of these offerings. Note that the SMRT provides educational opportunities from North America to New Zealand! Speaking of the southern hemisphere, note the recognition that the SMRT members and the organization has received on page 8.

The popular column Chapter Chat is back with ***Pam Vincent***, Local Chapter Chair, presenting an update. Going from local to global we read about this relatively new committee of the SMRT in the report from ***Anne Dorte Blankholm***, M. Sc., Co-Chair, Global Relations Committee.

The External Relations Committee activities are related by Co-Chair ***Gina Greenwood***. Clearly, the SMRT is involved on your behalf! Educational Seminars Editor, ***Anne Marie Sawyer***, B.S., R.T., (R) (MR), announces the latest in the home study series.

MRI Safety is provided this issue by ***Hans Engels***, Ph.D. who was an invited speaker for the Annual Meeting in Berlin. He gives us a comprehensive overview of MR safety which serves as good basic information or perhaps a refresher for us in our daily practice.

Those members who are able to attend the RSNA in Chicago, Illinois, USA will notice the continued involvement of the SMRT in the Associated Sciences. The SMRT will again participate in the refresher courses. These courses will be held on Monday, 26 November and are entitled: "Radiology's Role: When Disaster Strikes!

Included in this issue are second place award winning abstracts from the papers in both the clinical and research focus. Abstracts of papers and posters presented at the SMRT Annual Meetings are included in the Signals as space permits.

Be sure to check out the upcoming calendar of events on the back page and as always, we recommend that you check the SMRT web-site often for up to date information, educational opportunities and newly scheduled events.

"Your Vote Counts!"

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

Your Vote COUNTS! As a SMRT member this is an important duty to fulfill. Your vote shapes the future of your professional organization.

The SMRT Policy Board is comprised of individuals considered the premier experts in MRI. You'll be receiving your Ballot soon and please take the time to read over the outstanding slate of professionals and make your selection of candidates that you think will best fulfill the mission of the SMRT.

Let's make this a record year for voter turn out!

The SMRT Annual Meeting Update

From the 2007 Program Committee Co-chairs

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

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

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

"MR Education Unlimited!"

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

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

Located on the northwestern shore of Lake Ontario, farther south than the states of Minnesota and much of Michigan, Toronto is one of the most accessible cities in North America by road, air, rail and water. Toronto is only a one hour drive away for about five million Canadians, and within a 90-minute flight for 60 percent of the U.S. population. Toronto is as far south as the French Riviera and more people live in Toronto than in Canada's four Atlantic Provinces combined!

Toronto is home to the world's tallest building (the CN Tower) and the world's longest street starts at the City's lakeshore and continues north for 1,896 km. Toronto, with a population of 5 million in the Greater Toronto Area, is heralded as one of the most multicultural cities in the world and is ranked as the safest large metropolitan area in North America. Over 100 languages and dialects are spoken here, and over one third of Toronto residents speak a language other than English at home.

The SMRT Annual Meeting program in Toronto is being designed to fulfill the needs of all MR technologists/radiographers. The goal of the SMRT is to provide quality educational opportunities for MR technologists/radiographers and to establish and maintain a high level of professionalism in the field.

The theme of the 2008 meeting is "MR Education Unlimited!" and we hope to bring unlimited educational opportunities to all members through this international program.

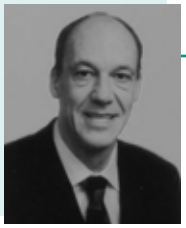
The topics for the invited speakers at the 2008 Annual Meeting were chosen based on comments and feedback received from attendees of the previous annual meetings. Some of the topics being presented at this SMRT meeting include: 3T in the clinical setting, Cardiac MR Tips and Techniques, Breast MR, fMRI, Spectroscopy, Veterinary MR, ENT, MSK, MR Safety, SAR and RF Heating, and Case Review quickies.

An important aspect of the meeting is the abstract submissions for oral and poster presentations. Proffered papers will be interlaced throughout the program. We encourage all technologists to actively participate in the meeting by submitting an oral or poster abstract. For information on these submissions, please visit the SMRT website. www.ismrm.org/smrt. The abstract deadline for the SMRT 17th Annual Meeting is 21 January 2008.

As chairs of the 2008 Program Committee, it is our pleasure to invite you to attend this meeting and join the SMRT in bringing to technologists/radiographers an exciting quality educational weekend in the beautiful city of Toronto.

Check our website:
http://www.ismrm.org/smrt
for up-to-date program information as it is available and for details on "Call for Papers."

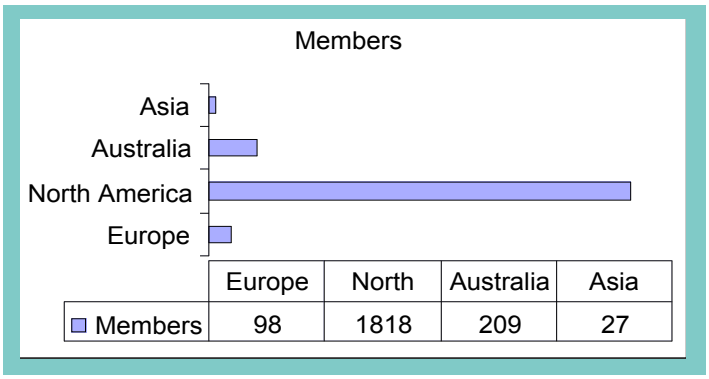
Membership Update



Filip De Ridder
M.R.T., (R)(MR)
Chair,
Membership Committee

First, it is a great honor for my being the chair of the Membership Committee. Our objectives for this year is to do better than last year: by holding more regional meetings around the world and promoting the mission of the SMRT worldwide.

During the annual meeting last May in Berlin, the slogan "MR Education Without Borders" was presented by the incoming president, Carolyn Bonaceto to promote the benefits of the SMRT to the rest of the world. The yearly membership fee offers quarterly newsletter (*Signals*), quarterly *Educational Seminars* Home Studies (37 to date), continuing Education Statement of Activity for tracking earned accreditation credits, reduced member registration fees for the Annual Meeting and Regional seminars as well as for the ISMRM meetings and workshops, ISMRM Study Groups and access to the ISMRM/ SMRT Membership Directory and the MR Pulse newsletter.



	Europe	North	Australia	Asia
Members	98	1818	209	27

The membership of SMRT is steadily rising with increasing participation of MR technologists from around the world. As described in the chart at the right, there are members from all the continents and the list of European countries is getting longer and longer. We, as the Membership Committee hope that MR technologists worldwide promote the SMRT to their colleagues.

Even in daily work the SMRT can help the MR technologists. Just think about the new problems with Gadolinium (NSF/ NSD). Don't you like to share information about this topic? How is the rest of the world is managing that type of problem? That's one of the reasons why the SMRT there for you, to provide and exchange information, protocols and so on.

For the first time in many years, the SMRT basic annual membership fee was increased up to $80 USD. Keep in mind that the value of the benefits from the SMRT is far more than the cost of annual dues. We thank all the people of the SMRT for their work and support. The SMRT will continue working toward the advancement of MR education and our profession. The SMRT is an organization for and by the MR technologists. We want to hear your voice!

Paul McElvogue R.T., (R)(MR)
Chair Publications Committee

SMRT Categories Explained

There seems to be some confusion from our current and potential members regarding voting and non-voting membership in the SMRT. Here is an explanation of the membership status and how it may apply to you.
There are three SMRT membership categories: Basic Technologist (Voting) Member, Technologist (Non-Voting) Member, and Student Technologist (Non-Voting) Member. Each of these membership categories has different qualifications.

BASIC TECHNOLOGIST (Voting) MEMBER:

There are two methods to qualify as a Basic Technologist (Voting) Member. Method #1:
In order to qualify as a voting member you must have practiced as a technologist in the field of magnetic resonance for a minimum of one year. Additionally, you must be one of the following:

For USA citizens:
Certified by the American Registry of Radiologic Technologists (ARRT); or
A Registered Diagnostic Medical Sonographer; or
A Certified Nuclear Medicine Technologist

For Non-USA citizens:
Certified by an appropriate equivalent professional certifying organization in your country, -Or Method #2:
1) You must be able to demonstrate appropriate equivalent professional competence in radiologic practice or in work in support of biochemical, biophysical, or biological programs, and you must have practiced as a magnetic resonance technologist for a minimum of two years.
2) You must also provide the signature of your department head or administrator on the membership application.

TECHNOLOGIST (Non-Voting) MEMBER:

This is an individual who shares the stated purposes of the SMRT but does not meet the qualifications for voting

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Regional SMRT Seminar News

The primary objective of the SMRT regional committee is to bring high quality educational programs to a 'neighborhood near you'.

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

If you don't see your 'neighborhood' on the list of upcoming SMRT Regional's, I encourage you to host a meeting in your area. You may say 'oh, I couldn't possibly…I wouldn't know where to start, I haven't got the time…' I can tell you first hand that the staff from the Central Office in Berkeley, California, will make you and your team look like stars with much less effort than you might imagine!

The SMRT membership includes a diverse MR culture from across the globe who are supportive and encouraging to all of our 'family members.' The regional programs offered are brought to you by dedicated, enthusiastic individuals who strive to bring a dynamic learning experience to the local level while continuing to raise the bar for each of us individually as well as our profession as a whole.

"We look forward to a really exciting year ahead and hope that if you have never hosted a regional that perhaps you've been inspired to look into what it might entail. I can say first hand that it is a very rewarding accomplishment. It is great to look at the list of upcoming regional's that will encompass the globe!"

The science of MRI is an ever changing landscape. The SMRT regionals are an excellent resource to get the latest information; and to hear it from world renowned industry leaders, who in many cases, are your own local heroes.

We would like to thank the participants and hosts of recently enjoyed Regional's from:

•Southeast Regional Educational Seminar, Greenville Hospital System, Greenville, South Carolina, Co-chaired by ***Melonee Elrod, Cindy Hipps, Carol Lee*** - 14 October 2006

•Eastern Canada Regional Educational Seminar, Sunnybrook Health Sciences Centre, Toronto, Ontario, with videoconference to McGill University Health Centre, Montreal, Quebec, co-chaired by ***Garry Detzler, Caron Murray, Rhonda Walcarius*** (Toronto) and ***Laurian Rohoman*** (Montreal), 4 November 2006

•Australia, New Zealand 1st Annual Meeting, Hosted by the SMRT Australia New Zealand Chapter, Brisbane, Australia, Co-chaired by ***Ben Kennedy, Dominic Kennedy*** and ***Wendy Strugnell***, 18 &19 November 2006

• New England Regional Educational Seminar, Brigham and Women's Hospital, Boston, Massachusetts, co-chaired by ***Carolyn Bonaceto, Janice Fairhurst, John Shirosky***, 3 March 2007

•President's Regional Educational Seminar, Morgan Stanley Children's Hospital, New York, New York, Co-chaired by ***Cindy Comeau*** and ***Carol Finn***, 3 March 2007

SMRT Membership Categories *continued from page 5*

membership.
Technologist membership (voting and non-voting) to the SMRT requires the applicant to submit a current CV or résumé.

STUDENT TECHNOLOGIST (Non-Voting) MEMBER:

In order to qualify as a student member, you must:
1) Be enrolled in a full-time academic program in an accredited educational institution; and
2) Provide an annual letter of verification of student status from the Academic Program Director. The letter should include: student's name, start and end dates of the program, and verification of enrollment.
All membership applications regardless of the category are reviewed by the SMRT Membership Committee for verification of eligibility. The final acceptance into the SMRT is determined by the Policy Board. Keep in mind, a current non-voting Technologist or Student member who then meets the qualifications can and is encouraged to change their membership to a voting member of the SMRT in the Basic Technologist (Voting) category.
The benefits of being a voting member of the SMRT include the eligibility to run for office including at-large positions on the Policy Board; serve on various committees; initiate and vote on Policy Board approved proposals for amendments to SMRT bylaws; and also nominate and vote for the office of President-elect, Policy Board positions, and Awards candidates.
By becoming a voting member, you have an important role and a voice in the policies, programs, proposals, and direction of the SMRT. If you meet the qualifications, please consider to be a voting member of the SMRT and help shape the future of our MRI education based society. Your vote counts and is important!

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

Chapter Chat

Recently, much attention has been given to promoting the fact that the SMRT is truly an international organization with members from across the globe. There are many benefits available to all members, including the *Signals* newsletter and our *Educational Seminars* home studies. We truly want to reach and serve everyone. But, at the same time, you also ask what can the SMRT do for you in your hometown, where you work, where you live? The SMRT is also your local organization. One of the benefits of the SMRT is our local chapters. Local chapters meet in your city, in your region, in your country. Chapters are organized by you, to benefit you, and to meet your needs.

If you don't see a chapter close to you, consider starting one! Contact Pam at vincentp@nhlbi.nih.gov for more information.

Getting involved in a local chapter gives you the opportunity to meet other technologists in your area, network, and exchange ideas. It is a chance to update current skills and learn new ones. MR is a constantly changing, dynamic field. Local chapters provide a way to receive updates and learn the latest technology. It is a way to improve ourselves, and advance our profession. The SMRT is your organization. Why not take advantage of all it has to offer? If you live in one of the areas listed below, contact your SMRT Local Chapter representative and get involved. All of the pertinent information is on the SMRT website If you don't see a chapter close to you, consider starting one. Contact Pam at vincentp@nhlbi.nih.gov for more information.

SMRT chapter meetings are coming up soon. Try to attend one near you!

SMRT Region/Chapter	Meeting Title	Date	Location
Atlanta, Georgia, USA	SMRT Southeast Regional Educational Seminar Hosted by the Atlanta SMRT Local Chapter	22 September 2007 1 Day Seminar	Saint Joseph's Hospital, Educational Auditorium, Ground Floor 5665 Peachtree Dunwoody Road Atlanta, Georgia, USA
South Carolina, USA	2007 Fall Meeting and "GE MAGNET PLANT TOUR" Hosted by the South Carolina SMRT Local Chapter	27 October 2007 8am-5pm	GE Healthcare Florence Operations Florence, South Carolina
New England, USA	President's Regional Hosted by the New England SMRT Local Chapter	3 November 2007 1 Day Seminar	Foxwoods Resort and Casino. See the SMRT website for more information
Northeast Ohio, USA	Annual fall meeting Hosted by the NE Ohio SMRT Chapter	11 November 2007 1 Day Seminar	Akron Ohio, USA. Please see the website at http://www.geocities. com/ neosmrt for more details
Australia/New Zealand	2nd Annual Meeting Hosted by the Australia and New Zealand SMRT Chapter	17 - 18 November 2007 2 Day Seminar	ZINC at Federation (at the corner of Square Flinders & Swanston Streets) Melbourne, Victoria, Australia

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From L to R: Greg Brown, R.T., Crues-Kressel recipient and Fellow of the Section; Wendy Strugnell, B.Sc., Past Co-Chair of the Global Relations Committee and President-Elect of the SMRT; Michael Kean, R.T., Past SMRT Policy Board member and Fellow of the Section, and Michael Macilquham, B.App.Sc., M.H.Sc., (MRI), active in SMRT educational offerings.

The SMRT continues to be recognized as a world leader in MR education through the work of the Regional, Local Chapter, External Relations, and Global Relations Committees.

Australian radiographers flying our flag on the international MRI stage

The 16th Annual Meeting of the Section for Magnetic Resonance Technologists (SMRT) of the International Society for Magnetic Resonance in Medicine (ISMRM) was held in Berlin in May. The SMRT is a global MRI society whose primary mission is to facilitate the education of MR radiographers world-wide. Over 200 Australian radiographers are members.

Sixteen Australian and three New Zealand MRI radiographers attended the conference in Berlin. It was held in conjunction with the 15th Annual Meeting of the ISMRM. Australian MRI radiographers featured prominently at the meeting, showcasing our skill levels and receiving high recognition for their contribution to the education of MRI radiographers.

Greg Brown from the Royal Adelaide Hospital presented a faculty lecture on MR tissue iron assessment. At the meeting, Greg was awarded the honour of being made a Fellow of the Section in recognition of his dedication to the mission of the SMRT.

Greg has made significant contributions to global MRI education throughout his career. He has received multiple awards for his services to MRI including the SMRT Crues-Kressel award for education in 2003.

Michael Kean from the Royal Children's Hospital in Melbourne was awarded the 2007 President's Award for the most outstanding proffered paper of the meeting, *Neonatal brain imaging at 3T: comparative study of standard transverse 2D TSE T2 and non motion corrected BLADE.* Michael also has a long educational affiliation with SMRT and was made a Fellow of the SMRT in 2005.

Michael Macilquham from John Fawkner Hospital in Melbourne presented a poster called *The utilisation of 3D volumetric MRI scans to determine lateral patellar displacement in patello-femoral osteoarthritis.* This is the third international SMRT meeting at which Michael has been accepted to present.

Wendy Strugnell of Brisbane's Cardiovascular MRI Research Centre based at the Prince Charles Hospital was inducted as President Elect of the international body.

Wendy has a long association with the AIR, serving on the MRI Steering Committee and Advisory Panel. She has been instrumental in affiliating SMRT activities with the AIR's CPD program. All educational activities of the SMRT are accredited AIR CPD activities.

At the annual meeting of the SMRT in Toronto next year, Wendy will become the first truly international President – the first non-American to be elected.

This meeting was a great example of the international recognition Australian radiographers are receiving on the international stage.

For details on the upcoming 2nd Annual Meeting of the SMRT Australia-New Zealand Chapter to be held in Melbourne on 17th–18th November 2007. Visit the SMRT website at www.ismrm.org/smrt/anz.htm.

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Spectrum Journal, Volume 14 Number 7, August 2007

Global Relations Committee Report

Anne Dorte Blankholm, M.Sc., Co-Chair, Global Relations Committee

At the SMRT 16th Annual Meeting the Global Relations committee had the pleasure of chairing the first Forum for international attendees at an SMRT meeting. We were very pleased that so many people (more than 300) had registered for the Annual Meeting and over half of the participants were from Europe. This diverse gathering of MR Technologists and Radiographers gave us a great opportunity to network and to inform them of the SMRT worldwide.

The participants were separated into groups related to geographical area with a moderator in each group to encourage and facilitate discussion. Lots of contacts were made showing an interest in obtaining educational programs which will, hopefully, lead to local chapters and regional meetings coming in different parts of the world.

At the moment the Global Relations Committee has four members: ***Jane Francis*** (United Kingdom), ***Filip DeRidder*** (Belgium), ***Wendy Strugnell*** (Australia) and ***Anne Dorte Blankholm*** (Denmark). We would like to encourage non North American members of the SMRT to come forward and help us to make the SMRT truly Global with more international members. We really need your input in order to meet your needs for MR education. We also hope that more SMRT members will participate on the Global Relations Committee.

Contacts can be e-mailed to:
Anne Dorte Blankholm: aid@sks.aaa.dk or
Jane Francis: jane.francis@cardiov.ox.ac.uk

Attendees at the Annual Meeting in Berlin listen to the presentation explaining the goals of the SMRT to bring educational opportunities to them.

President Elect Wendy Strugnell, far right leads the discussion in a regional group during the International Forum at the Annual Meeting in Berlin

Preparing to form regional groups to identify how the SMRT is better able to serve various areas around the world.

We would like to encourage non-North American members of the SMRT to come forward and help us to make the SMRT truly Global with more international members.

External Relations Committee Update

Gina Greenwood, MBA, R.T., (R)(MR)
Co-Chair
External Relations Committee

Although your newly elected Co-Chairs of the External Relations Committee of the SMRT officially began their 3-year term in May of 2007, they began fulfilling some of the responsibilities of their respective positions even before they took office! One such responsibility was attending the Health Professions Network (HPN) Spring Meeting which was held in Minneapolis, Minnesota, USA on 26 – 29 April, 2007. Both ***Gina Greenwood*** and ***Charles Stanley*** experienced the beautiful spring weather Minneapolis had to offer while attending the informative and enlightening meeting entitled "Healthcare's Human Resources"!

The HPN is a group of volunteers representing health professional associations interested in interdisciplinary communication, discussion, and collaboration in the United States. The Network represents approximately 200 health care provider organizations, educators, regulators, and government agencies. 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 various topics presented and discussed at this meeting focused on the healthcare workforce. The keynote presentation entitled "Building the Status of a Health Profession" was delivered by Paul Wing, Deputy Director of the Center for Workforce Studies located in Albany, New York, USA. The presentation focused on building professionalism with the various health care disciplines.

Other presentations heard during the meeting focused on utilizing the community of resources available to address the shortage of healthcare workers. Such resources include health providers, educational systems and employers. Some excellent examples were included in presentations, such as initiatives of Area Health Education Centers (AHEC) throughout the nation, and successful statewide efforts in Minnesota being undertaken by its Healthcare Education-Industry Partnership (HEIP). In addition, activities of Health Occupations Students of America (HOSA), whose mission is to promote career opportunities in health care to students, were also reviewed.

Finally the issue of professions requiring increasingly higher academic degrees at entry level and the subsequent implications for healthcare workforce development was discussed by a panel of experts including a representative from the pharmacy industry and deans from two and four-year institutions.

At the Business Meeting held during the Spring Meeting, the HPN discussed that in light of the current status and associated needs of the healthcare workforce, an utmost importance needed to be placed upon projected growth needs. Thus, the HPN is developing a large-scale proposal to heighten public awareness of the critical need for qualified health professionals to serve the healthcare needs of our nation. To do this, the HPN is proposing a two-phased approach: Phase One will be a nationwide public relations campaign, and Phase Two will address the long-range opportunities to focus consumer awareness on educational and capacity issues associated with training for health care workers. You can trust that your SMRT representatives (the External Relations Committee Co-Chairs) will be actively involved in this endeavor!

You can trust that your SMRT representatives (the External Relations Committee Co-Chairs) will be actively involved in this endeavor!

It will soon be time to attend the Fall Meeting of the HPN, which is entitled "Growing Your Profession." The Fall Meeting will be held in Anaheim, California, USA 26 - 29 September, 2007.

Another focus of the External Relations Co-Chair position is to serves as the SMRT representative to the Associated Sciences Consortium. This responsibility includes attending the RSNA planning meeting and the RSNA annual meeting in the fall. The External Relations Co-Chair actively participates in planning the Associated Sciences workshop and Refresher Courses held during RSNA. RSNA 2007 finds our own ***Charles Stanley*** moderating Part 2 of the Refresher Courses entitled "Radiology's Role: When Disaster Strikes! Part 1: Environmental; Part 2: Terrorism." These courses will be held on Monday, 26 November from 8:30 AM – 10:00 AM and from

Continued on page 11

Educational Seminars

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

> ***Advancements in hardware, software and RF coils have resulted in cardiac MRI becoming a significant part of the daily routine for many facilities.***

We are pleased to present the SMRT Educational Seminars, Volume 10, Number 3: "Techniques in Cardiovascular MR Imaging." This is the thirty-seventh home study developed by the SMRT, exclusively for the SMRT members.

SMRT Educational Seminars Volume 10, Number 3

Techniques in Cardiovascular MR Imaging

Advancements in hardware, software and RF coils, have resulted in cardiac MRI becoming a significant part of the daily routine for many facilities. Visualization of the heart, vessels, cardiac motion and flow continues to improve. This technological progress creates challenges for the MR technologists to expand their knowledge base. This includes the physics and principles necessary to understand and appropriately implement the software and hardware, and the anatomy and physiology to ensure the cardiac examinations are conducted in a manner most beneficial for the patient. This expertise also includes mastering ancillary equipment often in use simultaneously such as physiological monitoring, automatic injectors and infusion devices.

Despite these many advancements, cardiac MRI is not for the faint of heart. As ***Cindy Comeau*** (Advanced Cardiovascular Imaging, New York, NY, USA) says, "Keep in mind that MRI is the only imaging modality that can offer a comprehensive cardiac workup. Becoming proficient in this application requires a high degree of dedication as many educational resources are currently available specific to cardiac MRI."

We would like to thank Gary R. McNeal and Peter J. Weale for taking the time out of their busy schedules to write an article specifically for this SMRT home study publication. We are also very grateful for Cindy Comeau for taking the time to find articles to contribute to this home study. Serious support of MR Technologist education is a never ending journey for these dedicated individuals.

In addition, we would like to express our appreciation to ***Rhonda Walcarius*** (Toronto, Ontario, Canada) and ***Denise Davis*** (Pittsburgh, Pennsylvania, USA) for writing the questions that compose the quiz. Thank you to Cindy Comeau for participating 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 terrific 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.

External Relations Committee Update *continued from page 10*

10:30 AM – 12:00 PM. Other Refresher Courses held during RSNA 2007 include topics such as Fusion Imaging, Pay and Performance, Compliance, Radiology Errors, Controversies in Screening Examinations and Radiology Planning and Design. Please refer to your RSNA 93rd Scientific Assembly and Annual Meeting brochure or to www.rsna.org for complete course and schedule information.

The External Relations Co-Chairs will also be attending the Alliance for Quality Medical Imaging and Radiation Therapy Meeting which will be held in Las Vegas, Nevada, USA on 15 – 16 October, 2007. As you'll recall, the Alliance is a coalition dedicated to seeking the enactment of federal minimum standards of quality for professionals working in the field of medical imaging and radiation therapy. The passage of the Consistency, Accuracy, Responsibility and Excellence (CARE) in Medical Imaging and Radiation Therapy Bill would necessitate such standards. Once the CARE Bill is passed, the Department of Health and Human Services (HHS) will provide the public with an opportunity to comment on what they think should be included in federal minimum education and credentialing standards. The Alliance for Quality Medical Imaging & Radiation Therapy (including your past and present SMRT External Relations Chairs) has been working on a comprehensive draft of updated education and credentialing standards to provide to HHS when the rulemaking process begins. The Alliance meeting being held in October will focus on providing members of the Alliance with an update regarding the CARE Bill and associated advocacy activities and a review and further discussion of the draft consensus education and credentialing standards.

MRI Safety: Physical Principles & Physiological Effects

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.

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Introduction

A number of fatal incidents have been reported the past 20 years. These, however all relate to situations that were avoidable, such as the scanning of patients with contraindicated implants (pacemaker, deep brain stimulator, surgical clip), or the use of MR unsafe devices in the MR environment (infusion pump), the missile effect of a ferromagnetic object brought in the vicinity of the magnet and a wrongly constructed RF room, which caused the fact that a service engineer could not escape in time from the room when it filled up with cold helium gas resulting from a quench of the magnet.

The number of serious incidents reported that must be contributed to the basic properties of the MR system is very limited. In clinical practice serious incidents related to human exposure to the applied static magnetic fields or the dynamic gradient magnetic field of MR systems are not known, but incidents related to the RF field during scanning are known. These RF incidents result when uncontrolled and thus unwanted local RF absorption occurs, resulting in excessive local heating of the patient and subsequently can result in RF burns. This local RF absorption results from unwanted resonant RF antennas, which can be created by conductors present in the system (such as ECG leads, RF coil cables). Many of these situations are reported resulting in first and second-degree RF burns, including a smaller number of more serious incidents whereby even third-degree RF burns are seen. In this contribution the physical principles for the assessment of MRI safety related to exposure to the Electro Magnetic Fields (EMF) of MRI: the Static Magnetic Field (SMF) at 0Hz, the dynamic Gradient Magnetic Fields (GMF) in the kHz range and the RF field in the MHz range are discussed. For each of these fields the basic physical principles resulting in the interaction with the human body are shortly described. The question is raised whether we know the actual physiologic process and the related health effects that determine the maximum allowed human exposure limit value for each of these fields field. Furthermore it is questioned whether the parameters controlled in the MRI scanners correctly assure the safety of the patients and the MR workers in the hospital. The currently allowed maximum values for these safety parameters for the patients are described in the IEC60601-2-33 standard [1] a future extension will also include the safety of the MR worker.

> ***"A number of fatal incidents have been reported the past 20 years. These, however, all relate to situations that were avoidable..."***

An important observation is that all the observed and known health effects that result from exposure to the EMF generated during an MRI examination are short-term effects. All observed effects reported in the literature disappear shortly after the exposure of the person involved has ended. Up till now no scientific data has been published that claims any long-term effect.

The Static Magnetic Field.

The forces that are caused by the Static magnetic Field, Bo, are proportional to the Bo2 and are the largest for ferromagnetic materials. and less for partially saturated ferromagnetic, diamagnetic or paramagnetic objects. It is important to realize that these directional forces are the result of the product of Bo and the inhomogeneity of Bo in the stray field of the magnet. For MR scanners these forces are thus higher for high field systems and are observed in the spatial gradient of the magnetic field around the scanner. The forces are largest at the position where this gradient field is maximal and are especially large when the magnet is an active shielded magnet. The forces can also result in aligning forces along the magnetic field lines resulting in torques on asymmetric ferromagnetic objects. This can be especially dangerous for ferromagnetic implants (surgical clips) and tools applied by engineers.

Already since the introduction in the early eighties of MR scanners with a SMF ≥ 1.5T negative health effects related exposure to the SMF are known and have been published frequently. The effects reported are to a large extent subjective and include dizziness, nausea, metal taste and magnetophosphenes [2]. While some people do experience these effects, many others are not at all affected by the magnetic field. Since the observations were first reported when high field systems were introduced, these health effects are often related to the high value of the SMF. This however is not at all truly demonstrated by scientific data and in fact the ultimate safe limit of SMF strength is not known and the factors that

eventually may determine the maximum permissible field strength are yet to be determined [2]. More and more often it is suggested (but not proven) that not the exposure to the SMF by itself but in fact the motion of the person in the SMF is the relevant contributing factor for the observed health effects. This fits in with the observation that typically patients do not suffer from these health effects once they are positioned in the bore of the magnet, even when the SMF is as high as 7T. More often it is the MR worker doing his job around and sometimes inside the magnet bore who observes and reports these effects. Since also the physiological process that creates the listed health observations is not identified, there is still discussion on the exact physics parameters that must be controlled to minimize the observed health effects. Often the involvement of the human balance organ is suggested, but the exact mechanism is not known. Is it an electric current introduced in the galvanic vestibular system; is it a pressure difference introduced in the fluids in the labyrinth as a result of magnetohydrodynamic effects; is it the acceleration detected as a result of susceptibility inhomogeneities in this organ or is it yet another physiological effect? Is it the SMF itself; is it the spatial gradient of the magnetic field around the magnet, or is it may be the product of the SMF and its gradient? Is it the exposure only or is the movement and possibly even the acceleration of the human being in one or all of these stray fields relevant?

The observation that patients laying still in the magnet typically do not suffer from these health effects and the known fact that patient or volunteers must be transported into the bore of the high field magnets with a sufficiently low speed to avoid the effects, seem to indicate that not just the exposure to the SMF is the source of the effects, but that motion in an inhomogeneous SMF is involved. This is supported by the observation that MR workers moving in the relatively high spatial gradient magnetic field of the relative low SMF (1.0T) of the shielded open magnet, frequently also observe the reported health effects. In addition, comparison of the observations of MR workers working in the stray field of the 3.0T and the 7.0T systems supports this assumption. The gradient of the static fields around the shielded 3.0T magnet and the unshielded 7.0T magnet are of the same order of magnitude and the frequency of the subjective complaints of the workers are comparable (and thus not dramatically higher at 7.0T). As a result it can be postulated that safety limits for exposure to SMF must be expressed in a maximum change of the SMF per unit of time and thus in T/s. At which values the observed health effects are observed can be estimated from the speed of motion of the patient into the magnet and the threshold appears to be higher than a few T/s.

On the other hand the question may be raised what the exposure limit value of the SMF would be and which physiological process would determine this limit value. A possible effect is the force in the large blood vessels that results from the magnetohydrodynamic effect of the SMF perpendicular to the flowing blood in the aorta. Simulations have indicated that when the magnetic field is orthogonal to the flow in the aorta, this force will be of the same order of magnitude as the gravitational force at about 10T [3]. Also other effects such as cellular disorder induced by high SMF have been studied recently and cultured cell exposure to SMF>10T has been demonstrated to affect the cell cytoskeleton. Whether such perturbations have consequences for human beings is not determined [4]. Physiological parameters of persons subjected to the static field of an 8T MRI system were measured [5]. No clinically significant changes were observed apart form a slight increase in the systolic blood pressure with increasing SMF.

"It is interesting to see that the research of the last decade has resulted in an increase of the allowed values for the gradient output of modern MR scanners."

Another possible limiting class of effects resulting from the exposure of the human brain to SMF are the effects on physiologic or neuro-cognitive functions. Results described in [6] however suggest that the cognitive-motor (eye-hand coordination) and the sensory (near-visual contrast sensitivity) are negatively influenced by exposure to SMF as low as 700mT. Although these effects are undesirable in interventional MRI procedures, it is not clear how these transient effects relate to the actual performance in a clinical setting.

The Dynamic Gradient Magnetic Field.

The health effects related to exposure to the dynamic Gradient Magnetic Field, G, are the result of the electric fields induced by the time-variation of this field, dG/dt in T/s, during switching of the gradient coils in the kHz range. This field can affect excitable tissue and can result in Peripheral Nerve Stimulation (PNS) in the human body. For whole body gradient subsystems, the theory satisfactorily explains the effects of the GMF on the human body [7,8,9]. Compared to peripheral nerves, the cardiac nerves have a much higher threshold value for stimulation and at PNS threshold cardiac nerve stimulation still is avoided by a large safety factor. In practice the PNS is therefore a very good practical limiter to avoid cardiac stimulation.

It is interesting to see that the research of the last decade has resulted in an increase of the allowed values for the

gradient output of modern MR scanners. It is also allowed, following the requirements of the IEC standard [1], for the MR manufacturers to determine the mean threshold level for PNS for each system (gradient coil design). In this way it may be expected that somewhat higher values of the gradient output can be applied than the default values as given by the hyperbolic equation, without creating intolerable PNS (as opposed to mild or painful PNS) in the patient. Since the mean threshold level for PNS again varies considerably between individuals (with a standard deviation of about 20% of the mean threshold, [9]), it is in practice possible that very sensitive patients do experience a painful level of PNS on modern scanners. The number of reports is however very minimal and no reports are known which report the occurrence of any form of serious injury for the patient.

It is important to realize that the threshold level for PNS is independent of the value of the SMF. In fact in practice the experiments done to determine the threshold level on volunteers are done outside the MR magnet or in a system with the magnet field switched off in order to not influence the observation by the volunteer by the knocking sound of the gradients [9].

An open issue related to the health effect caused by the GMF is the discussion of the exposure limits proposed specifically for MR workers. The actual proposed limit values for workers for exposure to EMF in the kHz range are given by ICNIRP [10] and are based the observation of visual phosphenes and as such on the threshold current density estimated for minor effects on nervous system functions. Visual phosphenes are however observed at lower frequency values than applied during MR scanning and therefore the extrapolation of the ICNIRP guidelines to the kHz range should be discussed [11, 12]. A direct consequence of this situation is that the limit values as proposed by ICNIRP for workers in general (not specific MR workers) are much lower than the values allowed by IEC for patients [1] (for patients values identical to those of IEC are adopted by ICNIRP in a more recent publication [13]). When the low limits recommended by ICNIRP for the MR workers are used in national regulations (and such regulations are expected soon in the EEG), this may hamper the development of MR scanners and will certainly limit the application of interventional MR, whereby the medical doctor sometimes has to be present near the bore of the scanner during scanning).

The RF Radiation.

In the early days of MRI scanning on patients, it was already known that in the MHz range EMF in human tissue dissipates heat and results in a temperature rise in the human body. It was also realized that even the relative low RF energy levels available on the early MR scanners were nevertheless enough to heat up the human body locally to more than 1ºC. Since it is in practice impossible to monitor the temperature of the human body during an MRI scan, the power transmitted by the RF transmit coil has to be controlled. The RF transmit coils induces electric fields in the human tissue during an MR examination, which results in the RF magnetic field strength, B1. For an MR scanner the RF power absorbed by the human tissue can be controlled via the Specific Absorption Rate (SAR) expressed in W/kg in the patient. The SAR value can be estimated with reasonable accuracy. Up till now, the SAR has always been used to limit the transmitted RF power. The limit for the temperature rise in the patient body is 1ºC in any part of the human body [1]. The allowed maximum temperature is however different for the different parts of the human body (head, 38°C, trunk, 39°C and extremities, 40°C), but these numbers are not applied on MR scanners up till now.

> ***"...the amounts of energy needed for an MRI scan increases when the value of the B0 is increased."***

Since the mid nineties the maximum allowed SAR values have not been changed significantly for the MR scanners, being expressed in the whole body SAR value and the head SAR. Although limits are given for the local SAR values, its value was in practice not separately controlled by the MR system. Instead, supported by experiment and or by deduction, it was inferred that when the limits for the whole body SAR are applied, also the local SAR limits are respected. This is no longer true since the introduction of high field systems.

The limits for the allowed SAR values as given in the IEC standard [1] are independent of the value of the SMF. However, the amounts of energy needed for an MRI scan increases when the value of the B0 is increased. Ignoring all other effects related to the higher frequency of the RF radiation and the interaction with the human tissue, the number of occasions in which the SAR value in practice will be the limiting factor for a specific sequence increases for higher values of the SMF. It must be realized that since the wavelength of the RF waves is shorter at higher values of the SMF, the interaction with the human body is different. Simulations applying realistic heterogeneous human body models and finite difference time

domain (FDTD) calculations of the Maxwell equations have demonstrated that at these higher SMF in fact the local SAR values become more relevant [14]. As a consequence, it is no longer valid to assume that obeying the whole body SAR limits automatically fulfills the requirements for the local SAR value.

Also the averaging times applied for the SAR determination are in discussion in the MR community. In addition it is more and more realized that the limit for the allowed temperature increase of only 1ºC in any part of the human body may be too rigid for the MR patient. Is it possible to allow higher temperature for specific parts of the human body? Is it possible to allow higher local SAR for specific organs, taking into account the actual cooling by perfusion or diffusion? Specifically for the human head a multi-tissue numerical model was developed, that considered thermal conductivity, heat capacity, perfusion, heat of metabolism, electrical properties and density [15]. This resulted in the observation that the local SAR limits are exceeded in the brain before the temperature in the brain increased by more than 1ºC.

Conclusions and Future Outlook.

It is surprising to see that even after more than 20 years of experience with MR scanners, the scientific basis for the exposure limits for the EMF related parameters is still in discussion. For the static magnetic field it is not clear which parameter determines the maximum allowed field. Is it indeed the movement of the person in the gradient field of the SMF that results in the observed health effects? Can we define a practical limit to minimize these effects for patients and MR workers?

For the dynamic gradient magnetic field, the discussion is limited (and not relevant for patient scanning), since only the fact that the limits for workers are not in line with the limits for patients is open for debate.

Discussions on the allowed SAR values have started only the past few years, after results of simulations in realistic human models became available, faster and more energetic RF sequences created complains and the relevance of the local SAR values even at SMF of the order of 1.5T are demonstrated.

Clarity in this respect is urgently needed and resulted in the initiative to start working on the 3rd edition of the IEC 60601-2-33 standard. It may be expected that this 3rd edition will address these new aspects both for patients and for MR workers. S

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Comparison of Changes of the Signal Intensity and Contrast Ratio with respect to Variations of Concentration of the Contrast Media at 1.5T and 3.0T MRI

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Purpose

Increased signal-to-noise ratio(SNR) is the most appealing feature of the 3.0T field strength compared to that of lower field strengths and it also leads to increased T1 relaxation time of the tissues. Because of this the optimal pulse sequence parameters also changes, but the correlation between signal intensity(SI) and GD-DTPA concentration at high magnetic field strength has not yet been investigated. The purpose of this study is to compare signal intensity with variations of concentration of contrast media in 1.5T and 3T units and to find a suitable concentration of the contrast media at 3T MRI.

Materials and Methods

Phantoms were prepared with eight different concentrations ofGD-DTPA (0.05, 0.1, 0.2, 0.3, 0.4, 0.6, 0.8, 1mmol/_ diluted) in 50cc Saline buffer and they were imaged in 1.5T (Signa horizon, GE) and 3T (Magnetom trio, SIEMENS) MR units. Imaging parameters are as follows: TE = minimum, NEX: 1, variable TR (300ms, 400ms, 500ms, 600ms, 700ms, 800ms, 1000ms, 1600ms, 3200ms and 4800ms). The signal intensity (SI) and contrast ratio (CR) according to concentration of the contrast media and changes of the TR were measured and based on this to evaluate the concentration of proper contrast media depending on magnetic field strength. The SI is N(H).exp(-TE/T2).[1-exp(-TR/T1)], and the CR is SIc-SIs/SIs (SIc=GD-DTPA signal intensity, SIs=saline signal intensity).

Results and Discussion

At 1.5T, the SI was highest when the GD-DTPA concentration was 0.2mmol/_ and the TR was below 500ms and at 3.0T, SI was highest in 0.1mmol/_ over TR 600ms, 0.3mmol/_ at TR 300ms, 0.2mmol/_ at TR 400ms, 0.1mmol/_ at TR = 500~800ms and 0.05mmol/_ over TR 1000ms. Consequently, it was found that the SI was different depending on magnetic field strength. At 1.5T, the CR was highest in 0.2mmol/_ below TR 500ms, 0.1mmol/_ over 600ms and at 3.0T, it was highest in 0.3mmol/_ at TR 300ms, 0.2mmol/_ at 400ms, 0.1mmol/_ at 500~800ms and 0.05mmol/_ over 1000ms (Fig. 1). Accordingly, it was found that the influence of the contrast media between 1.5T and 3.0T was different.In particular, SI of the T1 weighted images with TR 500ms, the CR with 0.2mmol/_ at 1.5T and that of with 0.1mmol/_ at 3.0T were highest.

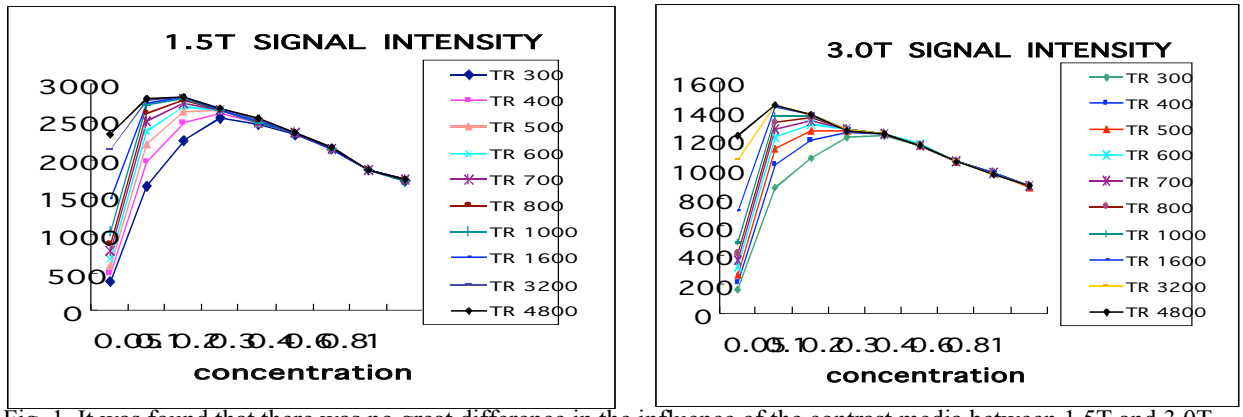

Fig. 1. It was found that there was no great difference in the influence of the contrast media between 1.5T and 3.0T

There was no great difference in the influence of the contrast media on peak signal intensity between 1.5T and 3.0T (Fig.1). At 500ms, peak CR was achieved with 0.2mmol/_ concentration of GD-DTPA in 1.5T and that of was achieved with 0.1mmol/_ concentration in 3.0T (Fig.2). So, the Concentration of the contrast media using at 3.0T will be lesser than using at 1.5T.

Conclusion

This study is only phantom *in vitro*, but it is concluded that when applied to a patient *in vivo*, it is useful to refer to this. There was no great difference in influence of contrast media depending on magnetic field strength between 1.5T and 3.0T. But, if it is to obtain imaging over TR 500ms with longer T1 relaxation time in 3.0T imaging, it will be possible to use less concentration of contrast media than that of 1.5T imaging.

Supine Breast MRI utilizing a Zonal Motion-Adapted Acquisition and Reordering Technique

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Introduction

Dynamic, contrast-enhanced breast MRI (DCE-MRI) has been shown to be more accurate than mammography, ultrasound and clinical breast exam for the identification of tumour extent in the breast. However, DCE breast MRI is not currently utilized for the guidance of breast conservation surgery, primarily due to the differences in breast positioning during the MR imaging compared to the positioning in the surgical theatre. Therefore a supine positioning of the patient during MR imaging is preferred, which should result in a better matching of the images of the preoperative MRI and the later positioning in the operating room.

In supine breast MRI, respiratory motion is not negligible. Therefore some type of motion compensation technique is necessary to produce diagnostic quality images. We propose the use of a modified 3D gradient echo sequence with motion compensation using the zonal motion-adapted acquisition and reordering technique (ZMART) and the standard respiratory belt for motion tracking.

Purpose

The aim of this study was to evaluate the feasibility of supine breast MRI with ZMART for breast conservation surgery.

Figure 1. Supine Breast Coil Positioning

Materials and Methods

Under IRB approval, imaging was performed on a 1.5T Signa EXCITE CVi system (GE Healthcare, Waukesha, WI). An in-house built dedicated phased array breast coil (2 elements) was used allowing the subjects to be placed in a supine, feet-first position with a respiratory belt in place (see fig.1). Images were acquired unilaterally using a 3D fast spoiled gradient recalled (FSPGR) sequence. The imaging parameters were as follows: TR/TE = 6.4 ms/4.2 ms, FA = 30 degrees, Matrix = 256 x 256, 32 locations, slice thickness = 3.0mm, FOV = 20cm, and NEX =1. Scans were acquired in the coronal oblique plane with the phase encoding direction selected R-L. The pulse sequence was modified to allow for ZMART, a form of k-space reordering and gating which increases the efficiency of the scans by dividing the region of gating into several segments. In this study, the ky-kz plane was divided into 32 equal size zones. As the respiratiory displacement from expiration increased, a line from a zone with a greater distance of the center of the ky-kz plane is chosen for the corresponding acquisition. Data were not acquired if the detected respiration was above a specific limit. The gating limit was set to 75% of the maximal displacement between expiration and inspiration. Scans were performed with and without the implementation of ZMART.

Results

The in-house made dedicated supine Breast MRI coil provided an acceptable image quality. The resultant images demonstrated a significant reduction in the amount of motion artefacts when compared to conventional (non k-space reordered and gated) techniques (see fig.2). ZMART led to a visible reduction of the respiratory motion artefacts caused by supine positioning of the patient while requiring an increase in scan time of 13 seconds.

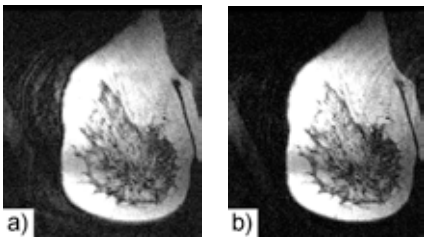

Figure 2. Coronal oblique breast MR images acquired with in-house made supine breast coil. a) image acquired without ZMART and b) image acquired with ZMART. Note the reduction in artefacts caused by respiratory motion in the motion compensated image.

Conclusion

Supine breast MR using ZMART for respiratory motion compensation may provide an alternative imaging method to allow guidance of breast conservation surgery in the future.

High Spatial and Temporal Resolution MRA of the Entire Peripheral Vascular System Using a New 3D Time-Resolved MRA Technique(TWIST)

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[2]Siemens Medical Solutions, Erlangen, Germany

Purpose: Bolus-chase magnetic resonance angiography (MRA) protocols collecting multiple high-resolution data sets covering the arterial vessels from the renal arteries down to the pedal arteries can be considered as the state-of-the-art technique and imaging modality of first choice in patients suffering from peripheral arterial disease (PAD). However, even if technically perfect, standard MRA techniques only provide morphologic information whereas digital subtraction angiography (DSA) as goldstandard collects several images during the first-pass of the contrast agent providing additional information on flow. To overcome these limitations at least for the infrapopliteal arteries hybrid MRA techniques combining time-resolved MRA of the lower legs and bolus chase MRA for pelvis and upper legs have been introduced. The results of hybrid MRA are encouraging but until now dynamic MRA requires to trade in spatial resolution for temporal resolution. Our study aimed to develop a triple injection scan protocol for dynamic, high-resolution, isotropic MRA of the peripheral vascular system applying a recently developed time-resolved 3D MRA sequence (TWIST).

Methods: Ten patients (mean age 64y) with PAD underwent contrast-enhanced MRA collecting dynamic 3D data sets at three consecutive, slightly overlapping stations. All imaging was performed on a 1.5 T system with Tim technology (Avanto, Siemens Medical Solutions, Erlangen, Germany). Two flexible phased array coils and a dedicated peripheral vasculature coil were used for signal reception. 25 consecutive T1w 3D datasets were acquired in coronal planes following automatically injection of 5 ml Gadovist (Schering, Berlin, Germany) at 3ml/sec for each station using the TWIST sequence. The TWIST sequence divides the k-space into a central (A) and a peripheral region (B). While region A is completely sampled, region B is undersampled by a factor of n. The k-space trajectory within region B follows a spiral pattern in the ky-kz plain with every trajectory in B slightly different, depending on the undersampling factor n. The individual trajectories of B are twisted into each other during the execution of the TWIST sequence. Parallel acquisition (GRAPPA, accel. factor 2) was applied and spatial resolution and coverage were adapted for each station. Abdominal/pelvic station: (slices 80; spatial res. 1.3x1.3x1.3 mm_; temporal res. true/interpolated 4.5/2.3 s). Thighs: (slices 64; spatial res. 1x1x1 mm_; temporal res. true/interpolated 5.1/2.6 s). Lower limbs: (slices 64; spatial res. 1x1x1 mm_; temporal res. true/interpolated 3.9/2.0 s). Reconstruction times were evaluated for all data sets. The MRAs were evaluated by two experienced radiologist in consensus and all significant stenoses (>50%) as well as all vessel occlusions were recorded. All patients underwent DSA of the aorto-iliac and lower extremity arteries within 24 - 48 hours of the MRA exam, which served as the standard of reference.

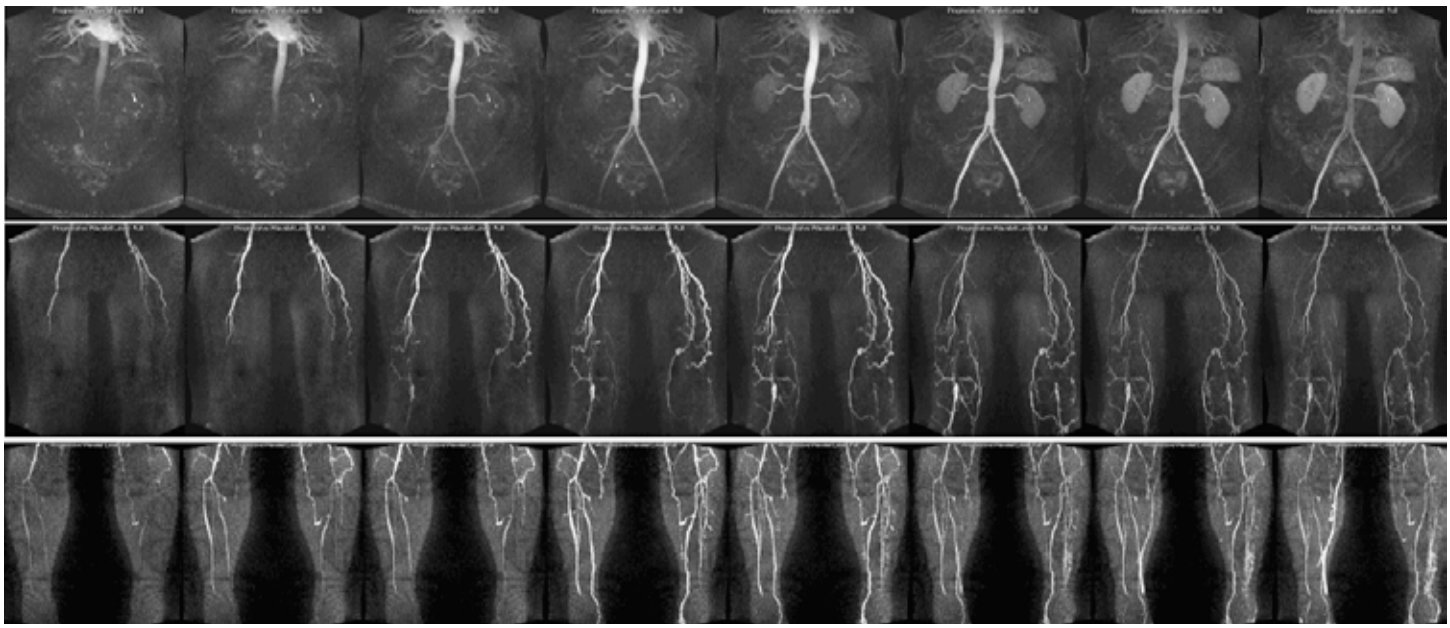

Fig. 1 83 y male old patient with PAD. Multiple stenoses and occlusions of the upper and lower limb arteries can be depicted

Results: All exams could successfully be performed; no technical or reconstruction problems occurred. A total number of up-to 2000 images per station were reconstructed in about 6 minutes. Due to the dynamic data acquisition venous overlay did not hamper the assessment of the arterial system in any station. The number of evaluable segments on the MRA data sets was equal to DSA. Significant stenoses (> 50%) as well as occlusions were correctly characterized in all cases using DSA as goldstandard.

Conclusion: The triple TWIST protocol is a robust and reliable technique for MRA of the peripheral arterial system. Compared to other MRA protocols it provides important advantages: 1. perfect arterial opacification of all vessels without any timing issues; 2. no venous overlay in the entire peripheral vascular system; 3. functional information combined with high resolution morphologic information. Hardware improvements will definitely further reduce the reconstruction time in the near future and this approach may become the state-of-the-art imaging protocol for MRA in PAD patients.

RSNA 2007
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Associated Sciences Program at RSNA 2007

Registration Information

Advance registration for the RSNA annual meeting ends November 5, 2007. Registration at McCormick Place begins at 12:00 PM on Saturday, November 24. RSNA shuttle bus service to McCormick Place will be available beginning at 11:00 AM on Saturday. Registration is required to attend the Associated Sciences programs.

Registration fees at McCormick Place are $100.00 higher than advance registration fees.

Advance registration and housing information can be found at *RSNA2007.RSNA.org*.

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Monday, November 26

AS21 8:30 AM – 10:00 AM

Radiology's Role: When Disaster Strikes! Part 1: Environmental

Sue Crowley, *Moderator*

A) Lessons Learned from SARS: Implications for a Radiology Department
Narinder S. Paul, MD

B) Emergency Imaging Services in Cold Weather
Valerie R. Cronin, CNMT

C) Lessons Learned from Hurricane Katrina
Edward I. Bluth, MD

AS22 10:30 AM – 12:00 PM

Radiology's Role: When Disaster Strikes! Part 2: Terrorism

Charles Stanley, *Moderator*

A) Terrorism and Radiology: The Israeli Experience
Dorith Shaham, MD

B) The Response of Radiology to Mass Casualties: Weapons of Mass Destruction
Douglas M. Coldwell, MD, PhD

C) The Radiology Professional's Role in Preparing for Radiological Events
Douglas W. Fletcher, PhD

AS23 1:30 PM – 3:00 PM

Satisfying Our Diverse Patient Needs: Unique Like Everyone Else

Arlene M. Adler, MEd, RT(R), FAERS, *Moderator*
Bettye G. Wilson, MA, Ed, RT (R)(CT), RDMS, FASRT
Peter K. Shams-Avari

AS24 3:30 PM – 5:00 PM

Optimizing Image Acquisition and Display in Digital Imaging

Sue Crowley, *Moderator*
Charles B. Burns, MS, RT(R)
Kerry T. Krugh, PhD

Tuesday, November 27

AS31 8:30 AM – 10:00 AM

Fusion Imaging

Charles Stanley, *Moderator*
Valerie R. Cronin, CNMT, *Moderator*

A) Image Fusion in Neuroradiology: Different Methods and Clinical Use
Gonzalo Rojas Costa

B) What's New in Body Fusion Imaging
David Gilmore, MS, CNMT, NCT, RT(R)(N)

AS32 10:30 AM – 12:00 PM

The Buck Stopped Here and I Put it in My Pocket: The Link Between Compliance and Good Business

Claudia A. Murray, *Moderator*
Judy LeRose, BS
Patricia Kroken, FACMPE, CRA
Daniel K. Knepper, MD

AS33 1:30 PM – 3:00 PM

Pay and Performance: Can Radiology Play Too?

Claudia A. Murray, *Moderator*
Mark O. Bernardy, MD
Susan Nedza, MD, MBA, FACEP
Paul A. Larson, MD

AS34 3:30 PM – 5:00 PM

Radiology Errors

Becky Kruse, RT(R), *Moderator*

A) Nursing Perspectives
Kimberly Parkinson, MSN, RN

B) A Look at Reality
Christine J. Lung, CAE

Wednesday, November 28

AS41 8:30 AM – 10:00 AM

Controversies in Screening: Breast, Cardiac, Chest, and Virtual Colonoscopy

Karen J. Finnegan, MS, RT(R)(CV), FAVIR, *Moderator*
Reuben S. Mezrich, MD, PhD
Charles S. White, MD
David J. Vining, MD

AS42 10:30 AM – 12:00 PM

The Art and Science of Radiology Planning and Design

Morris A. Stein, FAIA, FACHA, *Moderator*
Morris A. Stein, FAIA, FACHA
Bill Rostenberg, FAIA, FACHA
Steven C. Horii, MD

AAPM/RSNA PHYSICS LECTURE FOR THE RADIOLOGIC TECHNOLOGIST

(Approved for AMA PRA Category 1 Credits™ and Category A credit for technologists.)

Monday, 1:30 PM – 2:45 PM

Full-Field Digital Mammography

Donald Peck, PhD, *Moderator*

A) Acquiring a Digital Mammography Image — Who does What ... and Sometimes Why
William R. Geisler MS, DABR

B) MQSA and Accreditation for Full-Field Digital Mammography — Everything You Need to Know in 1/2 Hour
Priscilla F. Butler, MS, FAAPM, FACR

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Calendar of Events

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

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

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

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

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

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

11 November — **Annual Fall Meeting**
Akron, Ohio, USA
Hosted by Northeast Ohio Local Chapter

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

2008: 12 April — **SMRT Regional - Brussel, Belgium**
Universitar Ziekenhuis Brussel

2008: 3-4 May — **SMRT 17th Annual Meeting**
Toronto, Ontario, Canada

2008: 3-9 May — **ISMRM 16th Scientific Meeting & Exhibition**
Toronto, Ontario, Canada

Save the date!

See page 4 for details on the SMRT Annual Meeting in Toronto, Ontario Canada

Toronto!

SMRT 17th Annual Meeting • 3-4 May 2008