Signals

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NEWSLETTER OF THE SECTION FOR MAGNETIC RESONANCE TECHNOLOGISTS

IN THIS ISSUE

Information for You

President's Letter

John A. Koveleski, R.T. (R)(MR)

Typically in this issue of *Signals* the President will report on the recent Annual Meeting and offer an introduction to the Membership. With the turn of events, I have the opportunity to address you once more.

Obviously, everyone is aware that our 12th Annual Meeting, which was to be held in Toronto from 9-11 May 2003, has been postponed. Although everyone within the ISMRM and the SMRT was disappointed, we felt that the safety and health of the membership was our top priority. Due to the presence of Severe Acute Respiratory Disorder (SARS), the World Health Organization (WHO) issued a travel advisory of 23 April, which included Toronto. We had no choice but to postpone the meeting.

We're happy to announce that the SMRT Meeting will be held at the Toronto Metro Convention Centre from 9-11 July 2003. The meeting will start with a reception on Wednesday evening 9 July 2003 with the program running all day on Thursday 10 July and Friday 11 July. Obviously this is a change from the norm as our past Annual Meetings have started on Friday evening with the program running on Saturday and Sunday. The venues and cities for the Annual Meetings are decided many years in advance. Although the weekend format would be more desirable, we are fortunate to have been able to reschedule with our program intact. Weekends are obviously a better choice to host the meetings as it allows the SMRT membership the opportunity to attend the meeting and not impact the workflow of their facility however we hope you will still take advantage of this great educational opportunity. If you have any questions regarding the postponement and rescheduling of the Meeting, please visit the SMRT website at www.ismrm.org/smrt for more information.

The majority of the speakers will be able to present their work in July with some minor changes due to the rescheduling of the meeting. Having the meeting in July will enable the attendees to enjoy the beautiful Canadian summer weather. Please be sure to join us for this outstanding educational meeting and also participate in the SMRT Business Meeting which will be held during lunch on Thursday and the SMRT Safety Forum which will be held during lunch on Friday.

One other announcement that I'd like to share with our members is regarding the SMRT List Serve. Recently, the SMRT took the reins of this List Serve for MR Technologists, which was implemented by Richard Helsper. The List Serve has over 700 members representing twenty-plus countries. It's an open forum for the participants to ask the entire MR technologist world anything regarding MR. I've been involved with this list serve for approximately six years and it's an invaluable resource to all. Please visit the SMRT website for more information.

If you have any questions or comments, as always, please feel free to contact me at jak3264@aol.com. I look forward to seeing you in Toronto! ●

The SMRT gratefully acknowledges

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Contact information can be found at:
info@magmedix.com

Editor's Letter

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

Greetings.

In this issue of *Signals* you will find information about the rescheduled SMRT Annual Meeting. Please see the articles by President, **John Koveleski** and Program Chair, **Laurian Rohoman**. Annual Meeting Program changes are included for your review and **Nanette Keck** presents the *SMRT Forum on MR Purchase Decisions*. The *SMRT Educational Seminars* series Home Study update by **Kelly Baron** discusses the quarterly offering. External Liaison, **Maureen Hood**, shares important information for all technologists in the field pertaining to new educational standards, federal legislation and allied health initiatives. We appreciate the continuing support of MR safety expert **Frank Shellock** and his report. **Bill Faulkner** shares information in his Low and Mid-field MR column. Also featured in this issue are the first place abstracts in clinical and research as judged by the Education Committee, chaired by **Julia Lowe**. These winners will give an oral presentation of their papers at the Annual Meeting. Please note the calendar of events and the popular "Highlight Your Site" information. You may notice that this issue of *Signals* is a bit more brief than previous issues. Due to the postponement of the Annual Meeting and associated timelines, we are gearing up for a jammed packed offering with Annual Meeting news, abstracts, interesting articles and news for you about the field of MR in the next quarterly issue. ●

Update on *SMRT Educational Seminars*

Kelly D. Baron B.S., R.T. (R)(MR), Chair, SMRT Publications Committee

The *SMRT Educational Seminars* series Home Study for this quarter is *"Fundamental Principles of MR Imaging of the Head, Neck, and Spine."* This educational material is from two chapters in a book entitled *"MRI Survival Guide"* by Jim D. Cardoza, M.D. and Robert J. Herfkens, M.D. I have found this book to be a great foundation for technologists entering the field, as well as, a good refresher for those re-entering clinical work. I always recommend this text, especially now with the extreme shortage of technologists and limited amount of formal training available.

The entire book, including the chapters presented here for your study, is well organized and provides a quick reference for the most common findings in the head, neck, and spine. The text explains what the radiologist looks for in each imaging sequence and instances where particular sequences should be acquired by the technologist. I hope you enjoy this clinical learning experience. ●

Announcing the SMRT 12th Annual Meeting to be held 9-11 July 2003

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

On behalf of the SMRT and the Program Committee I am very pleased to announce that the SMRT 12th Annual Meeting will now take place on 9-11 July 2003 at the Metro Toronto Convention Centre in Toronto. We hope that many of you have already made plans to join us in July.

The theme of the 2003 meeting is *"Excellence Through World-Class Education."* The goal of the SMRT is to advance the continuing education for MRI/S technologists worldwide. We have assembled a team of very dedicated, enthusiastic speakers, all experts in their field, who are determined to share their knowledge on the latest and most advanced MR technology and applications with all MR technologists. This program will allow you to enhance your knowledge in the field of MR.

The Poster Exhibit and Walking Tour Reception will now be held on Wednesday evening, 9 July 2003 at 18:30. Come and meet fellow technologists from around the world and share ideas and experiences with them in a relaxed and informal atmosphere. This year a new event will be added to the Poster Exhibit Reception, five selected poster authors will give a short oral presentation of their work during the poster exhibit, beginning at 19:00. This year a record setting 64 abstracts from 16 different countries have been submitted. We are very proud of all who have contributed.

The didactic portion of the meeting will start off early Thursday morning 10 July at 07:45 with opening remarks from both the President and the Program Chair. Selected proffered papers will be presented as part of the program.

The annual SMRT Business Meeting will take place during the lunch hour on Thursday. This is an excellent way to learn more about the SMRT and to become actively involved in the Organization. After the Business Meeting, awards will be presented for the best oral and poster presentations. Special Recognition Awards will also be presented at this time.

Following last year's success, the popular Safety Forum will be held on Friday 11 July during the lunch hour. Dr. Shellock will be moderating the forum and a panel of safety experts will discuss current safety issues. There will be ample time for questions from the audience during the forum.

After two days of extensive learning, why not take some time off to enjoy the hospitality, the warm July weather and the many great attractions the city of Toronto has to offer. Please make plans now to join us on 9-11 July 2003 for a change in your routine and a great 2-day educational meeting. See you in Toronto in July. ●

"Excellence Through World-Class Education"
SMRT 12th Annual Meeting Program

(16 Category A CE credits have been approved by the ASRT and the CAMRT for the 2-day meeting)

The meeting will commence with a Poster Exhibit and Walking Tour Reception on Wednesday evening, 9 July at 18:30

Thursday, 10 July 2003, 07:45-17:30, Room 701, Accredited: 7 CE

07:45 **Welcome and Announcements**
Morning Moderator: Muriel Cockburn, D.C., R.B.Sc.(Hons), P.Gd. CERT. MRI

08:00 **Basics of Functional Neuro Imaging – 1 CE**
Anne Sawyer-Glover, B.S., R.T.(R)(MR), Stanford University, Stanford, California, USA

09:00 **Cardiac Imaging – 1 CE**
Naeem Merchant, M.D., Toronto Hospital, Toronto, Ontario, Canada

10:15 **Physics: New Pulse Sequences – 1 CE**
William Faulkner, B.S., R.T.(R)(MR)(CT), William Faulkner & Associates, Chattanooga, Tennessee, USA

11:15-11:45 **Proffered Papers: Improving Clinical Imaging Techniques in MRI – 0.5 CE**

11:15 ***1st Place Award– Clinical Focus***
Mercedes Pereyra, R.T., "Quantitative Assessment of Global LV Function Using Sensitivity Encoding (SENSE) Accelerated Balanced FFE"

11:25 ***2nd Place Award– Clinical Focus***
Claudio Arena, R.T. (CT)(MR), "Robust Small Field-of-View, High Resolution Contrast Enhanced MRA (CE-MRA) of Renal Arteries Using Sensitivity Encoding in Two Dimensions (2D-SENSE)"

11:35 ***3rd Place Award– Clinical Focus***
Eva Wembacher, R.T., "Comparison of Different Techniques for MR-Colonography"

11:45 SMRT Business Meeting and Awards Luncheon

Afternoon Moderator: Maureen Ainslie, M.S., R.T. (R)(MR)

13:30 **Breast Imaging – 1 CE**
Petrina Causer, M.D., Sunnybrook and Women's College Health Sciences Centre, Toronto, Ontario, Canada

14:30 **Pulse Sequences and Protocols in MSK – 1 CE**
Garry Gold, M.D., Stanford University, Stanford, California, USA

15:45 **Proffered Paper– *President's Award*–**
Eva Wembacher, R.T., "Combined Small and Large Bowel MR Imaging in Patients with Inflammatory Bowel Disease"

16:00 **Pre- and Postnatal Pediatric Neuromaging: How and Why – 1 CE**
Erin Simon, M.D., Children's Hospital of Pennsylvania, Philadelphia, Pennsylvania, USA

17:00 **Assessment of Gastrointestinal Disorders – 0.5 CE**
Silke Bosk, R.T. and Thomas Lauenstein, M.D., University Hospital Essen, Essen, Germany

17:30 Adjournment

Friday, 10 July 2003, 07:45-17:30, Room 701, Accredited: 9 CE

07:45 **Welcome and Announcements**
Morning Moderator: Julie Lowe, B.S., R.T. (R)(MR)

08:00 **Functional MRI: Past, Present, and Future – 1 CE**
Peter Bandettini, Ph.D., NIH-NIMH Laboratory of Brain and Cognition, Bethesda, Maryland, USA

09:00 **Stroke Imaging – 1 CE**
Richard Frayne, Ph.D., University of Calgary, Calgary, Alberta, Canada

10:15 **Contrast Enhanced MR of the Abdomen: Contrast Agents, Techniques, and Findings – 1 CE**
Richard Semelka, M.D., University of North Carolina at Chapel Hill, Chapel Hill, North Carolina, USA

11:15 **MRI Safety Forum and Luncheon – 2 CE**
Frank Shellock, Ph.D., Moderator

Afternoon Moderator: Laurian Rohoman, A.C.R., R.T. (R)(MR)

13:15 **Proffered Papers – Improving on the Analysis and Assessment of MRI Data with New Developments in MRI Research – 0.5 CE**

13:15 ***1st Place Award– Research Focus***
Heather Ducie, B.Sc. (Hons) R.T. (MR), "Analysis of Perfusion MRI Data in Patients with Severe Cerebrovascular Disease"

13:30 ***2nd Place (Tie) Award– Research Focus***
Wendy Strugnell, R.T., "Cardiac MRI Analysis of RV Function– A New Approach"

13:45 **Talking Sense and Non-Sense in Parallel Imaging – 1 CE**
Donald W. McRobbie, Ph.D., Charing Cross Hospital, London, England

14:45 Break

15:00 **MRI of the Female Pelvis: Emphasis on Technique – 1 CE**
Eric Outwater, M.D., The University of Arizona HSC, Tucson, Arizona, USA

16:00 **Why 3T? – 1 CE**
David W. Stanley, B.S., R.T. (R)(MR), GE Medical Systems, Milwaukee, Wisconsin, USA

17:00 **Proffered Papers – Clinical Studies that are Diagnosed with Functional MRI – 0.5 CE**

17:00 "Improvement in the Selection of Stereotactic Biopsy Target in Intracerebral Gliomas Using T2* Perfusion," *Filip De Ridder, R.T.*

17:10 "The Preoperative Assessment of Mitral Regurgitation by Magnetic Resonance Imaging: A Series of 6 Patients," *Cindy Comeau, B.S., R.T. (N)(MR)*

17:20 "Dynamic Contrast Enhanced Bilateral Breast Technique," *David Stanley, B.S., R.T. (R)(MR)*

17:30 Adjournment

SMRT Forum at the 11th Annual Meeting of the ISMRM: MR Purchase Decisions

Nanette Keck, R.T., 2003 SMRT Forum Organizer

Saturday, 12 July, 14:00 - 16:00

14:00 **Analytic Approach to Equipment, Finances, Compatibility, Site Preparation, PACs, and Delivery** – *Clare Sims, M.B.A.*
14:30 **Dedicated vs. Whole Body Scanning** – *James J. Stuppino, B.S., R.T. (R)(MR)*
15:00 **1.0/1.5 T vs. Low-field** – *James J. Stuppino, B.S., R.T. (R)(MR)*
15:30 **1.5T vs. 3T** – *Gary H. Glover, Ph.D.*
16:00 Adjournment

2003 1st Place Oral Presentation, Clinical Focus–

Quantitative Assessment of Global LV Function Using Sensitivity Encoding (SENSE) Accelerated Balanced FFE

Mercedes Pereyra[1], Margit Nemeth[2], Richard Kacere[2], Raja Muthupillai[1,3], Scott D, Flamm[1,2]

Departments of Diagnostic Radiology[1] and Cardiology[2], St Luke's Episcopal Hospital/Texas Heart Institute, Houston, Texas, USA.

Philips Medical Systems[3], Bothell, Washington, USA

Background

An important and routine component of cardiac MRI is the determination of global LV function. Higher SNR and myocardium to blood contrast offered by the Steady State Free Precession (Balanced FFE, TrueFISP, FIESTA) techniques compared to conventional gradient echo techniques (T1-TFE, SPGR, FLASH), they are now routinely used for assessing global LV function.[1,2] Parallel imaging techniques such as SENSE permit trading SNR to gain acquisition speed, without compromising spatial resolution.[3] Routine clinical adoption of MRI for the evaluation of heart disease would be facilitated by a rapid assessment of LV function without compromising spatial, temporal, and contrast resolution as well as the accuracy of quantitative evaluation. In this respect, the high SNR intrinsic to the Balanced FFE (bFFE) sequence, makes it a suitable candidate for combining it with a parallel acquisition technique such as SENSE for accelerating conventional LV functional assessment.

Purpose

The purpose of the study was to quantitatively compare LV function analysis using a conventional multi-slice, multi-phase bFFE acquisition with a SENSE accelerated cine bFFE acquisition.

Methods

Data Acquisition: 20 patients (10 M, age 58 +/- 12) referred for MRI assessment of LV function were imaged on a 1.5T commercial imager (Philips Gyroscan NT-Intera) using a 5-element synergy cardiac coil and using Vector-cardiographic gating. Following initial scout images, the bFFE sequence was used to obtain a series of short-axis slices to cover the entire LV (10-14 slices, 8 mm slices, skip 2 mm).

bFFE: The acquisition parameters for the bFFE (without SENSE) sequence were: TR/TE/flip=3.4 msec/1.7 msec/55 deg; temporal resolution or cardiac phase interval 36-40 msec; acquired in-plane spatial resolution 1.5-1.75 sq. mm depending on patient size; breath-hold duration: 14 heart beats/slice.

bFFE with SENSE: With SENSE, all acquisition parameters including spatial and temporal resolution were identical to the conventional bFFE cine acquisition above except the following: the number of in-plane phase encoding steps were halved. This reduction in acquisition time per slice permitted collecting two slices per breath-hold using SENSE.

Reference scan: Coil sensitivity maps necessary for SENSE reconstruction were acquired using a low-resolution reference scan (9 x 9 x 9 mm) as has been described previously (52 s acquisition duration).[3]

Post Processing: Data were transferred to a post-processing workstation for analysis of LV function. Two observers drew the endo-cardial and epi-cardial contours on each slice of the LV at end-diastole and end-systole. From these contours, end-diastolic volume (EDV), end-systolic volume (ESV), and left ventricular mass (LVM) were computed using the Simpson's algorithm. From these, derived parameters such as stroke volume (SV=EDV-ESV), and ejection fraction (EF=SV/EDV) were also calculated. The blood to muscle contrast-to-noise ratio (CNR) was also calculated.

Data Analysis: The mean and standard deviation were calculated for all parameters. The agreement between the conventional and SENSE bFFE measurements was assessed using Bland and Altman's method.[4] Pearson's correlation coefficient (*r*) was calculated for the two techniques. Inter-observer variability was assessed using the Bland-Altman method.

Results

Representative diastolic and systolic LV short axis bFFE images obtained with and without using SENSE are shown in Figure 1. The EF and LV mass computed using the two techniques were in good agreement (mean bias EF (%): -0.16+/-1.4, mean bias LV mass (gms): 1.7+/-4.2). The limits of agreement (+/- 2SD) between the two techniques were as follows: EF: 2.6 to –2.8, and LV mass: 10.3 to –6.7. The detailed results are shown in Figures 2A and 2B respectively. The Pearson's correlation coefficients (r^2) were: 0.99 and 0.97 for the evaluation of EF and LV mass respectively. The inter-observer variablilty between the two readers as determined by the Bland/Altman analysis was as follows: mean bias EF (%): conventional: -0.4+/-3.2; SENSE: 0.15+/-3.0; mean bias LV mass (grams): conventional: 8.0+/-6.8; SENSE: 4.6+/-8.3. With SENSE, the scan time was reduced by 40%, compared to without. Note that the scan time reduction is not 50% as might be expected, because the time for completion of the reference scan is included in the SENSE bFFE total acquisition time. As expected, the blood-to-muscle CNR was virtually identical between the two techniques, viz., 50.1+/-39.8 with conventional bFFE and 50.4 +/- 48.4 when using SENSE.

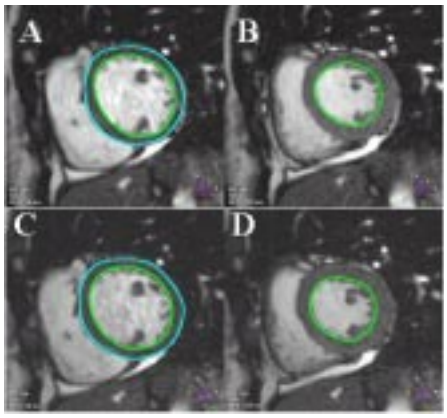

Figure 1. *End diastolic and end systolic volumes using the conventional bFFE, without using SENSE (A and B) and with SENSE (C and D).*

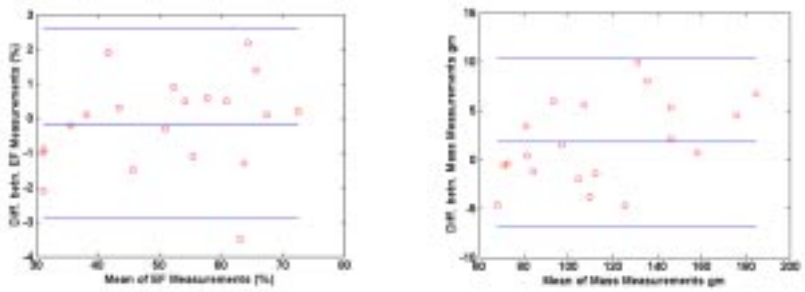

Figure 2 *Bland Altman plots reflecting the degree of agreement between conventional bFFE and bFFE and SENSE bFFE for evaluatuion of EF (left) and LV mass (right). The central line line line line indicates the bias, the outer lines indicate the limits of agreement.*

Discussion

The main findings of this study are as follows: (a) it is possible to combine SENSE with conventional bFFE cine acquisition and reduce total cine acquisition time by 40%, and (b) this scan time reduction does not impose any compromise on spatial resolution, temporal resolution, blood-to-muscle CNR, or the accuracy of quantitative data used for LV function assessment.

Conclusion

It is feasible to combine SENSE with bFFE to shorten the MRI acquisition times associated with the assessment of LV function. ●

References

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2. Plein S, Bloomer TN, et al. Steady-state free precession magnetic resonance imaging of the heart…. *J Magn. Reson. Imaging* 2001; **14:** 230-236.
3. Pruessmann KP, Weiger M, Scheidegger MB, Boesiger P. SENSE: sensitivity encoding for fast MRI. *Magn. Reson. Med.* 1999; **42,** 952-962.
4. Bland JM, Altman DG. Statistical methods for assessing agreement between two methods of clinical measurement. *Lancet* 1986; **1:** 307-310.

2003 1st Place Oral Presentation, Research Focus–

Analysis of Perfusion MRI Data in Patients with Severe Cerebrovascular Disease

H. Ducie, F. Calamante, V. Ganesan, F.J. Kirkham, D.G. Gadian, A. Connelly

Institute of Child Health, and Great Ormond Street Hospital for Children, London, U.K.

Purpose

Dynamic susceptibility contrast (DSC) MRI allows non-invasive investigation of perfusion of brain tissue. This involves the analysis of a transient loss of signal from brain tissue that is associated with the passage through the capillary bed of a narrow bolus of Gd-DTPA contrast agent. Due to the increasingly widespread availability of the software and hardware required to perform and analyze perfusion MRI, this technique is becoming more readily incorporated into the clinical evaluation of patients with acute stroke or chronic cerebral ischaemia. However, interpretation of DSC MRI data is not straightforward in all patients. Ideally accurate maps of cerebral blood flow (CBF), cerebral blood volume (CBV) and mean transit time (MTT) would be generated. For CBF calculation we need a measure of the shape of the bolus of Gd-DTPA contrast agent that arrives at the brain. This is called the arterial input function (AIF), and is typically measured in a large artery. In patients with cerebrovascular disease and other forms of occlusive large vessel disease, delay and dispersion of the bolus between the artery where the AIF is measured and any given region of interest (ROI) can introduce a large underestimation of CBF. In cases where there are delays and dispersions, the CBF maps cannot be trusted. An alternative method needs to be used, such as the quantitative analysis of "summary parameters" (i.e. parameters such as bolus arrival time (BAT) that can be obtained directly from the Gd-DTPA concentration time curve) which provide indirect measures of perfusion. The aim of this study is to indicate the possible source of error in the analysis of MRI CBF data, and to investigate the potential clinical applicability of alternative summary parameters in a group of patients with severe cerebrovascular disease.

Method

All patients in this study had angiographically confirmed moyamoya syndrome (MMS), which is a cerebrovascular disorder with terminal internal carotid artery (ICA) occlusion and formation of basal collateral vessels. The patients were classified according to their clinical symptoms into 3 categories: patients who were clinically stable (category A), patients with occasional transient-ischaemic attacks (TIA's) (category B), and patients who had TIA's occurring more than once a month (category C). All patients underwent MR examination on a 1.5-T Siemens Vision system. DSC MRI was performed using a spin-echo EPI sequence. Six slices were acquired, with one slice including the middle cerebral artery (MCA) to enable estimation of the AIF. The DSC MRI data were analyzed in 3 different ways. The first method is known as deconvolution, which uses information from the tissue signal change with time and from the AIF to generate maps of CBF. These data were assessed for the presence of bolus arrival delay. The second method is by visual analysis of summary parameter maps. The third method was quantitative regional analysis of summary parameters. A ROI in the cerebellum was used as a reference, generating a series of difference parameters (e.g.ΔDTTP is the difference between the time to peak (TTP) in a given region and that in the cerebellum). The noninfarcted tissue was divided into three categories: ΔTTP values from 0-5, 5-10, and 10-15 seconds, allowing a more robust calculation of the various summary parameters. Mean values of TTP, bolus arrival time (BAT), peak area (PA), and peak width (PW) were calculated and referenced to the corresponding values in the cerebellum. The resulting relative values were used to investigate the relationship between these parameters and clinical symptoms.

Results

Thirteen children and young adults were studied. Five patients were in category A, 3 in category B, and 5 in category C. The deconvolution method showed large bilateral abnormalities in all cases, but all had significant delay (up to 7secs), and therefore the CBF maps were considered unreliable. Visual assessment of summary parameters also showed abnormalities in all cases, but not related to clinical category. Quantitative assessment indicated that various summary parameters showed large abnormalities, which tended to be more severe in patients in category C. These latter patients showed very prolonged ΔBAT, ΔTTP, and ΔPW; however the only parameter exclusive to this category was ΔPW. All 5 patients in category C had a ΔPW >5 seconds, differentiating the most clinically unstable patients from the rest. It is important to note that, although our data suggest that ΔPW is a good discriminator, sample size was not sufficient to determine the sensitivity and specificity of this classification, and the threshold criterion may need refinement.

Conclusions

In conclusion, DSC MRI provides a method for the evaluation of regional cerebral perfusion in patients with severe cerebrovascular disease, with useful clinical applications. However, the technical limitations of perfusion maps obtained from deconvolution in the presence of significant delays in bolus arrival make interpretation of the CBF data unreliable in patients with severe cerebrovascular disease. In such patients, it is therefore essential that CBF maps be checked for delays to avoid misinterpretation. As an alternative, the findings in this study suggest that the use of quantitative regional analysis of summary parameters can provide clinically useful information in those patients with severe cerebrovascular disease in whom CBF maps cannot be used. ●

The Art of Coil Selection at Low Field

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

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.

You pay a good price for an MR unit (at least $800,000 or so) and you expect some SNR don't you? Unfortunately, SNR is, among other things, field strength dependent. I love to hear people (we will assume they are smart people for the sake of decorum) say, "This 0.35 T system will give you high field image quality and short scan times." Actually, my favorite one I heard someone (in sales believe it or not) say some years ago was something like this, "With our coils, a 0.35 T system has a much higher effective field strength." What, pray tell, is "effective field strength?" I can't find it in any of my reference books and I don't remember it being on the MR registry.

All joking aside, coils do make a huge difference at any field strength. At lower field strengths, they are a very important and powerful source of SNR. Interestingly enough, there is some benefit to using the types of coils required on a vertical field system. Vertical field systems require a solenoid coil design. All else being equal, a solenoid coil is approximately 40% more efficient than a planar (flat) coil of the same size.

With any system, the smaller the coil you use, the higher the SNR. The only problem with a small coil is the small area of coverage. One thing to keep in mind when dealing with solenoid coils is that if you imagine a sphere within the volume of the coil, that will represent the area of coverage (see Figure 1).

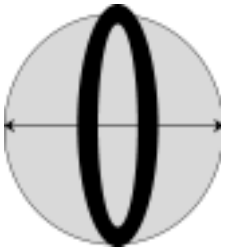

Figure 1. *Illustrates the coverage obtained when using a solenoid coil.*

One way in which vendors have increased the area of coverage while using smaller coil elements is by the use of phased-array coils (see Figure 2). These types of coils are now available on most vertical field systems. However, they do not provide the same SNR benefit as their horizontal field cousins. With vertical field systems, the coils must encompass the patient (solenoid design). So basically, the larger the patient, the larger the coil which results in reduced SNR.

What vertical-field phased-array coils do provide is improved coverage in the z-axis (head-to-foot). This is most useful when scanning one of the most dreaded exams on a vertical field system; thoracic spine. With the CTL array coils, one can acquire the large FOV image, which includes the entire cervical spine, so the vertebral bodies can be counted. The FOV center can then be adjusted to center lower over the thoracic spine. This can be accomplished just like on the vertical field systems without physically moving the patient and/or the coil. An additional benefit of these coils is one can acquire body studies without the signal dropping off toward the ends of the FOV.

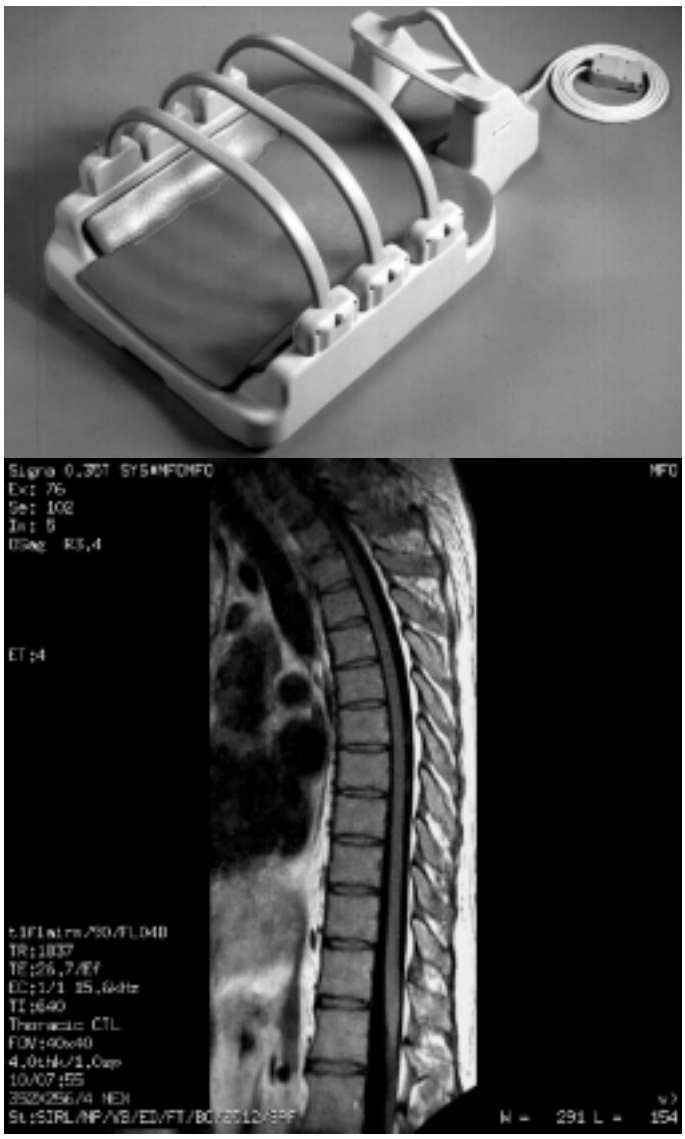

Figure 2. *An example of a phased-array coil designed for a vertical field system and a sample image acquired with such a coil at 0.35 T.*

The bottom line is that coils provide one thing – SNR. When scanning at lower field, you can't have too many coils. ●

MRI SAFETY

MR Safety and Body Piercing Jewelry

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

Ritual or decorative body piercing is increasing in popularity. Different types of materials are used to make body piercing jewelry including ferromagnetic metals, nonferromagnetic metals, as well as nonmetallic materials. Obviously, the presence of body piercing jewelry that is ferromagnetic may present a problem for a patient referred for a magnetic resonance (MR) procedure or an individual in the MR environment. Other MR-related hazards may also exist for patients with body piercing jewelry made from electrically conductive materials.

Risks include uncomfortable sensations from movement or displacement that may be mild-to-moderate depending on the site of the body piercing and the ferromagnetic qualities (e.g., mass, degree of magnetic susceptibility, etc.) of the piercing jewelry. In extreme cases, a serious injury may occur due to adverse interactions between the ferromagnetic jewelry and the MR system. In addition, for body piercing jewelry made from electrically conducting materials, there is a theoretical possibility of MRI-related heating that could cause burns.

Because of potential MR safety issues, metallic body piercing jewelry should be removed prior to entering the MR environment. However, patients or individuals with body piercings are often reluctant to remove their jewelry or other objects for a variety of reasons.

Therefore, if it is not possible to remove metallic body jewelry or other similar objects used for piercings, the patient or individual should be informed regarding the potential risks. In addition, if the body piercing jewelry is made from ferromagnetic material, some means of stabilization (e.g., application of adhesive tape or bandage) should be used to prevent movement or displacement. To prevent potential heating of body piercing jewelry made from conductive materials, gauze, tape, or other similar material should be used to wrap the body piercing jewelry in order to insulate it (i.e., prevent contact) from the underlying skin. This insulation should be a minimum of 1-cm in thickness.

The patient should be instructed to immediately inform the MR system operator if any heating or other unusual sensation occurs in association with the body piercing jewelry during the MR procedure. As always, the patient should be continuously during the MR examination to ensure safety. ●

Pertinent Reference

http://www.mrisafety.com

For more information on safety related issues, please visit:

MRIsafety.com

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

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ISMRM/SMRT CALENDAR

ISMRM 11th Scientific Meeting & Exhibition

Rescheduled Dates: 10-16 July 2003
Metro Toronto Convention Centre, Toronto, Ontario, Canada

SMRT 12th Annual Meeting

Rescheduled Dates: 10-11 July 2003
Metro Toronto Convention Centre, Toronto, Ontario, Canada

SMRT South Central Regional Educational Seminar

6 September 2003, Primary Children's Hospital, Salt Lake City, Utah, USA

SMRT Southeast Regional Educational Seminar

20 September 2003, St. Joseph's Hospital, Atlanta, Georgia, USA

SMRT Northeast Regional Educational Seminar

25 October 2003, Marriott Boston Copley Place, Boston, Massachusetts, USA

For more registration information, please contact:
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External Relations Committee Report

Maureen Hood, B.S.N., R.N., R.T. (R)(MR), 2003 External Relations Committee Liaison, Instructor of Radiology/MR Research Coordinator, Department of Radiology & Radiological Sciences, Uniformed Services University, Bethesda, Maryland, USA

Fantastic news! JRCERT

The **Joint Review Committee on Education in Radiologic Technology** has named two SMRT members and an ISMRM member to its Magnetic Resonance Subcommittee. The Technologist position is being filled by James J. Stuppino, B.S., R.T. (R)(MR), the Technical Director at MRI of Easton & Easton Radiological Associates in Easton, Pennsylvania. The Educator position has been filled by Luann J. Culbreth, M.Ed., R.T. (R)(MR)(QM), C.R.A., F.S.M.R.T., the Director of Radiology Education & Research at Baylor University Medical Center in Dallas, Texas. Geoffrey D. Clarke, Ph.D., Associate Professor at the University of Texas Health Science Center at San Antonio, Texas and the Chair of the Magnetic Resonance Committee of the American Association of Physicists in Medicine, has been named as the physicist on the subcommittee. This team will assist in the accreditation process for MR educational programs around the United States, just as the JRCERT does for radiography programs. The ISMRM/SMRT is very proud to have these fine individuals serving to ensure the academic reputation of MR programs. Congratulations to the new subcommittee members and thanks to all who were involved in the nomination process.

The SMRT sent a representative to Washington, D.C., for the **Alliance for Quality Medical Imaging & Radiation Therapy** meeting on February 24, 2003. Work continued on the Consumer Assurance of Radiologic Excellence (CARE) Act for the new 108th congressional session. The bill (HR 1214) was launched in the House of Representatives by Representative Wilson of New Mexico and already has more than 25 co-sponsors. The bill is meant to establish educational and credentialing standards for personnel who plan and deliver radiation therapy and who perform all types of medical imaging except diagnostic medial Sonography. Currently in the US, only 36 states voluntarily license or register radiographers, 29 states license radiation therapists, and 23 license nuclear medicine technologists. It is hoped that this bill will improve the delivery and safety of medical imaging and radiation therapy procedures. To read the actual bill, go to http://thomas.loc.gov/ and search for HR 1214. The various member associations of the Alliance for Quality Medical Imaging & Radiation Therapy are still working out the regulations behind the bill. More information can be found at https://www.asrt.org/asrt.htm.

The **Health Professions Network (HPN)** met in Kansas City, Missouri April 25-27, 2003. Representatives from 55 allied health professions were present at this meeting. The sessions focused on work shortages and strategies, the status of schools and recruitment for allied health schools, issues facing the aging of the population and the aging workforce, risk management, research in allied health and how the American Medical Association (AMA) can collaborate with allied health. HPN will be sending over 2000 posters and brochures out to school programs k-12 and another 600 to allied health programs to celebrate Allied Health Week. HPN is working with the Bureau of Labor Statistics, the American Hospital Association and the American Medical Association to increase awareness of the allied health professions. For additional information on HPN and its related associations and activities go to http://www.healthpronet.org/. ●