

出國報告(出國類別：開會)

## 第二十三屆 國際醫學核磁共振造影學會年會

服務機關：國防醫學院三軍總醫院

姓名職稱：高鴻文、主治醫師

派赴國家：加拿大 多倫多

報告日期：中華民國 104 年 6 月 11 日

出國時間：104 年 5 月 28 日至 6 月 6 日

# 摘 要

國際醫學核磁共振造影學會年會（ ISMRM ）是一個由臨床醫生，物理學家，工程師，化學家和放射技術師因共同興趣而產生之專業社群，在世界各地促進創新，發展和應用醫學之多學科且非盈利之組織，學會在每年的春夏之交召開年會進行深入的專題討論及研究論文的發表。今年來自全世界各地的核磁共振專家都藉此盛會齊聚於加拿大多倫多城進行意見交換及分享研究成果。本人主要於會議中報告急性中風之磁敏感加權影像：定量低血流灌注，磁敏感加權成像（SWI）的靜脈血的信號強度是血液氧水平依賴的（BOLD），並且可以反映脫氧血紅蛋白在缺血性中風的患者具有較高的氧提取分率濃度增加，在受影響的大腦半球增加的 BOLD 信號( IBS)中的稱為血流灌注缺損區。我們研究的目的是通過使用動脈自旋標記和 SWI 技術，分別定量地評估腦血流灌注和 IBS 治療急性缺血性中風之間的相關性。除此之外也藉由這次開會的機會，和世界各地進行核磁共振影像研究的專家學者，討論與我們研究相關的各項議題，在這個會議中也有很多新的影像技術發表，可以提供我們未來在核磁共振影像研究的發展方向。

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## 壹、會議緣起

國際醫學核磁共振造影學會年會（ISMRM）是在世界各地促進創新，發展和應用醫學和生物學磁共振技術之多學科且非盈利之組織，是一個由臨床醫生，物理學家，工程師，化學家和放射技術師因共同興趣而產生之專業社群，專注於科學和臨床社群之間的持續對話。

此學會的特色為彌合臨床和科學界之間的差距、培養基礎與臨床磁共振科學研究和開發及其應用的醫療服務、提供國際論壇、核磁共振醫學科學、生物學等專業熱門議題、提倡了解當代 MR 發展之認識與交流、提供教育渠道和繼續醫學教育學分、並出版兩本期刊，學會在每年的春夏之交召開年會進行深入的專題討論及研究論文的發表。今年來自全世界各地的核磁共振專家都藉此盛會齊聚於加拿大多倫多城進行意見交換及分享研究成果。此會議有深遠的傳統，無論其會議安排或內容皆是值得學習與借鏡的絕佳示範。

## 貳、參加目的

本次參加第二十三屆國際醫學核磁共振造影學會年會的目的主要是去展示有關急性中風之磁敏感加權影像:定量低血流灌注上的研究心得以及和與會人員交換意見，此研究論文主要是以科學海報呈現。除了展示研究成果之外，同時還進一步學習世界磁共振造影技術的最新發展。

## 參、會議過程

本人於 5 月 28 日從台北搭乘長榮航空公司班機直飛加拿大多倫多國際機場，開會的場地在 Metro Convention Centre，連接中央車站，交通十分方便，前二天參加會前會；所謂會前會是教育性質的會議(Education Course)，完整二天的核磁共振技術的原理介紹及於臨床各方面之應用課程，內容包含最新的分子磁振造影技術等等。接下來於星期一至星期四參加正式會議，每天皆從早上七點或七點半到下午六點三十分非常充實的再教育與研討會，星期四晚上整理會議資料及行李，於星期五凌晨裝搭機返國。

除了在上、下午分別舉行的正式討論會議之外，星期一至星期三中午有一項特別的議程是由各贊助廠商，包括 Siemens, Philips, General Electrics 等國際知名磁振機器供應商，介紹有關各家專門磁振造影技術的最新發展及臨床運用，除了各家研發人員深入淺出的說明，還邀請美國知名醫學中心的主任或是各方面的專家上台演講報告心得，以臨床的務實面解釋如何利用新的技術協助病人診斷或治療，這是一個非常好的學習方式，可以真正以臨床的角度去解決臨床上的各種問題。另外大會在這個中午的會議幫所有與會人員準備自取式的餐盒和飲料，餐點可以拿到會場邊用餐邊聽演講，所有時間都運用的很充實，同一層樓還有海報展示中心，佔地比開會場地還大，有幾百個科學研究成果海報，依照不同次分科學門展示，大會還在不同時間安排海報的作者在現場與所有有興趣的會員互動，旁邊還有電腦多媒體海報展示，也是有安排作者現場和大家互動。海報內容非常廣泛，舉凡尖端的分子影像研究到臨床實務的各式鑑別診斷等，皆有來自世界各地的心得報告。展示中心每天開放到晚上 9:00，每晚都有很多放射科醫師和磁振造影專業研究人員在此分享研究成果，偶而還會遇到同樣來自國內其他醫院的醫師，不單做了學術交流也增加之後在國內彼此合作的機

會。海報展示中心的另一側就是贊助場商的展示區，展場的模式和國內舉辦的大致相同，不同的是有不少新的診斷及治療工具還沒引進國內。

還有一些議程是屬於教育分積分課程，這是一個由美國各醫學中心非常有名的教授或專家，幫磁振相關專家做精要的複習與新知介紹的課程，另外大部分的研討會場都配備有一種加強互動的討論工具，叫做 ARS (Audience response system)。所謂 ARS 就是演講者在展示出一個題目的時候，由在場的聽眾按下選項，以顯示他們對此病例的了解，當現場所有的聽眾於講者限定的時間內按下答案之後，立即就會在投影幕上顯示出答對率及答錯率，以表示聽眾對此題了解的程度，此種方式已經慢慢在國內相關會議中使用，希望有朝一日院內也能夠引入這類互動電子學習的模式，相信不但可以提高學習的興趣，也可以讓教學的老師針對學生的認知加強教學的方向。

上下午主要是各場次的科學論文報告，分佈整個大會中心，同時可以多達十個會議廳，由各投稿人報告最近的科學研究成果。包含許多熱門課題，包括磁振張量影像在大腦的運用、磁振張量影像和白質路徑影像在大腦以及頸椎的研究結果、大腦中風之分析及腦灌注磁振造影技術及應用、以及最新的多切面同時磁振成像技術等，題目可以說是包羅萬象，每個次專業領域都有涵括，所以與會人數非常多。每日 16:00 到 18:00 是很精彩及實用的核磁共振基本物理專題演講，也是邀請知名的專定學者報告或複習重要的磁振觀念，其中也包括很多熱門和最新的技術，講者深入且有條理的介紹，對於了解複雜的磁振成像原理，有非常大的助益。這個大會還有一項非常特別的貼心設計，那就是委託了專業手機程式設計人員，提供了一個讓所有與會人員能夠隨時查詢大會議程的一個手機應用程式(如圖 1)，這個程式可以隨時上網更新，也可以根據自己選擇要參與的討論會，幫忙與會人員整理出一個每日行事曆，讓選擇開會變得非常輕鬆有秩序，不會遺漏了重要的會議時間，當你點選每一個議程之後，就會出現

與這個議程相關的詳盡資訊，例如開會的時間、地點、主持會議和報告的人員、以及所有的報告題目，例如本人在五月 31 日上午 7:30 於 room 714A/B 參加的 Neuro2 會議，是由知名的 Thomas L. Chenevert 及 John R. Griffiths 說主持的神經系統相關主題討論:內容包括 Brain tumors: What the clinician wants、What the radiologist provides、What the physicist can add、及 discussion，利用這種從不同專業人員的角度，提供腦腫瘤影像及治療追蹤的最新進展，會議中提到例如磁振張量影像和白質路徑影像在 術前及術後評估腦瘤所占的重要角色及對臨床的幫助，與會人員也非常熱烈的討論相關的最新研究和發展，對於參加這個討論會的所有相關專業有非常大的助益。

這次本人主要是以海報的方式來展現我們研究的成果，主要報告的題目是急性中風之磁敏感加權影像(SWI):定量低血流灌注之研究心得，SWI 的靜脈血的信號強度是血液氧水平依賴的 (BOLD)，並且可以反映脫氧血紅蛋白在缺血性中風的患者具有較高的氧提取分率濃度增加。在受影響的大腦半球增加的 BOLD 信號 (IBS) 中的稱為血流灌注缺損區。我們研究的目的是通過使用動脈自旋標記 ASL 和 SWI 技術，分別定量地評估腦血流灌注和 IBS 治療急性缺血性中風之間的相關性。SWI 採用相移放大缺氧血和含氧血的敏感性對比周圍組織。IBS 被假設可以反映脫氧血紅蛋白的引流靜脈的濃度，由於腦血流量差相對高度和由此而來的高氧提取分率。然而，CBF 和 IBS 之間的相關性可能會隨著時間改變。在我們的研究中，IBS 上 SWI 表現出與 CBF 在中風梗死區或半暗帶都呈正相關關係(如圖 2)，大會安排在 6 月 3 日下午兩點半開始有一小時的時間和所有對這個論文海報題目有興趣的與會人員交換意見和討論，我們的成果得到許多參加此會議的專家學者們的支持與讚賞。



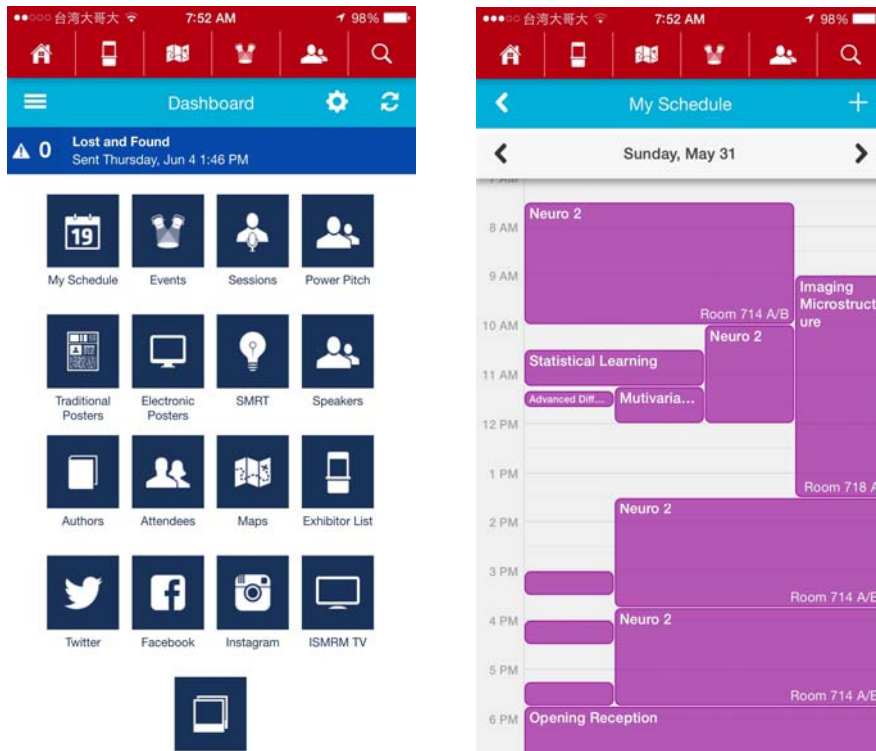


圖 1:左圖為手機程式的首頁，右圖為本人在五月 31 日上課的行事曆。

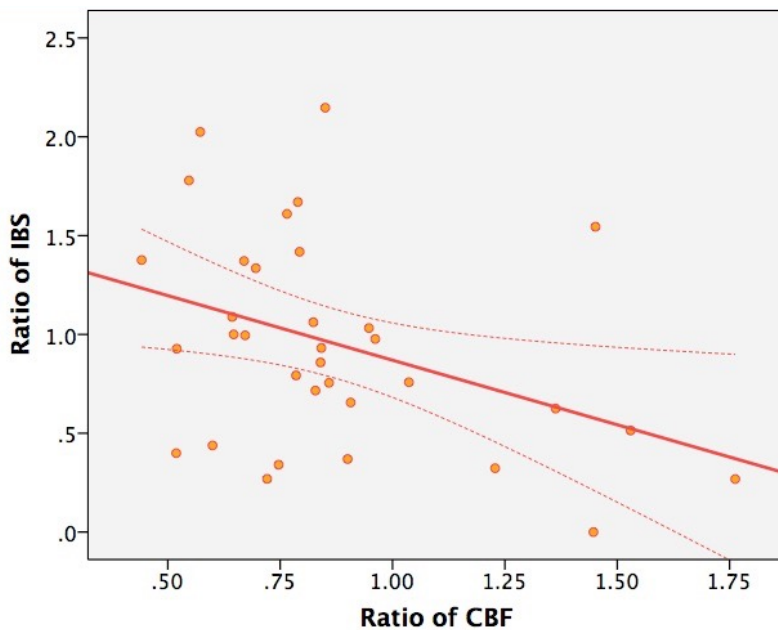


圖 2: Scatter plots 表示出 the ratios of CBF and IBS in the ROIs of perfusion defect 之間的負相關性 (Spearman' s  $\rho = -0.365$ ;  $P=0.034$ ;  $y=1.52-0.65x$ ).

## 肆、會議心得

此次在加拿大多倫多參加如此大型的核磁共振研討會，學習到很多最新最熱門的造影技術，也發現國外不斷致力於改善教育與研究，在加強演講者與聽眾的互動上，非常用心的採用 ARS 系統，使得參加的聽眾不斷能夠更積極更專心，而且也能了解自己對於討論議題的了解程度和其他人之間的差別，這對於學習有相當大的幫助，對演講者而言，要引導一個很好的題目而且能對聽眾的反應有立即的回應，也需要非常充分的準備，如此良性的循環的結果，正是所謂的教學相長。

因為本人在醫院主要是負責神經放射影像相關的工作和研究，所以特別注意會議中相關的議題，今年特別強調的是超高磁場在臨床的應用，所謂超高場核磁共振是指 7T 以上的磁場強度，目前歐美已經有少數醫學中心順利安裝完成，並用於臨床診斷及研究，超高場核磁共振的優點是解析度非常高，很多以前影像看不到的結構和異常在超高場影像上都可以清楚呈現出來。另外一個今年研究的重點是結合核磁共振與正子造影的好處於同一台機器上，提供更精準的影像對位，提早發現病灶，協助臨床更好的診斷與治療追蹤工具，並提供研究生理及病理機轉的新平台。

因應國內醫療的進步，不論在診斷或治療上都日新月異，人類的平均餘命已經接近 80 歲了，老化人口特有的疾病愈來愈多，例如阿滋海默症 Alzheimer's disease 就是其中之一，也是今年的重點題目，目前在診斷上並沒有簡單的檢查可以診斷出阿滋海默症，確實的診斷只能靠腦組織的切片檢查，但這侵犯性太高，臨床上比較不可行，所以目前各國的研究方向都致力於發展沒有侵犯性的檢查工具，利用核磁共振或分子影像技術早期診斷這類疾病。

本院目前裝置的 3T 磁振造影儀已經使用多年，所以對於在會議中提到的許多相關高級磁振造影技術在本院已經是非常熟稔的研究工具，其他較複雜的研究方法與分析

工具，我們也都在陸續引進當中，參加此一世界級的核磁共振醫學會後，深感三軍總醫院在硬體設施方面並不會落後國際目前的水準，只是通常國外有較多的研究資源，這是大環境的問題，也是我們需要共同努力的方向。目前在本院我們正在積極發展會議中被熱烈討論的 **NODDI** 核磁共振成像技術，這個最新技術相較於傳統 **DTI** 影像成像技術，能夠解釋很多大腦內複雜結構的生理及病理變化，我們目前除了和國內陽明大學的相關研究團隊合作之外，也和這次開會認識的國外相關研究團隊討論這個技術應用在腦瘤的診斷及治療的前景，希望不久的將來就能有本院相關的成果發表。

## 伍、回單位後報告情形

已於返國後 6 月 8 日早上部內晨報會中報告，獲得熱烈迴響。

## 陸、建議事項

希望醫院在教育與訓練方面，能夠引入加強演講者與聽眾互動的輔助工具，應加強學員的學習成效。醫學的進步日新月異，就如同這次開會的經驗，很多都是書本上沒有的知識和技術，音樂應該儘量鼓勵醫護人員參加各種學術活動，形成風氣，如此對於病患的照護品質必定有所提升，而且能與世界最先進的研究成果接軌，另外核磁共振影像的最新研究及分析方法都需要非常強大的分析軟體和硬體支援，例如 **DSI Studio** 軟體等可以分析大腦水分子擴散影像，之後除了建製這套系統之外，也希望放射診斷部能培養相關有興趣學習的技術師或物理師，投入這個領域，參與尖端影像研究的各項工作。

## 柒、參加此會議對單位之貢獻

此次出國除了展示本單位研究的成果之外，同時學習到了其他世界級醫學中心新的研究發展趨勢，以此經驗回國檢討後應再加強整合與臨床的研究，期望未來夠將新的成果再展現出去。

捌、附件資料

一、出國參加會議日程表及議程表

國軍軍醫人員出國參加學術會議每日行程表					
出國人員 單位	國防醫學院三軍總醫 院 放射診斷部	級職	少校	姓名	高鴻文
會議名稱	第 23 屆 國際醫學核磁共振造影學 會年會		會議地 點	加拿大多倫多	
個人聯繫資料		手機：0939-233-680 電子郵件信箱：cohimeow@gmail.com			
日 數	日 期	行 程 內 容 (詳述航空公司班次時間、會議行程、論文展示 等)			備 考
1	104.05.2 8	從臺灣桃園國際機場搭長榮航空 BR 36 (5/28 18:40) 於 於 20:50 抵達加拿大多倫多皮爾森國際機場 並住宿當地旅館。			詳如 旅行 社班 機時 刻表
2	104.05.2 9	於多倫多會議中心辦理報到(5/29 會議議程表)			詳如議程 表

3	104.05.3 0	參加臨床前影像、癌症影像、神經影像、進階功能性核磁共振造影等教育課程研討會(5/30 會議議程表)	詳如議程表
4	104.05.3 1	參加分子影像、神經影像、臨床分析及進階核磁共振造影等教育課程研討會(5/31 會議議程表)	詳如議程表
5	104.06.0 1	參加神經系統微結構、功能性核磁共振造影、水分子擴散影像、神經血管及中風等研究研討會、16:30-18:30 壁報展示論文(6/1 會議議程表)	詳如議程表
6	104.06.0 2	參加量化磁敏感性影像、神經血管及中風、急診核磁共振造影等研究研討會(6/2 會議議程表)	詳如議程表
7	104.06.0 3	參加臨床前癌症、動脈自旋標記、血管壁影像、腦老化、腦部水分子擴散核磁共振造影等研究研討會(6/3 會議議程表)	詳如議程表
8	104.06.0 4	參加質子化學交換飽和轉移磁振影像、多發性硬化症、腦部氧化、灌注、及代謝等研究研討會(6/4 會議議程表)	詳如議程表
9	104.06.0 5 至 103.06.0 6	從加拿大多倫多皮爾森國際機搭長榮航空 BR 35 (6/5 01:45) 於 於 6/6 04:45 返抵臺灣桃園國際機場	詳如旅行社班機時刻表

## 二、出國參加會議議程表




### 23<sup>rd</sup> Annual Meeting & Exhibition • 30 May–5 June 2015

SMRT 24<sup>th</sup> Annual Meeting • 30–31 May

Toronto, Ontario, Canada 

[www.ismrm.org](http://www.ismrm.org) • [www.ismrm.org/smrt](http://www.ismrm.org/smrt)

Metro Toronto Convention Centre, 255 Front Street West, Toronto, Ontario M5V 2W6

## 2015 PRELIMINARY PROGRAM SCHEDULE

Last updated: 24 February, 2015

[Friday, 29 May](#)      [Tuesday, 02 June](#)  
[Saturday, 30 May](#)      [Wednesday, 03 June](#)  
[Sunday, 31 May](#)      [Thursday, 04 June](#)  
[Monday, 01 June](#)      [Friday, 05 June](#)

### FRIDAY 29 MAY 2015

Onsite Registration Opens  
14:00-20:00

### SATURDAY 30 MAY 2015

**Educational Course Key**

Body	Cancer	Cardiovascular	Cross Cutting & Emerging Technologies
Diffusion/Perfusion	Musculoskeletal	Neuro	Physics & Engineering

Educational Course: <a href="#">Preclinical Imaging</a>	Educational Course: <a href="#">Clinical Cancer MRI: Case-Based</a>	Educational Course: <a href="#">Neuro 1</a>	Educational Course: <a href="#">Cardiac MRI: Function, Perfusion &amp; Viability (morning)</a>	Educational Course: <a href="#">Perfusion Imaging Brain &amp; Body (morning)</a>	Educational Course: <a href="#">Advanced fMRI: Techniques &amp; Applications (morning)</a>	Educational Course: <a href="#">MR Systems Engineering</a>	Educational Course: <a href="#">MR Physics for Physicists</a>
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			Room 716 A/B Educational Course: Cardiovascular MRI: Vascular Flow & Angiography (afternoon)	Room 718 A Educational Course: Quantitative Physiology (afternoon)	Room 718 B Educational Course: Introduction to fMRI (afternoon)		
Room 701 A	Room 701 B	Room 714 A/B	Room 716 A/B	Room 718 A	Room 718 B	Room 801 A/B	John Bassett Theatre 102



SMRT Annual Meeting - Day 1  
(Technologist/Radiographer Program)

SUNDAY  
31 MAY 2015

Educational Course Key

- Body
- Cancer
- Cardiovascular
- Cross Cutting & Emerging Technologies
- Diffusion/Perfusion
- Musculoskeletal
- Neuro
- Physics & Engineering

Educational Course: Molecular Imaging	Educational Course: Body MRI: Optimize Your Clinical Practice	Educational Course: Neuro 2	Educational Course: Clinical Interpretation & Advanced Imaging	Educational Course: Imaging Microstructure	Educational Course: Big Data: A Primer on Models & Methods Morning (morning) Room 718 B	Educational Course: RF Engineering: Coils	Educational Course: Imaging Acquisition & Reconstruction
					Educational Course: A Practical Guide to MR Safety (afternoon)		
Room 701 A	Room 701 B	Room 714 A/B	Room 716 A/B	Room 718 A	Room 718 B	Room 801 A/B	John Bassett Theatre 102



SMRT Annual Meeting - Day 2  
(Technologist/Radiographer Program)

Opening Reception in Technical Exhibition  
Exhibition Hall  
17:45 to 19:15

MONDAY  
01 JUNE 2015

PLENARY SESSION  
07:30-10:15

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BREAK

MONDAY 16:30 - 18:30

Traditional Poster Session (no CME credit) Neuro A Exhibition Hall		Electronic Poster Session (no CME credit) Relaxation, Magnetic Susceptibility, Magnetization Transfer, Pulse Sequences A Exhibition Hall			Study Group Session (no CME credit) MR Safety Reception Hall 104 BCD		Study Group Session (no CME credit) Diffusion Constitution Hall 105		
Power Pitch Session (no CME credit) The Cardiovascular Power Hour Exhibition Hall	Scientific Session Perfusion & Permeability: Contrast Agent Methods Room 701 A	Scientific Session New Methodological Approaches for MRS Room 701 B	Scientific Session fMRI: Physiology Room 714 A/B	Scientific Session Cancer: Preclinical Studies of Animal Models Room 716 A/B	Scientific Session Mechanisms of Neural Degeneration & Damage Constitution Hall 107	Scientific Session Simultaneous Multi-Slice Imaging John Bassett Theatre 102	Combined Educational & Scientific Course: Musculoskeletal Functional Imaging: Mechanics & More Room 718 A	Combined Educational & Scientific Session: Quantitative Biomarkers in Renal MRI: From Morphology to Physiology Room 718 B	Educational Course: MR Physics & Techniques for Clinicians Room 801 A/B

18:45 - 19:45

[Manuscript Reviewing for ISMRM's Scientific Journals](#)

(no CME credit)  
Meeting Room 701 A

TUESDAY  
02 JUNE 2015

SUNRISE EDUCATIONAL COURSES  
07:00 - 07:50

Educational Course: Addressing Clinical Challenges in the Body with MRI Room 701 A	Educational Course: How Can MRI of Mouse Models Provide Value? Constitution Hall 107	Educational Course: Fast Cardiac Imaging Room 714 A/B	Educational Course: UTE: Applications & Advances Room 716 A/B	Educational Course: Contrast by Body Part: How & Why? Room 718 A	Educational Course: Brain Networks Room 718 B	Educational Course: Cartilage Structure & Function Room 801 A/B	Educational Course: Neuroimaging: Infection Room 701 B	Educational Course: Nuts & Bolts of Advanced Imaging John Bassett Theatre 102
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PLENARY SESSION  
08:30-09:30

MR Imaging of Patients with Implanted Devices  
Organizer: Daniel Ennis, Ph.D.

- 08:30 MR Safety Considerations for Patients with Implanted Devices, Niels Kuster, Ph.D.
- 08:50 MR Imaging of Patients with Implanted Metal Devices, Brian A. Hargreaves, Ph.D.
- 09:10 MRI in the Setting of Permanent Pacemakers and Implantable Defibrillators, Saman B. Nazarian, M.D.
- 09:30 Adjournment

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07:30	Welcome & Awards Jeffrey Joseph Nell, M.D., Ph.D., ISMRM 2014-2015 President	09:15	What is Big Data?, Paul Thompson, Ph.D.
08:30	Lauterbur Lecture Franz Schmitt, Ph.D.	09:35	Collecting Big Data, Monique Breteler, M.D., Ph.D.
		09:55	Big Data in Action, Viren Jain, Ph.D.
		10:15	Adjournment

BREAK

MONDAY 10:45 - 12:45

Traditional Poster Session <i>(no CME credit)</i> Cancer, Musculoskeletal Exhibition Hall		Electronic Poster Session <i>(no CME credit)</i> Diffusion, Perfusion Exhibition Hall				Study Group Session <i>(no CME credit)</i> Psychiatric MR Spectroscopy & Imaging Reception Hall 104 BCD				
Power Pitch Session <i>(no CME credit)</i> Microstructure In CNS	Scientific Session New Insights & Innovations in Cardiovascular	Scientific Session Young Investigator Awards Presentations	Scientific Session Thermometry & Thermo-therapy	Scientific Session fMRI: Resting-State Functional Connectivity	Scientific Session New Encoding Method for MRS & Non-Proton fMRI	Scientific Session Brain Tumour Imaging: Focus on Treatment	Scientific Session Novel Image Reconstruction Methods	Combined Educational & Scientific Session: Quantitative Biomarkers In Liver MRI: How to Use them in the Real World	Educational Course: Osteoarthritis: Who, Where & Why?	Combined Educational & Scientific Session: Hyperpolarized C-13 Imaging
Power Pitch Theatre, Exhibition Hall	Constitution Hall 105	Room 701 A	Room 701 B	Room 714 A/B	Room 716 A/B	Constitution Hall 107	John Bassett Theatre 102	Room 718 A	Room 718 B	Room 801 A/B

LUNCH

13:00 - 14:00  
Corporate Symposium  
*(no CME credit)*

MONDAY 14:15 - 16:15

Traditional Poster Session <i>(no CME credit)</i> Young Investigator Award Presentations Exhibition Hall		Electronic Poster Session <i>(no CME credit)</i> Engineering, UHF, MR Safety Exhibition Hall			Study Group Session <i>(no CME credit)</i> Electro-Magnetic Tissue Properties (SWI) Reception Hall 104 BCD		Study Group Session <i>(no CME credit)</i> MR Spectroscopy Constitution Hall 105		
Power Pitch Session <i>(no CME credit)</i> Powerful Acquisition	Scientific Session Cartilage Imaging: Technical Developments	Scientific Session Relaxometry Applications Throughout the Body	Scientific Session fMRI Applications, Including Optogenetics	Scientific Session Hepatobiliary I	Scientific Session Diffusion Phantoms & Validation	Scientific Session Neurovascular & Stroke 1	Educational Course: ISMRM/SMRT Joint Forum	Combined Educational & Scientific Course: Dementia	Educational Course: Cancer Theranostics & Monitoring Therapy with MRI
Power Pitch Theatre, Exhibition Hall	Room 701 A	Room 701 B	Room 714 A/B	Room 716 A/B	Constitution Hall 107	John Bassett Theatre 102	Room 718 A	Room 718 B	Room 801 A/B

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BREAK

TUESDAY 10:00 - 12:00

Traditional Poster Session <i>(no CME credit)</i> Body, Interventional Exhibition Hall		Electronic Poster Session <i>(no CME credit)</i> Neuro A Exhibition Hall			Study Group Session <i>(no CME credit)</i> MR in Drug Research Reception Hall 104 BCD		Study Group Session <i>(no CME credit)</i> Cardiac MR Constitution Hall 105		
Power Pitch Session <i>(no CME credit)</i> ASL Methods: Neuro	Scientific Session Applications of Quantitative Susceptibility Mapping (QSM)	Scientific Session Neurovascular & Stroke 2	Scientific Session Implantable Medical Devices & Modelling	Scientific Session Translations MR Imaging of Musculoskeletal Physiology	Scientific Session It's a Polarized World	Scientific Session Parametric Mapping	Educational Course: MRI in the Emergency Room	Educational Course: Analyze This! Practicalities of fMRI & Diffusion Data Analysis	Educational Course: Research Meets Clinical: Incidental Findings
Power Pitch Theatre, Exhibition Hall	Room 701 A	Room 701 B	Room 714 A/B	Room 716 A/B	Constitution Hall 107	John Bassett Theatre 102	Room 718 A	Room 718 B	Room 801 A/B

LUNCH

12:15 - 13:15  
Corporate Symposium  
*(no CME credit)*

TUESDAY 13:30 - 15:30

Traditional Poster Session <i>(no CME credit)</i> Relaxation, Magnetic Susceptibility, Magnetization Transfer Exhibition Hall		Electronic Poster Session <i>(no CME credit)</i> Pulse Sequence B Exhibition Hall			Study Group Session <i>(no CME credit)</i> MR Flow & Motion Quantitation Reception Hall 104 BCD		Study Group Session <i>(no CME credit)</i> High Field Systems & Applications Constitution Hall 105		
Power Pitch Session <i>(no CME credit)</i> The Cutting Edge of Diffusion MRI	Scientific Session fMRI: Acquisition Techniques & Cortical Layers	Scientific Session Imaging Drug Delivery & Drug Function	Scientific Session RF Field & Exogenous Agent	Scientific Session Hepatobiliary II	Scientific Session Alzheimer's Disease	Scientific Session Novel & Hybrid Systems	Educational Course: Multifarious Manifestations of Muscle Disease	Educational Course: Challenges in Quantitative Cardiovascular Imaging	Educational Course: Genomics, Proteomics & Big Data
Power Pitch Theatre, Exhibition Hall	Room 701 A	Room 701 B	Room 714 A/B	Room 716 A/B	Constitution Hall 107	John Bassett Theatre 102	Room 718 A	Room 718 B	Room 801 A/B

BREAK

TUESDAY 16:00 - 18:00

Traditional Poster Session <i>(no CME credit)</i> Engineering, UHF, MR Safety Exhibition Hall		Electronic Poster Session <i>(no CME credit)</i> Cancer, fMRI Exhibition Hall			Study Group Session <i>(no CME credit)</i> White Matter Reception Hall 104 BCD		Study Group Session <i>(no CME credit)</i> Perfusion Constitution Hall 105		
Power Pitch Session	Scientific Session	Scientific Session	Scientific Session	Scientific Session	Scientific Session	Scientific Session	Scientific Session	Combined Educational &	Educational Course:

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(no CME credit)	Blomarkers & Subtyping of Psychiatric Disorders	Relaxometry: Methods & Corrections	Let It Flow	Renal/ Adrenal/ Male Pelvis MRI	Diffusion Biophysics & Microstructure	Brain Tumor Imaging: Focus on PET-MRI	System Monitoring & Correction	Scientific Course: UTE & Zero TE Imaging Techniques & Applications	MR Physics & Techniques for Clinicians
Power Pitch Theatre, Exhibition Hall	Room 701 A	Room 701 B	Room 714 A/B	Room 716 A/B	Constitution Hall 107	John Bassett Theatre 102	Room 718 A	Room 718 B	Room 801 A/B

18:30 - 20:30  
Bronze Corporate Evening Symposium  
(no CME credit)  
Bracco  
Meeting Room 701 A

**WEDNESDAY  
03 JUNE 2015**

SUNRISE EDUCATIONAL COURSES  
07:00 - 07:50

Educational Course: Addressing Clinical Challenges In the Body with MRI	Educational Course: How Can MRI of Mouse Models Provide Value?	Educational Course: 4D-flow: Ready for Primetime?	Educational Course: UTE: Applications & Advances	Educational Course: Contrast by Body Part: How & Why?	Educational Course: Brain Networks	Educational Course: Muscle Structure & Functional Imaging	Educational Course: Neuroimaging: Infection	Educational Course: Nuts & Bolts of Advanced Imaging
Room 701 A	Constitution Hall 107	Room 714 A/B	Room 716 A/B	Room 718 A	Room 718 B	Room 801 A/B	Room 701 B	John Bassett Theatre 102

PLENARY SESSION  
08:10-09:30

Doing More with Less  
Organizers: Christopher M. Collins, Ph.D. & Xiaohong Joe Zhou, Ph.D., D.A.B.R.

08:10 Emerging Challenges Faced by the MR Community, T.B.A.

08:30 MRI Services In Resource Limited, Underserved Populations, Pek-Lan Khong, M.D.

08:50 Using Technology to Do More with Less, John M. Pauly, Ph.D.

09:10 NIBIB New Horizons: Emerging MRI to Uncover the "Disordered Mind": Are We in an Era of "Psycho-Radiology"? Qiyong Gong, M.D., Ph.D.

09:30 Adjournment

BREAK

WEDNESDAY 10:00 - 12:00

Traditional Poster Session (no CME credit) Molecular Imaging, Spectroscopy, fMRI Exhibition Hall	Electronic Poster Session (no CME credit) Body, Interventional Exhibition Hall	Study Group Session (no CME credit) MR Elastography (MRE) Reception Hall 104 BCD	Joint Study Group Session (no CME credit) Hyperpolarized Media Hyperpolarization Methods & Equipment Constitution Hall 105
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Power Pitch Scientific Session Scientific Session Scientific Session Scientific Session Scientific Session Scientific Session Educational Combined Combined  
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(no CME credit)	Cancer	Spinal Cord & ENT Imaging	Cell Memories: Cell Tracking & MEMRI	Thinking Outside the Box: Novel Technical Development	Myocardial Tissue Characterization: Relaxometry & Diffusion	Diffusion MRI: Novel Insights into the Brain	Monitoring Change & Difference in Psychiatric Disorders	Functional Muscle MRI/MRS	Update on MRI Pulse Sequences for Body MRI	MR Physics & Techniques for Clinicians
Power Pitch Theatre, Exhibition Hall	Room 701 A	Room 701 B	Room 714 A/B	Room 716 A/B	Constitution Hall 107	John Bassett Theatre 102	Room 718 A	Room 718 B	Room 801 A/B	

ISMRM Business Meeting  
(no CME credit)  
Meeting Room 701A  
18:15 - 19:15

**THURSDAY  
04 JUNE 2015**

SUNRISE EDUCATIONAL COURSES  
07:00 - 07:50

Educational Course: Addressing Clinical Challenges In the Body with MRI	Educational Course: How Can MRI of Mouse Models Provide Value?	Educational Course: Clinical Challenges In Cardiovascular MRI	Educational Course: UTE: Applications & Advances	Educational Course: Contrast by Body Part: How & Why?	Educational Course: Brain Networks	Educational Course: Bone Structure & Bone Interface	Educational Course: Neuroimaging: Vascular	Educational Course: Nuts & Bolts of Advanced Imaging
Room 701 A	Constitution Hall 107	Room 714 A/B	Room 716 A/B	Room 718 A	Room 718 B	Room 801 A/B	Room 701 B	John Bassett Theatre 102

PLENARY SESSION  
08:00-10:00

08:00 Young Investigator Awards Presentation, James G. Pipe, Ph.D., 2015-2016 ISMRM President

08:15 Mansfield Lecture Elizabeth A. Morris, M.D., FACR

09:00 Fetal & Placental Imaging: Technical & Clinical Aspects  
Organizers: Patricia Ellen Grant, M.D. & Jeffrey J. Neil, M.D., Ph.D.

09:20 Technical Aspects/Challenges, Joseph V. Hajnal, Ph.D.

09:40 Clinical Aspects of Fetal Brain Imaging, Orit A. Glenn, M.D.

10:00 Clinical Aspects of Imaging the Placenta, Daniela Prayer, M.D.

10:00 Adjournment

BREAK

THURSDAY 10:30 - 12:30

Traditional Poster Session (no CME credit) Cardiovascular Exhibition Hall	Electronic Poster Session (no CME credit) Cardiovascular Exhibition Hall	Study Group Session (no CME credit) Molecular & Cellular Imaging Reception Hall 104 BCD
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Power Pitch Session (no CME credit) High Field Applications	Scientific Session Fetal & Neonatal Imaging: Clinical	Scientific Session CESToronto	Scientific Session Perfusion & Permeability Validation Studies	Scientific Session Diabetes/ Metabolism & GI	Scientific Session Motion Correction	Scientific Session Multiple Sclerosis 1	Educational Course: Orthopedic Surgery: What Do I Need to Know Before & After?	Combined Educational & Scientific Course: Traumatic Brain Injury	Combined Educational & Scientific Session: Pediatric Imaging
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Session (no CME credit) Neuro Power Posters	Cancer Preclinical: Cells & Animals	ASL Methods: From the Neck Down	Parallel Transmission Strategies	Vessel Wall Imaging	Focused Discussion: Fusion with Diffusion	Sparse & Low Rank Reconstruction for Dynamic MRI	Course: MRI & Radiation Therapy	Educational & Scientific Course: Cartilage Imaging Techniques	Educational & Scientific Session: Please Hold Still Next Time: Challenges & Solutions in Patient Adherence
Power Pitch Theatre, Exhibition Hall	Room 701 A	Room 701 B	Room 714 A/B	Room 716 A/B	Constitution Hall 107	John Bassett Theatre 102	Room 718 A	Room 718 B	Room 801 A/B
Hands-On Workshop 1 (no CME credit) Siemens Room 711			Hands-On Workshop 1 (no CME credit) GE Healthcare Room 703			Hands-On Workshop 2 (no CME credit) Philips Healthcare Room 707			
LUNCH									
12:15 - 13:15 Corporate Symposium (no CME credit)									
WEDNESDAY 13:30 - 15:30									
Traditional Poster Session (no CME credit) Neuro B, Perfusion Exhibition Hall			Electronic Poster Session (no CME credit) Musculoskeletal Exhibition Hall			Study Group Session (no CME credit) Musculoskeletal MR Reception Hall 104 BCD		Study Group Session (no CME credit) MR Engineering Constitution Hall 105	
Power Pitch Session (no CME credit) Advances in fMRI	Scientific Session Cancer: Therapy Response & Perfusion	Scientific Session Diffusion Weighted MRS & Compartmental Modeling	Scientific Session RF Coil Arrays	Scientific Session Body, Fetal, Female Pelvis	Scientific Session Developing & Aging Brain	Scientific Session Novel Pulse Sequences & Trajectories	Combined Educational & Scientific Session: Cardiovascular Tissue Characterization	Educational Course: MR Economics	Educational Course: Spine
Power Pitch Theatre, Exhibition Hall	Room 701 A	Room 701 B	Room 714 A/B	Room 716 A/B	Constitution Hall 107	John Bassett Theatre 102	Room 718 A	Room 718 B	Room 801 A/B
Hands-On Workshop 2 (no CME credit) Siemens Room 711			Hands-On Workshop 2 (no CME credit) GE Healthcare Room 703			Hands-On Workshop 2 (no CME credit) Philips Healthcare Room 707			
BREAK									
WEDNESDAY 16:00 - 18:00									
Traditional Poster Session (no CME credit) Pulse Sequences Exhibition Hall			Electronic Poster Session (no CME credit) Neuro B Exhibition Hall			Study Group Session (no CME credit) Interventional MR Reception Hall 104 BCD		Study Group Session (no CME credit) Current Issues in Brain Function Constitution Hall 105	
Power Pitch Session	Scientific Session	Scientific Session	Scientific Session	Scientific Session	Scientific Session	Scientific Session	Scientific Session	Educational Course:	Educational Course:

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Power Pitch Theatre, Exhibition Hall	Room 701 A	Room 701 B	Room 714 A/B	Room 716 A/B	Constitution Hall 107	John Bassett Theatre 102	Part 1: Arthritis Room 718 A	Room 718 B	Room 801 A/B
Hands-On Workshop 3 (no CME credit) Siemens Room 711			Hands-On Workshop 3 (no CME credit) GE Healthcare Room 703			Hands-On Workshop 3 (no CME credit) Philips Healthcare Room 707			
LUNCH									
THURSDAY 13:30 - 15:30									
Traditional Poster Session (no CME credit) Diffusion Exhibition Hall			Electronic Poster Session (no CME credit) Molecular Imaging, Spectroscopy Exhibition Hall			Study Group Session (no CME credit) Detection & Correction of Motion in MRI & MRS Reception Hall 104 BCD		Study Group Session (no CME credit) MR of Cancer Room 801 A/B	
Power Pitch Session (no CME credit) Body	Scientific Session Novel RF Coil Concepts	Scientific Session MR Guided Interventions	Scientific Session CE & Non CE: Innovations Around the Body	Scientific Session Breast Cancer: Clinical & Technical	Scientific Session Brain Oxygenation, Perfusion & Metabolic Rate	Scientific Session Multiple Sclerosis 2	Educational Course: Orthopedic Surgery: What Do I Need to Know Before & After? Part 2: Soft Tissue	Educational Course: Game Show: Artifacts, Eh?	
Power Pitch Theatre, Exhibition Hall	Room 701 A	Room 701 B	Room 714 A/B	Room 716 A/B	Constitution Hall 107	John Bassett Theatre 102	Room 718 A	Room 718 B	
Hands-On Workshop 4 (no CME credit) Siemens Room 711			Hands-On Workshop 4 (no CME credit) GE Healthcare Room 703			Hands-On Workshop 4 (no CME credit) Philips Healthcare Room 707			
BREAK									
THURSDAY 16:00 - 18:00									
Study Group Session (no CME credit) X-Nuclei Imaging Reception Hall 104 BCD									
Scientific Session RF Pulse Design	Scientific Session Methods of Magnetic Susceptibility & Electromagnetic Tissue Property Mapping	Scientific Session Bone & UTE	Scientific Session Abdomen/Pelvis	Scientific Session Diffusion Acquisition	Scientific Session Normal Brain Anatomy & Morphometry	Combined Educational & Scientific Session: Cardiovascular MRA With & Without Contrast	Combined Educational & Scientific Session: Quantitative Biomarkers of Chest Disease: the Role of MRI in a Multimodality Practice	Educational Course: MR Physics & Techniques for Clinicians	
Room 701 A	Room 701 B	Room 714 A/B	Room 716 A/B	Constitution Hall 107	John Bassett Theatre 102	Room 718 A	Room 718 B	Room 801 A/B	

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Closing Party  
18:15 to 22:00

FRIDAY  
05 JUNE 2015

08:00 - 10:00

Scientific Session	Scientific Session	Scientific Session	Scientific Session	Scientific Session	Scientific Session	Scientific Session	Scientific Session	Scientific Session
Proton MRSI Methods	Magnetization Transfer	Novel Techniques for Cardiac Perfusion & Function	Gradient Field Engineering & Monitoring	Diffusion Weighted Image Analyses	Pulmonary MRI - Proton & Non-Proton Applications	Cancer, Prostate Cancer	Elastography	Multimodality Approach for Traumatic Brain Injury
Room 701 A	Room 701 B	Room 714 A/B	Room 716 A/B	Room 718 A	Room 718 B	Room 801 A/B	Constitution Hall 107	Plenary Hall FG

BREAK

PLENARY SESSION  
10:30-11:30

Traumatic Brain Injury  
Organizer: Robert E. Lenkinski, Ph.D.

- 10:30 Traumatic Brain Injury in War, Geoffrey Ling, M.D., Ph.D.
- 10:50 Chronic Traumatic Encephalopathy: The Last Seven Years, Ann C. McKee, M.D.
- 11:10 Neuroimaging of Traumatic Brain Injury, Including Magnetoencephalography, Roland R. Lee, M.D.
- 11:30 Adjournment

The International Society for Magnetic Resonance in Medicine is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians.