

## Department of Medical Imaging Annual Report 2003-2004

<b>CHAIR'S REPORT</b> .....	<b>4</b>
<b>DEPARTMENT OF MEDICAL IMAGING - UNIVERSITY OF TORONTO</b> .....	<b>7</b>
Radiologists-in-Chief.....	7
Program Directors.....	7
Division Heads .....	7
Department Administrative Staff.....	7
<b>COMMITTEES</b> .....	<b>8</b>
Executive Committee .....	8
Promotions Committee .....	8
Undergraduate Teaching Committee .....	8
Specialty Training Committee.....	8
<b>UNIVERSITY OF TORONTO FULLY AFFILIATED HOSPITALS AND INSTITUTES</b> .....	<b>9</b>
<b>DEPARTMENT OF MEDICAL IMAGING FACULTY</b> .....	<b>10</b>
<b>THE DEPARTMENT OF MEDICAL IMAGING AND THE UNIVERSITY OF TORONTO TEACHING HOSPITALS</b> .....	<b>13</b>
University Health Network/Mount Sinai Hospital .....	13
Sunnybrook and Women's College Health Sciences Centre .....	14
St. Michael's Hospital .....	14
Hospital for Sick Children .....	15
<b>RESEARCH GRANTS</b> .....	<b>16</b>
<b>PUBLICATIONS: PEER-REVIEWED PAPERS AND ABSTRACTS</b> .....	<b>21</b>
<b>PUBLICATIONS: NON-PEER-REVIEWED, BOOKS, CHAPTERS</b> .....	<b>36</b>
<b>INVITED PRESENTATIONS AND VISITING PROFESSORSHIPS</b> .....	<b>39</b>
<b>SCIENTIFIC PRESENTATIONS: PEER-REVIEWED PAPERS, POSTERS AND EXHIBITS</b> .....	<b>59</b>
<b>AWARDS AND SPECIAL RECOGNITION</b> .....	<b>80</b>
<b>RESEARCH PROGRAM</b> .....	<b>81</b>
The Research Program.....	81
The Medical Imaging Research and Development Awards (Protected Research Time) .....	81
RSNA Resident/Fellow Research Award .....	82
Research Day.....	82
Positron Emission Tomography Centre, Centre for Addiction and Mental Health .....	82
Imaging/Bioengineering Research, SWCHSC .....	82
Real-Time / Interventional Group.....	83
Faculty List.....	84
Grants .....	85
Publications .....	87
Books or Book Chapters.....	95
Abstracts and Scientific Presentations.....	96
Patents.....	102
Invited Presentations.....	103
Teaching -- Hours of Lectures.....	105
Research Report 2004.....	106
Department of Medical Imaging Annual Research Day 2004.....	112

<b>RESIDENT TRAINING PROGRAM .....</b>	<b>114</b>
General Description .....	114
PGY1 .....	114
PGY2 .....	114
PGY3 .....	115
PGY4 .....	115
PGY5 .....	115
Armed Forces Institute of Pathology .....	115
Physics Instruction.....	115
Conferences .....	116
Seminars and Half-Day Program.....	116
Research .....	116
Rounds.....	116
View Box Teaching .....	117
Journal Club.....	117
Visiting Professor Program.....	117
Organ Imaging Review Course .....	117
Program Evaluation .....	117
Program Supervision .....	117
Resident Evaluations .....	118
Resident Awards.....	118
Summary.....	119
<b>RESIDENTS .....</b>	<b>120</b>
PGY1 Level .....	120
PGY2 Level .....	120
PGY3 Level .....	121
PGY4 Level .....	121
PGY5 Level .....	122
<b>NUCLEAR MEDICINE TRAINING PROGRAM .....</b>	<b>123</b>
General Description .....	123
General Objectives .....	123
Dual Radiology and Nuclear Medicine Residency .....	123
<b>RADIOLOGY SCIENTIST TRAINING PROGRAM.....</b>	<b>124</b>
Objectives .....	124
Organization .....	124
Eligibility and Application Procedure .....	124
Remuneration .....	124
Selection of Research Project and Supervisor .....	124
Graduate Degrees .....	125
Clinical Responsibilities .....	125
<b>OBJECTIVES OF TRAINING &amp; SPECIALTY TRAINING REQUIREMENTS IN DIAGNOSTIC RADIOLOGY .....</b>	<b>126</b>
Definition.....	126
General Objectives .....	126
Specific Objectives .....	126
Training in Canada .....	129
<b>SPECIALTY TRAINING REQUIREMENTS IN DIAGNOSTIC RADIOLOGY .....</b>	<b>130</b>
<b>RESIDENT RESEARCH PROGRAM.....</b>	<b>132</b>
Seminar Series .....	132
Support .....	132

Presentation Day.....	133
<b>FELLOWSHIP PROGRAM .....</b>	<b>134</b>
<b>UNDERGRADUATE PROGRAM .....</b>	<b>137</b>
Year I Medicine .....	137
Year II Medicine.....	137
Year III Clerkship.....	139
Year IV .....	140
Other Teaching Activities and Involvement .....	141
<b>CONTINUING EDUCATION PROGRAM.....</b>	<b>143</b>
Organ Imaging Review .....	143
Women’s Imaging: Advances in Gynaecological Imaging and Transvaginal Ultrasound .....	145
<b>INVITED LECTURERS AND VISITING PROFESSORS .....</b>	<b>146</b>

## CHAIR'S REPORT

The Department of Medical Imaging at the University of Toronto is by far the largest in Canada, and one of the largest in all of North America. Our Department has 150 full-time faculty members, 45 Residents, and 58 Fellows. The academic activities of our faculty and trainees are closely integrated with clinical activities at five, fully affiliated teaching hospitals. This Annual Report describes the components and organization of our department and the academic activities of our faculty and trainees, while our clinical programs are more fully described in the reports of our teaching hospitals.

We recently completed a review and update of our academic Strategic Plan. Our strategy is to focus on eight to ten areas of translational research where we can attain leadership positions. We plan to do so in collaboration with related groups in Medical Biophysics, Surgery, Radiation Oncology and Neurosciences. These areas of translational research include: advanced methods of cancer imaging and treatment, neuro-imaging, microvascular imaging, musculoskeletal imaging, minimally invasive image guided therapy, and image registration and fusion. In order to achieve our goals we continue to increase the number of faculty with protected research time, principally funded from clinical practice plans, but with financial incentives from our university budget. We provide improved basic research training and mentoring to residents, fellows and faculty, and opportunities for involvement in meaningful, exciting research. Our Residency Program Directors, Drs. Walter Montanera and Suzanne Laughlin, are heading a small task force examining the research content of our residency program, and determining whether we should implement a special "research stream" for select trainees. We are proud of and support the work of our trainees. Dr. Richard Bitar is our first trainee to enroll in a Ph.D program during the residency. Working under the supervision of Drs. Alan Moody and Tim Roberts in the area of non-invasive vascular imaging, Dr. Bitar has demonstrated tremendous success with grants and publications. All of our Fellows are now involved in research projects. Each is required to complete at least one major academic paper for every year in our program.

We continue to face several challenges. One of these is manpower. Although not as severe as the shortages experienced just a few years ago, they persist all across North America, in both academic and private practice. We have been very successful in our recruitment efforts. We have been aggressive locally, nationally and internationally. Generally speaking, we have met our staffing requirements. We also face difficulties in acquiring funding to support our academic mission. For the most part, funding has been achieved by contributions of faculty members' time "in-kind" from clinical practice plans. We constantly seek other sources. We are also striving to sustain our core research teams. These were initiated with funding from the Canada Research Chair Program, the Ontario Research Development & Challenge Fund, the Canada Foundation for Innovation, and industry. We must sustain these programs.

Our department maintained the support of its faculty for protected research time. This year, the faculty members with departmentally sponsored research time were:

- Dr. Mostafa Atri (Accuracy of Unenhanced Helical CT and Added Value of Enhanced Helical CT in the Assessment of Acute Abdomen)

- Dr. Petrina Causer (MRI Evaluation of the Contralateral Breast in Women with a Recent Diagnosis of Breast Cancer)
- Dr. Peter Chait (Percutaneous Liver Biopsy in Children: A Prospective and Retrospective Study of Complications)
- Dr. Bairbre Connolly (Radiation Dose to Children and Radiologist During PICC Insertions)
- Dr. Alan Daneman (Necrotizing Enterocolitis: Comparison of Grey Scale and Doppler Sonography Findings with Clinical Radiographic and Pathological Findings)
- Dr. Marcus Dill-Macky (Radiofrequency Ablation of Hypervascular Liver Lesions: Prediction of Success Using Contrast Enhanced Ultrasound)
- Dr. Richard Farb (Idiopathic Intracranial Hypertension: The Prevalence and Morphology of Sinovenous Stenosis)
- Dr. Roberta Jong (The ACRIN Digital Mammography Imaging Screening Trial)
- Dr. Korosh Khalili (The Utility or Futility of a Second Imaging Test in the Assessment of Acute Abdominal Pain in Patients Presenting to the Emergency Department)
- Dr. Derek Muradali (Contrast Enhanced Sonography of Breast Nodules and Lymph Nodes: Vascular Morphology and Pathologic Correlation)
- Dr. Dawn Pearce (Weight-bearing CT Scan of the Feet)
- Dr. Manohar Shroff (Emergency Cervical Spine X-rays in Children: Differences in Interpretation by Subspecialization)
- Dr. Jeffrey Traubici (Maximum Intensity Projection Imaging in the Evaluation of Children for Pulmonary Metastatic Disease)
- Dr. Lawrence White (Quantitative T2 Mapping of Cartilage Transplantation in an Animal Model)
- Dr. Stephanie Wilson (Characterization of Indeterminate Hepatic Nodules in High-Risk Patients for Hepatocellular Carcinoma with Contrast-Enhanced Ultrasound).

We are very proud of the excellent teaching in all of our educational programs. Every year we publicly recognize those teachers selected by our trainees as being the most outstanding. Our departmental teaching awards this year were:

Edward L. Lansdown Award for Outstanding Teaching in the Residency Training Program

- Dr. Damien Maharaj

Outstanding teaching in the residency program

- Dr. Mostafa Atri
- Dr. Edna Becker
- Dr. Robert Bleakney
- Dr. Monique Christakis
- Dr. Dae-Gyun Chung
- Dr. TaeBong Chung
- Dr. Lisa Ehrlich
- Dr. Nasir Jaffer
- Dr. Damien Maharaj
- Dr. Caitlin T. McGregor

- Dr. Derek Muradali
- Dr. Martin O'Malley
- Dr. Harry Shulman
- Dr. Louis Wu
- Dr. Arthur Zalev

Outstanding teaching in the fellowship program

- Dr. Mostafa Atri
- Dr. Robert Bleakney
- Dr. Karina Bukhanov
- Dr. Alan Daneman
- Dr. Masoom Haider
- Dr. Anthony Hanbidge
- Dr. Chia Sing Ho
- Dr. Kartik Jhaveri
- Dr. Korosh Khalili
- Dr. Martin O'Malley
- Dr. David Salonen
- Dr. Kenneth Sniderman
- Dr. Manohar Shroff
- Dr. Robert Willinsky
- Dr. Stephanie Wilson

Achieved distinction for outstanding teaching in both the residency and fellowship programs

- Dr. Mostafa Atri
- Dr. Robert Bleakney
- Dr. Martin O'Malley

The academic promotions this year were (effective July 1, 2004):

Associate Professor - Dr. Roberta Jong  
 Assistant Professor - Dr. Raymond Chan  
 Dr. TaeBong Chung  
 Dr. Eran Hayeems.

In closing, I would like to thank Amy Shea, Gina Sciortino, and Felomena Teixeira - the administrative staff at the university offices. They are wonderful friends and are tremendously helpful in getting the Department's work done. I greatly appreciate their efforts.

Walter Kucharczyk, M.D., F.R.C.P. (C)  
 Professor and Chair

# DEPARTMENT OF MEDICAL IMAGING - UNIVERSITY OF TORONTO

(as of June 30, 2004)

Chair ..... Kucharczyk, W.  
Associate Chair..... Roberts, T.

## **Radiologists-in-Chief**

Hospital for Sick Children .....Babyn, P.  
Mount Sinai Hospital-University Health Network (Princess Margaret Hospital/  
Toronto General Hospital/Toronto Western Hospital) ..... Bret, P.  
St. Michael's Hospital ..... Common, A.  
Sunnybrook & Women's College Health Sciences Centre .....Moody, A.

## **Program Directors**

Continuing Education ..... Hamilton, P.  
Fellowship ..... Shroff, M.  
Neuroradiology ..... Willinsky, R.  
Nuclear Medicine ..... Hershkop, M.  
PGY1 ..... Laughlin, S..  
Radiology Residency ..... Montanera, W.  
Radiology Residency (Co-Director) .....Laughlin, S.  
Research ..... Roberts, T.  
Undergraduate ..... Dowdell, T.  
Undergraduate (Co-Director)..... Jaffer, N.

## **Division Heads**

Abdominal Imaging..... Atri, M.  
Breast Imaging.....Muradali, D.  
Cardiothoracic  
    Cardiac Imaging ..... Merchant , N.  
    Thoracic Imaging ..... Paul, N.  
Musculoskeletal Imaging..... White, L.  
Neuroradiology ..... TerBrugge, K.G.  
Pediatric Imaging..... Manson, D.  
Vascular and Interventional Radiology ..... Chait, P.

## **Department Administrative Staff**

Business Officer .....Sciortino, G.  
Secretary .....Shea, A.

# COMMITTEES

## **Executive Committee**

Kucharczyk, W. (Committee Chair)  
Armstrong, S. (Chief Resident)  
Babyn, P.  
Bret, P.  
Laughlin, S.  
Common, A.  
Dowdell, T.  
Hamilton, P.  
Hershop, M.  
Jaffer, N.  
Laughlin, S.  
Montanera, W.  
Moody, A.  
Roberts, T.  
Salem, S.  
Shroff, M.

## **Promotions Committee**

TerBrugge, K. (Committee Chair)  
Mostafa Atri  
Babyn, P.  
Jaffer, N.  
Rubenstein, J.  
Weiser, W.  
Yaffe, M.

## **Undergraduate Teaching Committee**

Dowdell, T. (Committee Chair)  
Chan, R.  
Jaffer, N.  
Kachura, J.  
Lax, M.  
Montanera, W.  
Paul, N.  
Pearce, D.  
Weiser, W.

## **Specialty Training Committee**

Montanera W. (Committee Chair)  
Armstrong, S. (Chief Resident)  
Christakis, M.  
Hayeems, E.  
Herskop, M.  
Laughlin, S.  
MacDonald, C.  
Mikulis, D.  
Pearce, D  
Betel, C.  
Bharatha, A.  
Grinblat, L.  
Margau, R.



**UNIVERSITY OF TORONTO FULLY AFFILIATED HOSPITALS AND INSTITUTES**

**Hospital for Sick Children**..... 555 University Avenue  
Toronto, Ontario  
M5G 1X8

**Mount Sinai Hospital**..... 600 University Avenue  
Toronto, Ontario  
M5G 1X5

**St. Michael's Hospital**..... 30 Bond Street  
Toronto, Ontario  
M5B 1W8

**Sunnybrook & Women’s College Health Sciences Centre**

Sunnybrook Campus ..... 2075 Bayview Avenue  
Toronto, Ontario  
M4N 3M5

Women’s College Campus ..... 76 Grenville Street  
Toronto, Ontario  
M5S 1B2

**University Health Network**

Princess Margaret Hospital..... 610 University Avenue  
Toronto, Ontario  
M5G 2M9

Toronto General Hospital ..... 585 University Avenue, NCSB  
Toronto, Ontario  
M5G 2N2

Toronto Western Hospital ..... 399 Bathurst Street  
Toronto, Ontario  
M5T 2S8

**Centre for Addiction and Mental Health** ..... 250 College Street  
Toronto, Ontario  
M5T 1B8

**Positron Emission Tomography Centre** ..... 250 College Street  
Toronto, Ontario  
M5T 1B8

## DEPARTMENT OF MEDICAL IMAGING FACULTY

Academic Rank, Subspecialty Division and Hospital as of June 30, 2004

<u>NAME</u>	<u>RANK</u>	<u>DIVISION</u>	<u>HOSPITAL</u>
Alton, D.J.	Assistant Professor	Pediatric Imaging	Hospital for Sick Children
Arenson, A.M.	Assistant Professor	Abdominal Imaging	Sunnybrook & Women's College Health Sciences Centre
Armstrong, D.	Assistant Professor	Neuroradiology	Hospital for Sick Children
Ash, J.M.	Associate Professor	Pediatric Imaging	Hospital for Sick Children
Atri, M.	Associate Professor	Abdominal Imaging	Sunnybrook & Women's College Health Sciences Centre
Babyn, P.S.	Associate Professor	Pediatric Imaging	Hospital for Sick Children
Becker, E.J.	Associate Professor	Musculoskeletal Imaging	University Health Network
Benjamin, M.	Assistant Professor	Vascular Imaging	University Health Network
Blaser, S.	Associate Professor	Neuroradiology	Hospital for Sick Children
Bleakney, R.	Assistant Professor	Musculoskeletal Imaging	Mount Sinai Hospital
Blend, R.	Associate Professor	Neuroradiology	University Health Network
Bobechko, P.E.	Assistant Professor	Musculoskeletal Imaging	University Health Network
Bret, P.	Professor	Abdominal Imaging	Mount Sinai Hospital
Bukhanov, K.	Assistant Professor	Breast Imaging	Mount Sinai Hospital
Caldwell, C.B.	Assistant Professor	Research	Sunnybrook & Women's College Health Sciences Centre
Causser, P.	Lecturer	Abdominal Imaging	Sunnybrook & Women's College Health Sciences Centre
Chait, P.G.	Associate Professor	Pediatric Imaging	Hospital for Sick Children
Chan, R.	Assistant Professor	Vascular Imaging	St. Michael's Hospital
Chawla, T.	Assistant Professor	Abdominal Imaging	Mount Sinai Hospital
Cheng, M.H.L.	Lecturer	Pediatric Imaging	Hospital for Sick Children
Cheyne, D.	Associate Professor	Pediatric Imaging	Hospital for Sick Children
Christakis, M.	Assistant Professor	Musculoskeletal Imaging	Sunnybrook & Women's College Health Sciences Centre
Chuang, S.H.	Associate Professor	Neuroradiology	Hospital for Sick Children
Chui, M.C.	Assistant Professor	Neuroradiology	St. Michael's Hospital
Chung, D-G.	Lecturer	Abdominal Imaging	St. Michael's Hospital
Chung, T.B.	Assistant Professor	Cardiothoracic Imaging	University Health Network
Common, A.A.	Assistant Professor	Vascular Imaging	St. Michael's Hospital
Connolly, B.	Assistant Professor	Pediatric Imaging	Hospital for Sick Children
Cooke, G.M.	Assistant Professor	Musculoskeletal Imaging	St. Michael's Hospital
Cooper, P.W.	Assistant Professor	Neuroradiology	Sunnybrook & Women's College Health Sciences Centre
Crawley, A.	Assistant Professor	Research	University Health Network
Curpen, B.	Assistant Professor	Breast Imaging	Sunnybrook & Women's College Health Sciences Centre
Damyanovich, A.	Assistant Professor	Research	University Health Network
Daneman, A.	Professor	Pediatric Imaging	Hospital for Sick Children
David, E.	Lecturer	Vascular Imaging	Sunnybrook & Women's College Health Sciences Centre
Deitel, W.	Assistant Professor	Abdominal Imaging	St. Michael's Hospital
Dill-Macky, M.	Assistant Professor	Breast Imaging	University Health Network
Doria, A.	Assistant Professor	Pediatric Imaging	Hospital for Sick Children
Dowdell, T.R.	Assistant Professor	Musculoskeletal Imaging	St. Michael's Hospital
Ehrlich, L.E.	Associate Professor	Nuclear Medicine	Sunnybrook & Women's College Health Sciences Centre
Farb, R.	Assistant Professor	Neuroradiology	University Health Network
Fishell, E.	Associate Professor	Breast Imaging	Sunnybrook & Women's College Health Sciences Centre
Fong, K.	Associate Professor	Abdominal Imaging	University Health Network
Fox, A.	Professor	Neuroradiology	Sunnybrook & Women's College Health Sciences Centre
Ganguli, N.	Lecturer	Nuclear Medicine	Sunnybrook & Women's College Health Sciences Centre
Gilday, D.L.	Professor	Pediatric Imaging	Hospital for Sick Children
Glanc, P.	Assistant Professor	Abdominal Imaging	Sunnybrook & Women's College Health Sciences Centre
Goldberg, F.	Assistant Professor	Breast Imaging	St. Michael's Hospital
Gray, B.	Assistant Professor	Neuroradiology	St. Michael's Hospital
Greyson, N.D.	Associate Professor	Nuclear Medicine	St. Michael's Hospital
Haider, M.	Assistant Professor	Abdominal Imaging	University Health Network
Hamilton, P.A.	Assistant Professor	Abdominal Imaging	Sunnybrook & Women's College Health Sciences Centre
Hanbidge, A.	Assistant Professor	Abdominal Imaging	University Health Network
Harris, A.	Assistant Professor		University Health Network

Hayeems, E.	Assistant Professpr	Vascular Imaging	University Health Network
Hendler, A.L.	Assistant Professor	Nuclear Medicine	University Health Network
Herman, S.J.	Associate Professor	Cardiothoracic Imaging	University Health Network
Hershkop, M.	Assistant Professor	Nuclear Medicine	University Health Network
Ho, C.S.	Professor	Vascular Imaging	University Health Network
Houle, S.	Associate Professor	Nuclear Medicine	Centre for Addiction and Mental Health
Ibach, K.	Lecturer	Abdominal Imaging	University Health Network
Jaffer, N.M.	Associate Professor	Vascular Imaging	Mount Sinai Hospital
Jhaveri, K.	Assistant Professor	Abdominal Imaging	University Health Network
John, P.	Associate Professor	Pediatric Imaging	Hospital for Sick Children
Jong, R.A.	Associate Professor	Breast Imaging	Sunnybrook & Women's College Health Sciences Centre
Kachura, J.	Assistant Professor	Vascular Imaging	University Health Network
Kassel, E.E.	Associate Professor	Neuroradiology	Mount Sinai Hospital
Kassner, A.	Assistant Professor	Research	University Health Network
Keller, M.A.	Assistant Professor	Neuroradiology	University Health Network
Khalili, K.	Assistant Professor	Abdominal Imaging	University Health Network
Koff, D.	Assistant Professor	Abdominal Imaging	Sunnybrook & Women's College Health Sciences Centre
Kucharczyk, W.	Professor and Chair	Neuroradiology	University Health Network
Kulkarni, S.	Assistant Professor	Breast Imaging	University Health Network
Lata, A.C.	Assistant Professor	Cardiothoracic Imaging	St. Michael's Hospital
Laughlin, S.	Assistant Professor	Neuroradiology	University Health Network
Lax, M.	Assistant Professor	Musculoskeletal Imaging	University Health Network
Lazinski, D.	Lecturer	Neuroradiology	Mount Sinai Hospital
Loucks-Gray, T.	Lecturer	Vascular Imaging	Sunnybrook & Women's College Health Sciences Centre
MacDonald, C.E.	Assistant Professor	Pediatric Imaging	Hospital for Sick Children
Macgowan, C.	Assistant Professor	Pediatric Imaging	Hospital for Sick Children
Maharaj, D.	Lecturer	Nuclear Medicine	Mount Sinai Hospital
Manson, D.E.	Assistant Professor	Pediatric Imaging	Hospital for Sick Children
Marcuzzi, D.W.	Assistant Professor	Vascular Imaging	St. Michael's Hospital
Margolis, M.	Assistant Professor	Abdominal Imaging	Mount Sinai Hospital
Marotta, T.	Assistant Professor	Neuroradiology	University Health Network
Merchant, N.	Assistant Professor	Cardiothoracic Imaging	University Health Network
McGregor, C.	Lecturer	Abdominal Imaging	Sunnybrook & Women's College Health Sciences Centre
Mikulis, D.	Associate Professor	Neuroradiology	University Health Network
Miller, S.	Assistant Professor	Pediatric Imaging	Hospital for Sick Children
Montanera, W.	Associate Professor	Neuroradiology	University Health Network
Moody, A.	Associate Professor	Cardiothoracic Imaging	Sunnybrook & Women's College Health Sciences Centre
Muradali, D.	Assistant Professor	Breast Imaging	University Health Network
Murray, S.Y.	Assistant Professor	Nuclear Medicine	Sunnybrook & Women's College Health Sciences Centre
Navarro, O.	Assistant Professor	Pediatric Imaging	Hospital for Sick Children
Noël de Tilly, L.	Assistant Professor	Neuroradiology	St. Michael's Hospital
Nugent, P.	Lecturer	Abdominal Imaging	Sunnybrook & Women's College Health Sciences Centre
O'Malley, M.	Assistant Professor	Abdominal Imaging	University Health Network
Oudjhane, K.	Associate Professor	Pediatric Imaging	Hospital for Sick Children
Pantazi, S.	Lecturer	Breast Imaging	Mount Sinai Hospital
Paul, N.	Assistant Professor	Cardiothoracic Imaging	University Health Network
Pearce, D.	Lecturer	Musculoskeletal Imaging	St. Michael's Hospital
Provost, Y.	Lecturer	Cardiothoracic Imaging	University Health Network
Pugash, R.A.	Assistant Professor	Vascular Imaging	Sunnybrook & Women's College Health Sciences Centre
Rajan, D.	Assistant Professor	Vascular Imaging	University Health Network
Ranson, M.	Assistant professor	Pediatric Imaging	Hospital for Sick Children
Roberts, H.	Associate Professor	Cardiothoracic Imaging	University Health Network
Roberts, T.	Professor	Research	University of Toronto
Rowlands, J.A.	Professor	Research/Medical Biophysics	Sunnybrook & Women's College Health Sciences Centre
Rubenstein, J.D.	Associate Professor	Musculoskeletal Imaging	Sunnybrook & Women's College Health Sciences Centre
Salem, S.	Associate Professor	Abdominal Imaging	Mount Sinai Hospital
Salonen, D.C.	Assistant Professor	Musculoskeletal Imaging	University Health Network
Sarrazin, J.	Assistant Professor	Cardiothoracic Imaging	Sunnybrook & Women's College Health Sciences Centre
Shroff, M.	Assistant Professor	Neuroradiology	Hospital for Sick Children
Shulman, H.S.	Professor	Cardiothoracic Imaging	Sunnybrook & Women's College Health Sciences Centre
Simons, M.	Assistant Professor	Vascular Imaging	University Health Network
Sniderman, K.W.	Associate Professor	Vascular Imaging	University Health Network

Sussman, M.	Assistant Professor	Research	University Health Network
Sussman, S.	Lecturer	Cardiothoracic Imaging	University Health Network
Symons, S.	Assistant Professor	Neuroradiology	Sunnybrook & Women's College Health Sciences Centre
Temple, M.	Assistant Professor	Pediatric Imaging	Hospital for Sick Children
TerBrugge, K.G.	Professor	Neuroradiology	University Health Network
Thomas, K.	Assistant Professor	Pediatric Imaging	Hospital for Sick Children
Thurston, W.	Assistant Professor	Abdominal Imaging	St. Joseph's Health Centre
Toi, A.	Associate Professor	Abdominal Imaging	University Health Network
Traubici, J.	Assistant Professor	Pediatric Imaging	Hospital for Sick Children
Turner, D.	Assistant Professor	Musculoskeletal Imaging	Sunnybrook & Women's College Health Sciences Centre
Wall, J.	Lecturer	Abdominal Imaging	St. Michael's Hospital
Weisbrod, G.L.	Professor	Cardiothoracic Imaging	University Health Network
Weiser, W.J.	Professor	Cardiothoracic Imaging	St. Michael's Hospital
White, L.	Associate Professor	Musculoskeletal Imaging	Mount Sinai Hospital
Willinsky, R.A.	Professor	Neuroradiology	University Health Network
Wilson, C.	Assistant Professor	Breast Imaging	University Health Network
Wilson, S.R.	Professor	Abdominal Imaging	University Health Network
Wood, M.L.	Professor	Research/Medical Biophysics	Sunnybrook & Women's College Health Sciences Centre
Wright, B.E.	Assistant Professor	Breast Imaging	Sunnybrook & Women's College Health Sciences Centre
Wu, L.	Lecturer	Abdominal Imaging	St. Michael's Hospital
Xiang, J.	Assistant Professor	Research	Hospital for Sick Children
Yaffe, M.J.	Professor	Research/Medical Biophysics	Sunnybrook & Women's College Health Sciences Centre
Yoo, S-J.	Professor	Pediatric Imaging	Hospital for Sick Children
Yu, E.	Lecturer	Neuroradiology	University Health Network
Zalev, A.H.	Assistant Professor	Abdominal Imaging	St. Michael's Hospital
Zelovitzky, J.L.	Assistant Professor	Cardiothoracic Imaging	University Health Network

### **Cross Appointments**

Bronskill, M.J.	Professor	Medical Biophysics
Foster, S.	Professor	Medical Biophysics
Freedom R.	Professor	Pediatrics
Henkelman, R.M.	Professor	Medical Biophysics
Johnson, J.A.	Associate Professor	Obstetrics and Gynaecology
McLaughlin, P.R.	Professor	Medicine
Noseworthy, M.	Assistant Professor	Medical Biophysics
Noyek, A.M.	Professor	Otolaryngology
Pharoah, M.J.	Professor	Dentistry
Plewes, D.B.	Professor	Medical Biophysics
Reilly, R.	Associate Professor	Pharmacy
Tomlinson, G.	Assistant Professor	Biostatistics
Trachtenberg, J.	Professor	Surgery
Vanek, I.	Assistant Professor	Ophthalmology

### **Radiation Sciences Program (Joint Program with Michener Institute)**

Babiak, C.	Instructor
Cornacchione, P.	Instructor
Crowley, S.	Instructor
Goodin, L.	Instructor
Havil, D.	Instructor
King, D-M.	Instructor
Maynard, L.	Instructor
Murray, L.	Instructor
Rodrigues, G.	Instructor
Sharpe, W.	Instructor
Shin, H.	Instructor
Souter, C.	Instructor
Topple, A.	Instructor
Watson, T.	Instructor
Wong, B.	Instructor

## **THE DEPARTMENT OF MEDICAL IMAGING AND THE UNIVERSITY OF TORONTO TEACHING HOSPITALS**

The academic programs in the Department of Medical Imaging are integrated with its five major teaching hospitals: the University Health Network (UHN), Mount Sinai Hospital (MSH), St. Michael's Hospital, Sunnybrook & Women's College Health Sciences Centre, and the Hospital for Sick Children. The medical imaging departments at UHN and MSH are consolidated into a single operational unit under the leadership of Dr. Patrice Bret. The Medical Imaging departments at St. Michael's Hospital, Sunnybrook & Women's College Health Sciences Centre, and the Hospital for Sick Children are led by Dr. Andrew Common, Dr. Alan Moody, and Dr. Paul Babyn.

### **University Health Network/Mount Sinai Hospital**

#### **Organizational Structure:**

Andy Holt, Administrative Director, left the Department in the Summer of 2003. Scott Jarrett was hired from St. Joseph's Health Centre. The Radiologist-in-Chief went on a 6-month sabbatical from January 2004-June 30, 2004. During this time, Dr. Anne Keller was the Acting Radiologist-in-Chief. No changes were made on the organizational structure for the Radiologists, however a number of Charge Technologists' positions were consolidated in order to address budget shortfalls. In addition, one of five Manager positions was closed.

With respect to clinical services, waiting lists for CT and MRI remain a constant challenge. Some CT evening shifts, and as many MRI night shifts as funding allows have been opened, however the waiting time remains well above acceptable standards.

#### **Significant Events/Accomplishments:**

- The Management Team was trained in patient centered care.
- UHN Quality Committee: Our department received specific praise from the UHN Patient Relations Department.
- PET/CT clinical trials started at PMH.
- TWH renovation was completed and installation of the new equipment should be completed by Fall of 2004.
- The Management Team was provided new training opportunities.
- A new funding model has been tested for inpatient activity using charge-back to the units. This is done in an effort to better control utilization of MI tests for inpatients.

## **Sunnybrook and Women's College Health Sciences Centre**

Sunnybrook & Women's College Health Sciences Centre, Medical Imaging department, is comprised of 6 divisions (Body Imaging, Neuroradiology, Cardiothoracic/VIR, Nuclear Medicine, Musculoskeletal and Breast Imaging) supporting major regional programmes including Oncology, Trauma, Burns and Stroke. The department is research driven encouraging hypothesis generated clinical research and collaboration with the adjacent department of Research Imaging. Access to state of the art research equipment including 3T MRI, 1.5T MRI and PET-CT, complement clinical twin speed MRI's (2), 3 CT scanners and fully equipped nuclear medicine, angiography and ultrasound departments. The department is fully integrated with PACS and RIS systems. For further information regarding clinical or research imaging, please contact [alan.moody@sw.ca](mailto:alan.moody@sw.ca).

## **St. Michael's Hospital**

The Medical Imaging Department at St. Michael's Hospital has undergone considerable remodeling in the past few years. A Siemens PACs system has now been installed, and integrated VR Technology and electronic worklisting will soon render the department filmless and paperless, with markedly improved reporting efficiency. The annual tally of imaging examinations is over 240, 000, excluding a very busy cardiac catheterization service which performs over 4000 radiologist-interpreted procedures per year. Virtually all of the imaging equipment has been replaced, with two helical CT scanners, three new MRI units, and three angio suites, including a bi-plane neuro interventional facility. An aggressive recruiting campaign of subspecialist radiologists has brought full-time staffing levels to 17 which has allowed the department to better meet the needs of the University Residency and Fellowship Programs. St. Michael's is proud of its long-standing commitment to teaching and clinical excellence. The hospital has appointed a renowned Critical Care researcher as VP of Research, and there is renewed commitment to increasing the research profile of the hospital. A new state-of-the-art research building is planned. Other unique hospital attributes which are reflected in the Medical Imaging Department at St. Michael's are the Inner City Health Programme, the world-renowned Minimal Access Therapeutics Program and the Hereditary Hemorrhagic Telangiectasia Program. Our Neurointerventional Service has grown rapidly in the last few years, and will continue to expand. The Breast Imaging service has recently moved into a new CIBC Breast Centre on the same floor as the Medical Imaging Department. Further, St. Michael's is downtown Toronto's helipad-serviced trauma centre, and lithotripsy centre, and has outstanding clinical and research programs in renal disease, and in heart and vascular diseases, which are actively supported by the Medical Imaging Department.

## **Hospital for Sick Children**

The Hospital for Sick Children Department of Diagnostic Imaging provides full imaging service for all children up to the age of 18 years. We currently perform approximately 145,000 examinations per year. The department has 21 full-time staff currently with subspecialists in Pediatric Neuroradiology, Interventional, Cardiac, and body-cross sectional imaging. The Department has an extensive training program with an international group of pediatric radiology fellows and other trainees.

Departmental equipment is state of the art with two 1.5T MR scanners, two CT scanners, (including one 8 slice CT) along with a dedicated Image Guided Therapy suite. This suite allows both interventional radiology and minimally invasive surgical procedures to be combined, and consists of four rooms containing integrated CT fluoroscopy, a biplane unit, and two single plane fluoroscopic units with ultrasound units. The department has an active sonography service with eleven ultrasound units. There is an integrated PACS and RIS system providing image and report distribution throughout the hospital.

Research and training are active interests of the department with many ongoing projects. Dedicated imaging scientists have interests in MR and Magnetoencephalography, Cardiac, Interventional and Functional Neuroimaging.

## RESEARCH GRANTS

Members of the Department of Medical Imaging (underlined) were investigators on the following grants, identified by the principal investigator, other investigators, project title, sponsor, total amount of grant, and start and end dates of the funding period.

Atri M. A prospective evaluation of female patients receiving Contingen Bard Collagen implant mid-urethra for the treatment of stress urinary incontinence. Co-investigator. \$65,875,00, May 2003 – July 2004, funded by C. R. Bard Inc.

Babyn P, Blanchette V, Feldman B, Hedden D. Magnetic resonance imaging (MRI) of Elbows, Knees and Ankles of Subjects enrolled in the Escalating Dose Primary Prophylaxis Study. Bayer, Healthcare Division. \$86,842.48 October 2003 – October 2005

Bassett A (Principal Investigator), Mikulis DJ (Co-Investigator). Delineating a high risk phenotype in familial schizophrenia. Canadian Institutes of Health Research (CIHR). \$140,000.00/yr. April 2002-March 2007.

Blanchard R (Principal Investigator), Mikulis DJ (Co-Investigator). Brain structure and function in pedophiles. Canadian Institutes of Health Research (CIHR). \$157,190.00. 2001-2004.

Bukhanov K. Z-Tech breast cancer detection system using homologous electrical difference analysis (HEDA). Z-Tech (Canada) Inc. \$22,295.00. 2001 (end date unknown).

Burns PN (Principal Investigator), Wilson SR (Co-Investigator). Nonlinear imaging with ultrasound contrast agents: MOP-12482. Canadian Institutes of Health Research. \$95,748.00. June 1, 2000-May 31, 2004.

Chait P. Therapeutic efficacy of intrapleural alteplase in rabbit empyema model. Hoffmann-LaRoche Limited. \$25,000 March 2004.

Causser P co-investigator, P.I. Warner E, Plewes DB. Surveillance magnetic resonance imaging and ultrasound for women at high risk for hereditary breast cancer. CBCRA (\$1 300, 000) for 2004-2009. CBCRI (\$710,409) for 2001-2004

Causser P co-investigator. (P.I. Dr. C. Lehman). MRI Screening of the Contralateral Breast ACRIN 6667. NIH (\$55 000 to our centre). 2003-2006

Causser P co-investigator, P.I. Wright F. Is Clinical Breast Examination, Mammography or Magnetic Resonance Imaging the Best Method for Assessing Residual Disease after Neo-Adjuvant therapy in Women with Locally Advanced Breast Cancer? CBCF (\$113 096) 2004-2007.

Chan V, Simons ME. Is ultrasound imaging a practical and more accurate method of nerve localization than nerve stimulation during brachial plexus block. 2003 Canadian



Anesthesiologists' Society, Smiths Medical Canada Ltd. Canadian Research Award in Pain Research and/or Regional Anesthesia. \$10,000.00. July 2003-July 2004.

Chan V, Simons ME. Improving accuracy and safety of nerve localization- a comparison of ultrasound imaging versus nerve stimulator for nerve localization for brachial plexus block. 2003 Physicians Services Incorporated Foundation. Ontario, Canada. \$ 75,000.00. August 2003-August 2004.

Cheyne D. Development of Neuromagnetic Imaging Methods for Measuring Oscillatory Brain Activity. CIHR – Research Grant. \$276,054 2003 – 2006

Cheyne D. MEG Studies of Sensorimotor Rhythms in Humans. Individual Research Grant. \$95,000 2004-2009.

Chuang S, Pang EW, Otsubo H, Sharma R. Examination of auditory function in children using MEG. Seed Grant at The Hospital for Sick Children \$19,995. Jan. 2002 - Dec. 2003.

Chuang S, Xiang J. Localization and Delineation of Epileptogenic Zone in Children Using Specially Filtered MEG. Nov. 2003.

Chow E (Principal Investigator), Mikulis DJ (Co-Principal Investigator). Potential predictor of schizophrenia in a high genetic risk sample: Ontario project. Schizophrenia Society of Ontario. \$40,000.00 per annum. April 2002-March 2004.

Connolly B, Swoboda N. Radiation Dose to Children and Radiologist During PICC Insertions. Dept of Medical Imaging, University of Toronto. \$8,000 April 1, 2004 – March 31, 2005

Dill-Macky MJ. Simultaneous dynamic bilateral breast MRI: Is it adequate? Marvelle Koffler Breast Center Account for Excellence. (#03-0216-E) Grant funded \$30,000.00. Ethics approved December 10, 2003.

Dinniwell R, Milosevic M, Warde P, Catton C, Bayley A, Haycocks T, Jaffray D, Haider MA, Jhaveri K, Chan P, Chung P. MR imaging with ultra-small superparamagnetic iron oxide for pelvic lymph node target definition in the treatment of high risk prostate cancer. Abbott-CARO Uro-Oncologic Radiation Award (ACURA). \$36,393.00. 2004.

Esdaile J (Principal Investigator), White LM, et al (Collaborators). Tooling up for OA: Measuring what matters. Canadian Institutes of Health Research (CIHR), and the Institute of Musculoskeletal Health and Arthritis (IMHA). Total amount \$1,500,000.00 (CIHR New Emerging Team Grant). 2003-2006.

Fleshner N (Principal Investigator), Toi A, Sweet J, Evans A, Gleave M, Klotz L, Rao V (Co-Investigators). Incidence and characteristics of prostate cancers detected in men with prostate specific antigen values < 2.5 ng/ml. Canadian Prostate Cancer Research Initiative (CPCRI) and National Cancer Institute of Canada (NCIC). \$50,000.00. February 1, 2003 for one year.

Goss PE, Thompson L (Principal Investigators), Bukhanov K, Muradali D (Collaborators). A protocol to study the effects of dietary flaxseed on mammographic density. Canadian Breast Cancer Research Initiative. \$218,165.00. 1998 (end date unknown).

Goss PE (Principal Investigator), Josse R, Bukhanov K, Muradali D (Collaborators). A randomized feasibility study of letrozole in postmenopausal women at increased risk for development of breast cancer as evidenced by high breast density. Novartis. \$433,880.00. Summer 1999 (end date unknown).

Green R, Mikulis D (Principal Investigators). Cognitive vs motor recovery after traumatic brain injury: Is there competition for limited neural resources. The Physician Services Incorporated Foundation (03-32). \$42,000.00 (2004); \$80,000.00 (2005).

Haider M (Principal Investigator), Toi A, Sweet J, O'Malley M, Trachtenberg J (Co-Investigators). The utility of functional and morphologic MRI in the detection of prostate cancer for patients with elevated PSA and prior negative biopsy. PMH Foundation. \$30,000.00. April 2002 (ongoing).

Hill R (Principal Investigator), Bristow R, Fyles A, Hedley D, Milosevic M, Yeung I, Haider MA (Co-Investigator). Hypoxia in human tumors: clinical and experimental studies. Project 5 (Biomarkers and imaging studies of the tumour microenvironment: treatment response and new therapeutic targets in cervix and prostate cancer). Terry Fox Program Project Grant, National Cancer Institute of Canada. \$5,935,083.00 (2004-2008).

Hurtig MB, White LM, Marks PH (Principal Investigators), Buschmann M, Shirazi S, Dickey J, Weller I, Mohtadi NG (Collaborators). Risk factors and indicators that predict the progression of osteoarthritis after knee injury. Canadian Institutes of Health Research (CIHR), and the Institute of Musculoskeletal Health and Arthritis (IMHA). Total amount \$1,500,000.00 (CIHR New Emerging Team NET Grant; Quality of Life Enhancement Competition 2004). 2004-2009.

Hurtig M, White LM, Marks PH (Principal Investigators), Buschmann M, Shirazi S, Dickey J, Weller I, Mohtadi NG (Collaborators). Risk factors that predict the progression of osteoarthritis after knee injury: *A retrospective pilot study* (Study 04-SRID-OA-02). Canadian Arthritis Network (CAN). Total amount \$132,000.00. 2004-2005.

Jewett MAS (Principal Investigator), Panzarella T, Haider MA, Evans A, Rendon R, Fleshner N, Klotz L, Nam R, Macgregor P, Gallie B. The natural history of small renal masses. Kidney Foundation of Canada. \$100,000.00. 2004-2006.

Kapur S (Principal Investigator), Mikulis D (Co-Investigator). Schizophrenia, reward learning and reward prediction errors - A study using computational models and event related fMRI. Canadian Institutes of Health Research (CIHR). \$108,619.00 (3 Years) + \$9,961 Equipment.

Kucharczyk W. Functional Imaging Research Network (FIRN) - \$34,000,000. With other principal investigators: Donald Stuss, Mark Henkelman and Franco Vacarino. Funding agency: CFI. Continuation. Grant attributed to Dr. Walter Kucharczyk \$6,500,000. 2000-2005.

Kucharczyk W. Ontario Consortium for Image Guided Surgery. \$40,000,000. Grant attributed to Dr. Walter Kucharczyk \$5,000,000. Funding agency: ORDCAF. 2001-2006.

Macgowan C. Multi-Institutional Research Position – Real-Time Cardiovascular MRI. Ontario Consortium for Cardiac Imaging. \$40,000 January 2004 – January 2005

MacRae AR (Principal Investigator), Chitayat D, Chodirker BN, Holowaty PH, Knight GJ, Lockner CA, MacKenzie JJ, Palomaki G, Toi A, Van Caesele PG (Co-Investigators). The SAFER study: second and first trimester evaluation of risk of fetal trisomies. Canadian Institutes of Health Research (CIHR). \$176,506.00 annually for 3 years. January 29, 2003 for 3 years.

Merchant N (Principal Investigator). Ontario Consortium for Cardiac Imaging. Ontario Research and Development Challenge Fund. Funding includes ORDCAF, Private Sector and Institution Component. \$1,886,700.00. 2001-2006.

Mikulis DJ (Co-Principal Investigator). The Behavioral Research and Imaging Network. Grant Support (BRAIN #01-MAR-0936). Ontario Research and Development Challenge Fund. \$95,000.00/yr. 2002-2007.

Milosevic MF (Principal Investigator), Toi A, Bristow R, Panzarella T, Sweet J, Headley D, Hill R (Co-Investigators). A study of transrectal tumor oxygen measurements in patients with clinically localized prostate cancer. US Department of Defence Prostate Cancer Research Program. \$198,375.00. 2001-2004.

Milosevic MF (Principal Investigator), Parker C, Warde P, Toi A, Sweet J (Co-Investigators). A clinical study of the effect of recombinant human erythropoietic (rHuEPO) of tumor oxygenation in prostate cancer. Anemia Institute for Research and Education. \$39,000.00. August 1, 2001-July 31, 2003.

Milosevic MF (Principal Investigator), Dinniwell R, Haider MA, Jaffray D, Warde P. Magnetic resonance imaging using ultra-small superparamagnetic iron oxide for pelvic lymph node targeted definition in high risk prostate cancer. Canadian Prostate Cancer Research Initiative IDEA Grant, National Cancer Institute of Canada. \$36,069.00 (2004-2005).

Moody A. The site, cause and outcome of complicated atherosclerotic plaque in the cardiovascular and neurovascular circulations. Pfizer \$300,000, 2004-2007.

Roberts H (Principal Investigator). International Early Lung Cancer Action Program. Lusi Wong Lung Cancer Early Detection Research Fund. Approximately \$2.5 million dollars. 2003-2008.

Roberts H (Principle Investigator). IMI Lung Alert substudy to I-ELCAP. IMI Medical Innovations International Inc. \$530,000.00. 2003-2008.

Roberts H (Principle Investigator for Toronto Site). International Early Lung Cancer Action Program (I-ELCAP). Cornell University, New York, USA. \$40,000.00. April 2003-March 2004.

Saint-Cyr J, McAndrews MP (Principal Investigators), Mikulis DJ (Co-Principal Investigator). Deep brain stimulation effects on task-drive fMRI. Natural Sciences and Engineering Research Council of Canada. (# 155451). \$64,000.00. 2001-2004.

Shroff M, Kirby K. Imaging of Cervical Spine trauma in children: University of Toronto Department of Medical Imaging Research & Developmental Award of CAD 8000.

Shroff M. Use of intravenous Contrast in CT of the head in Children: University of Toronto Departmental Medical Imaging Research & Developmental Award of CAD 8000 approved. June 2004 – 2005.

Shroff M, Bouffet E. Use of Vinblastine in the the treatment of Optic pathway glioma: This study involves pre and post treatment MRI studies with detailed evaluation. Ontario Cancer Society. \$100, 000.

Shroff M, Blaser S, Banwell B. Pediatric Multiple Sclerosis study: 4.5 million 2004 – 2009.

Therrien J (Principal Investigator), McCrindle B, Merchant N, Gatzoulis M, Siu S, Webb G. Effects of ACE inhibitor and beta blocking therapy in patients with systemic right ventricles. Heart & Stroke Foundation of Canada. \$100,000.00. 2002-2004.

Wanzel K, Anastakis D (Principal Investigators), Mikulis DJ (Co-Investigator). Cortical mapping of surgical residents on tasks of surgical skill and mental rotations. Center for Excellence in Surgical Education, Research and Training (CESERT). \$26,786.00. October 2002-October 2003.

White L (Principal Investigator), Kandel R, Hurtig M, Roberts T, Sussman M (Co-Investigators). Quantitative T2 MR imaging assessment of cartilage repair. Canadian Arthritis Network (CAN). \$34,100.00 (Special Projects Grant). 2003-2004.

Wright G (Principal Investigator), Merchant N. Magnetic resonance imaging for ischemic heart disease. Canadian Institutes of Health Research (CIHR). \$135,240.00 per year plus equipment x 4 years (2003-2007).

## **PUBLICATIONS: PEER-REVIEWED PAPERS AND ABSTRACTS**

Agid R, Ducreux D, Halliday W, Kucharczyk W, terBrugge K, Mikulis D. MR diffusion-weighted imaging in a case of West Nile virus encephalitis. *Neurology* 2003 Dec;61(12):1821-1823.

Agid R, Willinsky RA, Haw C, Souza MP, Vanek IJ, terBrugge KG. Targeted compartmental embolization of cavernous sinus dural arteriovenous fistulae using transfemoral medial and lateral facial vein approaches. *Neuroradiology* 2004 Feb;46(2):156-160.

Al-Gahtany M, Shroff M, Bouffet E, Dirks P, Drake J, Humphreys R, Laperriere N, Hawkins C, Rutka J. Primary central nervous system sarcomas in children: clinical, radiological, and pathological features. *Childs Nerv Syst.* 2003 Dec;19(12):808-817. Epub 2003 Oct 22.

Algra A, Gates PC, Fox AJ, Hachinski V, Barnett HJM, for the North American Symptomatic Carotid Endarterectomy Trial (NASCET) Group. Side of brain infarction and long-term risk of sudden death in patients with symptomatic carotid disease. *Stroke* 2003; 34:2871-2875.

Allder SJ, Moody AR, Martel AL, Morgan PS, Delay GS, Gladman JR, Lennox GG. Differences in the diagnostic accuracy of acute stroke clinical subtypes defined by multimodal magnetic resonance imaging. *J Neurol Neurosurg Psychiatry.* 2003 Jul;74(7):886-888.

Atri M. Ectopic pregnancy versus corpus luteum cyst revisited: best Doppler predictors. *J Ultrasound Med.* 2003;22:1181-1184.

Auyeung KM, Laughlin S, terBrugge K. Prenatal diagnosis of unusual fetal pial arteriovenous malformation. A case report. *Interventional Neuroradiology* 2003 Nov;9:163-168.

Babyn P, Blanchette VS, Rivard GE, Israels SJ, Robinson. Musculoskeletal results from the Canadian hemophilia dose escalation prophylaxis trial. *Blood* 2003;52A.

Babyn PS, Chu WC, Tsou IY, Wansaicheong GK, Allen U, Bitnun A, Chee TS, Cheng FW, Chiu MC, Fok TF, Hon EK, Gahunia HK, Kaw GJ, Khong PL, Leung CW, Li AM, Manson D, Metreweli C, Ng PC, Read S, Stringer DA. Severe acute respiratory syndrome (SARS): chest radiographic features in children. *Pediatr Radiol.* 2004 Jan;34(1):47-58. Epub 2003 Nov 18.

Babyn P, Tse SML, Doria A, Boros C, Parker S. Anti-tumor necrosis factor alpha therapy leads to improvement of both enthesitis and synovitis in children. *Arthritis and Rheumatism.* 2003, S92- S93.

Barr JD, Connors JJ III, Sacks D, Wojak JC, Becker GJ, Cardella JF, Chopko B, Dion JE, Fox AJ, et al. Quality Improvement Guidelines for the Performance of Cervical Carotid Angioplasty and Stent Placement. *AJNR* 2003: 24:2020-34 and *JVIR* 2003;14:1079-1093.

Barynshnik DB, Farb RI. Changes in the appearance of venous sinuses after treatment of disordered intracranial pressure. *Neurology* 2004 Apr;62(8):1445-1446.

Beck C, Krafchik B, Traubici J, Jacobson S. Mercury intoxication: it still exists. *Pediatr Dermatol*. 2004 May-Jun;21(3):254-259.

Benjaminov FS, Prentice M, Sniderman KW, Siu S, Liu P, Wong F. Portopulmonary hypertension in decompensated cirrhosis with refractory ascites. *Gut* 2003;52:1355-1362.

Benjaminov O, Atri M. Sonography of the abnormal fallopian tube. *AJR Am J Roentgenol*. 2004;183:737-42.

Bitar R, Gladstone D, Sahlas D, Moody A. MR angiography of subclavian steal syndrome: pitfalls and solutions. *AJR Am J Roentgenol*. 2004 Dec;183(6):1840-1841.

Bitar R, Muradali D, Weiser WJ, Avendano M, Derkach P, Low DE. Chest radiographic manifestations of severe acute respiratory syndrome in health care workers: the Toronto experience. *AJR* 2004 Jan;182(1):45-48.

Bitnun A, Allen U, Heurter H, King SM, Opavsky MA, Ford-Jones EL, Matlow A, Kitai I, Tellier R, Richardson S, Manson D, Babyn P, Read S; Other Members of the Hospital for Sick Children SARS Investigation Team. Children hospitalized with severe acute respiratory syndrome-related illness in Toronto. *Pediatrics*. 2003 Oct;112(4):e261.

Bitnun A, Sochett E, Babyn P, Holowka S, Stephens D, Read S, King SM. Serum lipids, glucose homeostasis and abdominal adipose tissue distribution in protease inhibitor-treated and naive HIV-infected children. *AIDS*. 2003 Jun 13;17(9):1319-1327.

Blaser S, Feigenbaum A. A neuroimaging approach to inborn errors of metabolism. *Neuroimaging Clin N Am*. 2004 May;14(2):307-29, ix.

Blaser SI, Peraud A, Drake J, Armstrong D, Hedden D, Wilson G. Fatal ethibloc embolization of vertebrobasilar system following percutaneous injection into aneurismal bone cyst of the second cervical vertebra. *AJNR Am J Neuroradiol*. 2004 Jun-Jul;25(6): 1116-1120.

Brannigan M, Burns P, Wilson SR. Blood flow patterns in focal liver lesions: concordance of microbubble contrast enhanced pulse inversion sonography with CT and MRI. *Radiographics* 2004;24: 921-935.

Burn PR, Haider MA, Alfuhaid T, Brown MP, Roberts TP. Proton magnetic resonance spectroscopy as a potential tool for differentiating between abdominal fluid collections. *J Magn Reson Imaging* 2003;18(6):740-744.

Burton JM, Kern RZ, Halliday W, Mikulis D, Brunton J, Fearon M, Pepperell C, Jaigobin C. Neurological manifestations of West Nile virus infection. *Can J Neurol Sci* 2004 May;31(2):185-193.

Carcao MD, Connolly BL, Chait P, Stain AM, Acebes M, Massicotte P, Blanchette VS. Central venous catheter-related thrombosis presenting as superior vena cava syndrome in a haemophilic patient with inhibitors. *Haemophilia*. 2003 Sep;9(5):578-583.

Causier PA, Warner E, Piron C, Hill K, Jong R, Shumak R, Ramsay E, Plewes DB. A comparison of annual breast mammography, ultrasound, MRI and clinical exam for screening women at high risk for hereditary breast cancer: A five year study. *European Radiology* 2003; 13(9):D7.

Cervini P, Wu L, Shenker R, O'Blenes C, Mahoney J. Endometriosis and the canal of Nuck: atypical manifestations in an unusual location. *Can J of Plastic Surgery Summer* 2004;12(2):73-75.

Chan RP, Common AA. Stent-graft repair of femoral pseudoaneurysm/AV fistula using a retrograde popliteal approach. *Cardiovasc Intervent Radiol* 2004; 27:516-519.

Chan RP, David E. Reperfusion of splanchnic artery aneurysm following transcatheter embolization: treatment with percutaneous thrombin injection. *Cardiovasc Intervent Radiol* 2004 May-Jun; 27(3):264-267.

Chen R, Anastakis DJ, Haywood CT, Mikulis DJ, Manktelow RT. Plasticity of the human motor system following muscle reconstruction: A magnetic stimulation and functional magnetic resonance imaging study. *Clinical Neurophysiology* 2003;114:2434-2446.

Cheng H-LM, Purcell CM, Bilbao JM, Plewes DB. Usefulness of contrast kinetics for predicting and monitoring tissue changes in muscle following thermal therapy in long survival studies. *Journal of Magnetic Resonance Imaging* 2004;19(3):329-341.

Cheng H-LM, Purcell CM, Bilbao JM, Plewes DB. Prediction of subtle thermal histopathological change using a novel analysis of Gd-DTPA kinetics. *Journal of Magnetic Resonance Imaging* 2003;18(5):585-598.

Cheung RT, Eliasziw M, Barnett HJM, Fox AJ. Risk, types, and severity of intracranial hemorrhage in patients with symptomatic carotid artery stenosis. *Stroke* 2003;34:1847-1851.

Chow E, Holden L, Rubenstein J, Christakis M, Sixel K, et al. Computed Tomography (CT) Evaluation of breast cancer patients with osteolytic bone metastases undergoing palliative radiotherapy - A feasibility study. *Radiother Oncol* 2004;70:291-294.

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Connolly BL, Temple M, Chait PG, Restrepo R, Adatia I. Early mediastinal seroma secondary to modified Blalock-Taussig shunts – imaging and successful management by percutaneous drainage. *Pediatric Radiology*, 2003 July; 33(7):495-498.

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Djaiani G, Fedorko L, Borger M, Carroll J, Cheng D, Mikulis D, Karski J. Atheromatous disease of the aorta predicts new ischemic brain lesion after cardiac surgery. *Heart Surg Forum* 2003;6(4):199-200.

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Khalili K, Wilson SR. The biliary tract. In: Rumack C, Wilson SR, Charboneau W. Diagnostic Ultrasound, 2<sup>nd</sup> edition. Elsevier Science Publishers, 2004. Vol. I, pages 171-212.

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Macgowan CK, Roberts TPL. "Magnetic Resonance Imaging" in Biomedical Technology and Devices Handbook, Eds. James Moore and George Zouridakis, CRC Press – August 2003 – Co-principal Author.

Muller NL, Shulman H. Imaging of SARS in North America. In: Imaging in SARS. Edited by Ahuja AT, Ooi CGC. University Press, Cambridge 2004.

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Rubenstein J. Defining the Injury: Assessment of Acetabular Fractures. In: Fractures of the Pelvis and Acetabulum, M Tile, J Kellam and DL Helfet, eds., 3<sup>rd</sup> ed. Lippincott Williams & Wilkins, 2003, pp 419-426.

Salonen DC, Brower A. Seronegative spondyloarthropaties: Imaging. In: Hochberg, et al, (eds). Rheumatology, 3<sup>rd</sup> edition. 2003. Chapter 105, pages 1193-1203.

Thurston W, Wilson SR. The urinary tract. In: Rumack C, Wilson SR, Charboneau W. Diagnostic Ultrasound, 2<sup>nd</sup> edition. Elsevier Science Publishers, 2004. Vol. I, pages 321-394.

Thurston W, Wilson SR. The adrenal glands. In: Rumack C, Wilson SR, Charboneau W. Diagnostic Ultrasound, 2<sup>nd</sup> edition. Elsevier Science Publishers, 2004. Vol. I, pages 425-442.

Wilson SR. The gastrointestinal tract. In: Rumack C, Wilson SR, Charboneau W. Diagnostic Ultrasound, 2<sup>nd</sup> edition. Elsevier Science Publishers, 2003. Vol. I, pages 269-320.

Wilson SR, Withers C. The liver. In: Rumack C, Wilson SR, Charboneau W. Diagnostic Ultrasound, 2<sup>nd</sup> edition. Elsevier Science Publishers, 2003. Vol. I, pages 77-146.

Yoo S-J, Freedom RM, Li J. Late complications following the fontan operation. 85-91. Ed.: Gatzoulis MA, Webb GD, Daubeney PEF Diagnosis and Management of Adult Congenital Heart Disease Churchill Livingstone 2003

Yoo SJ, Hornberger LK, Smallhorn JF. Ventricular outflow tract anomalies. Ed: Yagel, Gembruch and Silverman. 223-247 Fetal Cardiology Martin Dunitz Publishers 2003

Yoo SJ, Hornberger LK, Smallhorn JF. Abnormalities of the situs and congenital heart disease  
Ed.: Yagel, Gembruch and Silverman. 265-280. Fetal Cardiology Martin Dunitz Publishers 2003

## INVITED PRESENTATIONS AND VISITING PROFESSORSHIPS

Armstrong D. Rafay MF, Chan A, deVeber G, MacGregor DL. “Long Term Angiographic Abnormalities in Children with Craniocervical Arterial Dissection”. (Poster Presentation). 5<sup>th</sup> World Stroke Congress, Vancouver B.C., Canada. June 23-28, 2004.

Armstrong D. Posterior fossa development and malformations. Strong Memorial Hospital Radiology Grand Rounds, Rochester, NY, October 30, 2003.

Armstrong D. Interesting fetal MRI cases, a tutorial. Strong Memorial Hospital Radiology Rochester, NY, October 30, 2003.

Armstrong D. Metabolic brain disorders, understanding the leukodystrophies Strong Memorial Hospital Radiology Rochester, NY, October 30, 2003.

Armstrong D. Hypoxic ischemic encephalopathy of the fetus, premature, and full term infant. Rochester Radiology Society, Rochester, NY, October 30, 2003.

Armstrong D. Craniofacial malformations and craniosynostoses Strong Memorial Hospital Radiology Rochester, NY, October 31, 2003.

Armstrong D. Posterior fossa development and malformations. Montreal Childrens Hospital, October 21, 2003.

Armstrong D. Craniofacial malformations and craniosynostoses. Montreal Childrens Hospital, October 21, 2003.

Armstrong D. Interesting pediatric brain cases, a tutorial. Montreal Childrens Hospital, October 21, 2003.

Armstrong D. Metabolic brain disorders, understanding the leukodystrophies. Montreal Neurological Institute grand rounds. October 20, 2003.

Armstrong D. Hypoxic ischemic encephalopathy of the fetus, premature, and full term infant. Montreal Neurological Hospital. October 20, 2003.

Armstrong D. Interesting head and neck cases, a tutorial. Montreal General Hospital. October 20, 2003.

Armstrong D. Labyrinthine dysplasias. Montreal General Hospital. October 20, 2003.

Armstrong D. Posterior fossa development and malformations. Pediatric Neurology, Sao Paulo, August 2003.

Armstrong D. Pediatric neurometabolic imaging. Pediatric Neurology, Sao Paulo, August 2003.

Armstrong D. Hypoxic ischemic encephalopathy of the fetus, premature, and full term infant. Pediatric Neurology, Sao Paolo, August 2003.

Armstrong D. Craniofacial malformations. Pediatric grand rounds. Childrens Hospital, Sao Paolo, August 2003.

Armstrong D. Pediatric neurometabolic imaging. Cancer institute, Rio de Janeiro, August 2003.

Armstrong D. Posterior fossa malformations. Division of Neonatal Medicine grand rounds. U of Toronto, January 17, 2003.

Ash J. Invited Speaker, Meds 6T9 U of T Reunion, “Current Concepts in Pediatric Nuclear Medicine”. Toronto, June 12, 2004.

Atri M. MR Imaging of the andexal pathology. International Congress of Radiology. Montreal, QC. June 2004.

Atri M. Sonography of uterus in 2004. International Congress of Radiology. Montreal, QC. June 2004.

Babyn P. “Imaging of Pediatric Arthritis” Brigham & Women’s Hospital – Boston Massachusetts General Hospital March 23 – 24, 2004

Bleakney R. Musculoskeletal MRI. MRI Imaging Seminar for Family Doctors (Ontario MRI). Four Seasons Hotel, Toronto, Ontario, Canada. October 2003.

Bleakney R. MRI upper and lower extremity. The Michener Institute for Applied Health Sciences, Toronto, Ontario, Canada. November 2003.

Bleakney R. Introduction to musculoskeletal imaging and MSK imaging case review. 3rd Canadian Comprehensive Review Course in Physical Medicine & Rehabilitation. Toronto, Ontario, Canada. March 2004.

Bleakney R. MRI of the knee: Ligaments; MRI ankle: Ligaments and tendons; Imaging of the ankle: MRI or Ultrasound. MSK MR Imaging Course 2004. University of Toronto. Whistler, British Columbia, Canada. March 28-30, 2004.

Bleakney R. Musculoskeletal radiology. Bruce Tovey Lecture Series. University of Toronto, Toronto, Ontario, Canada. April 2004.

Bleakney R. Musculoskeletal radiology. The International Medical Graduate Review Lectures. University of Toronto, Toronto, Ontario, Canada. May 2004.



Bret P. Future of digital imaging: DR or CT? Twenty-Second Annual Practical Radiology at Whistler. University of British Columbia, Whistler, British Columbia, Canada. February 8-13, 2004.

Bret P. Visiting Professor. MRI of the biliary tract; Current status of pancreatic imaging (US, CT, MRI); The future of abdominal imaging; PACS infrastructure and models. Hatyai, Songkhla, Thailand. March 16, 2004.

Bret P. Visiting Professor. MRI of the biliary tract; Current status of pancreatic imaging (US, CT, MRI); The future of abdominal imaging. Khon Kaen, Thailand. March 19, 2004.

Bret P. Visiting Professor. Current status of pancreatic imaging (US, CT, MRI); Imaging and acute pancreatitis; Practical biliary imaging US versus MRI; The future of abdominal imaging; PACS infrastructure and models; PACS implementation issues; MRI of the biliary tract; MRI of the pancreas. Bangkok, Thailand. March 22-23, 2004.

Bret P. Visiting Professor. Imaging and acute pancreatitis. SGH, National University of Singapore, Singapore. March 25, 2004.

Bret P. Visiting Professor. MRI of the biliary tract. National University of Singapore, Singapore. March 26, 2004.

Bret P. Visiting Professor. Practical biliary imaging - US vs MRI. National University of Singapore, Singapore. March 29, 2004.

Bret P. Visiting Professor. Current status of pancreatic imaging; MRI of the pancreas. National University of Singapore, Singapore. April 2, 2004.

Bret P. Visiting Professor. Imaging and acute pancreatitis. National University of Singapore, Singapore. April 5, 2004.

Bret P. Visiting Professor. Future of abdominal imaging. National University of Singapore, Singapore. April 6, 2004.

Bret P. Visiting Professor. PACS infrastructure & implementation issues. SGH, National University of Singapore, Singapore. April 6, 2004.

Bret P. 23<sup>rd</sup> International Congress of Radiology. Montreal, Quebec, Canada. June 25-29, 2004.

Causar P. Update Results of MR Screening Program, Breast MRI: Structured Approach in Interpretation, 23<sup>rd</sup> International Congress of Radiology, Montreal, Quebec, June 2004.

Causar P. Breast MRI, Visiting Professor, Queen's University, Kingston, Ontario, April 2004

Causar P. Women's Imaging, Interventional Breast Ultrasound Workshop, the Marriot Hotel, February 2004

Causser P. Breast MRI Intervention, CAR, Halifax, Nova Scotia, October 2003

Causser P. Section for Magnetic Resonance Technologists, the Metro Toronto Convention Centre, Breast Imaging, July 2003

Chang M. Distinguished Seminars in Bioengineering, Institute of Biomaterials and Biomedical Engineering, University of Toronto, Toronto, Canada, 6 Nov, 2003. Magnetic Resonance Imaging for Non-Invasive Assessment of Tissue Status

Chang M. Diagnostic Imaging Grand Rounds, Hospital for Sick Children, Toronto, Canada, 14 Jan, 2004. Magnetic Resonance Image-Guided Thermal Ablative Surgery.

Chait P. Techniques of Freehand Invasive Sonography. RSNA Refresher Course Presentations, Chicago, Illinois. November 2003

Chait P. Venous Access. RSNA Refresher Course Presentations, Chicago, Illinois. November 2003

Chait P. Techniques of Invasive Sonography. RSNA Refresher Course Presentations, Chicago, Illinois. November 2003

Chait P. Minicourse: Practical Answers for Complex Imaging. RSNA Refresher Course Presentations, Chicago, Illinois. November 2003

Chait P. Pediatric Image Therapy- Where are we and what is the future? Armand Brodeur Lecture. St. Louis, MI. January 2004. New England Society of Interventional Radiology. Massachusetts's General Hospital, Boston, March 2004.

Chait P. Future of Paediatric Interventional Radiology. SIR 29<sup>th</sup> Annual Scientific Meeting, Phoenix, Arizona, March 2004.

Chait P. Moderator, Society of Interventional Radiology, Phoenix, Arizona, March 2004.

Chait P. AVIR 14<sup>th</sup> Annual Scientific Meeting- Pediatric Intervention presentation at SIR, Phoenix, Arizona, March 2004.

Chait P. Central Venous Access. Society of Interventional Radiology, Phoenix, Arizona, March 2004.

Chait P. Vascular Imaging, Department of Biophysics, University of Toronto, Sunnybrook, Hospital, Toronto, Ontario, April 2004.

Chait P. Pediatric Procedures. Ontario Society of Diagnostic Imaging Nurses. Toronto, Ontario, April 2004.

Chait P. Venous Access in Children. 23<sup>rd</sup> International Congress of Radiology. Montreal, Quebec. June 2004.

Chait P. Non Vascular Intervention in Children. 23<sup>rd</sup> International Congress of Radiology. Montreal, Quebec. June 2004.

Cheyne D. MEG studies of ADHD. NIH funded workshop on cerebeller-striatal-prefrontal dysfunction in ADHD, NYU Child Study Center, New York City, USA; July, 2003.

Connolly B. Cancer: A Multi-modality Approach: The Michener Institute for Applied Health Sciences, Toronto, Ontario. October 2003.

Connolly B. Pediatric Resident Lecture Series, The Hospital for Sick Children. Plain film interpretation and chest tube management. December 2003.

Connolly B. Fetal Medicine Group. Image Guided Therapy in Antenatal & Postnatal Pediatric Patients. Connolly B, Robinson A. April 2004.

Connolly B. Canadian Society of Pediatrics Workshop in Montreal: Nutritional Rehabilitation of the Pediatric Patient with Special Needs in the Community. Connolly B, Telch J, Issenmann R. June 2004.

Connolly B. Canadian Association of Pediatrics Workshop on gastrostomy & gastrojejunostomy tube feeds. June 2004.

Daneman A. The Royal Australian and New Zealand College of Radiologists – Kodak Visiting Professor 2003

Daneman A. iRANZCR 54<sup>th</sup> Annual Scientific Meeting Brisbane, Queensland, Australia, September 18-21, 2003

Daneman A. Lectures: An approach to imaging abdominal masses in children; Intussusception: Evolution and current concepts in diagnosis and management; Disappearing masses of the abdomen in fetuses, neonates and infants; Malrotation: Spectrum of appearances, techniques and pitfalls in diagnosis and management. Guest Faculty Kodak Professor 2003

Daneman A. Lecture: Approach to imaging the acute abdomen in children. PERTH, WESTERN AUSTRALIA Royal Perth Hospital, Perth, Australia, October 2, 2003

Daneman A. Lecture: The role of gray scale and Doppler sonography in imaging of necrotizing enterocolitis. Princess Margaret Hospital, Perth, Australia, October 3, 2003

Daneman A. Lectures: Malrotation: Spectrum of appearances, techniques and pitfalls in diagnosis and management, Cross-sectional imaging of the GI tract in children, Tutorial to Radiology Registrars, The role of gray scale and Doppler imaging in necrotizing enterocolitis. Royal Children's Hospital, Melbourne, Australia, October 13, 2003

Daneman A. Lecture: Complications related to treatment in paediatric oncology patients. Peter MacCallum Cancer Institute, Melbourne, Australia, October 13, 2003

Daneman A. Lecture: College Lecture: Imaging of the acute abdomen in pediatrics. Royal Melbourne Hospital, Melbourne, Australia, October 13, 2003

Daneman A. Lectures: Malrotation: Spectrum of appearances, techniques and pitfalls in diagnosis and management, Intussusception, An approach to renal cystic disease in children, The role of gray scale and Doppler sonography in imaging necrotizing enterocolitis, Neurosonography in premature and full-term neonates. Monash Medical Centre, Melbourne, Australia, October 14, 2003

Daneman A. Lectures: Imaging of the acute abdomen in pediatrics, Disappearing masses of the abdomen in fetuses, neonates and infants, An approach to imaging abdominal masses in pediatrics, The role of gray scale and Doppler imaging in necrotizing enterocolitis. Star Ship Children's Hospital, Auckland, New Zealand, October 16-17, 2003

Daneman A. Lectures: An approach to imaging the acute abdomen in children, An approach to renal cystic disease in children, Hyperechoic renal pyramids in children: Spectrum of appearances related to etiology, Cross-sectional imaging of the GI tract in children, An approach to imaging congenital bowel obstruction. Australian society of paediatric imaging 2003 conference Noosa, Queensland, Australia, September 22-24, 2003

Daneman A. Refresher Course Faculty Advances in Pediatric Doppler Sonography. Radiological Society of North America Chicago, Illinois, USA, December 3, 2003

Daneman A. 47<sup>th</sup> Annual meeting of the society for Pediatric radiology. Savannah, Georgia, USA, April 27-28, 2004.

Daneman A. Lecture: Neurosonography in Premature and Term Infants. Lakeridge Health Corporation - Oshawa General Site, September 3, 2003.

Daneman A. Lecture: Endocrine Imaging in Pediatrics. Endocrinology Department Rounds, The Hospital for Sick Children, March 5, 2004.

Daneman A. Lectures: Acute Abdomen in Pediatrics (30 minutes), Sonography of the Neonatal Abdomen. Ontario Society of Diagnostic Medical Sonographers Spring Meeting, April 17, 2004.

Daneman A. Lecture: An Approach to Imaging Abdominal Masses in Children. Paediatric Residents Education Day, The Hospital for Sick Children, May 5, 2004.

Daneman A. Lectures: Acute abdomen in neonates including congenital bowel obstruction, Acute abdomen in older children including intussusception, malrotation and Meckel diverticulum and appendicitis, An approach to imaging abdominal masses in children. Resident lectures McMaster University Health Centre, June 2, 2004.

Daneman A. Lecture: Thyroid Ultrasound. Endocrinology Department Rounds, The Hospital for Sick Children, June 11, 2004.

Dill-Macky MJ. MRI: post-operative breast. 66th Annual Scientific Meeting of the Canadian Association of Radiologists. Halifax, Nova Scotia, Canada. October 2003.

Doria A. Reliability assessment of three MRI scoring systems: Denver, European and combined scales. International Prophylaxis Study Group Workshop – Toronto, ON. 2003

Doria A. Hypothesis-Driven Research. 45<sup>th</sup> Annual Meeting of the Society for Pediatric Radiology Workshop – San Francisco, CA, USA 2003

Doria A. Recommendations of the MRI Working Group. International Prophylaxis Study Group Workshop – Montreal, PQ. (2003)

Doria A. Meta-Analysis and Structured Literature Review. Refresher Course – Critical Thinking Skills: Evidence-Based Radiology – 52<sup>nd</sup> Annual Meeting of the Association of University Radiologists – San Francisco, CA, USA. 2004

Fong KW. The 11-14 week scan: screening for chromosomal & structural abnormalities. Canadian Association of Radiologists 66th Annual Meeting. Halifax, Nova Scotia, Canada. October 1-4, 2003.

Fong KW. (Hands-on workshop-Refresher Course Faculty) Venous doppler sonography: visceral and extremity applications. Radiological Society of North America - 89<sup>th</sup> Scientific Assembly and Annual Meeting. Chicago, Illinois, USA. November 30-December 5, 2003.

Hanbidge A. CT of the pancreas. Annual Meeting of the Canadian Association of Radiologists. Halifax, Nova Scotia, Canada. October 2003.

Hanbidge A. (Refresher Course) Sonographic Evaluation: The Acute Abdomen of Hepato-Biliary Origin. Annual Meeting of the Radiological Society of North America. Chicago, Illinois, USA. December 2003.

Hanbidge A. Role of ultrasound 2004: Ovary. International Congress of Radiology. Montreal, Quebec, Canada. June 2004.

Hanbidge A. Co-Presenter. Celebrity jeopardy. International Congress of Radiology. Montreal, Quebec, Canada. June 2004.

Ho CS, Kachura JK, Greig PD, Gallinger S, Grant D, McGilvray I, Knox J, Sherman M, Wong F, Wong D. Percutaneous ethanol injection of medium and large hepatomas using a multi-pronged needle: efficacy and safety. CIRSE. 2004.

Ho CS. Self-expandable metallic biliary stents with permanent access. (Scholarly Address) The International Congress of Radiology. Montréal, Quebec, Canada. June 25, 2004.

Jaffer N. The role of multislice CT in the diagnosis of GI pathology. The Aga Khan Hospital Clinical Meeting. Nairobi, Kenya. January 8, 2004.

Jaffer N. Introduction to virtual colonoscopy. Ontario Association of Radiologists. Oakville, Ontario, Canada. May 16, 2004.

John P. Intestinal failure: Chronic complications and clinical management NIDDK Intestinal Failure Workshop, American Society for Parenteral and Enteral Nutrition, Feb 2004

John P. Liver Intervention The Society for Pediatric Radiology, 47<sup>th</sup> Annual Meeting, Savannah, Georgia, April 2004.

Jong R. Digital Mammography: The Radiologist's Perspective International Congress of Radiology, Montreal, Quebec June 25-29, 2004.

Jong R. Breast Imaging for the Family Physician. Controversies in the Etiology, Detection and Treatment of Breast Cancer, Toronto, Ontario, June 10-11, 2004.

Jong R. Digital Mammography 2003. Canadian Association of Radiologists Annual Scientific Meeting, Halifax, Nova Scotia, October 4, 2003.

Jong R. Breast Imaging Update 2003, Montreal, Quebec August 2003

- a) Masses
- b) Problem Solving in Mammography
- c) Controversies in Ultrasound
- d) Digital Mammography – Radiologist's Perspective
- e) Magnetic Resonance Imaging & Screening

Kachura JR. Case discussion: peripheral vascular disease. Transfemoral Endovascular Aneurysm Management Symposium. Victoria, British Columbia, Canada. October 22, 2003.

Kachura JR. Tumor ablation with radiofrequency, cryotherapy or microwave systems (hands-on workshop). Society of Interventional Radiology, 29<sup>th</sup> Annual Scientific Meeting. Phoenix, Arizona, USA. March 27, 2004.

Kachura JR. Radiofrequency ablation of renal cell carcinoma in 2004. Urology Research Rounds. Princess Margaret Hospital, Toronto, Ontario, Canada. May 5, 2004.

Kachura JR. Course Co-Director. Interventional oncology in liver disease – an overview. Tumor Ablation Workshop. Toronto, Ontario, Canada. May 27-28, 2004.

Kachura JR. Course Co-Director. Hepatic transarterial chemoembolization (TACE). Tumor Ablation Workshop. Toronto, Ontario, Canada. May 27-28, 2004.

Kachura JR. Course Co-Director. Radiofrequency ablation – an overview. Tumor Ablation Workshop. Toronto, Ontario, Canada. May 27-28, 2004.

Kachura JR. Course Co-Director. RFA - lung. Tumor Ablation Workshop. Toronto, Ontario, Canada. May 27-28, 2004.

Kachura JR. Course Co-Director. RFA - kidney. Tumor Ablation Workshop. Toronto, Ontario, Canada. May 27-28, 2004.

Kachura JR. Course Co-Director. Animal lab (hands-on). Tumor Ablation Workshop. Toronto, Ontario, Canada. May 27-28, 2004.

Kachura JR. New horizons for interventional radiology: IR in Oncology. 23<sup>rd</sup> International Congress of Radiology. Montreal, Quebec, Canada. June 27, 2004.

Kassel EE. Basic concepts of CT scanning and recent advances in head and neck imaging. American Association of Oral and Maxillofacial Surgeons 85th Annual Meeting. Orlando, Florida, USA. September 11, 2003.

Kassel EE. Salivary neoplasia: Imaging and clinical implications. American Society of Head and Neck Radiology Annual Conference. Palm Springs, California, USA. October 3, 2003.

Kassel EE. Advances of CT and MR applicable to the oral cavity, oropharynx, facial bones and jaws. Anderson Honour Society. Faculty of Dentistry, University of Toronto, Toronto, Ontario, Canada. January 20, 2004.

Kassel EE. Update on CT/MRI of thyroid masses and malignancies. Thyroid Day. University of Toronto, Mount Sinai Hospital, Toronto, Ontario, Canada. June 11, 2004.

Keller A. Basic concepts of MRI scanning and recent advances in imaging of soft tissue masses. American Association of Oral and Maxillofacial Surgeons Meeting. Orlando, Florida, USA. September 11, 2003.

STAR International Teaching Program – Bangkok, Thailand. November 2003.

- (a) CNS infections
- (b) The pituitary gland
- (c) MRI physics
- (d) Expert film panel

International Diagnostic Course Davos (IDKD). Davos, Switzerland. March 2004. The pituitary gland and central skull base. (I was evaluated as best teacher out of 40 internationally recognized faculty).

ISMRM 12<sup>th</sup> Annual Meeting. Kyoto, Japan. May 2004. “Spin gymnastics”.

The Shanghai Workshop. Shanghai, China. May 2004. iMRI for guidance of neurological procedures.

International Society of Magnetic Resonance in Medicine (ISMRM) 11<sup>th</sup> Annual Meeting. Toronto, Canada. July 2004. “Spin gymnastics”.

Lax M. Shoulder imaging: MRI or ultrasound? University of Toronto - MSK MR Imaging Course 2004. Whistler, British Columbia, Canada. March 28-30, 2004.

Lax M. MRI of the elbow: Common pathology. University of Toronto - MSK MR Imaging Course 2004. Whistler, British Columbia, Canada. March 28-30, 2004.

Lee SK. Diagnosis and management of neuro-vascular emergencies. Iowa Radiological Society 2003 Fall Meeting. University of Iowa Hospitals and Clinics, Iowa City, IA, USA. October 18, 2003.

Lee SK. Endovascular management of epistaxis. Grand Rounds. Department of Otorhinolaryngology, University of Iowa Hospitals and Clinics, Iowa City, IA, USA. December 9, 2003.

Lee SK. Matrix and neuroform stent in the intracranial aneurysm management, the University of Iowa experience. Asian Australasian Federation of Interventional and Therapeutic Neuroradiology. Bangkok, Thailand. March 26, 2004.

Macgowan C. Evaluation of Pulmonary Blood Flow Guest Speaker, Toronto, Canada – May 5, 2004. Sponsor: Sunnybrook and Women’s College Health Sciences Centre.

Macgowan C. How to Minimize Magnetic-Resonance Artifacts Pediatric Cardiovascular MR Symposium, Houston, Texas, USA – April 5, 2004. Sponsor: Society for Pediatric Radiology.

Macgowan C. How to Minimize Magnetic-Resonance Artifacts Pediatric Cardiovascular MR Symposium, Toronto, Canada – October 29, 2003. Sponsor: Society for Pediatric Radiology.

Macgowan C. MR Protocol for the Evaluation of Blood Flow Pediatric Cardiovascular MR Symposium, Toronto, Canada – October 26, 2003. Sponsor: Society for Pediatric Radiology.

Macgowan C. Cardiovascular Applications of MRI Toronto MRI Scientific Retreat, Toronto, Canada – October 02, 2003. Sponsor: Sunnybrook & Women’s College Health Sciences Centre.

Macgowan C. Real-Time Hemodynamic Assessment by MRI Real-Time Cardiac MRI Workshop, Toronto, Canada – July 10, 2003. Sponsors: Ontario Consortium for Cardiac Imaging, GE Medical Systems, Ontario Research and Development Challenge Fund.

Macgowan C. How to Minimize Magnetic Resonance Imaging Artifacts Department of Diagnostic Imaging Academic Rounds, Toronto, Canada – September 29, 2003. The University of Toronto & The Hospital for Sick Children.



Macgowan C. Magnetic Resonance Blood-Flow Evaluation Department of Diagnostic Imaging Academic Rounds, Toronto, Canada – September 22, 2003. The University of Toronto & The Hospital for Sick Children.

MacDonald C. Symposium on Pediatric Cardiovascular MR. MR Evaluation of Pediatric Cardiac Tumors The Hospital for Sick Children October 2003

Manson D. Approach to mediastinal masses. Presented to Division of Haematology/ Oncology. The Hospital for Sick Children, September 17, 2003.

Manson D. Contemporary Imaging Techniques and the Pediatric Abdomen. Pediatric Clinics Day of William Osler Health Centre Retreat. Niagara Falls, Ontario, November 1, 2003.

Manson D. Approach to Common Pediatric Pneumonia and Neonatal Chest + Resident Case Review. ½ day Invited Lecturer for Radiology Residents, McMaster University Health Sciences Centre. Hamilton, Ontario, February 18, 2004.

Mikulis D. MRI hyperacute ischemic stroke. 11<sup>th</sup> Scientific Meeting and Exhibition, International Society of Magnetic Resonance in Medicine (ISMRM). Toronto, Ontario, Canada. July 12, 2003.

Mikulis D. Imaging cerebral infections. 36<sup>th</sup> International Diagnostic Course (IDKD 36). Davos, Switzerland. March 26-April 3, 2004.

Mikulis D. Reactivity and oxygen extraction fraction. American Society of Neuroradiology 2004. Seattle, Washington, USA. June 2004.

Moody A. International Society of Thrombosis and Haemostasis, Birmingham, 2003.

Moody A. British Association of Emergency Medicine, Nottingham, 2003.

Moody A. Japanese Atherosclerosis Society: MRI of Atheroma, 2004.

Moody A. MRA Club, London, Ontario

Moody A. Mount Sinai School of Medicine, New York. Advanced Imaging Program Seminar Series, March 2004.

Navarro O. Visiting Professor, Queen's University, Kingston. Neonatal Gastrointestinal Imaging. June 29, 2004

O'Malley ME. Multidetector CT of the kidneys and urinary tract. Canadian Association of Radiologists 66<sup>th</sup> Annual Scientific Meeting. Halifax, Nova Scotia, Canada. October 2003.

O'Malley ME. Update on renal and urinary tract imaging. Grand Rounds. North York General Hospital, Toronto, Ontario, Canada. April 2004.

Oudjhane K. MRI of Inflammatory Myopathies in children. The 30th Annual Refresher Course , The International Skeletal Society, San Francisco ,CA, Sept 17-20, 2003.

Provost Y. Cardiac CT and CTA: Technique and clinical applications. Canadian Cardiovascular Congress, XIX InterAmerican Congress of Cardiology. Toronto, Ontario, Canada. October 27, 2003.

Provost Y. Coronary plaque characterization using multidetector CT: Technique, benefits and limitations. 3<sup>rd</sup> Annual Imaging Symposium. Toronto, Ontario, Canada. March 3, 2004.

Provost Y. MRI in congenital heart disease. 23<sup>rd</sup> International Congress of Radiology. Montréal, Québec, Canada. June 2004.

Rajan DK. Management of dysfunctional autogenous fistulas.10th Annual Interventional Radiology and Vascular Imaging 2001. Department of Radiology, University of Pennsylvania, Philadelphia, PA, USA. September 2003.

Rajan DK. Temporary filters - should they stay or should they go. 10th Annual Interventional Radiology and Vascular Imaging 2001. Department of Radiology, University of Pennsylvania, Philadelphia, PA, USA. September 2003.

Rajan DK. Management of thoracic dissection with colonic stents. TEAMS (Transfemoral Endovascular Aneurysm Management Symposium) 2003. University of Sherbrooke, Victoria, British Columbia, Canada. October 2003.

Rajan DK. Venous foreign body retrieval techniques. TEAMS (Transfemoral Endovascular Aneurysm Management Symposium) 2003. University of Sherbrooke, Victoria, British Columbia, Canada. October 2003.

Rajan DK. Management of dialysis fistulas. 23<sup>rd</sup> Annual International Congress of Radiology. Montreal, Quebec, Canada. June 2004.

Ranson M. Organ Imaging Review “Imaging of Paediatric Musculoskeletal Trauma” September 10, 2003.

Ranson M. DI Grand Rounds, HSC “Pediatric Musculoskeletal Trauma” October 22, 2003

Ranson M. Dept. of Rheumatology Imaging of Rheumatologic Diseases March 16, 2004 and May 18, 2004

Roberts HC. Perfusion imaging: CT vs. MR. 11<sup>th</sup> Scientific Meeting and Exhibition, International Society of Magnetic Resonance in Medicine (ISMRM). Toronto, Ontario, Canada. July 2003.

Roberts HC. Visiting Professor. Chest radiography - basics. University of Buffalo, New York, USA. August 2003.

Roberts HC. Visiting Professor. Portable chest radiography. University of Buffalo, New York, USA. August 2003.

Roberts HC. Rao A, Boylan C, Chung TB, Paul N. Utility of automated growth rate analysis for lung nodules scanned with routine computed tomography. 89<sup>th</sup> Annual Meeting Radiological Society of North America. Chicago, Illinois, USA. November 30-December 5, 2003.

Roberts HC. Visiting Professor. Oncologic diseases of the chest. University of Buffalo, New York, USA. February 2004.

Roberts HC. Visiting Professor. High resolution CT of the chest. University of Buffalo, New York, USA. February 2004.

Roberts HC. Visiting Professor. Vascular diseases of the chest. University of Buffalo, New York, USA. February 2004.

Roberts HC. Visiting Professor. Lung cancer screening. University of Buffalo, New York, USA. February 2004.

Salem S. The adnexal mass - sonographic evaluation. Canadian Association of Radiologists Annual Meeting. Halifax, Nova Scotia, Canada. October 1-5, 2003.

Salem S. Sonography of the early first trimester. Women's Imaging: Advances in Gynaecologic Imaging and Transvaginal Ultrasound. University of Toronto, Toronto, Ontario, Canada. February 2004.

Salem S. The role of ultrasound in the management of thyroid nodular disease. Management of Thyroid Nodular Disease and Cancer. University of Toronto, Toronto, Ontario, Canada. June 2004.

Salonen D. MRI of the shoulder: rotator cuff. International Society for Magnetic Resonance in Medicine, Educational Courses – Sports Medicine MR Imaging: Clinical and Technical Update. Toronto, Ontario, Canada. July 10-11, 2003.

Salonen D. Visiting Professor. MR imaging of shoulder: Rotator cuff. Memorial University of Newfoundland, St. John's, Newfoundland, Canada. March 3-4, 2004.

Salonen D. Pre & post operative assessment of the knee:Ligaments. Dr. Patrick J. McManamon Memorial Lectureship Newfoundland and Labrador Association of Radiologists: Spring Meeting. Corner Brook, Newfoundland, Canada. March 5-7, 2004.

Salonen D. Imaging assessment of shoulder instability. NLAR Guest Speaker Newfoundland and Labrador Association of Radiologists: Spring Meeting. Corner Brook, Newfoundland, Canada. March 5-7, 2004.

Salonen D. MR shoulder: Rotator cuff. MSK MR Imaging Courses 2004: Clinical Musculoskeletal MRI: Current Concepts and Emerging Trends. Whistler, British Columbia, Canada. March 28-30, 2004.

Salonen D. MR shoulder: Labrum/Ligaments. MSK MR Imaging Courses 2004: Clinical Musculoskeletal MRI: Current Concepts and Emerging Trends. Whistler, British Columbia, Canada. March 28-30, 2004.

Salonen D. MR wrist: Common disorders. MSK MR Imaging Courses 2004: Clinical Musculoskeletal MRI: Current Concepts and Emerging Trends. Whistler, British Columbia, Canada. March 28-30, 2004.

Shroff M. Pediatric Neuroradiology Resident Teaching Session: Milwaukee, 1<sup>st</sup> August 2003

Shroff M. Lecture on: Pediatric Cervical Spine Trauma: 2 pm to 3 pm , followed by “ Pediatric Neuroradiology Quiz for Residents: 3.15 pm to 5.00 pm. McMaster University, Hamilton., 24<sup>th</sup> September 2003

Shroff M. CME talk on “Neonatal CT and MRI: 4th October 2003, Annual conference of Canadian Association of Radiology at Halifax., Nova Scotia, Canada.

Shroff M. CME talk on “Pediatric Cervical Spine Trauma” : 4th October 2003 , Annual Conference of Canadian Association of Radiology, at Halifax, Nova Scotia, Canada

Shroff M. Invited lecture in the plenary session of the 57<sup>th</sup> Annual Congress, Indian Radiological & Imaging Association, January 11<sup>th</sup>, 2004, Hyderabad, India, on “Imaging of Pediatric Stroke”

Shroff M. “Neonatal CT & MRI” & Discussion of “Interesting Neuroradiology Cases”, at P.D. Hinduja National Hospital, Mumbai, India, 6<sup>th</sup> January 2004.

Shroff M. Chest and Skull: Interpreting the Shadows, at Michener Institute, Toronto: MRI of the brain: the basics and beyond including neonatal MRI. 17<sup>th</sup> April 2004.

Shroff M. Alberta Children’s Hospital, Calgary; 3 day visiting professor program: which included case discussions in the morning and 3 hours resident teaching sessions on every day in the afternoon, and lectures at noon time. Lectures given were: Imaging of Pediatric Stroke, Neonatal CT & MRI imaging, Imaging of Inherited Metabolic diseases: 17<sup>th</sup> to 19<sup>th</sup> March 2004

Shroff M. McMaster University, Hamilton,: Resident teaching Quiz session and lecture on “Pediatric Cervical Spine trauma” – 12<sup>th</sup> May 2004.

Shroff M. Queen's University, Kingston, Canada, 20<sup>th</sup> & 21 May 2004: Visiting Professor to their Department of Radiology with two days of lectures and case presentations for their residents and a lecture for all radiology staff on "Pediatric Stroke"

Shroff M. CME lecture at the "23<sup>rd</sup> International Congress of Radiology" at Montreal, June 25-29, 2004: "CNS infections in Children".

terBrugge K. Natural history of DAVs; Venous injuries thromboses and hemorrhages; DAVs and cortical venous drainage; Spontaneous thrombosis; Post op trauma (pituitary surg); Abused children, para spinal and epidural lesions; spinal cord vascular tumours; SC cavernoma, hemangioblastomas; Para spinal AVM, DAVs sacral; SCAVM. 2003-2004 International Master Degree in Neurovascular Diseases. Chiangmai, Thailand. November 9-14, 2003.

terBrugge K. Classification of DAVMs. ABC/WIN 2004. Val d'Isère, France. January 11-16<sup>th</sup> 2004.

terBrugge K. Angioarchitectonic analysis and partial targeted embolization of brain AVMs; Intracranial dural AVFs: classification, natural history, angioarchitecture and indications for endovascular treatment. 12<sup>th</sup> Zurich Course on Interventional Neuroradiology. Zurich, Switzerland. March 4-6, 2004.

terBrugge K. Management of occlusive vascular diseases. "Should we dilate all the narrowing?" 6<sup>th</sup> Meeting Asian-Australian Federation of Interventional and Therapeutic Neuroradiology. Bangkok, Thailand. March 25-27, 2004.

terBrugge K. Current management of brain AVM. "What do we discuss about partial treatment?" 6<sup>th</sup> Meeting Asian-Australian Federation of Interventional and Therapeutic Neuroradiology. Bangkok, Thailand. March 25-27, 2004.

terBrugge K. DAV shunt: Classification and management. 6<sup>th</sup> Meeting Asian-Australian Federation of Interventional and Therapeutic Neuroradiology. Bangkok, Thailand. March 25-27, 2004.

terBrugge K. Ante-natal neuroradiology and vascular lesion, Pial AVMs management; Aneurysms in children, VGAM; HHT; Imaging strategies; Carotid asymptomatic; thrombophlebitis; Dissections; Vertebro-basilar insufficiency. 2003-2004 International Master Degree in Neurovascular Diseases. Chiangmai, Thailand. March 28-April 2, 2004.

Traubici J. DI Grand Rounds, HSC Autosomal Recessive Polycystic Kidney Disease. March 10, 2004

White L. MR imaging in the postoperative orthopedic patient: Technical considerations. Categorical Course Lecture. Controversies and Advances in Musculoskeletal MRI Course. 11<sup>th</sup> Scientific Meeting and Exhibition, International Society for Magnetic Resonance in Medicine (ISMRM). Toronto, Ontario, Canada. July 2003.

White L. Bone growth and development. Pathology/Radiology Refresher Course Lecture. International Skeletal Society (ISS) Annual Meeting. San Francisco, California, USA. September 17-20, 2003.

White L. Visiting Professor. Pre and postoperative MR imaging assessment of the cruciate ligaments. Department of Medical Imaging, Queens University, Kingston, Ontario, Canada. October 30, 2003.

White L. Categorical Course in Diagnostic Radiology: Musculoskeletal Imaging: Exploring New Limits - MR Imaging at the Fringe: MR Imaging in the Vicinity of Orthopedic Hardware. 2003 Scientific Assembly and Annual Meeting of the Radiologic Society of North America. Chicago, Illinois, USA. December 3, 2003.

White L. Guest Faculty. MRI of the knee: Traumatic injury of the menisci and articular cartilage. New York University Department of Radiology 22<sup>nd</sup> Annual Morton Bosniak CT/MRI: Head to Toe Conference. New York, New York, USA. December 19<sup>th</sup>, 2003.

White L. Guest Faculty. MRI of the knee ligaments. New York University Department of Radiology 22<sup>nd</sup> Annual Morton Bosniak CT/MRI: Head to Toe Conference. New York, New York, USA. December 19<sup>th</sup>, 2003.

White L. Guest Faculty. MRI of the postoperative knee. New York University Department of Radiology 22<sup>nd</sup> Annual Morton Bosniak CT/MRI: Head to Toe Conference. New York, New York, USA. December 19<sup>th</sup>, 2003.

Willinsky R. Intracranial dural arteriovenous shunts: etiology and angioarchitecture & natural history. AANS/CNS CV Section & the ASITN Joint Annual Meeting. San Diego, California, USA. February 1-4, 2004.

Willinsky R. Intracranial dural arteriovenous shunts and venous congestive encephalopathy: clinical and radiological findings. AANS/CNS CV Section & the ASITN Joint Annual Meeting. San Diego, California, USA. February 1-4, 2004.

Willinsky R. Spinal dural arteriovenous fistula: angioarchitecture and the role of gadolinium enhanced MRA. AANS/CNS CV Section & the ASITN Joint Annual Meeting. San Diego, California, USA. February 1-4, 2004.

Willinsky R. Evaluation of the cerebral vessels. 36<sup>th</sup> International Diagnostic Course. Davos, Switzerland. March 29-April 2, 2004.

Willinsky R. Anterior circulation aneurysm distal to the paraclinoid location-endovascular treatment-complication and efficacy-which patients should be treated with embo and how effective is the treatment? Neurovascular update: Aneurysms: Current Challenges and Future Directions. Harvard Medical School, Boston, Massachusetts, USA. June 17-18, 2004.

Willinsky R. Review of dissection diagnosis/presumptive diagnosis. Canadian Chiropractic Protective Association- Legal Conference. June 25-26, 2004.

Willinsky R. Spinal vascular malformations and fistulae: Diagnosis and treatment. 23<sup>rd</sup> International Congress of Radiology. Palais des Congrès de Montréal. Montréal, Québec. Canada. June 25-29, 2004.

Wilson S. Ultrasound contrast agent for liver mass evaluation: Diagnostic algorithms and concordance with CT and MR. Royal College of Radiologists 2003 Annual Meeting. London, England. September 2003.

Wilson S. Right lower quadrant pain: Not always acute appendicitis. Royal College of Radiologists 2003 Annual Meeting. London, England. September 2003.

Wilson S. Staging rectal cancer in women: Transvaginal or transrectal sonography. Society of Radiologists in Ultrasound, 13<sup>th</sup> Annual Meeting and Postgraduate Course “Advances in Sonography”. Chicago, Illinois, USA. October 2003.

Wilson S. Gut evaluation: Does sonography play a role? Society of Radiologists in Ultrasound 13<sup>th</sup> Annual Meeting and Postgraduate Course “Advances in Sonography”. Chicago, Illinois, USA. October 2003.

Wilson S. Ultrasound - State of the Art 2003. 54<sup>th</sup> Annual Meeting of the American Association for the Study of Liver Diseases. Boston, Massachusetts, USA. October 2003.

Wilson S. Evaluation of hepatic nodules: Pathologist or Radiologist or both. 54<sup>th</sup> Annual Meeting of the American Association for the Study of Liver Diseases. Boston, Massachusetts, USA. October 2003.

Wilson S. Ultrasound of the benign and malignant structures of the biliary tree. Harrogate, England, BMUS. December 2003.

Wilson S. Gut evaluation: Does sonography play a role? Harrogate, England, BMUS. December 2003.

Wilson S. Microbubbles: The future: Characterization of focal liver lesions with ultrasound contrast, the way forward? Harrogate, England, BMUS. December 2003.

Wilson S. Right lower quadrant pain: Not always acute appendix. Radiological Society of North America Meeting. Chicago, Illinois, USA. December 2003.

Wilson S. A bowel wall looks thickened: What does that mean? Radiological Society of North America Meeting. Chicago, Illinois, USA. December 2003.

Wilson S. Sonography for jaundice. “Curso Internacional de Imagenologia”. Mexico City, Mexico. January 15-17, 2004.

Wilson S. Sonography of the gut. “Curso Internacional de Imagenologia”. Mexico City, Mexico. January 15-17, 2004.

Wilson S. The acute abdomen of hollow visceral origin. “Curso Internacional de Imagenologia”. Mexico City, Mexico. January 15-17, 2004.

Wilson S. Microbubble contrast agents for the liver mass imaging. “Curso Internacional de Imagenologia”. Mexico City, Mexico. January 15-17, 2004.

Wilson S. Visiting Professor. Detroit Regional Universities. Detroit, Michigan, USA. February 2004.

Wilson S. Visiting Professor. St. Joseph Mercy Oakland. Pontiac, Michigan, USA. February 20, 2004.

Wilson S. Visiting Professor. University of Florida. Jacksonville, Florida, USA. February 27, 2004.

Wilson S. Abdominal radiology: Generalist or specialist? ARC, The Society of Gastrointestinal Radiologists. Scottsdale, Arizona, USA. March 7 -12, 2004.

Wilson S. Sonography of the acute abdomen. ARC, The Society of Gastrointestinal Radiologists. Scottsdale, Arizona, USA. March 7 -12, 2004.

Wilson S. Microbubbles contrast agents for sonography-Liver mass characterization and detection. SLMAS Day Symposium 2004. St. Louis, Missouri, USA. March 20, 2004.

Wilson S. Liver sonography: Fat or fibrosis? Hepatology Update 2004. Toronto, Ontario, Canada. April 23, 2004.

Wilson S. Ultrasound of the GI tract. American Roentgen Ray Society, 104<sup>th</sup> Annual Scientific Meeting. Miami, Florida, USA. May 2-7, 2004.

Wilson S. Diagnosis algorithms and concordance with CT/MR scans. 23<sup>rd</sup> International Congress of Radiology of the International Society of Radiology. Montreal, Quebec, Canada. June 25-29, 2004.

Wilson S. Gut evaluation - Is there a role for sonography? 23<sup>rd</sup> International Congress of Radiology of the International Society of Radiology. Montreal, Quebec, Canada. June 25-29, 2004.

Wilson S. Abdominal Imaging Quiz. “Celebrity Jeopardy”. 23<sup>rd</sup> International Congress of Radiology of the International Society of Radiology. Montreal, Quebec, Canada. June 25-29, 2004.



Yip M, Jong RA, Hendrick RE, Wolfman J, Zeng X, Stapleton S, Curpen B, Causer P, Kornecki A, Ali A, Shen S, Yaffe MJ. Preliminary Results: Efficacy of a Digital Mammographic CAD System, International Workshop on Digital Mammography, Durham, North Carolina June 18-21, 2004.

Yoo SJ. Fetal cardiac imaging. University of Toronto, Refresher Course on Obstetrics and Gynecological Ultrasound September, 24-26, 2003

Yoo SJ. MRI evaluation of pulmonary circulation. Society of Asia-Oceanianic Pediatric Radiology Congress September, 24-26, 2003

Yoo SJ. Postoperative MR evaluation of congenital heart disease. Society of Asia-Oceanianic Pediatric Radiology Congress September, 24-26, 2003

Yoo SJ. Pediatric CT and MR Pediatric Grand Round, Seoul National University, Seoul, Korea September 23, 2003

Yoo SJ. Fetal aortic arch anomaly. Samsung Cheil Women's Health Care Center, Seoul, Korea September 24, 2003

Yoo SJ. MRI evaluation of pulmonary circulation. Sejong Heart Institute September 19, 2003

Yoo SJ. MRI Evaluation of pulmonary circulation. Canadian Association of Radiology Congress, Halifax October 3, 2003

Yoo SJ. Pediatric cardiac CT and MR. Canadian Association of Radiology Congress, Halifax October 3, 2003

Yoo SJ. MRI evaluation of pulmonary circulation. Radiology Grand Round, Cornell University, New York October 16, 2003

Yoo SJ. Plain film interpretation of congenital heart disease Resident and Fellow Round, Cornell University, New York October 16, 2003

Yoo SJ. Normal cardiac anatomy for imaging. SPR Symposium on Pediatric Cardiovascular MR Oct 25-29, 2003

Yoo SJ. Postoperative MR evaluation. SPR Symposium on Pediatric Cardiovascular MR Oct 25-29, 2003

Yoo SJ. Pediatric cardiovascular MR practicum. SPR Symposium on Pediatric Cardiovascular MR Oct 25-29, 2003

Yoo SJ. Case-based review, pediatric, cardiovascular. Radiological Society of North America, Chicago November 29-December 5, 2003

Yoo SJ. Normal cardiac anatomy for imaging. Resident and Fellow Round, Women's and Children's Hospital, Buffalo January 9, 2004

Yoo SJ. Plain film interpretation of congenital heart disease Resident and Fellow Round, Women's and Children's Hospital, Buffalo January 9, 2004

Yoo SJ. Pediatric cardiac MR. Women's and Children's Hospital, Buffalo January 9, 2004

Yoo SJ. Normal cardiac anatomy for imaging. 2<sup>nd</sup> SPR Symposium on Pediatric Cardiovascular MR, Houston April 1-5, 2004

Yoo SJ. Sequential segmental approach to congenital heart disease. 2<sup>nd</sup> SPR Symposium on Pediatric Cardiovascular MR, Houston April 1-5, 2004

Yoo SJ. Postoperative MR evaluation. 2<sup>nd</sup> SPR Symposium on Pediatric Cardiovascular MR, Houston April 1-5, 2004

Yoo SJ. Pediatric Cardiovascular MR Practicum. 2<sup>nd</sup> SPR Symposium on Pediatric Cardiovascular MR, Houston April 1-5, 2004

Yoo SJ. Cardiac CT. 2<sup>nd</sup> SPR Symposium on Pediatric Cardiovascular MR, Houston April 1-5, 2004

Yoo SJ. Basic MR cardiac functional evaluation. Society for Pediatric Radiology, Refresher Course, Savannah April 27-May 1, 2004

Yoo SJ. Future trends, cardiac imaging. 23<sup>rd</sup> Congress of Radiology, Montreal June 25-29, 2004

## SCIENTIFIC PRESENTATIONS: PEER-REVIEWED PAPERS, POSTERS AND EXHIBITS

Armstrong B. Neuroimaging: The Latest Developments for Determining Timing, Causation, and Liability of the Events Leading to Irreversible Brain Damage. Presented at The Canadian Institute's 10<sup>th</sup> Annual Obstetric Malpractice. March 29, 2004. Toronto.

Armstrong D, Krafchik B, Phillips J. Hemangiomas and Vascular Malformations. Paediatric Update 2004. The Hospital for Sick Children. April 21-24, 2004.

Armstrong D, Rafay MF, MacGregor DL, deVeber G. Craniocervical Arterial Dissection: Children are Different. poster presentation. Presented at the Annual Neurology Research Day (2004).

Armstrong D, Rafay MF, Dirks P, Logan W, Shroff M, Anderson P, de Veber G. "Patterns of Cerebral Ischemia in Children with Moyamoya". Presented at the Annual Neurology Research Day (2004).

Babyn P, Cartwright L, Cheng M, Chen J, Sherman C, Yeger H, Farhat W. "Dynamic Magnetic Resonance Imaging: a Non-invasive Method to Assess Progress of Neovascularization in Tissue Engineered Bladder Constructs," 2004 Annual Surgical Services Residents/Fellows Research Competition, Hospital for Sick Children, Toronto, Canada, 21 May, 2004.

Babyn P, Doria AS, Amernic H, Dick P, Chait P, Ungar W. 2004 - 46<sup>th</sup> Annual Meeting of the Society for Pediatric Radiology – Savannah, GA, USA. Cost-effectiveness analysis of appendicitis assessment in a tertiary pediatric hospital (abstract). *Pediatr Radiol* 2003; 34 (Suppl. 1): S36

Babyn P, Doria AS, Gahunia H, Jong R, Pritzker K, Foster FS. 2004 - 46<sup>th</sup> Annual Meeting of the Society for Pediatric Radiology – Savannah, GA, USA. Multimodal imaging of cartilaginous lesions of the knee: comparison among macroscopy, MRI, US biomicroscopy (UBM) and histology. (abstract). *Pediatr Radiol* 2003; 34 (Suppl. 1): S49

Babyn P, Doria AS, Amernic H, Dick P, Chait P, Ungar W. 2004 – 1<sup>st</sup> Annual Meeting of the Canadian Association for Health Services and Policy Research – Montreal, PQ. Cost-effectiveness analysis of a weekday versus a weeknight/weekend shift program for assessment of appendicitis (abstract). Proceedings of the Inaugural Conference of the Canadian Association for Health Services and Policy Research, Montreal, QC, Canada

Babyn PS, Jarrín J, Daneman A, Epelman MS, Navarro OM. Ultrasound of the neonatal brain: A comprehensive illustrated guide – A multimedia CD ROM based teaching file. Radiological Society of North America 89<sup>th</sup> Scientific Assembly Chicago, Illinois, USA, November 30 – December 5, 2003

Babyn PS, Epelman M, Kellenberger CJ, Miller SF, Oudjhane K. Imaging of the inguinal canal in children, what surprises can we find there? Scientific poster ,The 47th Annual Meeting of the Society for Pediatric Radiology, Savannah , Georgia , April 2004 Abstract: Pediatric Radiology (2004) 34; S1: S84

Babyn PS, Tse SML, Doria AS, Boros C, Parker S, Feldman B, Laxer RM. 2003 – Park City and Beyond IX – Annual Meeting of the American Academy of Pediatrics - Snowmass, Colorado, USA. Anti-tumor necrosis factor alpha therapy leads to improvement of both enthesitis and synovitis in children with enthesitis-related arthritis

Babyn PS, Doria AS, Harasiewicz K, Rogers M, Jong R, Pritzker K, Foster FS. Model. Ultrasound biomicroscopy for characterization of articular cartilage abnormalities of the knee in an antigen-induced arthritis. 45<sup>th</sup> Annual Meeting of the Society for Pediatric Radiology – San Francisco, CA, USA 2003. Pediatr Radiol 2003; 33 (Suppl. 1): S109

Bartlett ES, Fox AJ. Quantification of Carotid Stenosis on CT Angiography. 5<sup>th</sup> World Stroke Congress, 2004, program.

Basran PS, Caldwell C, Mah K. Performance evaluation of a PET/CT imaging system for radiation oncology treatment simulation. Presented at Canadian Organization of Physicists in Medicine Annual Meeting, Winnipeg, Manitoba, June 14, 2004.

Beck M, Lee SK, Hsu SW, Chaloupka J. Preliminary clinical experience with aneurysm neck remodeling using a new nitinol self expanding Micro-stent (neuroform 1) in over 40 cases. Scientific Exhibit. 7<sup>th</sup> Annual meeting of the AANS/CNS section on Cerebrovascular Surgery and the ASITN. San Diego, California, USA. February 2004.

Beecroft R, Rajan DK, Simons ME, Sniderman KW, Kachura JR, Hayeems EZ, Sved M, Asch MR. Risk of intrauterine infectious complications after fibroid embolization in patients with submucosal fibroids. The 29th Annual Scientific Meeting of the Society of Interventional Radiology (SIR). Phoenix, Arizona, USA. March 25-30, 2004.

Benjamin MS, Asch M, Rajan D, Hayeems E, Kachura J. The utility of CT before removal of long standing retrievable vena caval filters. (Poster) 29<sup>th</sup> Annual Scientific Meeting. Phoenix, Arizona, USA. March 25-30, 2004.

Blaser S, Epelman M, Daneman A, Konen O, Aziz A, Kellenberger C. Perinatal brain injury: A prospective comparison of state-of-the-art ultrasound (US) and magnetic resonance imaging (MRI): Can US compete with MRI? Presented at RSNA, Chicago, December 1-6, 2003.

Blaser S, Konen O, Clarke H, Armstrong D, Padfield N. Use of 3D and multiplanar CT reformations to evaluate C1-C2 vertebral anomalies in velopharyngeal insufficiency patients with and without velocardiocardial syndrome. RSNA 89<sup>th</sup> Scientific Assembly and Annual Meeting, Chicago November 30-December 6, 2003.

Blaser S, Robinson A, Toi A, Chitayat D, Gundogan M, Pantazi S,. MR imaging of the fetal cerebellar vermis in utero: Description of some useful anatomical criteria for normal and abnormal development. RSNA 80<sup>th</sup> Scientific Assembly and Annual Meeting, Chicago November 30-December 6, 2003.

Bleakney RR, White LM, Salonen DC, Miniaci A. (Scientific Exhibit) MRI of mosaicplasty (autogenous osteochondral transplantation) of the knee. Radiological Society of North America Scientific Assembly and Annual Meeting. Chicago, Illinois, USA. November 30-December 5, 2003.

Bunston S, Rajan DK, Misra S. Prevalence of stenosis in dysfunctional autogenous native fistulas and outcome after percutaneous angioplasty. Radiological Society of North America 89rd Scientific Assembly. Chicago, Illinois, USA. December 2003.

Burn PR, Jewett M, O'Malley M, Rendon R, Gospodarowicz MK, Haider MA. Assessment of extravascular disease in bladder cancer: MRI vs clinical evaluation. Radiological Society of North America Meeting. Chicago, Illinois, USA. November 30-December 5, 2003.

Causar PA, Piron CA, Jong RA, Curpen B, Hill K, Plewes DB. Medial-Lateral Access MRI-guided Breast Localization System. RSNA Annual Meeting, Chicago, Illinois December 2, 2003

Chait P, Richmond L, Connolly B, Geary D, Amaral J, John P, et al. Renal Angiography and Percutaneous Transluminal Angioplasty in Hypertensive Children. SIR, Phoenix Arizona. March 2004.

Chaloupka J, Lee SK, Ugurel M, Hsu SW. Single-centre experience with Matrix detachable coils in more than 100 aneurysms technical evaluation and outcomes. 7<sup>th</sup> Annual Meeting of the AANS/CNS section on Cerebrovascular Surgery and the ASITN. San Diego, California, USA. February 2004.

Chaloupka J, Johnson M, Ugurel M, Lee SK, Tejada J, Hsu SW. First year single centre experience with the Matrix detachable coils for treatment of 139 consecutive intracranial aneurysm cases: technical and clinical outcomes including 6-month angiographic follow-up. 42<sup>nd</sup> Annual Meeting of the American Society of Neuroradiology. Seattle, Washington, USA. June 2004.

Chan RP. Lung and brain manifestations of HHT. 11<sup>th</sup> Annual International HHT Conference. October 17-19, 2003; Dallas, Texas.

Chan RP. Pulmonary AVM embolotherapy: The Toronto HHT Centre experience. Advanced course for the diagnosis and treatment of hereditary hemorrhagic telangiectasia. June 28-30, 2004; Yale University School of Medicine, New Haven, CT.

Chawla T, Ibach K, Greenberg G, Wilson SR. Evaluation of fistulizing perianal inflammatory disease in Crohn patients: Concordance of MRI and transperineal sonography. Radiological Society of North America Meeting. Chicago, Illinois, USA. November 30-December 5, 2003.

Cheng H-LM, Plewes DB. "Prediction of Subtle Thermal Histopathological Change using a Novel Analysis of Gd-DTPA Kinetics," 11<sup>th</sup> Scientific Meeting of the International Society of Magnetic Resonance in Medicine, 1211, Toronto, Canada, 10-16 July, 2003.

Cheng H-LM, Purcell CM, Bilbao JM, Plewes DB. "Contrast Kinetics as a Histopathological Surrogate for Improved Assessment in Thermal Therapy," 12<sup>th</sup> Scientific Meeting of the International Society of Magnetic Resonance in Medicine, 475, Kyoto, Japan, 15-21 May, 2004.

Cheng M, Cartwright L, Chen J, Sherman C, Yeager H, Babyn P, Farhat W. Dynamic Magnetic Resonance Imaging: a Non-invasive Method to Assess Progress of Neovascularization in Tissue Engineered Bladder Constructs. Annual Surgical Services Residents/Fellows Research Competition, Hospital for Sick Children, Toronto, Canada, 21 May, 2004.

Cheyne D, Simine E, Gaetz W, Tsotsos JK, Martinez-Trujillo JC. Transient changes in the direction of moving stimuli activates human MT/V5+ and inferior parietal lobe. Annual meeting of Neuroscience, San Diego, USA. (2004)

Cheyne D, Gaetz W, Robaey, P, Bakhtazad L., Schachar R. Localization of movement-related brain activity in adults and children using MEG. 26<sup>th</sup> International Symposium of the Centre for Research in the Neurological Sciences (CRSN). Montreal, Canada. (2004)

Cheyne D, Gaetz W, Simine E, Martinez-Trujillo J, Tsotsos J. Neuromagnetic imaging of cortical activity following the detection of transient changes in the direction of moving stimuli. Annual Meeting of the Cognitive Neuroscience Society, San Francisco. (2004)

Cheyne D, Simine E, Gaetz W, Tsotsos JK, Martinez-Trujillo JC. MEG study of temporal parameters and localization of brain responses during the detection of transient changes in the direction of moving stimuli. To be presented at 4<sup>th</sup> Annual Meeting of the Vision Sciences Society Sarasota, FL, USA. (2004)

Cheyne D, Rodriguez-Sanchez A, Martinez-Trujillo JC, Tsotsos JK. Speed gradient information influences optical flow processing in human observers. Annual meeting of Neuroscience, New Orleans, USA. (2003)

Cheyne D, Schachar R, Levin H, Max J, Mehta Y, Xiang J, Noseworthy M, Chevrier A. ADHD and inhibition deficit after closed head injury in children. 50<sup>th</sup> Annual meeting of the American Academy of Child and Adolescent Psychiatry, Miami Beach, October, 2003.

Chung P, Haycocks T, O'Malley M, Bayley A, Catton C, Milosevic M. Interobserver variation in delineating target volume for pelvic lymph nodes. Annual Meeting of the Canadian Association of Radiation Oncologists. Montreal, Quebec, Canada. October 2003.

Connolly B, Mann E, Mahant S, Chait P, Amaral J, Temple M. Peritonitis Following Retrograde Percutaneous Gastrostomy (G) and Gastrojejunostomy Tube Insertion in Children. Society of Interventional Radiology, Phoenix, Arizona. March 2004.

Connolly B, Swoboda N, Charkot E, Smith J, Armstrong D. Pediatric Patient Doses in Interventional Neuroradiology. Society of Interventional Radiology, Phoenix, Arizona. March 2004.

Connolly B, Schwartz JA, Amaral J, Chait P, Temple M, John P, et al. Ultrasound Guided Percutaneous Liver Biopsies in Infants. Society of Interventional Radiology, Phoenix, Arizona. March 2004.

Connolly B, Mann E, Mahant S, Chait P, Amaral J, Temple M. Peritonitis Following Retrograde Percutaneous Gastrostomy (G) and Gastrojejunostomy Tube Insertion in Children. Society for Pediatric Radiology, Savannah, Georgia. April 2004.

Connolly B, Swoboda N, Charkot E, Smith J, Armstrong D. Pediatric Patient Doses in Interventional Neuroradiology. Society for Pediatric Radiology, Savannah, Georgia. April 2004.

Connolly B, Schwartz JA, Amaral J, Chait P, Temple M, John P, et al. Ultrasound Guided Percutaneous Liver Biopsies in Infants. Society for Pediatric Radiology, Savannah, Georgia. April 2004.

Connolly B, Chait P, John P, Temple M, Amaral J. Ultrasound Guided Biopsy of Pulmonary Lesions in Children. Society for Pediatric Radiology, Savannah, Georgia. April 2004.

Connolly B, Richmond L, Geary D, Klasinowska B, Stevens D, Temple M. Renal Angiography (RA) & Percutaneous Transluminal Angioplasty (PTA) in Hypertensive Children. Society for Pediatric Radiology, Savannah, Georgia. April 2004.

Connolly B, Mann E, Mahant S, Chait P, Amaral J, Temple M. Peritonitis Following Image Guided Retrograde Percutaneous Gastrostomy (G) and Gastrojejunostomy Tube Insertion: Risks, Management and Outcomes in a Pediatric Population. Society for Pediatric Radiology, Savannah, Georgia. April 2004.

Connolly B Mendoza C, Gamulka B. Evaluation of a unique pediatric nurse-inserted PICC Program. CINA, Toronto, Ontario. October 2003.

Connolly B, Schmugge M, Bang KWA, Blanchette VS, Albisetti M, Freedman J, Rand ML. Platelet activation and binding of Von Willebrand Factor (VWF) after insertion of central venous lines into neonates. American Society of Hematology, San Diego, California, December 2003.

Connolly B, Richmond L, Geary D, Chait P, Amaral J, John P, et al. Renal Angiography (RA) and Percutaneous Transluminal Angioplasty (PTA) in Hypertensive Children. Society of Interventional Radiology, Phoenix, Arizona, March 2004.

Connolly B, Parvez B, McNamara P. Radiological Landmarks for Optimal Central Venous Line Placement. Society for Pediatric Research, April 2004.

Coffey J, Bell R, Wunder J, Kandel R, Howarth D, Griffin A, White-L, Blackstein M, Irish J, Catton C, O'Sullivan B. The role of adjuvant RT in the management of primary extra-cranial skeletal chondrosarcoma. 8<sup>th</sup> Annual Meeting of the Connective Tissue Oncology Society. Barcelona, Spain. November 2003.

Colak E, Jaffer NM, Khan M, Margolis M, Ho C, Zalev AH. An interactive multimedia tutorial for radiology residents performing GI tract imaging. RSNA, Chicago, November 30 – December 5, 2003.

Daneman A, Epelman M, Malviya M, Traubici J, Parvez B. Portal vein thrombosis in neonates and young infants: spectrum of radiological findings with emphasis on high resolution sonography. 47th Annual Meeting of the Society for Pediatric Radiology Savannah, Georgia, USA, April 27-28, 2004.

Daneman A, Epelman M, Malviya M, Traubici J, Parvez B. Portal vein thrombosis (PVT): spectrum of clinical and radiological findings in neonates and young infants with emphasis on high resolution ultrasound (HRUS). Radiological Society of North America 89<sup>th</sup> Scientific Assembly Chicago, Illinois, USA, November 30 – December 5, 2003.

Daneman A, Epelman M, Konen O, Aziz A, Kellenberger C, Blaser S. Perinatal brain injury: a prospective comparison of state-of-the-art ultrasound (US) and magnetic resonance imaging (MRI): Can us compete with MRI? Radiological Society of North America 89<sup>th</sup> Scientific Assembly Chicago, Illinois, USA, November 30 – December 5, 2003.

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Ghai SD, Dill-Macky MJ, Grant D. Imaging valuation of potential donors for living related liver transplantation: what the surgeon needs to know. (Poster) Radiological Society of North America Meeting. Chicago, Illinois, USA. November 30-December 5, 2003.

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Haider MA, Talbot N. (InfoRad Exhibit) An automated MRI protocol generator. Radiological Society of North America Meeting. Chicago, Illinois, USA. November 30-December 5, 2003.

Hanbidge AE, Lynch D, Wilson SR. US of the peritoneum. Radiological Society of North America Meeting. Chicago, Illinois, USA. November 30-December 5, 2003.

Hanbidge AE. (Audio Visual-RSP969CD) Acute right upper quadrant pain. RSNA Education Center. Radiological Society of North America Meeting. Chicago, Illinois, USA. November 30-December 5, 2003.

Hanson J, Power N, Atri M. Ultrasound guided thrombin injection of iatrogenic groin pseudoaneurysm: Doppler features, technical tips, and causes of failure. ARRS 2004 Miami Beach, Florida (Exhibit).

Hasan DM, Lee SK, Traynelis VC, Chaloupka JC. Incidence of retreatment of intracranial aneurysm primarily managed by endovascular embolization with detachable coils. 7<sup>th</sup> Annual Meeting of the AANS/CNS section on Cerebrovascular Surgery and the ASITN. San Diego, California, USA. February 2004.

Haycocks T, Chung P, O'Malley ME, Bayley AJ, Catton C, Bristow RG, et al. Dose escalation in bladder cancer: potential hazards and rewards. Annual Meeting of the Radiological Society of North America. Chicago, Illinois, USA. November 30-December 5, 2003.

Hayeems E, Mcleod A, Asch M. The recovery IVC filter: initial human experience. Annual Meeting of the American Society of Hematology. San Diego, California, USA. December 2003.

Herman S. Mustard Gas. European Congress of Radiology. Vienna, Austria. March 2004.

Herman S. Introduction to speech recognition. Society for Computer Applications in Radiology. Vancouver, British Columbia, Canada. May 20-23, 2004. (Syllabus)

Hershkop M, Azim K, Tampinico D, Aliidina Y. Predicting the incidence of Dipyridamole (Persantine) stress cardiac SPECT induced side effects using body mass index and gender. Radiological Society of North America Meeting. Chicago, Illinois, USA. December 2003.

Hershkop M. Back to the basics: biliary imaging. Canadian Society of Nuclear Medicine Annual Meeting. Niagara-on-the-lake, Ontario. June 2004.

Ho CS, Kachura JK, Greig PD, Gallinger S, Grant D, McGilvray I, Knox J, Sherman M, Wong F, Wong D. Percutaneous ethanol injection of medium and large hepatomas using a multi-pronged needle: efficacy and safety. CIRSE. 2004.

Hsu SW, Chaloupka J, Cassell M, Lee SK. (Scientific Exhibit) Ex-Vivo studies of the Neuroform stent using transparent human intracranial arteries. 42<sup>nd</sup> Annual Meeting of the American Society of Neuroradiology. Seattle, Washington, USA. June 2004.

Huang H, Merchant N. MRI evaluation of right heart remodelling after percutaneous atrial septal defect (ASD) closure. 7<sup>th</sup> Annual Society Cardiovascular Magnetic Resonance Meeting (SCMR). Barcelona, Spain. February 13-15, 2004.

Huang Y, Merchant N, Wright GA. (Poster) Dynamic monitoring of contrast distribution in lower extremities for timing and localizing targeted 3D MRA. 12<sup>th</sup> Scientific Meeting & Exhibit. International Society for Magnetic Resonance in Medicine. Kyoto, Japan. May 15-21, 2004.

Jang HJ, O'Malley ME, Haider MA. (Exhibit) Characterization of small renal masses incidentally found on CT. European Congress of Radiology. Vienna, Austria. March 2004.

Jang HJ, Kim TK, Wilson SR. Characterization of indeterminate hepatic nodules in high-risk patients for hepatocellular carcinoma with contrast-enhanced ultrasound. Liver Research Day. Toronto, Ontario, Canada. April 2004.

Jaskolka JD, Asch MR, Hayeems EB, Tsao M, Waddell TK, Kachura JR, et al. Pathological assessment of radiofrequency ablation of pulmonary metastases in humans - preliminary experience. Society of Interventional Radiology, 29<sup>th</sup> Annual Scientific Meeting. Phoenix, Arizona, USA. March 27, 2004.

Jaskolka JD, Asch MR, Kachura JR, Ho C, Sherman M, Gallinger S, et al. Needle tract seeding after radiofrequency ablation of hepatic tumors. Society of Interventional Radiology, 29<sup>th</sup> Annual Scientific Meeting. Phoenix, Arizona, USA. March 27, 2004.

Jhaveri K. MRI of hyperdense adrenal nodules: Does it still have a role? (Poster) International Society for Magnetic Resonance in Medicine (ISMRM). Toronto, Ontario, Canada. July 2003.

Jhaveri K. Accuracy of MRI in differentiation between cervix vs. endometrial origin of adenocarcinoma in patients with a cervix mass. Radiological Society of North America. Chicago, Illinois, USA. November 30-December 5, 2003

Jhaveri K. Considerations for ultra-high parallel MRI reduction factors in long echo train fast spin echo sequences: Application to MR cholangiography. Radiological Society of North America. Chicago, Illinois, USA. December 2003.

Jhaveri K. MRI for hyperdense (10HU) adrenal nodules: does it still have a role? Radiological Society of North America. Chicago, Illinois, USA. November 30-December 5, 2003.

John P. Wedged hepatic venography in portal cavernomas – as imaging window before mesoportal bypass surger. 40th Annual Congress of the European Society of Pediatric Radiology 2003.

Kam A, Causer P, Hill K, Warner E. MRI detected ductal carcinoma in situ: 5 year progress findings on annual screening of women at high risk for hereditary breast cancer. (Award for certificate of Merit) (ARRS 2004, Miami Beach Florida)

Kandel R, White LM, Bell R, Wunder J. Histological assessment of peritumoral edema in soft tissue sarcoma. 8<sup>th</sup> Annual Meeting of the Connective Tissue Oncology Society. Barcelona, Spain. November 2003.

Kassner A, Roberts TPL, Taylor K, Silver F, Mikulis DJ. Detection of blood-brain barrier leakage in early acute stroke using dynamic contrast-enhanced MR Imaging. (Book of Abstracts) 42<sup>nd</sup> Annual Meeting of the American Society of Neuroradiology. Seattle, Washington, USA. June 2004.

Kassner A, Crawley A, Rown S, Roberts TPL, Mikulis DJ. Integration of MR perfusion abnormalities and cerebral vascular reactivity changes in patients with moyamoya disease. (Book of Abstracts) 42<sup>nd</sup> Annual Meeting of the American Society of Neuroradiology. Seattle, Washington, USA. June 2004.

Kim TK, Jang HJ, Wilson SR. Successful implementation of contrast-enhanced ultrasound in the routine evaluation of focal liver lesions. Liver Research Day. Toronto, Ontario, Canada. April 2004.

Koles S, Paul NS, Chung T, Patsios D, Rao A, Tomlinson G, Weisbrod G. Pneumothorax following CT-guided lung biopsy: is there a role for post biopsy CT? 23<sup>rd</sup> International Congress of Radiology. Montreal, Quebec, Canada. June 25-29, 2004.

Kulkarni S, Bukhanov K, Dhamanaskar K, Wilson C. Does CE-MR of the breast underestimate invasive lobular cancer? MR findings: correlation with conventional imaging and post-excisional pathology. Radiological Society of North America Meeting. Chicago, Illinois, USA. November 30-December 5, 2003.

Lan F, Chan RP, David E, Common AA. Comparison of Tris-acryl microspheres and polyvinyl alcohol for uterine fibroid embolization. 29<sup>th</sup> Annual Scientific Meeting of the Society of Interventional Radiology; March 27, 2004; Phoenix, AZ.

Pearce D. 2<sup>nd</sup> Annual Arthritis Refresher Course for Family Physicians. Role of US & MRI in MSK disorders. Toronto, Saturday, October 18, 2003.

Lee TY, Sahlas DJJ, Fox, AJ et al. CT Functional indicators of tissue viability in acute stroke. 5<sup>th</sup> World Stroke Congress, 2004, program.

MacDonald C, Das P, Carcao M, Weitzman S, Lee J, Ngan B, Fernandes C, Malkin D. Primary Cardiac Lymphoma in Children. First International Symposium on Non-Hodgkin's Lymphoma in Children and Adolescents. New York, NY 2003

MacDonald DB, Haider MA, O'Malley ME, Khalili K, Kim TK, Greig PD, Grant DR, Cattral MS, Lockwood G. The relationship between portal and arterial branch patterns and anomalous biliary drainage in live liver donors. Annual Meeting of the American Roentgen Ray Society. Miami, Florida, USA. May 2004.

Manson D. Approach to Neonatal Chest X-rays. Moderator: 66<sup>th</sup> Annual Scientific Meeting of the Canadian Association of Radiologists, Halifax, Nova Scotia, October 1- 4, 2003.

Martel AR, Morgan PS, Daniels LR, Delay GS, Moody AR. Measuring clot volumes using watershed segmentation algorithms. ISMRM 2003

McGregor C, Atri M, Power N, McInnes M, Rahnavardi K, Law C. Mechanical small bowel obstruction: Comparison of unenhanced and enhanced multidetector helical CT. ARRS 2004 Miami Beach, Florida

Metser U, Haider MA, Dill-Macky MJ, Lockwood G, Atri M, Minden M. Fungal infection of the liver in immunocompromised patients: detection with multiphasic contrast-enhanced helical CT. Radiological Society of North America 89<sup>th</sup> Scientific Assembly and Scientific Meeting. Chicago, Illinois, USA. November 30-December 5, 2003.

Midwinnter W, White LM, Noseworthy MD. Statistical evaluation of dMRI region of interest (ROI) analysis for cancer assessment. 11<sup>th</sup> Scientific Meeting and Exhibition, International Society of Magnetic Resonance in Medicine. Toronto, Ontario, Canada. July 2003.

Milic A, Chan RP, Prasad V, Faughan ME. Reperfusion of pulmonary arteriovenous malformations following embolotherapy: Imaging features and management. 29<sup>th</sup> Annual Scientific Meeting of the Society of Interventional Radiology; March 27, 2004; Phoenix, AZ.

Molinari M, Dixon E, Kachura JR, Rajan DK, Sherman M, Grant D, Greig PD, Gallinger S, Knox J. (Poster) Transarterial chemoembolization for unresectable hepatocellular carcinoma. Gastrointestinal Cancers Symposium. San Francisco, California, USA. January 22-24, 2004.

Morgan PS, Moody AR, Martel AL, Cooper AD. Dynamic contrast enhanced whole brain perfusion using a rapid 3D T1-weighted sequence. Proc ISMRM 2003 page 2196.

Murphy RE, Moody AR, Morgan PS, Martel AR. Clinical correlates of MRDTI-defined complicated plaque. ISMRM, Toronto 2003.

Navarro O, Daneman A, Miller SF. Small bowel volvulus in complicated meconium ileus: Demonstration on contrast enema. 41<sup>st</sup> Congress European Society of Paediatric Radiology, Heidelberg, Germany, June 2004

Navarro O, Epelman M, Miller SF. Imaging of the diaphragm in neonates and young infants, with special emphasis on diaphragmatic motion. Society for Pediatric Radiology 47<sup>th</sup> Annual Meeting, Savannah, Georgia, April-May 2004

Navarro OM, Jarrín J, Daneman A, Babyn PS, Epelman MS. Ultrasound of the neonatal brain: a comprehensive illustrated guide – a multimedia CD-ROM-based teaching file. Radiological Society of North America 89<sup>th</sup> Scientific Assembly, Chicago, Illinois, November-December, 2003

Ossip MG, Kachura JR, Ho CS, Tomlinson GA, Asch MR, Gallinger S, et al. Radiofrequency ablation of liver tumors: local progression-free survival and factors for failure of effectiveness. Society of Interventional Radiology. 29<sup>th</sup> Annual Scientific Meeting. Phoenix, Arizona, USA. March 29, 2004.

Ossip MG, Kachura JR, Ho CS, Tomlinson GA, Asch MR, Gallinger S, et al. Radiofrequency ablation of liver tumors: patient survival, local progression-free survival, and factors for failure of effectiveness. 19<sup>th</sup> Annual Sheila Sherlock Liver Research Day. Toronto, Ontario, Canada. April 29, 2004.

Oudjhane K, Epelman M, Kellenberger CJ, Miller SF, Babyn PS. Imaging of the inguinal canal in children, what surprises can we find there? Scientific poster ,The 47th Annual Meeting of the Society for Pediatric Radiology, Savannah , Georgia , April 2004 Abstract: Pediatric Radiology (2004) 34; S1: S84

Oudjhane K, Geoffray A, Lau L, Weismann S. Langerhans Cell Histiocytosis in children: Modern Imaging. Scientific poster C683 The Annual Meeting of the European Congress of Radiology. Vienna, March 2004

Oudjhane K, Miller SF, Traubici J. The Duodenum Inversum: a radioclinical correlation, presented at the 41st Annual Scientific Meeting, European Society of Pediatric Radiology, Heidelberg, Germany, June 7-11, 2004. Abstract: Pediatric Radiology (2004) 34; S2: S117

Patlas M, Haider MA, Jhaveri K, Chapman W, Fyles A, Rosen B. Accuracy of MRI in differentiation between cervix vs endometrial origin of adenocarcinoma in patients with a cervix mass. Radiological Society of North America Meeting. Chicago, Illinois, USA. November 30-December 5, 2003.

Patlas M, Deitel W, Taylor B, Gallinger S, Wilson SR. Focal chronic pancreatitis mimicking pancreatic head carcinoma. The 104<sup>th</sup> Annual Meeting of the American Roentgen Ray Society. Miami, Florida, USA. May 2004.

Paul NS. Radiation dose in thoracic CT. STR Rancho Mirage, California, USA. March 31, 2004.

Paul NS, Rao,A, Chung,T, Patsios D, Roberts H, Herman,S, Weisbrod G. A comparison of minimum dose thoracic CT with chest radiography in the evaluation of the acutely ill patient. Annual Meeting of the American Roentgen Ray Society. Miami Beach, Florida, USA. May 5, 2004.



Paul NS, Rao,A, Chung,T, Patsios D, Roberts H, Herman,S, Weisbrod G. A comparison of minimum dose thoracic CT with chest radiography in the evaluation of the acutely ill patient. UKRC, Manchester, UK. June 6, 2004.

Pearce D. CAR Meeting. Poster. Weight bearing CT of feet. Halifax, October 1-4, 2003.

Pignol JP, Keller B, Rakovitch E, Benk V, Morton G, Curpen B, Causer P, Sankreacha R, Que W. A Permanent Breast Seed Implant as Adjuvant Radiation Therapy: A Dosimetric Comparison Between  $^{103}\text{Pd}$  and  $^{125}\text{I}$  Emitters. AAPM Meeting, San Diego, California, August 2003

Pignol JP, Keller B, Rakovitch E, Benk V, Morton G, Curpen B, Causer P, Sankreacha R and Que W. August 2003. World Congress on Medical Physics and Biomedical Engineering, Sidney, Australia. Comparison of  $^{103}\text{Pd}$  and  $^{125}\text{I}$  Seeds Permanent Implant for Adjuvant Breast Brachytherapy.

Pignol JP, Keller B, Rakovitch E, Benk V, Morton G, Curpen B, Causer P, Sankreacha R, Que W. October 2003, CARO-ACRO Annual Scientific Meeting, Montréal, Quebec. Dosimetric comparison of  $^{125}\text{I}$  and  $^{103}\text{Pd}$  for breast permanent implant as an adjuvant technique.

Piron C, Causer P, Jong R, Walcarius R, Luginbuhl C, Walters S, Plewes DB. System for Co-registration of MR/US breast images: Preliminary in vivo evaluation of accuracy. ISMRM Toronto, Ontario, July 2003.

Piron C, Causer P, Jong R, Luginbuhl C, Walcarius R, Walters S, Plewes DB. Co-registration of MRI and US breast images: Preliminary in vivo evaluation of accuracy. November 2003, RSNA meeting, Chicago, Illinois

Piron CA, Causer PA, Jong RA, Curpen B, Walters S, Plewes DB. Co-registration of MR and US images: In vivo evaluation of accuracy. RSNA Annual Meeting , Chicago, Illinois December 4, 2003.

Power N, Atri M, Ryan S, Haddad R, Smith A. CT assessment of anastomotic bowel leak. ARRS 2004 Miami Beach, Florida.

Provost YL, Konen E, Yang Y, Elliott T, Butany J, Paul N. MRI detection of thrombus in left ventricular aneurysms. (Poster) 7<sup>th</sup> Annual SCMR Meeting. Barcelona, Spain. February 13-15, 2004.

Provost YL, Elliot T, Paul NS, Merchant N. Morphologic and functional right ventricular abnormalities in arrhythmogenic cardiomyopathy. (Poster) 7<sup>th</sup> Annual SCMR Meeting. Barcelona, Spain. February 13-15, 2004.

Punnen SJ, Haider MA, Moulding F, O'Malley ME, Lockwood G, Jewett MA. Variability in size measurement of small renal masses on CT imaging. Annual Meeting of the American Urological Association. San Francisco, California, USA. May 2004.

Rajan DK, Stavropoulos W, Clark TW, Robinette M. Transplant renal artery stenosis: Outcome following percutaneous intervention. SIR Annual Meeting. Phoenix, Arizona, USA. March 2004.

Rao A, Paul NS, Siewardsen JH, Chung T, Patsios D, Roberts H, Weisbrod G. Limits of nodule detection with low dose CT. American Roentgen Ray Society. Miami Beach, Florida, USA. May 5, 2004.

Rao A, Paul NS, Siewardsen JH, Chung T, Patsios D, Roberts H, Weisbrod G. Limits of nodule detection with low dose CT. UKRC Manchester, UK. June 8, 2004.

Ranson M, Fontalvo L, Sookman J, Jacobson E, Daneman A, Restrepo R. Renal cystic disease imaging, pathologic and genetic correlation. Caffey Award for Outstanding Clinical Research Poster The Society for Pediatric Radiology Meeting Savannah, GA April 28-May 1, 2004

Riddell AM, Khalili K. The utility or futility of a second imaging test in the assessment of acute abdominal pain in patients presenting to the Emergency Department. American Roentgen Ray Society. Miami Beach, Florida, USA. May 5, 2004.

Roberts T, Haider MA, Kassner A, Maheshwari S, Jhaveri K, Riddell A. Considerations for ultra-high parallel MRI reduction factors in long echo train fast spin echo sequences: Application to MR cholangiography. Radiological Society of North America Meeting. Chicago, Illinois, USA. November 2003.

Robinson A, Blaser S, Toi A, Chitayat D, Pantazi S, Gundogan M, Laughlin S, Ryan G. MR imaging of the fetal cerebellar vermis in utero: description of some useful anatomical criteria for normal and abnormal development. Radiological Society of North America Meeting. Chicago, Illinois, USA. November 30-December 5, 2003.

Robinson AJ, Blaser S, Toi A, Chitayat D, Ryan G, Pantazi S, Gundogan M, Laughlin S. MR imaging of the fetal eyes: Normal and abnormal development. European Society for Pediatric Radiology. Heidelberg, Germany. June 2004.

Robinson AJ, Blaser S, Toi A, Chitayat D, Ryan G, Pantazi S, Gundogan M, Laughlin S. MR imaging of the fetus in utero I: A practical guide to systematic analysis - central nervous system. European Society for Pediatric Radiology. Heidelberg, Germany. June 2004.

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Robinson AJ, Blaser S, Toi A, Chitayat D, Ryan G, Pantazi S, Gundogan M, Laughlin S. MR imaging of the fetus in utero II: (non-CNS). 42<sup>nd</sup> Annual Meeting of the American Society of (Pediatric) Neuroradiology. Seattle, Washington, USA. June 2004.

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Salem S, Glanc P. Fetal and neonatal ovarian cystic masses: Sonographic appearance and evolution. International Society of Ultrasound in Obstetrics and Gynecology Annual Meeting. Paris, France. September 2003.

Shroff M, Bharucha P, Chuang S, Armstrong D, Babyn P. An audit of cervical spine radiographs in children with acute trauma. Scientific exhibit, at the Radiological Society of North America, Chicago, 30<sup>th</sup> November 2003 to 4 December 2003

Shroff MM, Mater A, Drake J. Radiographic Evaluation of VP Shunt Obstruction – interobserver differences in interpretation and impact on management. Oral presentation: American Society of Neuroradiology, Seattle May 2004

Simons ME, Tan KT, Rajan DK, terBrugge K. Cyanoacrylate embolotherapy of peripheral high flow arteriovenous vascular malformation: a single-center experience. The 29th Annual Scientific Meeting of the Society of Interventional Radiology (SIR). Phoenix, Arizona, USA. March 25-30, 2004.

Sussman M, Merchant N, Wright G, White LM. The similarity-based navigator echo (SIMNAV). (Poster) 12<sup>th</sup> Scientific Meeting & Exhibit. International Society for Magnetic Resonance in Medicine. Kyoto, Japan. May 15-21, 2004.

Sussman MS, White LM, Roberts TP. High-resolution diffusion-weighted imaging of cartilage using PROPELLER. 12<sup>th</sup> Annual Scientific Meeting of the International Society of Magnetic Resonance in Medicine (ISMRM). Kyoto, Japan. May 15-21, 2004.

Tan KT, Simons ME, Rajan DK, terBrugge K. Peripheral high flow arteriovenous vascular malformations: a review of 31 patients. The 29th Annual Scientific Meeting of the Society of Interventional Radiology (SIR). Phoenix, Arizona, USA. March 25-30, 2004.

Tejada J, Chaloupka J, Lee SK, Ugurel M, Hsu SW. Emergency repair of an iatrogenic MCA dissecting aneurysm after angioplasty using the neuroform self-expanding microstent. 42<sup>nd</sup>

Annual Meeting of the American Society of Neuroradiology. Seattle, Washington, USA. June 2004.

Temple M, Hayes-Jordan A, Diamond I, Chait P, Kim P. A Novel Treatment of Congenital Duodenal Web: Image-Guided Treatment of Congenital and Acquired Bowel Stenosis in Children. CAPS, Los Angeles, California. October 2003.

Temple M, Connolly B, Mann E, Mahant S, Chait P, Amaral J. Peritonitis Following Retrograde Percutaneous Gastrostomy (G) and Gastrojejunostomy Tube Insertion in Children. Society of Interventional Radiology, Phoenix, Arizona. March 2004.

Temple M, Schwartz JA, Amaral J, Chait P, Connolly B, John P, et al. Ultrasound Guided Percutaneous Liver Biopsies in Infants. Society of Interventional Radiology, Phoenix, Arizona. March 2004.

Temple M, Connolly B, Mann E, Mahant S, Chait P, Amaral J. Peritonitis Following Retrograde Percutaneous Gastrostomy (G) and Gastrojejunostomy Tube Insertion in Children. Society for Pediatric Radiology, Savannah, Georgia. April 2004.

Temple M, Schwartz JA, Amaral J, Chait P, Connolly B, John P, et al. Ultrasound Guided Percutaneous Liver Biopsies in Infants. Society for Pediatric Radiology, Savannah, Georgia. April 2004.

Temple M, Connolly B, Chait P, John P, Amaral J. Ultrasound Guided Biopsy of Pulmonary Lesions in Children. Society for Pediatric Radiology, Savannah, Georgia. April 2004.

Temple M, Richmond L, Connolly B, Geary D, Klasinowska B, Stevens D. Renal Angiography (RA) & Percutaneous Transluminal Angioplasty (PTA) in Hypertensive Children. Society for Pediatric Radiology, Savannah, Georgia. April 2004.

Temple M, Richmond L, Connolly B, Geary D, Chait P, Amaral J, John P, et al. Renal Angiography (RA) and Percutaneous Transluminal Angioplasty (PTA) in Hypertensive Children. Society of Interventional Radiology, Phoenix, Arizona. March 2004.

Temple M, Mann E, Connolly B, Mahant S, Chait P, Amaral J. Peritonitis Following Image Guided Retrograde Percutaneous Gastrostomy (G) and Gastrojejunostomy Tube Insertion: Risks, Management and Outcomes in a Pediatric Population. Society for Pediatric Radiology, Savannah, Georgia. April 2004.

Theal J, Haider M, Greenberg GR. Meropenem improves complex perianal Crohn's disease refractory to infliximab. Canadian Digestive Diseases Week, Gastroenterology Residents in Training Course. Banff, Alberta, Canada. February 2004.

Thomas K, Parnell-Parmley J, Haidar S, Moineddin R, Charcot E, BenDavid G, Krajewski C. Radiation dose awareness among paediatric clinicians European Society of Paediatric Radiology Annual Meeting, Heidelberg, Germany, 2004

Thomas K, Parnell-Parmley J, Haidar S, Charcot E, Krajewski C, BenDavid G. Calculation of effective doses for paediatric radiological investigations or So how many Chest X-rays is that? European Society of Paediatric Radiology, Heidelberg, Germany 2004

Thomas K, Armstrong D, Charkot E, Smith J, Connolly B. Pediatric Patient Doses in Interventional NeuroRadiology N Swaboda. Society of Interventional Radiology, Phoenix USA 2004 Society of Pediatric Radiology, Savannah USA 2004.

Toi A, Tomlinson G, Johnson JM, Pai A. Is nasal bone measurement in the first trimester affected by maternal factors of race, age, weight or diabetes? AIUM Annual Convention. Phoenix, Arizona, USA. June 20-22, 2004.

Toi A, Downey DB, Ajzen S. Expert panel TRUS biopsy - How and why we do it. 23rd International Congress of Radiology of the ICS and CAR. Montreal, Quebec, Canada. June 25-29, 2004.

Trachtenberg J, Bogaards A, Weersink RA, McCluskey SA, Haider MA, Yue CKK, Savard J, Simpson S, Brun P, Cohen P, Scherz A, Salomon Y, Aprikian AG, Elhilali MM, Wilson BC, Gertner MR. A phase I/II trial of WST09-mediated photodynamic therapy (WST09-PDT) for recurrent prostate cancer following failed EBRT. Canadian Urological Association Annual Meeting. Whistler, British Columbia, Canada. 2004.

Traubici J, Amaral J, Daneman A, BenDavid G, Reintamm G. Safety of power injector use in children as measured by rate of extravasation. American Roentgen Ray Society 104<sup>th</sup> Annual Meeting, Miami Beach, Florida, May 2-7, 2004.

Traubici J, Amaral J, Daneman A. Ultrasound findings in the liver in autosomal recessive polycystic kidney disease. American Roentgen Ray Society 104<sup>th</sup> Annual Meeting, Miami Beach, Florida, May 2-7, 2004.

Traubici J, Epelman M, Daneman A, Malviya M, Parvez B. Portal vein thrombosis (PVT) in neonates and young infants spectrum of radiological findings with emphasis on high resolution ultrasound (HRUS). The Society for Pediatric Radiology April 28-May 1, 2004 Savannah, GA

Traubici J, Fontalvo L, Ranson M, Restrepo R, Smith C, Daneman A. Renal cystic disease imaging, pathologic, and genetic correlation. American Roentgen Ray Society Meeting Miami, Florida May 4-9, 2004

Ugurel M, Beck M, Chaloupka J, Lee SK, Tejada J, Hsu SW. First year single centre experience with a new Nitinol self-expanding microstent (neuroform 1 and 2) for cerebrovascular applications: technical and short term outcomes in 72 stent placements. 42<sup>nd</sup> Annual Meeting of the American Society of Neuroradiology. Seattle, Washington, USA. June 2004.

Wang SX, Lavery S, Stuart K, White LM, Plaas A, Grynpsas MD. The effects of glucosamine on the bone in a rabbit model of osteoarthritis. 50<sup>th</sup> Annual Meeting of the Orthopaedic Research Society. San Francisco, California, USA. March 7-10, 2004.

Warner E, Plewes D, Hill K, Causser P, DeBoer G, Narod S, Cutrara M, Ramsay E, Jong R, Wong J. Effect of age and temporal patterns over 5 years in a Magnetic Resonance Imaging (MRI)-based breast surveillance study for BRCA mutation carriers. American Society of Clinical Oncology, New Orleans, Louisiana, June 2004.

Warner E, Donald Plewes D, Hill K, Causser P, Wong J, Jong R, Cutrara M, DeBoer G, Ramsay E, Yaffe M, Messner S, Meschino W, Piron C, Narod S. Comparison of Magnetic Resonance Imaging (MRI), ultrasound (US), mammography (M), and Clinical Breast Examination (CBE) for breast cancer surveillance for women at high risk for hereditary breast cancer. NYU Medical Centre Conference on The Emerging Role of Screening & Prevention in Women's Cancers, New York, April 2004.

Weisbrod GL. Pulmonary hypertension. Society of Thoracic Radiology. Rancho Mirage, California, USA. March 28, 2004.

Wilson SR. (Scientific Exhibit) Evaluation of fistulizing perianal inflammatory disease in Crohn patients: Concordance of MRI and transperineal sonography. Radiological Society of North America Meeting. Chicago, Illinois, USA. November 30-December 5, 2003.

Wilson SR, Dhamanaskar KP, Thurston WA. Transvaginal sonography (TVS). A better technique than transrectal ultrasound (TRUS) for staging rectal cancer in women? Radiological Society of North America Meeting. Chicago, Illinois, USA. November 2003.

Wilson SR, Burns PN. Assessing therapy for hepatocellular carcinoma using US contrast agents: A baseline reproducibility study. Radiological Society of North America Meeting. Chicago, Illinois, USA. November 2003.

Wilson SR. Transvaginal sonography (TVS): A better technique than transrectal ultrasound (TRUS) for staging rectal cancer in women? Abdominal Radiology Course (ARC). Scottsdale, Arizona, USA. 2004.

Yang Y, Merchant N, Provost Y, Konen E, Wright G. Mural thrombus in post-infarction left ventricular aneurysm: A varied MR appearance. (Poster) Radiological Society of North America Meeting. Chicago, Illinois, USA. November 2003.

Yang Y, Merchant N, Provost Y, Konen E, Wright GA. Scar tissue in patients with ischemic heart failure: Evaluation by delayed enhancement magnetic resonance imaging and correlation with left ventricular ejection fraction. Canadian Cardiovascular Society. 2003.

Yang Y, Foltz W, Hong J, Stainsby J, Dharmakumar, Merchant N, Wright G. MR feasibility study of global left ventricular myocardial oxygen consumption in normal volunteers:

preliminary results. (Poster) 12<sup>th</sup> Scientific Meeting & Exhibit International Society for Magnetic Resonance in Medicine. Kyoto, Japan. May 15-21, 2004.

Yu E, Roberts T, Mikulis D, Keller A. (Poster) Physiologically-specific imaging of posterior reversible encephalopathy syndrome. American Society of Neuroradiology. Seattle, Washington, USA. June 5-11, 2004.

Zalev A. Society of Gastrointestinal Radiology Meeting. Venous barium embolization: a rare potentially fatal complication of barium enema. Scottsdale, AZ, March 7 – 11, 2004.

Zalev A, Deitel WL, Kundu S. The radiologic appearance of recurrent ileal Crohn's disease. Annual Meeting – Canadian Association of Radiologists, Halifax NS, October 2, 2003.

Zalev A, Deitel WL, Kundu S. The radiologic appearance of recurrent ileal Crohn's disease. Annual Meeting – Society of Gastrointestinal Radiology, Scottsdale AZ, March 7-11, 2004.

## AWARDS AND SPECIAL RECOGNITION

Causser P. Department of Medical Imaging Research & Development Award, 2003 – present.

Ghai S, Fong KW, Toi A, Chitayat D, Blaser S, Pantazi S.(Poster) Prenatal ultrasound and MRI findings of lissencephaly and a review of fetal cerebral cortical maturation. Radiological Society of North America 89<sup>th</sup> Scientific Assembly and Annual Meeting. Chicago, Illinois, USA. November 30-December 5, 2003. \*Education exhibit selected for Category 1 CME credit program and awarded a certificate of merit

Kirpalani A, Khalili K, Lee S, Haider MA, Crozier M, Bret P. Utilization and outcomes of unenhanced helical CT for emergency investigation of renal colic: a comparison of 1998 and 2002. Radiological Society of North America Meeting. Chicago, Illinois, USA. November 30-December 5, 2003. \*Awarded RSNA's Resident Research Trainee

Lem SL, Asch M, Kachura JR, Gallinger S, Swallow C. (Poster) Toronto hepatic artery embolization study. 29<sup>th</sup> Annual Scientific Meeting. Phoenix, Arizona, USA. March 25-30, 2004. SIR Poster Award: Honors.

Robinson A, Blaser S, Toi A, Gundogan M, Pantazi S, Chitayat D, Ryan G, Laughlin S. MR imaging of the fetus in utero I: a practical guide to systematic analysis-CNS system. 42<sup>nd</sup> Annual Meeting of the American Society of (Pediatric) Neuroradiology. Seattle, Washington, USA. June 2004. \*Cum laude award

Robinson AJ, Blaser S, Toi A, Chitayat D, Ryan G, Pantazi S, Gundogan M, Laughlin S. MR Imaging of the fetal cerebellar vermis in utero: Criteria for abnormal development with ultrasonographic and clinicopathologic correlation. 42<sup>nd</sup> Annual Meeting of the American Society of (Pediatric) Neuroradiology. Seattle, Washington, USA. June 2004. \*Magna cum laude and awarded the Derek Harwood-Nash outstanding presentation award



## RESEARCH PROGRAM

### The Research Program

Many of the faculty, residents, and fellows in the Department of Medical Imaging devote considerable effort to research. Research is an important mission of the Department of Medical Imaging. The nature of this research depends primarily on the interest and expertise of individuals and on resources at particular hospitals. In addition, the department promotes certain research topics, including the development and evaluation of imaging methods, such as magnetic resonance (MR) imaging, percutaneous and transvascular treatment methods, use of contrast agents, and most recently, minimally-invasive diagnosis and therapy.

Approximately eight years ago, an aggressive program to enhance research within the Department was initiated. The Research Program was created in 1992 with two main objectives:

- to encourage more faculty to participate in research related to radiological observations and procedures;
- to allow at least a few of the faculty to perform intensive medical imaging research

The two objectives are being pursued through several initiatives, involving contributions to the salary of a small number of faculty, shared access to certain resources, and an annual forum for highlighting research accomplishments. A synopsis of the key initiatives is presented below. Also included below are the research grants and publications of the faculty who are not listed with one of the affiliated hospitals.

### The Medical Imaging Research and Development Awards (Protected Research Time)

The Medical Imaging Research and Development Awards have been our most successful initiative. These awards allow a select group of radiologists to devote at least one day each week to a particular research project. The radiologists listed in the table below were awarded the Medical Imaging Research and Development Award in 2003-2004.

Award Holder	Hospital	Project Title
Mostafa Atri	SWCHSC	Accuracy of Unenhanced Helical CT and Added Value of Enhanced CT in the Assessment of Acute Abdomen
Susan Blaser	HSC	Correlation of Radiologically Determined Labyrinthine Dysplasias with Audiometric Data and Prediction of Response to Cochlear Implantation
Petrina Causer	SWCHSC	ACRIN 6667: MRI Evaluation of the Contralateral Breast in Women with a Recent Diagnosis of Breast Cancer
Bairbre Connolly	HSC	Prospective Evaluation of the Safety and Efficacy of Sonographically Guided Tendon Sheath Injections in Children
Marcus Dill-Macky	UHN/MSH	Radiofrequency Ablation of Hypervascular Liver Lesions: Prediction of Success Using Contrast Enhanced Ultrasound

Richard Farb	UHN/MSH	Idiopathic Intracranial Hypertension: The Prevalence and Morphology of Sinovenous Stenosis
Roberta Jong	SWCHSC	The ACRIN Digital Mammography Imaging Screening Trial
Korosh Khalili	UHN/MSH	The Utility or Futility of a Second Imaging Test in the Assessment of Acute Abdominal Pain in Patients Presenting to the Emergency Department
Derek Muradali	SMH	Contrast Enhanced Sonography of Breast Nodules and Lymph Nodes: Vascular Morphology and Pathologic Correlation
Dawn Pearce	SMH	Weight-bearing CT Scan of the Feet
Manohar Shroff	HSC	Emergency Cervical Spine X-rays in Children: Differences in Interpretation by Subspecialization
Lawrence White	UHN/MSH	Quantitative T2 Mapping of Cartilage Transplantation in an Animal Model
Stephanie Wilson	UHN/MSH	Characterization of Indeterminate Hepatic Nodules in High-Risk Patients for Hepatocellular Carcinoma with Contrast-Enhanced Ultrasound

### **RSNA Resident/Fellow Research Award**

The RSNA Research and Education Fund offers an award annually to recognize and encourage outstanding residents and fellows in radiology research. The award is for one resident or fellow in each training program in North America who is deemed to have participated meaningfully in research during the previous year.

### **Research Day**

Our Annual Research Day was held on April 29, 2004. It consisted of presentations from senior residents, the faculty who received the Medical Imaging Research and Development Awards, and many other members of the department. An excerpt from the Program for Research Day is included at the end of this section.

### **Positron Emission Tomography Centre, Centre for Addiction and Mental Health**

The University of Toronto Positron Emission Tomography (PET) Centre is under the direction of Dr. Sylvain Houle. Investigations concentrate on schizophrenia, mood and anxiety disorders, cognitive neuroscience, aging and dementia, movement disorders, and PET methodology.

### **Imaging/Bioengineering Research, SWCHSC**

Imaging research is a major focus of the Imaging/Bioengineering Research group at Sunnybrook and Women's College Health Sciences Centre (SWCHSC). Scientists in this group have University of Toronto appointments in the Department of Medical Biophysics, or the Department of Medical Imaging, or both. The faculty in this group make use of exceptional resources for research at SWCHSC and conduct research involving x-ray, nuclear medicine, magnetic resonance, and ultrasound technology. This group is internationally recognized for its excellent graduate student program.

## **Real-Time / Interventional Group**

**Chris Macgowan:** This project deals with the development of real-time techniques for flow visualization. This involves phase contrast methods, velocity-spectroscopy via pencil-beam excitation, and Doppler techniques. The applications of these techniques include the characterization and quantification of regurgitation and shunts within the heart. These techniques can also be applied to the determination of pulse wave velocities in the aorta, which has implications for diseases such as Marfan's syndrome.

**Fabio Settecase / Marshall Sussman / Tim Roberts:** Endovascular procedures performed under fluoroscopic guidance often require the use of metal guidewires for steering catheters along their desired paths. The use of metal guidewires in interventional MRI is rendered problematic due to RF resonant heating of conductive metals in the MR environment, and by susceptibility artifacts. This project deals with the development of techniques for non-guidewire catheter steering. These involve the application of electric currents to the catheter, and relying on Lorentz forces to torque the wire in the presence of the main magnetic field associated with MRI. The main issues currently being addressed are the design, characterization, and optimization of the catheter design.

**Marshall Sussman / Tim Roberts:** An ongoing challenge in real-time imaging is improving the spatial / temporal resolution of the scans. This project deals with the development of novel k-space trajectories for accomplishing this task. Specifically, the use of undersampled trajectories is being explored for use in real-time imaging. These trajectories trade off small amount of artifacts against decreased data acquisition requirements.

**Gal Sela / Marshall Sussman / Walter Kucharczyk:** In surgical procedures, one must often navigate through the body based on information contained within previously acquired medical images. A major challenge associated with this task is correlating the information contained within the images with the actual coordinate system of the body. For this project, a surgical navigation system has been developed which tracks the position of surgical instruments during the surgical procedure via an infrared camera. This tracking information is displayed graphically and in real-time on top of the previously-acquired images. This allows the surgeon to directly correlate the surgical and image coordinate systems. This navigation system has been used successfully in brain biopsy procedures, as well as lymph node excisions from the abdomen.

**Jeff Stainsby/ Labonny Biswas:** This project involves the development of a real-time MR system from scratch. This involves two major components: The development of an external real-time interface, and achieving interactivity between the MR scanner and this interface. This system forms the basis of much of the real-time projects ongoing at UHN.

**Hai-Ling Margaret Cheng:** The primary focus of my research is rapid MRI *quantitation* methodologies (measurement of tissue relaxivity) as applied to physiological imaging of perfusion, characterization of angiogenesis, assessment of diseased or damaged tissue, and assessment of drug efficacy. Alongside these technical developments, I am also investigating more accurate and robust models and methods for characterizing the *microcirculation* and

measuring *temperature*. Rapid, volumetric, and motion-robust acquisitions are highly desirable. Clinical applications include imaging of cancer, cardiac infarcts, and neurological disorders such as epilepsy; assessing the efficacy of antiangiogenic tumor drugs or localizing labeled targeted agents; and monitoring heat-related interventional treatment.

### **Faculty List**

(Academic Rank as of June 30, 20043)

Timothy Roberts	Professor	Director, Research Program, UHN
John A. Rowlands	Professor	Senior Scientist, SWCHSC
Michael L. Wood	Professor	MR physicist
Martin J. Yaffe	Professor	Senior Scientist, SWCHSC
Sylvain Houle	Associate Professor	Director, PET Centre Centre for Addiction and Mental Health
Curtis B. Caldwell	Assistant Professor	Physicist, SWCHSC
Adrian Crawley	Assistant Professor	MR physicist, UHN
Andrea Kassner	Assistant Professor	MR physicist, UHN
Christopher MacGowan	Assistant Professor	MR physicist, HSC
Marshall Sussman	Assistant Professor	MR Physicist, UHN
George Tomlinson	Assistant Professor	Biostatistics

Dr. Marshall Sussman, MR Physicist at the University Health Network, has recently joined the Department of Medical Imaging as an Assistant Professor. Dr. Michael Noseworthy has left the Department of Medical Imaging to accept a position at the MacMaster University, Hamilton.

## Grants

Members of the Department of Medical Imaging (underlined) were investigators on the following grants, identified by the principal investigator, other investigators, project title, sponsor, total amount of grant, and start and end dates of the funding period.

Bitar R – CHIR Research Fellowship, \$50,000 pa, 2004-2007.

Bitar R – CHAR/Amsterdam Health Development Award, First Canadian Recipient, \$12,000.

Caldwell CB, Mah K, Turksen IB, Ung YC, Danjoux CE, Ehrlich LE – Principle Investigators. “A Fuzzy logic expert system for radiation targeting” Philips Medical Systems, Inc. \$125,000/year (2 years total) 2004-2005

Caldwell CB, Mah K, Turksen IB, Ung YC, Danjoux CE, Ehrlich LE – Principle Investigators.. “Automated target definition for radiation treatment” Ontario Cancer Research Network, \$108,667/year (3 years total) 2004-2006

Caldwell CB and Mah K – Principle Investigators. “Multimodality functional and dynamic imaging for target definition: integration into cancer therapy” (project within the Ontario Consortium for Image Guided Therapy and Surgery) Funding Institution: Ontario Research and Development Challenge Fund \$277,140. 2000-2004

Cheyne D - Principal Investigator: CIHR – Research Grant “Development of Neuromagnetic Imaging Methods for Measuring Oscillatory Brain Activity”, \$276,054, 2003- 2006.

Cheyne D - Co-Investigator. CIHR – New Emerging Team (NET) Grant “Inattention, impulsiveness, and restlessness in childhood: heritability, genetics, neuropsychology and psychophysiology (KIDNET).” \$1,249,585, 2002 – 2007.

Cheyne, D – Principal Investigator. NSERC – Individual Research Grant, “Mapping the Human Sensorimotor Cortex using Spatially Filtered Magnetoencephalography.” \$40,000, 2002-2004.

Chiarelli A, Yaffe MJ, et al, Effect of Mammographic Density and Estrogen Replacement Therapy on Detection of Breast Cancer, National Cancer Institute of Canada -CBCRI, \$C189,567, 2001-

Crawley A – Co-investigator. CIHR Operating Grant, PI: L deNil Neuroimaging studies of auditory processing in individuals who stutter, \$82,344 pa 2004-2009

Friedenreich CM, Courneya KS, McTiernan A, Ballard-Barbash R, Irwin ML, Yaffe M, Boyd NF, Terry T, Brant RF, Jones CJ, Cameron B, ALPHA Trial: Alberta Physical Activity and Breast Cancer Prevention Trial, Canadian Breast Cancer Research Initiative, \$1,104,147, 2002-2005

Henkelman RM (Principal Investigator), Bronskill MJ, Burns PN, Foster FS, Plewes DB, Rowlands JA, Wright GA, Yaffe MJ. NCI Canada (Terry Fox Program Project) “Medical Imaging for JA Cancer” \$C 1,425,844 pa 07/2001 – 06/2006

Kasap SO, Rowlands JA. NSERC (Strategic Grant) “Direct Conversion Flat Panel X-ray Image Detectors for Medical Imaging” \$C 87,500 pa 10/2002 - 10/2005

MacGowan C – Co-Investigator: Sun Microsystems Canada Equipment Competition: Computing Infrastructure for Cardiovascular and Brain Research. \$193,000, 2002/03

MacGowan C – Collaborator, Canadian Institutes of Health Research, Development of MR Imaging to Measure Arterial Pulse Pressure and Vessel Distension: \$40,000 annually, 2001/09 - 2003/08

Mah K, Caldwell CB, and Danjoux C – Principle Investigators. “Can <sup>18</sup>FDG-PET images provide the 3D extent of lung tumour motion for individualized radiation targeting?” National Cancer Institute of Canada Operating Grant. \$63,000/year (2 years total). 2002-2003

Nathan A, Rowlands JA, Kasap SO, Karim K. NSERC (Collaborative Health Research Project) “Novel approaches to flat panel detectors” \$C 162,000 pa 5/2004 – 5/2007

Oram-Cardy J. CIHR Post-Doctoral Fellowship, \$47,500 stipend plus \$3,500 pa, 2003-2005

Pisano ED, Yaffe MJ, et al. Trial of Digital Mammography versus Screen-Film Mammography, US National Institutes of Health/ACRIN CA80098, \$208,900 USD, 06/01/01 - 05/30/04

Roberts TPL. CIHR Fellowship. Postdoc: Oram J, “Functional neuroimaging of language disorders” 5/03-6/04, \$100,000 CDN

Roberts, TPL. Canada Research Chair in Imaging Research. \$500,000. 1/2002-12/2006

Roberts TPL. National Alliance For Autism Research (NAAR), Principal Investigator, "Neural correlates of phonological processing in individuals with autism". 7/01-6/03, \$ 96,273

Roberts TPL. National Alliance For Autism Research (NAAR), Principal Investigator, "MEG Correlates of Linguistic Processing At and Below the Word Level in Autism" 7/01-6/03, \$ 119,918

Robaey P, Schachar R, Cheyne D, Perusse D: CIHR – New Emerging Team Grant, “Inattention, impulsiveness, and restlessness in childhood: heritability, genetics, neuropsychology and psychophysiology (KIDNET)”; Amount: \$1,249,585; 2002 – 2007;

Rowlands JA (Principal Investigator), Zhao W, Pang G and Fahrig R. National Institutes of Health “Low cost x-ray imager using liquid crystals: Application of x-ray light valves to very low cost chest x-ray imagers” \$US 225,000 pa 08/2003 - 06/2008

Rowlands JA (Principal Investigator), Robert N, Fort S. Image Guided Optimisation of X-ray Cardiac Angiography, Canadian Institutes of Health Research (Operating Grant), \$C 75,121, 01/10/2002 – 30/09/2005

Rowlands JA. + 9 Co-applicants, Imaging Research Centre for Cardiac Interventions, Ontario Innovation Trust, \$C 6,109,294 total, 06/2002 - 06/2005

Rowlands JA – Co-Investigator (Wright G, PI) Ontario R&D Challenge Fund “Cardiac Imaging Centre of Excellence (Cardiac Flat Panel Imagers)” \$C 3,118,244 pa 01/2001 - 12/2005

Yaffe MJ – Principal Investigator, Rowlands JA (Co-Investigator), et al. Ontario R&D Challenge Fund: “Ontario Centre of Excellence in Breast Cancer Imaging Research (a-Se Detectors for Digital Mammography)” \$C 1,087,922 pa 01/2001 - 12/2004

Zhao W, Rowlands JA, Pang G. US Army Breast Cancer Initiative “SAPHIRE: A New Flat-Panel Digital Mammography Detector with Avalanche Photoconductor and High-Resolution Field Emitter Readout” \$US 100,000 pa 01/2004 - 12/2006

Zhao W, Rowlands JA, Street R, National Institutes of Health “Flat panel x-ray imaging detector with avalanche gain” \$US 350,000 pa 08/2003 - 06/2008

## **Publications**

Abosch A, Kapur S, Lang AE, Hussey D, Sime E, Miyasaki J, Houle S, Lozano AM. Stimulation of the subthalamic nucleus in Parkinson's disease does not produce striatal dopamine release. *Neurosurgery*. 2003 Nov;53(5):1095-102; discussion 1102-5.

Addis DR, McIntosh AR, Moscovitch M, Crawley AP, McAndrews MP. Characterizing spatial and temporal features of autobiographical memory retrieval networks: a partial least squares approach. *NeuroImage* 2004 December 23(4):1460-1471.

Addis DR, Moscovitch M, Crawley AP, McAndrews MP. Recollective qualities modulate hippocampal activation during autobiographical memory retrieval. *Hippocampus*. 2004;14(6):752-62.

Addis DR, Moscovitch M, Crawley AP, McAndrews MP. Qualities of autobiographical memory modulate hippocampal activation during retrieval: preliminary findings of an fMRI study. *Brain Cogn*. 2004 Mar;54(2):145-7.

Al-Kwif O, Kim JK, Stainsby J, Huang Y, Sussman MS, Farb RI, Wright GA. Pulsatile Motion Effects on 3D Magnetic Resonance Angiography: Implications for Evaluating Carotid Artery Stenoses. *Magnetic Resonance in Medicine*. 2004 Sep;52(3):605-11.

Bitar R, Bezjak R, Mah K, Loblaws DA, Gotoviec AP, Devins G. Does tumour status influence cancer patient's satisfaction with the doctor-patient interaction? *Support Care Cancer* 2004;12:30-40.

Bitar R, Weiser WJ, Avendaño M, Derkach P, Low D, Muradali D. Chest radiographic manifestations of Severe Acute Respiratory Syndrome in health care workers: the Toronto experience. *American Journal of Roentgenology* 2004;182:45-48.

Burn PR, Haider MA, Alfuhaid T, Brown MP, Roberts TPL. Proton magnetic resonance spectroscopy as a potential tool for differentiating between abdominal fluid collections. *J Magn Reson Imag* 18:740-4 (2003)

Caldwell CB, Mah K, Skinner M, Danjoux CE. Can PET provide the 3D extent of tumor motion for individualized internal target volumes? A phantom study of the limitations of CT and the promise of PET. *Int J Radiat Oncol Biol Phys*. 2003 Apr 1;55(5):1381-93.

Strumas N, Antonyshyn O, Caldwell CB, Mainprize J. Multimodality imaging for precise localization of craniofacial osteomyelitis *J Craniofac Surg* 2003 Mar;14(2):215-9

Callen DJ, Black SE, Caldwell CB, Grady CL. The influence of sex on limbic volume and perfusion in AD. *Neurobiol Aging*. 2004 Jul;25(6):761-70.

Cardenas L, Houle S, Kapur S, Busto UE. Oral D-amphetamine causes prolonged displacement of [11C]raclopride as measured by PET. *Synapse*. 2004 Jan;51(1):27-31.

Cheyne D, Gaetz W, Garnero L, Lachaux J-P., Ducorps A, Schwartz D and Varela F (2003) Neuromagnetic imaging of cortical oscillations accompanying tactile stimulation. *Cognitive Brain Research* 17: 599-611.

Chong T, Alejo DE, Greene PS, Redmond JM, Sussman MS, Baumgartner WA, Cameron DE. Cardiac valve replacement in human immunodeficiency virus-infected patients. *Ann Thorac Surg*. 2003 Aug;76(2):478-80; discussion 480-1.

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## **Patents**

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### **Invited Presentations**

Flagg E. Auditory processing of native language speech-sound combinations: an MEG study. U of T Dept. of Medical Imaging Annual Research Day, April 29, 2004.

Flagg E. Decomposition, fusion, and competition in English Auxiliary Reduction. U of T Syntax Group, March 19, 2004.

Flagg E. Topic: Brain Imaging. Invited Guest Lecturer, York University, January 21, 2004.

Kassner A. Imaging cerebrovascular reactivity – University of Lund, Sweden

Kassner A. Advanced imaging in cerebrovascular disease – GE Healthcare, Malmoe, Sweden

Kassner A. Biological imaging of brain tumors - Rostoker Lecture, UofT

Oram Cardy J. Disentangling ADHD and SLI: Research Findings and Clinical Considerations, Board-wide in-service for speech-language pathologists and special education teachers. Toronto District School Board, Toronto, Ontario, March 2004.

Oram Cardy J. MEG and Autism, Neurology Grand Rounds Presentation. The Hospital for Sick Children, Toronto, Ontario, March 2004.

Oram Cardy J. Neuroimaging of SLI and Autism: An MEG investigation, Autism Academic Rounds Presentation. Surrey Place Centre, Toronto, Ontario, November 2003.

Roberts TPL. “The Neurovascular Imaging Suite of the Future”, 5<sup>th</sup> Interventional Neuroradiology Symposium, Toronto, Canada, November 2003.

Roberts TPL. “Advances in MRI” GE Multimodality Seminar, Toronto, Canada, November 2003.

Roberts TPL. “High field MRI”, Neuroscience Grand Rounds, TWH, Toronto, Canada, November 2003

Roberts TPL. “Imaging Angiogenesis”, UHN Research Day, Toronto, Canada, November 2003.

Roberts TPL. “Imaging Brain Waves” The Annual nd Fanny Rostoker Lecture, Toronto, Canada, October 2003.

Roberts TPL. “Physiologically Specific Imaging” MSY1010 Institute of Medical Science, University of Toronto, October 2003.

Roberts TPL. “High Field MR”, 2nd High Field MR Symposium, Bonn, Germany, September 2003.

Roberts TPL. “Microvascular Permeability”, Neuro MiniSymposium, Technical Institute, Zuerich, Switzerland, August 2003.

Roberts TPL. “Physics of diffusion, perfusion and DTI”, ISMRM, July 2003.

Roberts TPL. “Physics of fMRI”, ISMRM, July 2003.

Roberts TPL. “Biological Imaging”, Finding a Cure for Glioblastoma Summit, Cleveland Clinic, Cleveland, OH, July 2003

Sussman M. Talk Title: Magnetic Resonance Imaging (MRI) Safety. University Health Network, Toronto, Ontario, January 19, 2004.

Sussman M. Real-Time Cardiac Workshop, Talk Title: Real-Time Image Combination: A Better Approach for Imaging in the Presence of Motion? Toronto, Ontario, July 10, 2003.

Yaffe MJ. Digital Mammography: Basic Physics for the Radiologist, 23rd International Congress of Radiology, Montreal, June 2004.

Yaffe MJ. Questions and Answers on Digital Mammography, 23rd International Congress of Radiology, Montreal, June 2004.

Yaffe MJ. Detector Technology for Digital Mammography, 7th International Workshop of Digital Mammography, Raleigh NC, June 2004

Yaffe MJ. Volumetric Breast Density, 2nd International Breast Densitometry Workshop, San Francisco, June 2004.

Yaffe MJ. Advanced Applications of Digital Mammography, 21st Meeting of the Society for Computer Applications in Radiology, Vancouver, May 2004

Yaffe MJ. Detector Technology for Digital Mammography. University of Chicago CME Course, Chicago, March 2004.

Yaffe MJ. Is Mammographic Density a Surrogate for Breast Cancer Risk? International Conference on Gynecologic Endocrinology, Florence, Feb. 27, 2004.



Yaffe MJ. Workstations for Digital Mammography. Digital Radiography and PACS Course, Tampa, Feb. 2004.

Yaffe MJ. Detectors for Digital Mammography. French Medical Physicists Association, Toulouse Dec 17, 2003.

Yaffe MJ, Jong RA. Image Quality in Digital Mammography. RSNA, Chicago IL, December, 2003.

Yaffe MJ. Basic Principles of Digital Mammography Harvard Breast Imaging Course, Burlington Ma, Oct. 24, 2003.

Yaffe MJ. Advanced applications in digital breast imaging: digital subtraction angiography. Harvard Breast Imaging Course, Burlington Ma, Oct. 24, 2003.

Yaffe MJ. Physics of digital mammography. University of N Carolina Continuing Medical Education Course, Oct. 11, 2003.

Yaffe MJ. Quality control for digital mammography. University of N Carolina Continuing Medical Education Course, Oct. 11, 2003.

Yaffe MJ. Advanced applications of digital mammography. University of N Carolina Continuing Medical Education Course, Oct. 11, 2003.

### Teaching -- Hours of Lectures

<b>Faculty Member</b>	<b>Students</b>	<b>Residents, Fellows, Faculty</b>	<b>Technologists</b>
C.B. Caldwell	4	10 (30 additional hours evert 2 years)	10
S. Houle	10	20	10
T.R. Roberts	6	10	2
J.A. Rowlands	0	2	0
M.L. Wood	0	4	0
M.J. Yaffe	10	38	3

**Research Report 2004**  
**Andrea Kassner, Ph.D. – Teamleader Microvascular Imaging**

Current research projects:

**1. Prediction of hemorrhage in acute ischemic stroke using permeability MRI**

Increased risk of intracranial hemorrhage limits the general use of tissue plasminogen activators (t-PA) in acute ischemic stroke (AIS). Preliminary results of this study shows that early blood-brain-barrier (BBB) defects in AIS can be assessed using quantitative DCE MRI. Significantly increased permeability was found in 3 cases which later on hemorrhaged. This method indicates the potential to identify patients at higher risk of HT and may allow to use physiological imaging rather than time from onset of symptoms to guide the decision to treat with t-PA.

Collaborators: David Mikulis, TWH; Frank Silver, TWH; Keri Taylor, TWH, Tim Roberts

**2. CVR and perfusion measurements in MM disease**

There are two primary methods currently used for assessing blood flow abnormalities in patients with Moyamoya disease. These are resting perfusion techniques and vasoactive challenge methods. This study integrates resting perfusion measurements using dynamic contrast-enhanced susceptibility MRI with measurements of cerebral vascular reactivity with a CO<sub>2</sub> challenge using BOLD MRI to provide a comprehensive characterization of the vascular dysfunction in Moyamoya disease.

Collaborators: David Mikulis, TWH; Adrian Crawley, TWH, Tim Roberts (UofT)

**3. Tissue classification in brain tumors**

Physiological MR imaging including diffusion (to assess tumor cellularity), dynamic contrast-enhanced (DCE) MRI (to assess blood volume and microvascular permeability related to angiogenesis) and spectroscopy (to assess metabolism) offer insights into aspects of tumor physiology and metabolism, thus allowing characterization of tumor dysfunction. These techniques will assist with tumor grading as well as surgical planning and monitoring of cancer related therapies. Furthermore the use of combinatorial approaches such as factor analysis may yield even higher specificity in determining prognosis and treatment response.

Collaborators: Ab Guha, Tim Roberts, Amparo Wolf

**4. CVR BOLD imaging in healthy volunteers**

Combining CO<sub>2</sub> manipulation with BOLD MRI is a promising for assessing regional differences in cerebrovascular reactivity (CVR) which is a measurement of the brains autoregulatory

capacity which is important for the assessment of vascular disorders in which autoregulation is compromised or exhausted. Since this technique is beginning to be used pre-operatively to guide surgical decision making and to assess efficacy of revascularization, knowledge concerning reproducibility is essential. This study provides quantitative CVR measurements by correlating BOLD MR signal intensity with square wave changes in end-tidal pressure of CO<sub>2</sub> ( $p_{ET} \text{ CO}_2$ ) and demonstrates excellent reproducibility of this method.

Collaborators: Julien Poublanc, Adrian Crawley, David Mikulis

## **5. ASL**

Flow-sensitive alternating inversion recovery (FAIR) is a pulsed arterial spin-labeling method which acquires pairs of inversion recovery images following a slice-selective and non-selective inversion pulse. The difference image for each individual pair usually has a low signal-to-noise ratio (SNR) and therefore multiple pairs of images are acquired and averaged. In this paper we compare a gated version of FAIR vs a non-gated FAIR approach to improve SNR by impacting both the individual difference signal for each pair as well as the averaged signal for all pairs. Gated-FAIR improves SNR at TI values less than approximately 1.0 seconds.

Collaborators: Nasim Maleki, Jeff Stainsby, Tim Roberts

## **6. Imaging of angiogenesis in experimental arthritis**

Juvenile idiopathic arthritis is a chronic disease that may impair any joint of the body. It produces inflammation of the synovium, which is a highly vascularized membrane that overlies the bones at the joints. The inflamed synovium in arthritis erodes the adjacent cartilage and bone. The sooner the arthritis is treated, the milder is the progression of the disease. Although conventional imaging modalities exist to evaluate the degree of inflammation and degeneration of the articular cartilage, such as anatomic magnetic resonance imaging, they are unable to depict articular changes before the joint is destroyed. In this study we plan to induce arthritis in rabbit knees and to determine whether functional magnetic resonance imaging such as permeability or BOLD imaging is able to monitor the response of the joints to treatment using non-steroidal antiinflammatory drugs and a technique of continuous movimentation of the rabbit legs by means of a machine which is called continuous passive motion.

Collaborators: Andrea Doria, Tim Roberts, Adrian Crawley

## **7. Andrew Baines**

Hemoglobin-based-oxygen-carriers (HBOC) are being developed as a substitute for human blood to replace blood loss and ensure adequate oxygen delivery . Vasoconstriction limits the effectiveness of HBOC. To reduce the vasoconstrictor response the NO and O<sub>2</sub> affinity and diffusivity of HBOC have been modified. The effect of these HBOC on intrarenal pO<sub>2</sub> and blood

flow distribution is not known. We therefore aim to develop methods for quantitating intrarenal blood flow and hemoglobin oxygenation following infusions of HBOC in a rat model. Renal deoxyHb levels will be rapidly assessed during and subsequent to HBOC injection using BOLD-MRI. Renal blood flow will be quantified with dynamic MRI (Gd-DPTA injection). Blood pressure will be monitored with an MRI compatible transducer. Hb content of cortex and medulla will be measured at the end of experiments.

Collaborators: Andrew Baines, Chris McGowan

## **8. fMRI pre-op mapping**

Currently surgery is often used in the management of patients with brain tumours. However, there is a trade-off between the margin of excision used to ensure complete removal and the potential loss of function that may arise as a consequence of removing normal surrounding brain tissue. There are several invasive approaches used in neurosurgery to define eloquent areas of the cortex prior to surgical excision. One approach is to perform electrophysiological mapping of the cortex in the awake patient at the time of the operation. A second approach routinely used prior to surgery for epilepsy is the *Wada test*, where the predominant side of the brain used for language and memory is identified by the invasive sequential injection of sodium amytal (which transiently stops the brain from working) into each of the two main blood vessels supplying different sides of the brain, during standard neuropsychological testing. This test is highly invasive and very costly. An alternative non-invasive approach is to use fMRI to localise activations associated with important tasks such as limb movement or speech production. A number of groups have now reported the effectiveness of fMRI in correctly identifying the localisation of the main motor strip or language area pre-operatively in patients with lesions near these eloquent regions. We are currently investigating this in brain tumor patients with the view that further refinement of these techniques may lead to the discontinuation of the former expensive and invasive approaches.

Collaborators: Elissa Flagg, Tim Roberts, Ab Guha

## **9. Blood transit time maps**

Cerebrovascular reactivity (CVR) is a measure of the brain's autoregulatory capacity and can be measured using BOLD MRI combined with inhaled CO<sub>2</sub> manipulation. Although the magnitude of the BOLD signal is primarily employed to assess the reactivity of the cerebral vasculature, the temporal delay of the BOLD response may contain useful information concerning blood transit times. In this study, we calculated the time delay differences between vascular territories of the anterior, middle, and posterior cerebral arteries as well as white compared to overall grey matter, which were in line with what authors have reported previously for DSC imaging.

Collaborators: Julien Poublanc, Adrian Crawley, David Mikulis

## **Adrian Crawley – Research Summary 2003-04**

### **1) ROI-based analysis of fMRI activation signal height and extent using a mixture model approach.**

- a) We have demonstrated that false negative errors that occur with simple thresholding can be successfully avoided by fitting the distribution of signals within a ROI to a mixture model (i.e. either non-activated or activated voxels). This is particularly important for unbiased spatial extent estimation. We have also shown that height x extent as a measure of overall activation is far more robust than the usual estimate of number of suprathreshold pixels.
- b) Paper almost finished; abstract to be submitted to HBM 2005.

### **2) Cerebral vascular reactivity (CVR) delay maps (with Julien Poublanc and Andrea Kassner)**

- a) For specific grey and white matter ROIs, we have measured relative delays in the onset of BOLD signal increase due to vasodilation caused by increased pCO<sub>2</sub> that compare to known values in blood transit times.
- b) Future work: extend method to generate actual delay time maps rather than ROI analyses; reanalyze patient CVR data to produce delay maps for correlation with blood transit time maps calculated from gadolinium DSC scans. Abstract submitted to ISMRM 2005.

### **3) Oxygen extraction mapping (with Andrea Kassner and David Mikulis)**

- a) We repeated other investigators' experience with using CO<sub>2</sub> reactivity + ASL to calibrate the BOLD effect (in terms of each subject's particular baseline dHb concentration) to enable change in CMRO<sub>2</sub> to be estimated from a standard fMRI experiment.
- b) Realizing that the method cannot produce baseline CMRO<sub>2</sub> measurements, we intend to shift our focus to methods that measure OEF from large veins or possibly use a range of CO<sub>2</sub> to produce a range of blood flow in the tissue of interest in order to estimate OEF from the slope of BOLD signal as a function of blood flow. Our preliminary work with the baseline dHb calibration procedure has indirectly motivated a CVR reproducibility study - being conducted by Julien Poublanc and Andrea Kassner- at two points in female subjects' menstrual cycle.

## **Dr. Marshall Sussman – Research Progress for 2003-2004**

My areas of research activity are as follows:

### **1) Cardiac:**

I have primarily been involved in two different areas of research for cardiac imaging: motion compensation and  $T_2$  mapping. I will discuss each of these in turn.

The first area of my research deals with the development of techniques for motion compensation. This technique is known as the SIMNAV method. The advantage over conventional methods is that it uses the image data itself, rather than external devices such as ECG, to correct for motion. As a result, it is potentially more accurate and robust than conventional motion compensation methods. An additional advantage is that this approach may be applied to any type of motion. As a result, there are a broad range of applications. To date, we have explored the applications of cardiac imaging and the assessment of joint kinematics with this technique. Other areas, such as abdominal and neuro imaging, are planned for the future. At the present time, we have hired a research engineer out of the ORDCF cardiac budget to work on this project. In the past year, this work has resulted in 2 abstract publications and 1 patent filing.

A second area of interest in cardiac imaging is  $T_2$  mapping. To date, we have successfully implemented at UHN a  $T_2$  mapping pulse sequence, as well as  $T_2$  mapping post-processing software. The  $T_2$  value of tissue can potentially provide information in a broad range of disease processes. At the present time, we are using it to assess the state of the myocardium in patients with cardiomyopathies. In the future, we intend to apply these techniques to other clinical applications including patients with thalassemia, and the quantification of blood oxygen level. In the past year, this work has resulted in 1 manuscript publication.

### **2) Musculoskeletal:**

I have primarily been involved in three different areas of research for MSK imaging:  $T_2$  mapping, diffusion-weighted imaging, and joint kinematics. I will discuss each of these in turn.

The first area of my research in MSK imaging is  $T_2$  mapping. As with the cardiac  $T_2$  mapping projects discussed above, we have implemented a  $T_2$  mapping pulse sequence, as well as a number of different versions of  $T_2$  mapping post-processing software. A major focus of this study was the evaluation of cartilage degeneration in surgically-treated horse knees. This project was carried out under funding provided by a Canadian Arthritis Foundation (CAN) grant.  $T_2$  maps were obtained from a total of 10 horse knees. At the present time, analysis of the data is ongoing. Manuscript preparation will follow. All of this work was performed under the assumption of pure monoexponential  $T_2$  decay. We have also begun some investigations into more sophisticated  $T_2$  mapping techniques, employing multi-exponential  $T_2$  decay. This was the focus of a co-op student project. Data analysis is under way.

A second area of interest is in diffusion-weighted imaging of cartilage. Since cartilage is relatively thin (~2-3mm), high-resolution images are required. Unfortunately, this presents a

significant challenge for conventional diffusion-weighted imaging techniques, specifically single-shot EPI (SS-EPI). This is challenging because SS-EPI is sensitive to off-resonance effects, which gives rise to image warping and blurring. As a consequence, we have begun to explore the use of a new pulse sequence, diffusion-weighted (DW) PROPELLER to cartilage. DW-PROPELLER is a multi-shot fast spin echo technique. Preliminary results have demonstrated significantly less off-resonance sensitivity than conventional SS-EPI. In the past year, this work has resulted in 2 abstract publications.

A third area of interest in MSK is the imaging of joint kinematics. The technical development for this project is derived from the SIMNAV technique, developed as part of the cardiac research project described above. As mentioned earlier, this general motion compensation strategy can be applied to almost any type of motion. Currently, we are investigating its use in the imaging of joint kinematics.

### **3) Interventional MRI:**

I have primarily been involved in two different areas of research for interventional imaging: Surgical navigation and catheter steering. I will discuss each of these in turn.

In surgical procedures, one must often navigate through the body based on information contained within previously acquired medical images. A major challenge associated with this task is correlating the information contained within the images with the actual coordinate system of the body. For this project, a surgical navigation system has been developed which tracks the position of surgical instruments during the surgical procedure via an infrared camera. This tracking information is displayed graphically and in real-time on top of the previously-acquired images. This allows the surgeon to directly correlate the surgical and image coordinate systems. This navigation system has been used successfully in brain biopsy procedures, as well as lymph node excisions from the abdomen.

Endovascular procedures performed under fluoroscopic guidance often require the use of metal guidewires for steering catheters along their desired paths. The use of metal guidewires in interventional MRI is rendered problematic due to RF resonant heating of conductive metals in the MR environment, and by susceptibility artifacts. This project deals with the development of techniques for non-guidewire catheter steering. These involve the application of electric currents to the catheter, and relying on Lorentz forces to torque the wire in the presence of the main magnetic field associated with MRI. The main issues currently being addressed are the design, characterization, and optimization of the catheter design.

### **4) Miscellaneous:**

I am also involved in various other miscellaneous projects. These include the development of novel data acquisition strategies (Spiral-PR), the development of real-time MR techniques, the development of motion tracking algorithms, the development of parallel imaging methodologies, the investigation of novel diffusion-weighted imaging strategies, and the development of MEG signal processing strategies. In total, this work has resulted in 6 manuscripts (2 published, 2 in press, 2 submitted), 5 abstracts, and 1 patent filing.

## Department of Medical Imaging Annual Research Day 2004

Date: Thursday, April 29, 2004

Location: Sadowski Auditorium, 18th Floor, Mount Sinai Hospital

Starting Time: 12:30 pm with welcome by Walter Kucharczyk

### Body Imaging I

Session Chairs: Mostafa Atri and Martin O'Malley

12:35	Ants Toi	How Early Are Fetal Cerebral Sulci Visible and When Can Lissencephaly Be Suspected?
12:43	Katherine Fong	Ultrasound Detection of Fetal Anomalies in the First Trimester in Conjunction with Nuchal Translucency Screening: A Feasibility Study
12:51	Mostafa Atri	Mechanical Small Bowel Obstruction: Comparison of Unenhanced and Enhanced Multidetector Helical CT
12:59	Alexander Coret	Does Stress Increase the Size of the Adrenal Glands on Cross Sectional Imaging?
1:07	Wayne Deitel	The Radiologic Appearance of Recurrent Ileal Crohn's Disease
1:15	Sangeet Ghai	Ultrasound Imaging in Uterine Artery Embolization Patients: Pre-Procedure Evaluation and Post-Procedure Imaging Findings
1:23	Hyun-Jung Jang	Characterization of Indeterminate Hepatic Nodules in High-Risk Patients for Hepatocellular Carcinoma with Contrast-Enhanced Ultrasound
1:31	Tae Kyoung Kim	Contrast Enhanced Pulse Inversion Sonography of Liver Tumors: Why Is There Discordance with Contrast-Enhanced CT or MR Scan?
1:39	Blair MacDonald	Relationship between Vascular and Biliary Anatomy in Live Liver Donors
1:47	Martin O'Malley	Small (10 - 20mm) Arterial Phase Enhancing Nodules on Triphasic CT in Patients at Risk for Hepatocellular Carcinoma

1:55

**Break (15 minutes)**

### Body Imaging II

Session Chair: David Manson

2:10	Monica Epelman	Portal Vein Thrombosis (PVT): Spectrum of Clinical and Radiological Findings in Neonates and Young Infants with Emphasis on High Resolution Ultrasound (HRUS)
2:18	Michael Stefanos	Agreement Rates between Functional and Morphological Imaging for Pretreatment Assessment of Non-Hodgkin's Lymphoma Patients
2:26	Aaron Glickman	Dynamic MR Perfusion Imaging of Anterior Cruciate Ligament Autografts
2:34	Petrina Causer	6 Year Results Comparing Annual Breast Mammography, Ultrasound, MRI and Clinical Exam for Screening Women at High Risk for Hereditary Breast Cancer
2:42	Lenny Grinblat	The Radiology of Severe Acute Respiratory Syndrome (SARS): Radiographic Examination of 46 Confirmed Cases in Toronto, Canada
2:50	Anuradha Rao	High Resolution Computed Tomographic Findings in Patients Exposed to Mustard Gas with Pulmonary Function Test Correlation
2:58	Sarah Koles	Pneumothorax Post Thoracic FNA: Is There A Role For Post Biopsy CT?
3:06	Naeem Merchant	MRI and the Evaluation of Atrial Septal Defects
3:14	Demetris Patsios	Lung Cancer Screening using Low-Dose Computed Tomography in Toronto: The Experience So Far
3:22	Marshall Sussman	A New Method for MR Imaging of Moving Anatomy



**Neuroimaging**

Session Chairs: David Mikulis and Tim Roberts

3:30	Ellen Charkot	Pediatric Patient Doses in Interventional Neuroradiology
3:38	Elissa Flagg	Auditory Processing of Native Language Speech-Sound Combinations: An MEG Study
3:46	Andrea Kassner	Blood-Brain-Barrier Hyperpermeability in Acute Stroke
3:54	David Mikulis	Can MRI Replace CT for the Exclusion of Acute Intraparenchymal Hemorrhage in Patients Presenting with Acute Stroke Syndrome?
4:02	Janis Oram Cardy	Magnetoencephalography Reveals Rapid Temporal Processing Impairment in Autism
4:10	Clara Ortiz	Neurological Compromise in Extramedullary Hematopoiesis
4:18	Adrian Crawley	Effect of Task-Related Motion on FMRI Data

4:26 **Break (20 minutes)****Vascular and Interventional Radiology** Session Chairs: Peter Chait and Andrew Common

4:46	Rob Beecroft	Risk of Intrauterine Infectious Complications After Fibroid Embolization in Patients with Submucosal Fibroids
4:54	Richard Bitar	MR of Complicated Plaque
5:02	Marc Freeman	Percutaneous Vertebroplasty Results in the Reversal of Height Loss and Spinal Deformity in Patients with Osteoporotic and Pathologic Compression Fractures
5:10	C.S. Ho	Percutaneous Ethanol Injection of Medium to Large Hepatomas Using a Multi-Pronged Needle: Efficacy and Safety
5:18	Jeff Jaskolka	Needle Tract Seeding After Radiofrequency Ablation of Hepatic Tumors
5:26	John Kirby	CT Angiography for Endoleak: Is a Tri-Phasic Study Required?
5:34	Fred Lan	Comparison of Tris-Acryl Gelatin Microspheres and Polyvinyl Alcohol for Uterine Fibroid Embolization
5:42	Marc Ossip	Radiofrequency Ablation of Liver Tumors: Survival, Local Progression, and Factors for Failure of Effectiveness
5:50	Vikash Prasad	Coil Embolotherapy of Pulmonary Arteriovenous Malformations: Efficacy of Platinum Versus Stainless Steel
5:58	Dheeraj Rajan	Outcomes of Dysfunctional Autogenous Hemodialysis Fistulas After Angioplasty: Are there Clinical Predictors of Patency?
6:06	Andrea Milic	Reperfusion of Pulmonary Arteriovenous Malformations Following Embolotherapy
6:14	Kongteng Tan	Peripheral High Flow Arteriovenous Vascular Malformations: A Review of 31 Patients
6:22	Dan Mozeg	Assessing the Value of CT-Enteroclysis in the Diagnosis of Small Bowel Disease
6:30	Ashley Robinson	MR Imaging of the Fetal Cerebellar Vermis in Utero: Description of some useful Anatomical Criteria for Normal and Abnormal Development
6:38	Susan Blaser	Cochlear Nerve Hypoplasia in CHARGE Association
6:46	Stephanie Wilson	

6:54 Walter Kucharczyk **Closing comments**

# **RESIDENT TRAINING PROGRAM**

## **General Description**

There were 53 residents in our program in the 2003-2004 year. The five-year program consists of one year of preliminary clinical training (PGY1), followed by four years of training in medical imaging.

The university-wide integration and rotational system ensures that each resident will have access to all the strengths of our large and expert faculty and the huge volume of clinical pathology. Residents have the opportunity to train at several large modern hospitals, doing so in groups of 5 – 10 trainees of all levels, thus maintaining a close working environment with peers and faculty. All hospitals are equipped with state-of-the-art equipment. Residents work daily with the best of general radiographic, ultrasound, CT and MRI technology. Several hospitals have digital image archiving and communication systems.

## **PGY1**

PGY1 Clinical training is divided into two blocks, one eight-nine month block at core teaching hospitals and a two-three month block at a community hospital. During 2003 - 2004, the core teaching hospitals have been the Mount Sinai Hospital and the St. Michael's Hospital. Community training is principally done at the North York General Hospital. The content of the PGY1 program included Medicine (General Medicine and Respiriology); Surgery (General Surgery, Orthopaedics, Urology, Neurosurgery, Obstetrics and Gynaecology); one month of Paediatrics; one month of Anatomy at the U of T Anatomy Department; and two months of elective choices. In the final month of PGY1, all residents come together for a Radiology Orientation Program, which introduces the trainees to physics, imaging equipment, clinical lectures, program issues and the core hospitals. The PGY1 rotation opportunities are reviewed annually, attempting to make the best of training choices in the clinical services.

## **PGY2**

This is the first year of training in medical imaging. During 2003 - 2004, a PGY2 trainee spent the entire year at one or two of the three core teaching Departments (Mount Sinai – University Health Network, Sunnybrook and Women's College Health Sciences Centre and St. Michael's Hospital). There is a graduated increase in responsibility over the course of the year. In order to prepare residents to take night call (which starts in September), the year begins with a 10 week introductory program covering thoracic, GI, GU, CNS, MSK, CT and nuclear imaging. The remainder of the year consists of one or two month rotations in each of the above organ systems, as well as a one-month rotation in ultrasound.

### **PGY3**

In 2003- 2004, residents in this training year divided their rotations into three to six month blocks at hospitals different from that of their PGY2 training year. This allows the trainee an opportunity to see a different spectrum of pathology and to work with a different group of faculty. Rotations during the PGY3 year have included Breast Imaging, Neuroradiology, Ultrasound, Vascular-Interventional, and Nuclear Medicine as well as additional training in CT, MSK, GI and Chest. MRI training is included within all organ system rotations and is a strong component of all core hospitals.

### **PGY4**

During this year, each resident spent a four-month block in Paediatric Radiology at the world famous Hospital for Sick Children. The other eight months is at one or two of the core hospitals. This year includes a two-month block of dedicated Angio-Interventional training. The resident also has four to six months of General Radiology rotations. The Armed Forces Institute of Pathology (AFIP) six-week rotation for Radiology-Pathology is scheduled during the General radiology time.

### **PGY5**

The resident is usually allowed to use this year for electives, but this is conditional upon the resident having achieved an acceptable standard of competence in medical imaging. It may be spent concentrating on areas of relative weakness, or on subspecialty areas. Most residents include electives in obstetric ultrasound, cardiac imaging and Body MRI in this final year.

### **Armed Forces Institute of Pathology**

All residents are encouraged to attend the Armed Forces Institute of Pathology in Washington, D.C., where they receive a six-week, intensive, didactic course in pathology correlated to imaging. This generally occurs during the PGY4 year. Some financial support is available. To date, we have been successful in reserving a sufficient number of positions at AFIP to permit all of our residents to attend at some point in their training.

### **Physics Instruction**

All residents must be knowledgeable about the physics of medical imaging. To that end, intensive physics instruction is provided. One week courses are provided for the PGY1 and PGY3 years and there is also a five-day review course in the PGY3 or PGY4 year of training. These courses are organized by Martin Yaffe, Ph.D. (Department of Medical Imaging) and taught by the faculty of our department, the faculty of the Department of Medical Biophysics, and guest speakers.

## **Conferences**

Residents are encouraged to attend imaging conferences, both to be involved in presenting papers or posters and also for the benefit of knowledge and interaction with the imaging community at large. During the PGY3 year, each resident is given the opportunity to attend a major imaging conference with the provision of financial support. The resident is not required to present at the conference to receive this support but does prepare a report following the meeting to highlight what they gained in their attendance. In addition, residents presenting papers or posters at recognized meetings generally receive financial support through affiliations with hospital imaging departments.

## **Seminars and Half-Day Program**

Wednesday afternoons from September to June have been the focus for the academic program. There is a formal two to three hour weekly clinical seminar for PGY1, PGY2 and PGY3 residents. Most seminars are organized around organ systems and imaging modalities.

As well, there are special sessions for all resident years on non-clinical topics such as ethical and legal issues, practice management and career planning. Speakers from outside the Department add interest to the content of these featured sessions.

A 10 hour review series is provided for PGY5 residents each spring in preparation for the ABR and Royal College examinations.

## **Research**

Residents in Medical Imaging are required to have a good foundation of research methodology and critical appraisal in order to either critically evaluate scientific medical literature or pursue independent research activities. Principles and issues of health technology assessment, quality improvement and clinical audits are also core components of the clinical research curriculum. Dr. David Mikulis is responsible for the design and delivery of the course curriculum, workshops, tutorials and lectures on these topics. Instruction in this curriculum is given throughout the Residency Program. In total, residents in Medical Imaging receive over 30 hours of course instruction.

Each resident is required to become involved in a research project beginning no later than the PGY3 year. All residents receive protected time to work on their project. The research is conducted in conjunction with one or more staff persons with a view to presenting the project during the PGY4 or PGY5 years at our Annual Research Day. The residents are encouraged to publish their results and to present them at national or international meetings.

## **Rounds**

Teaching rounds, or small group conferences, are held at each of the core hospitals once or twice a day. University Division rounds are held for the entire department six to eight times annually at a central location.

## **View Box Teaching**

Every resident in the PGY2 through to the PGY5 years receives daily teaching from faculty at the view box and in the procedure rooms. Teaching is based on the day's cases, but may be supplemented with related cases from faculty teaching files. The amount of teaching varies from rotation to rotation but on average there are one to two hours of this type of one-to-one teaching daily. This program is widely recognized for the quality of teaching provided to residents. In addition, residents learn to teach others and are expected to teach students and observers in the Department.

## **Journal Club**

This is organized by the residents and is held approximately five times annually.

## **Visiting Professor Program**

This program of six lectures between October and April is organized by the CME Director of our department and is provided for all imaging specialists including community radiologists. Residents attend the lecture and reception. Visiting Professors from outside Toronto usually present resident teaching sessions at two or three of the teaching hospitals during their visits to Toronto.

## **Organ Imaging Review Course**

This is a week-long, internationally recognized review course. It is given in September or October of each year. It is primarily intended as a CME course for practicing radiologists but also contains a wealth of valuable teaching material for residents. All residents are given some time off clinical services to attend, and can do so at no cost.

## **Program Evaluation**

In addition to that carried out by the Radiologists-in-Chief and the teaching co-ordinators at each hospital, the residents complete an assessment of each rotation, and an annual assessment of the faculty's teaching.

## **Program Supervision**

This is the direct responsibility of the Program Director who is, in turn, responsible to the Departmental Chair and the Departmental Executive Committee. The Program Director is assisted by the Resident Training Committee, which is composed of a representative from each of the teaching hospitals, a PGY1 coordinator responsible for all PGY1 issues, as well as from Nuclear Medicine and the Research Committee. In addition, the University of Toronto Chief Resident in Medical Imaging and a resident representative from each year of training are full members of the committee.

There are Division Heads appointed for Cardiothoracic, Musculoskeletal, Abdominal, Pediatric, Vascular-Interventional, Breast Imaging and Neuroradiology. These Division Heads and the Program Director for Nuclear Medicine are responsible for rotation goals and objectives, suggested reading lists and recommendations regarding the resident lectures and seminars. Division Heads advise the Program Director and Resident Training Committee.

### **Resident Evaluations**

- Evaluation consists of the following:
- An in-training evaluation completed following each rotation.
- A summary in-training evaluation at the end of each year of training.
- Results of the American College of Radiology multiple choice in-training examination, taken in the spring of each year.
- Results of a yearly oral examination based on the Royal College format (PGY2-5).
- Results of a written examination in physics following the PGY1 course.
- A practice OSCE examination in the spring of each year (PGY3-5).

### **Resident Awards**

Outstanding residents are recognized by awards for clinical excellence, teaching and research.

#### **1) Gordon Potts Award**

This award of a commemorative plaque is made to the outstanding final-year resident, based on a combination of the following academic and personal strengths: Interpersonal skills, willingness to explore new methods and ideas, dedication to patient service and academic activities, intellectual capacity and publications in residency.

2003 - 2004 recipient: Dr. Selina Lem / Dr. Angela HO, PGY5

#### **2) Resident Teacher-Mentor Award**

This award will be made to a final year graduating resident, based on a combination of the following strengths and contributions: dedication to teaching, resident advocate and mentor, contribution to Resident Program and commitment to personal continuing educational growth.

2003 - 2004 winner: Dr. Selina Lem, PGY5

#### **3) Research Awards**

Each year residents as well as fellows are nominated to receive the RSNA Research Award for Research excellence within the University Of Toronto Department Of Medical Imaging.

2003 – 2004 winner: Dr. Sangeet Ghai, Abdominal Imaging Fellow

### **Summary**

The University of Toronto training program in Medical Imaging is designed to provide the best possible training in all aspects of imaging. The program is an intensive one, with considerable emphasis on teaching, in addition to exposure to a huge volume of clinical pathology. The university-wide integration and rotational system ensures that each resident will have access to all of the strengths of our departments.

## **RESIDENTS**

### **PGY1 Level**

Aditya Bharatha, MD  
University of Toronto, 2003

Philip Buckler, MD  
University of Toronto, 2003

Patrick Cervini, MD  
University of Toronto, 2003

Errol Colak, MD  
University of Toronto, 2003

Kebby King, MD  
University of West Indies, 1997

Jeff Mandelcorn, MD  
University of Toronto, 2003

Alex Menard, MD  
University of Ottawa, 2003

Peyvand Pordeli, MD  
University of Iran, 1992

Jeremy White, MD  
University of British Columbia, 2003

### **PGY2 Level**

Meg Chiavaras, MD  
University of Massachusetts, 2002

Christopher Dyck, MD  
University of Toronto, 2002

Lenny Grinblat, MD  
McMaster University, 2002

Winnie Lee, MD  
University of Toronto, 2002

Andrea Milic, MD  
University of Ottawa, 2002

Shantel Minnis, MBBS  
University of West Indies, 1998

Emma Robinson, MD  
University of Toronto, 2002

Neil Rosta, MD  
Queen's University, 1994

Brian Yeung, MD  
Queen's University, 2002

Katerine Zukotynski, MD  
University of Toronto, 2002



### **PGY3 Level**

Gagan Ahuja, MD  
University of Toronto, 2001

Harpreet Baweja, MD  
McMaster University, 1994

Richard Bitar, MD  
University of Toronto, 2001

Louis-Martin Boucher, MD/PhD  
University of Toronto, 2001

Debra Chang, MD  
University of Toronto, 2000

Meaghan Hyland, MD  
University of Ottawa, 2001

Jeffery Jaskolka, MD  
University of Western Ontario, 2001

Ryan Margau, MD  
University of Toronto, 2001

Elaine Martinovic, MD  
University of Calgary, 2001

Matthew McInnes, MD  
University of Toronto, 2001

Rola Shaheen, MD  
University of Jordan, 1996

### **PGY4 Level**

Susan Armstrong, MD  
University of Toronto, 2000

Marc Freeman, MD  
University of Toronto, 2000

Aaron Glickman, MD  
University of Western Ontario, 2000

Anish Kirpalani, MD  
McMaster University, 2000

Sarah Koles, MD  
University of Calgary, 2000

Dan Mozeg, MD  
University of Toronto, 2000

Vikash Prasad, MD  
Dalhousie University, 2000

Michael Stefanos, MD  
University of Toronto, 2000

## PGY5 Level

Peter Ballyk, MD  
University of Toronto, 1999

Carrie Betel, MD  
University of Toronto, 1999

Anita Chae, MD  
University of Western Ontario, 1999

Zdenko Filakovic, MD  
Ontario International Medical Program, 1999

Angela Ho, MD  
University of Toronto, 1999

Zeinab Layton, MD  
University of Western Ontario, 1999

Selina Lem, MD  
Queen's University, 1999

Bonnie O'Hayon, MD  
University of Toronto, 1999

Erika Mann, MD  
Queens University, 1998

Markian Shulakewych, MD  
University of Manitoba, 1994

Steven Singer, MD  
University of Ottawa, 1998

Sameh Tadros, MB, BCh  
Ontario International Medical Program, 1999

Lana Wilkinson, MD  
McMaster University, 1999

# **NUCLEAR MEDICINE TRAINING PROGRAM**

## **General Description**

Nuclear medicine is a branch of medical practice primarily concerned with the use of unsealed radioactive sources in the study, diagnosis, and treatment of disease. Our program currently provides dual-certification in radiology and nuclear medicine. This is a six year (including PGY1) program with two years of subspecialty training in nuclear medicine (provided that the subspecialty training is taken following the completion of at least 18 months in Diagnostic Radiology, effective June 1, 1998).

The Nuclear Medicine Program provides formal instruction and training for both radiology and nuclear medicine residents. Formal lectures cover various aspects of nuclear medicine including cardiac and oncologic nuclear medicine, functional neuroimaging, radiopharmacy, nuclear physics, and general nuclear medicine. Residents have specific goals, objectives and reading lists during their rotation at one of the teaching hospitals. There are biweekly teaching rounds for both radiology and nuclear medicine residents at these hospitals. The residents acquire skills by participating in daily clinical work. Didactic instruction is supplemented by teaching files at each hospital. Residents are encouraged to attend evening lectures given monthly or bi-monthly by internationally renowned guest speakers, who lecture on current topics in nuclear medicine at Toronto Nuclear Medicine Society Meetings. Journal clubs are occasionally organized where academic staff discuss interesting cases and/or current journal articles.

## **General Objectives**

The goal of the nuclear medicine resident is to be able to function independently as a medical specialist with the ability to advise on, supervise, perform, and interpret all diagnostic procedures, and to achieve a level of competence in the performance of radiotherapy with unsealed radioactive sources so as to act as a consultant to referring physicians. The resident must acquire excellent communication and technical skills, and the knowledge and professionalism appropriate to a lifetime career in nuclear medicine.

## **Dual Radiology and Nuclear Medicine Residency**

Applicants will be considered from candidates who are already in the Diagnostic Radiology Training Program at the University of Toronto, usually, one slot per year is reserved for the dual certification program.

# **RADIOLOGY SCIENTIST TRAINING PROGRAM**

## **Objectives**

The purpose of the Radiological Scientist Training Program (RSTP) is to provide a small group of radiology residents with the opportunity to develop skills important to the pursuit of independent research. These skills encompass research methodology, publications, grant writing, and presentations. The research training is intended to complement the excellent clinical training for which the Department of Medical Imaging is already recognized.

## **Organization**

The RSTP is a six-year program with two years of research and four years of clinical training. The Royal College of Physicians and Surgeons of Canada will accept one year of research towards fulfilling the requirements of the five year program in diagnostic radiology. The RSTP is able to accommodate as many as two residents per year. The first two years of the RSTP are identical to the regular radiology training program. The difference is in the PGY3 and PGY4 years which, in the RSTP, are entirely devoted to research. Research opportunities are available in many departments relevant to radiology. Under certain circumstances, residents in the RSTP may pursue a M.Sc. or Ph.D. degree. The final two years, PGY5 and PGY6, are designated for clinical training to fulfil the requirements of the Royal College of Physicians and Surgeons of Canada.

## **Eligibility and Application Procedure**

Applications will be considered from candidates already accepted into the regular radiology training program and will occur during the PGY2 training year. A maximum of two places per year will be reserved for residents in the RSTP. Applicants need not have prior experience in research or a special background, but are expected to be self-motivated.

## **Remuneration**

Residents in the RSTP will be remunerated commensurate with residents in the regular radiology training program, up to a maximum of the PGY5 level.

## **Selection of Research Project and Supervisor**

Residents in the RSTP should select a project and a supervisor as soon as possible, and before the PGY3 year. The Director of Research and the Chair of the department can offer assistance with this selection. A supervisor may be selected from various University of Toronto departments, including Medical Imaging, Medical Biophysics, Anatomy, Physiology, Biochemistry, Computer Science, Clinical Epidemiology, or Electrical Engineering, specifically the Institute of Biomedical Engineering. The supervisor must have operating funds to support the research, but is not expected to provide remuneration for the resident. Candidates will be strongly encouraged also to apply for a fellowship from an agency such as the Medical Research

Council, but acceptance into the RSTP will not be conditional upon success in obtaining such a fellowship.

### **Graduate Degrees**

Residents in the RSTP are encouraged to pursue a graduate degree. The procedure depends somewhat on the department in which the research is to be conducted, but requires a separate application to that department and the School of Graduate Studies or Institute of Medical Sciences. Residents are responsible for fulfilling all requirements of the department in which they are registered as graduate students.

### **Clinical Responsibilities**

During the two years of research training, residents in the RSTP will have minimal clinical responsibilities, probably limited to one on-call evening/night per week. In addition, residents in the RSTP are encouraged to maintain contact with clinical activities through attendance at select departmental rounds and teaching sessions. Such attendance will not be compulsory for RSTP residents in the two research years, as it is for residents in the regular training program.

# **OBJECTIVES OF TRAINING & SPECIALTY TRAINING REQUIREMENTS IN DIAGNOSTIC RADIOLOGY**

## **Definition**

Diagnostic Radiology is a branch of medical practice concerned with the use of imaging techniques in the study, diagnosis and treatment of disease.

## **General Objectives**

On completion of the educational program, the graduate physician will be competent to function as a consultant in Diagnostic Radiology. This requires the physician to have the ability to supervise, advise on and perform imaging procedures to such a level of competence, and across a broad range of medical practice, as to function as a consultant to referring family physicians and specialists.

Communication skills, knowledge, and technical skills are the three pillars on which a radiological career is built, and all are dependent on the acquisition of an attitude to the practice of medicine which recognizes both the need to establish a habit of continuous learning and a recognition of the importance of promoting a team approach to the provision of imaging services.

Residents must demonstrate the knowledge, skills and attitudes relating to gender, culture and ethnicity pertinent to Diagnostic Radiology. In addition, all residents must demonstrate an ability to incorporate gender, cultural and ethnic perspectives in research methodology, data presentation and analysis.

## **Specific Objectives**

At the completion of training, residents will have achieved the following competencies so as to function effectively as:

### **i) Medical Expert/Clinical Decision-Maker**

#### **General Requirements**

- Demonstrate diagnostic and therapeutic skills for ethical and effective patient care.
- Access and apply relevant information to clinical practice so as to have competence in clinical radiological skills.
- Demonstrate effective consultation services with respect to patient care, education and legal options.

#### **Specific Requirements**

- Understand the nature of formation of all types of radiological images, including physical and technical aspects, patient positioning, contrast media.
- Knowledge of the theoretical, practical and legal aspects of radiation protection, including other imaging techniques and their possible harmful effects.

- Knowledge of human anatomy at all ages, both conventional and multi-planar, with emphasis on radiological applications.
- Knowledge of all aspects of clinical radiology, including understanding of disease, appropriate application of imaging to patients, importance of informed consent, complications such as contrast media reactions, and factors affecting interpretation and differential diagnosis.
- Understand the fundamentals of quality assurance in radiology.
- Understand the fundamentals of epidemiology, biostatistics and decision analysis.
- Show competence in manual and procedural skills and in diagnostic and interpretive skills.
- Demonstrate the ability to manage the patient independently during a procedure, in close association with a specialist or other physician who has referred the patient. The radiologist should know when the patient's best interests are served by discontinuing a procedure, or referring the patient to another physician.
- Understand the acceptable and expected results of investigations/and or interventional therapy as well as unacceptable and unexpected results. This must include knowledge of and ability to manage radiological complications effectively.
- Understand the appropriate follow-up care of patients who have received investigations and/or interventional therapy.
- Show understanding of a sound and systematic style of reporting.
- Competence in effective consultation, conduct of clinico-radiological conferences, and the ability to present scholarly material and lead case discussions.

## **ii) Communicator**

- Establish appropriate therapeutic relationships with patients/families.
- Listen effectively.
- Obtain the appropriate information during consultation with referring physicians in order to be able to make recommendations regarding the most appropriate testing and/or management of patients.
- Discuss appropriate information with patients/families and the health care team, and be able to obtain informed consent for tests and procedures when this is needed.

### Specific Requirements

- Have the ability to produce a radiological report which will describe the imaging findings, most likely differential diagnosis, and when indicated, recommend further testing and/or management.
- Understand the importance of communication with referring physicians, including an understanding of when the results of an investigation or procedure should be urgently communicated.
- Communicate effectively with patients and their families and have a compassionate interest in them.
- Recognize the physical and psychological needs of the patient and their families undergoing radiological investigations and/or treatment, including the needs of culture, race and gender.

### **iii) Collaborator**

#### General Requirements

- Consult effectively with other physicians and health care professionals.
- Contribute effectively to other interdisciplinary team activities.

#### Specific Requirements

- Have the ability to function as a member of a multi-disciplinary health care team in the optimal practice of radiology.

### **iv) Manager**

- Utilize resources effectively to balance patient care, learning needs, and other activities.
- Allocate finite health care resources wisely.
- Work effectively and efficiently in a health care organization.
- Utilize information technology to optimize patient care, life-long learning and other activities.

#### Specific Requirements

- Be competent in conducting or supervising quality assurance including an understanding of safety issues and economic considerations.
- Be competent in computer science as it pertains to the practice of radiology.

### **v) Health Advocate**

#### General Requirements

- Identify the important determinants of health affecting patients.
- Contribute effectively to improve the health of patients and communities.
- Recognize and respond to those issues where advocacy is appropriate.

#### Specific Requirements

- Understand and communicate the benefits and risks of radiological investigation and treatment including population screening.
- Recognize when radiological investigation or treatment would be detrimental to the health of a patient.
- Educate and advise on the use and misuse of radiological imaging.

### **vi) Scholar**

#### General Requirements

- Develop, implement and monitor a personal continuing education strategy.
- Critically appraise sources of medical information.
- Facilitate learning of patients, house staff/students and other health professionals.
- Contribute to development of new knowledge.

#### Specific Requirements

- Competence in evaluation of the medical literature.
- The ability to be an effective teacher of radiology to medical students, residents, technologists and clinical colleagues.
- The ability to conduct a radiology research project, which may include quality assurance.



- Appreciation of the important role that basic and clinical research plays in the critical analysis of current scientific developments related to radiology.

## **vii) Professional**

### General Requirements

- Deliver highest quality care with integrity, honesty and compassion.
- Exhibit appropriate personal and interpersonal professional behaviours.
- Practice medicine ethically consistent with the obligations of a physician respecting the needs of culture, race and gender.

### Specific Requirements

- Be able to accurately assess one's own performance, strengths and weaknesses.
- Understand the ethical and medical-legal requirements of radiologists.

## **Training in Canada**

The foregoing represents the general and specific objectives that all candidates for the Royal College examinations in Diagnostic Radiology are expected to meet. For those training in Canadian programs, these objectives will be accomplished in a staged manner. Residents in Canadian programs may obtain the document describing this approach from their program directors.

## **SPECIALTY TRAINING REQUIREMENTS IN DIAGNOSTIC RADIOLOGY**

These specialty training requirements apply to those who began training on or after 1 June 1997.

The five years of approved training require, at first, a closely supervised practice, with the opportunity for increasing responsibility in the final years, so that the resident near the end of training can function as a general radiology consultant, requesting help from staff radiologists when necessary. The residency may be followed by one or more years of fellowship training in a subspecialty discipline, as the residence training is not intended to provide a subspecialty level of expertise.

This period must include:

- 1) One year of basic clinical training:  
The purpose of this year is to give the resident a degree of independent responsibility for clinical decisions; an opportunity for further development of the skills required in making effective relationships with patients; the consolidation of competence in primary clinical and technical skills across a broad range of medical practice; and an understanding of the nature of the relationship between a referring physician and a clinical radiological consultant.
- 2a) Three years of approved resident training in “general diagnostic imaging”, this must include:  
Respiratory, cardiovascular, gastro-intestinal and biliary, genitourinary, musculoskeletal, mammography, neurological and pediatric radiology, as well as the following modalities: fluoroscopy, ultrasound, CT and MR imaging.  
Because of the varying training programs in the recognized university training centres, these 36 months may be allocated as block periods of at least three months or their equivalents.
- 2b) One year of approved residency that may consist of one to twelve month periods in any of the following, as long as these are appropriately integrated by the Residency Training Committee:
  - further training in diagnostic radiology
  - diagnostic ultrasound
  - CT
  - MR
  - nuclear medicine
  - cardiac and/or vascular radiology
  - interventional radiology
  - neuroradiology
  - pediatric radiology

- pathology or other clinical specialty relevant to the practice of radiology (for up to three months)
- a full-time research project, relevant to diagnostic imaging, and acceptable to the program director and the Credentials Committee.

**NOTE:** In view of the amount and variety of radiology to be covered and the skills required at the time of the final examination, it will seldom be appropriate to spend the entire 12 months of the fifth year in any one of these areas.

## **RESIDENT RESEARCH PROGRAM**

While training in clinical radiology remains the main focus of the residency, research is considered to be of paramount importance as well. It is essential that residents gain experience in as many aspects of research as possible, including searching the literature, data analysis and manuscript preparation. A resident cannot know if he/she would enjoy an academic career without firsthand experience. The feeling of satisfaction that accompanies completion of a project, and contribution of information to the medical/scientific literature, can only be appreciated if personally experienced.

The Research Program consists of three aspects; a seminar series, resident support, and a formal presentation day.

### **Seminar Series**

Residents in Medical Imaging are required to have a good foundation of research methodology and critical appraisal in order to either critically evaluate scientific medical literature or pursue independent research activities. Principles and issues of health technology assessment, quality improvement and clinical audits are also core components of the clinical research curriculum. Workshops, tutorials, and lectures on these topics are organized by the department's epidemiologist who is responsible for the design and delivery of the course curriculum. Attendance at these sessions is compulsory and instruction of this curriculum is given throughout the Residency Program.

### **Support**

Department faculty are asked to submit research topics from which residents may choose a project, which he or she finds interesting. The residents are given the opportunity to create their own topic or to choose one from this faculty-generated list. Residents are freed from clinical responsibilities for their work. Each resident presents a short, informal outline of the intended project to the Resident Research Committee in November of their PGY3 year so that project feasibility can be assessed before too much time has been devoted to it. Helpful suggestions are offered by Committee Members. Data collection for the project begins in January of the PGY3 year and extends to December of the same year. During June, the residents present an interim report, again informal, to the Committee, to confirm that data collection has begun and is progressing satisfactorily. In November/December the residents present a third informal discussion for assessment of project status and to determine if an abstract can be generated for submission to a national/international meeting. It is at this time that the Committee determines if the project is satisfactory. Incomplete studies may be considered satisfactory depending on the circumstances described by the resident. Finally, the study is presented formally in the following Spring at the Annual Research Day.

## Presentation Day

Our 16<sup>th</sup> annual Department of Medical Imaging Research Day was held on April 29, 2004. The resident presentations included:

Michael Stefanos	Agreement Rates between Functional and Morphological Imaging for Pretreatment Assessment of Non-Hodgkin's Lymphoma Patients
Aaron Glickman	Dynamic MR Perfusion Imaging of Anterior Cruciate Ligament Autografts
Lenny Grinblat	The Radiology of Severe Acute Respiratory Syndrome (SARS): Radiographic Examination of 46 Confirmed Cases in Toronto, Canada
Sarah Koles	Pneumothorax Post Thoracic FNA: Is There A Role For Post Biopsy CT?
Marc Freeman	Percutaneous Vertebroplasty Results in the Reversal of Height Loss and Spinal Deformity in Patients with Osteoporotic and Pathologic Compression Fractures
Jeff Jaskolka	Needle Tract Seeding After Radiofrequency Ablation of Hepatic Tumors
Vikash Prasad	Coil Embolotherapy of Pulmonary Arteriovenous Malformations: Efficacy of Platinum Versus Stainless Steel
Andrea Milic	Reperfusion of Pulmonary Arteriovenous Malformations Following Embolotherapy
Dan Mozeg	Assessing the Value of CT-Enteroclysis in the Diagnosis of Small Bowel Disease

While presentation at this meeting is an end unto itself, many of the projects have since been presented at national and international meetings and have been published in peer-reviewed journals. Since the research program was instituted, more than 60 of the resident's projects have appeared in peer-reviewed journals. Of those not published, many have been presented either orally or as a poster at national/international meetings.

## **FELLOWSHIP PROGRAM**

With access to several thousand inpatient beds, the affiliated hospitals of the University of Toronto form one of the largest teaching facilities in the world, thereby serving as an ideal setting for advanced subspecialty training in Medical Imaging. The program has national and international stature both clinically and in research, and attracts fellows from around the world.

In 2003-2004 the seven divisions of the University of Toronto Department of Medical Imaging offered a comprehensive array of fellowships:

- Abdominal Imaging
- Breast Imaging
- Cardiac Imaging
- Cross-sectional Imaging
- Magnetic Resonance Imaging
- Musculoskeletal Imaging
- Neuroradiology (Diagnostic)
- Neuroradiology (Interventional)
- Pediatric Imaging
- Thoracic Imaging
- Vascular/Interventional Radiology
- Women's Imaging
- Combined Clinical/Research

The flexibility of the program permits tailoring of the fellowship experience to accommodate most needs. Research is encouraged as an integral component of the fellowship program and to this end protected research time is available to all Medical Imaging fellows.

### **2003–2004 Department of Medical Imaging Fellows**

#### ***Abdominal Imaging Fellows***

- Karam Al-Hiary
- Colm Boylan
- Ajay Chauhan
- Alexander Corat
- Kavita Dhamanaskar
- John Hanson
- Hyun-Jung Jang
- Rana Karam
- Tae Kyoung Kim
- John Kirby
- Blair MacDonald
- Fenella Moulding
- Sue Roach

#### ***Cardiac Imaging Fellow***

- Tracy Elliot

***Cross-sectional Imaging Fellows***

- John Clarke
- Catriona Davies
- Sarah McGlone

***Magnetic Resonance Imaging Fellow***

- Anatomy Kam

***Musculoskeletal Imaging Fellows***

- Sam Chhaya
- Kawan Rakhra
- Tom Powell

***Neuroradiology (diagnostic) Fellows***

- Eria Bartlett
- Judith Corat-Simon
- Ilan Shelef
- Marlise Santos
- Eugene Yu

***Neuroradiology (interventional) Fellows***

- Ronit Agid

***Thoracic Imaging Fellows***

- Sharad Maheshwari
- Demetris Patsios
- Anuradha Rao
- Angela Riddell

***Vascular/Interventional Radiology Fellows***

- Robert Beecroft
- Sangeet Ghai
- Frederick Lan
- Marc Ossip
- Kongteng Tan
- Robert Yu

***Women's Imaging Fellow***

- Nicole Brofman
- Sandeep Ghai
- Munire Gundogan
- Anat Kornecki
- Jillian Pugh
- Vincent Shin

***Pediatric Imaging Fellows***

- Joao Amaral
- Monica Epelman
- Lucia Fontalvo

- Katharine Foster
- Anne Geoffray
- Salwa Haidar
- Mohannad Ibrahim
- Christian Kellenberger
- Clara Ortiz
- Rodrigo Ozelame
- Ashley Robinson
- Sheldon Wiebe



## **UNDERGRADUATE PROGRAM**

### **Year I Medicine**

The first year medical program consists of three main contiguous block courses of study. These include Structure and Function, Metabolism and Nutrition and Brain and Behavior. Medical imaging participates in the Structure and Function and Brain and Behavior courses.

#### **Structure and Function**

This course teaches anatomy, histology, and cardio-respiratory physiology.

#### **Anatomy - Radiology Seminar**

The anatomy radiology seminar series has been extensively revised and standardized. Fourteen lecturers gave a total of 24 hours of interactive seminars to the first year medical class using this new curriculum. These six seminars taught radiographic anatomy of the thorax, abdomen, pelvis-urinary tract, upper extremity, lower extremity and of the head and neck. Faculty lecturers participating in this seminar series included the following radiologists; Dr. Ray Chan, Dr. Tanya Chawla, Dr. TaeBong Chung, Dr. Wayne Dietel, Dr. Tim Dowdell, Dr. Nasir Jaffer, Dr. Walter Kucharzyk, Dr. Lynne Noel de Tilly, Dr. Narinder Paul, Dr. Dawn Pearce, Dr. Joel Rubinstein, Dr. Manu Schroff, Dr. William Weiser and Dr. Louis Wu.

#### **Full Class Lecture - Medical Imaging Modalities**

This one hour lecture was given by Dr. Nasir Jaffer. It outlines basic technical aspects of the major medical imaging modalities including X-ray, CT, MRI, ultrasound and nuclear medicine.

#### **Brain and Behavior**

From time to time, the Department of Medical Imaging has provided tutors for the Brain and Behavior course. Neuroradiology teaching tools have been developed by members of the department of Medical Imaging and are used in this course on an ongoing basis.

### **Year II Medicine**

Year II teaching centers around the two main programs in the Year II curriculum: The Pathobiology of Disease (the first half of the year), and The Foundations of Medical Practice (the second half of the year).

## **The Pathobiology of Disease Course**

This fourteen-week course teaches pathology, immunology, genetics and other similar subjects. The Department of Medical Imaging has worked on an ongoing basis to develop and provide the medical imaging teaching resources required for delivery of this PBL. (Problem based learning), oriented curriculum.

### **Pathobiology of Disease - Imaging Case material**

In past years, a series of images with annotations was exhibited on a viewer in the Medical Science Building. The content of this series roughly paralleled and/or emphasizes the imaging aspects of the material taught in the Pathobiology of Disease course. Efforts are currently under way, in cooperation with course organizers, to revise and update these cases using current imaging technology. In the near future, this case material will be presented to students in a web-based format.

### **Seminar in Chest Imaging**

Dr. Narindar Paul and Dr. TaeBong Chung each gave a 2 hour seminar on chest imaging to half of the year 2 class, at the beginning of the Pathobiology of Disease Course. This seminar included a review of the radiographic anatomy and radiographic findings associated with the pathology of common diseases of the lung. Numerous radiographs of common lung diseases were presented.

### **Seminar in the Imaging of Cancer**

This seminar emphasized the role medical imaging plays in the staging and follow-up of neoplastic disease. Dr. Martin O'Malley, Dr. Tanya Chawla and Dr. Petrina Causer each gave this 2 hour seminar to members of the year 2 class.

## **Foundation of Medical Practice Course**

This 21-week course teaches core clinical subjects such as medicine and surgery.

### **PBL Tutors**

Faculty members in the Department of Medical Imaging participated as tutors by leading core multidisciplinary seminars in the Foundations of Medical Practice curriculum.

Dr. Frank Goldberg, Dr. Wayne Deitel and Dr. Danny Marcuzzi provided 102 hours of teaching time as tutors, plus an additional 55 hours of preparation for this course.

## **Year II Seminars**

The chest imaging seminar, previously given through the academies was standardized last year. The seminar series was prepared and supervised by Dr. TaeBong Chung. This 2 hour seminar was given to 4 groups of 50 students by four radiologists. Dr. TaeBong Chung, Dr. Tim Dowdell, Dr. William Weiser and Dr. Narindar Paul participated in this seminar series.

### **Full Class Lecture in Trauma Radiology**

The trauma imaging seminar, previously given through the academies was standardized last year into a full class lecture.

A 2 hour, full class, lecture was given introducing key elements of trauma imaging. Topics covered included imaging of the cervical spine and brain, chest trauma and imaging of abdominal trauma. Participating radiologists in this lecture included Dr. Lynn Noël de Tilly, Dr. William Weiser and Dr. Paul Hamilton.

### **Clerkship**

The two-year clerkship consists of 78 weeks of clinical rotations. The department of medical imaging provides an array of teaching activity during the clerkship program.

## **Year III Clerkship**

### **Essentials of Radiology Lecture Seminar Series**

At the request of the Faculty of Medicine and in response to feedback from undergraduate medical students requesting more teaching in medical imaging, a new lecture and seminar series was developed and launched this year. Under the direction of Dr. Tim Dowdell and Dr. Nasir Jaffer, five half day teaching sessions were presented to the year three class to help prepare them prior to the commencement of their clinical clerkship. This new series utilized a, one hour, full class lecture format followed immediately by a two hour, case review, seminar in which the class was divided into four groups.

The curriculum for this series brought together elements from the first and second undergraduate years in medical imaging instruction and emphasised core elements of medical imaging geared to the needs of clinical clerks. Full class lectures in this new program were developed and delivered by the following radiologists in the following subject areas. Dr. Tim Dowdell – Medical Imaging Modalities, Dr. Elizabeth David – Interventional Radiology, Dr. William Weiser and Dr. Harry Schulman – Chest Imaging, Dr. Nasir Jaffer and Dr. Tanya Chawla – Abdominal Imaging, Neuroradiology – Dr. Manu Schroff, Musculoskeletal Imaging – Dr. Robert Bleakney.

Seminars for this series were jointly developed and lead by the following radiologists.

**Interventional radiology and Modalities** – Dr. Elizabeth David, Dr. Matthew Benjamin, Dr. E. Hayeems and Dr. Tim Dowdell

**Chest Imaging** – Dr. TaeBong Chung, Dr. William Weiser, Dr. Harry Schulman and Dr. Narindar Paul.

**Abdominal Imaging** – Dr. Nasir Jaffer, Dr. Tanya Chawla, Dr. Wayne Deitel and Dr. Myles Margolis.

**Neuroradiology** – Dr. Manu Schroff, Dr. Tom Marotta, Dr. Walter Kucharczyk and Dr. Suzanne Laughlin.

**Muskuloskeletal Imaging** - Dr. Robert Bleakney, Dr. Joel Rubinstein, Dr. Matthew Lax and Dr. Tim Dowdell.

### **Elective Students**

A significant number of third year medical students at the University of Toronto took electives in radiology at the various teaching hospitals during the 2003-2004 Academic year.

### **Hospital Based Seminars**

Various Year III seminars have been held in the teaching hospitals as part of the Medicine - Surgery block rotations. These include a series of chest seminars, interventional, gastrointestinal, as well as neuroradiology seminars.

## **Year IV**

### **Medical Imaging Electives**

Electives in Medical Imaging are among the most popular medical under-graduate electives at the University of Toronto. In addition to teaching basic radiology skills these electives also serve to promote awareness about medical Imaging within the undergraduate medical community. Elective students are also given an opportunity to consider specialty training in radiology during these teaching blocks.

These electives remain very popular in the undergraduate elective program.

### **University of Toronto Electives**

Fifty four Toronto medical students took radiology electives in their third and fourth year at the various teaching hospitals during the 2003-2004 academic year.

## **Visiting Elective Students**

Twenty five, medical students from outside medical schools, many of whom were overseas foreign students in their senior undergraduate year, took part in visiting electives during the 2003–2004 academic year.

## **The Bruce Tovee LMCC Review Lectures**

The Undergraduate Committee in Radiology has participated in this review course for many years. Three hours of radiology review lectures were given to final year medical students. The majority of these were University of Toronto students. The review course has also been very well received and attended by final year students from McMaster and other local medical schools. The lectures were given in the evening at the main medical lecture theatre of the University. Three, one hour lectures were given. These are listed below.

- i) Musculoskeletal Radiology – Dr. Robert Bleakney
- ii) Chest Radiology – Dr. TaeBong Chung
- iii) Gastrointestinal Radiology – Dr. Nasir Jaffer

The final year students have had access to a series of notes, the MCCQE Study Guide. The medical imaging portion of this lecture series and syllabus were updated and revised by the participating radiologists.

## **Other Teaching Activities and Involvement**

### **Physiotherapy Student Seminars**

A series of seminars are given to the physical therapy students at the University of Toronto by radiologists at the various Academies each year.

### **Career Sampling Electives in Radiology**

On a somewhat informal basis, undergraduate students, many in Year I have spent various periods of time, from several days to weeks, in all of the teaching hospital radiology departments as part of a career sampling experience.

### **Undergraduate Teaching Computer File for Radiology**

A comprehensive interactive computerized teaching program, called **Radiofile** has been developed by the Department of Medical Imaging. This program allows undergraduate students to have a uniform exposure to core medical imaging teaching material. The students can access this program either in the various radiology departments, or in the Academy computer laboratories. The program is available centrally, in the computer laboratory in the Medical Sciences Building.

### **The Internet and Undergraduate Education in Radiology**

Under the direction of Dr. Nasir Jaffer, the Department of Medical Imaging hosts an internet web site on which various program descriptions are posted. This web site is also playing an expanding role in the Internet delivery of imaging seminars and programs as well as in the evaluation of undergraduate Medical Imaging teaching programs.

### **The Future Direction of the Medical Imaging Undergraduate Teaching Program**

Efforts have been under way to standardize the major components of the undergraduate medical imaging teaching program through the development and implementation of standardized curriculum and electronic teaching tools. This task is largely complete. This effort has and will continue to further optimize the efficiency, scope and value of the undergraduate teaching program in Medical Imaging at the University of Toronto.

## **CONTINUING EDUCATION PROGRAM**

### **Organ Imaging Review September 7 - 10, 2003**

#### **Course Description**

This four day course focuses on aspects of primary interest to both radiologists and radiologists-in-training. The course content includes general concepts of diagnostic imaging with emphasis on recent advances. The participant learns new ideas and has the opportunity to enhance their knowledge in selected common clinical situations. The participant is also able to participate in problem-solving with daily case reviews in each of the organ systems.

Course Chairman: Walter Kucharczyk, M.D.  
Course Director: Paul Hamilton, M.D.

#### **University of Toronto Faculty**

Asch, Murray, M.D., Assistant Professor  
Becker, Edma. M.D., Associate Professor  
Bleakney, Robert, M.D., Assistant Professor  
Causar, Petrina, M.D., Lecturer  
Chawla, Tanya, M.D., Assistant Professor  
Christakis, Monique, M.D., Assistant Professor  
Chung, Tae-Bong, M.D., Lecturer  
Dill-Macky, Marcus, M.D., Assistant Professor  
Ehrlich, Lisa, M.D., Associate Professor  
Farb, Richard, M.D., Assistant Professor  
Fox, Allan, M.D., Professor  
Ghai, Sandeep, M.D., Clinical Fellow  
Haider, Masoom, M.D., Assistant Professor  
Hamilton, Paul, M.D., Assistant Professor  
Hanbidge, M.D., Assistant Professor  
Herman, Stephen, M.D., Assistant Professor  
Hershkop, Marlon, M.D., Assistant Professor  
Jong, Roberta, M.D., Assistant Professor  
Kassel, Edward, M.D., Associate Professor  
Khalili, Korosh, M.D., Assistant Professor  
Kulkarni, Supriya, M.D., Assistant Professor  
Laughlin, Suzanne, M.D., Assistant Professor  
Lax, Matthew, M.D., Assistant Professor  
Lazinski, Dorothy, M.D., Lecturer  
Merchant, Naeem, M.D., Assistant Professor  
McGregor, Caitlin, M.D., Lecturer

Mikulis, David, M.D., Associate Professor  
Montanera, Walter, M.D., Associate Professor  
Muradali, Derek, M.D., Assistant Professor  
Noël de Tilly, Lyne, M.D., Assistant Professor  
O'Malley, Martin, M.D., Assistant Professor  
Pantazi, Sophia, M.D., Lecturer  
Paul, Narinder, M.D., Assistant Professor  
Provost, Yves, M.D., Lecturer  
Pugash, Robyn, M.D., Assistant Professor  
Marilyn Ranson, M.D., Assistant Professor  
Roberts, Heidi, M.D., Associate Professor  
Rubenstein, Joel, M.D., Associate Professor  
Salonen, David, M.D., Assistant Professor  
Sarrazin, Josée, M.D., Assistant Professor  
Weisbrod, Gordon, M.D., Professor  
White, Lawrence, M.D., Associate Professor  
Willinsky, Robert, M.D., Associate Professor  
Wilson, Christine, M.D., Assistant Professor  
Wright, Barbara, M.D., Assistant Professor  
Zelovitsky, Leon, M.D., Assistant Professor

### **Guest Faculty**

Federle, Michael., M.D.  
Professor  
Department of Radiology  
University of Pittsburgh Medical Center  
Pittsburgh, Pennsylvania



## **Women's Imaging: Advances in Gynaecological Imaging and Transvaginal Ultrasound February 13-15, 2004**

Co-sponsored by Departments of Medical Imaging and Obstetrics and Gynaecology

### **Course Description**

This 2 ½ day program on women's imaging will provide participants with the most up-to-date practice standards in gynaecological and early fetal imaging, It will emphasize the integration of ultrasound into current clinical management and will explore some of the latest technological and clinical advances in women's imaging. It will be of interest to radiologists, obstetricians and gynaecologists and ultrasonographers.

Directors: Phyllis Glanc M.D., Shia Salem M.D., Department of Medical Imaging  
Jo-Ann Johnson M.D., Greg Ryan M.D., Department of Obstetrics and Gynaecology

### **University of Toronto Medical Imaging Faculty**

Atri, Mostafa, M.D., Associate Professor  
Causar, Petrina, M.D., Lecturer  
Fong, Katherine, M.D., Associate Professor  
Glanc, Phyllis, M.D., Assistant Professor  
Haider, Massoom, M.D., Assistant Professor  
Hamilton, Paul, M.D., Assistant Professor  
Hanbidge, Anthony, M.B., Assistant Professor  
Jong, Roberta, M.D., Assistant Professor  
McGregor, Caitlin, M.D., Lecturer  
Muradali, Derek, M.D., Assistant Professor  
Salem, Shia, M.D., Associate Professor  
Toi, Ants, M.D., Associate Professor  
Wilson, Stephanie, M.D., Professor  
Wright, Barbara, M.D., Assistant Professor

### **Guest Faculty**

Peter Doubilet, M.D.  
Professor of Radiology, Harvard Medical School  
Vice-Chair of Radiology  
Brigham and Women's Hospital  
Boston, Massachusetts

Faye Laing, M.D.  
Professor of Radiology, Harvard Medical School  
Brigham and Women's Hospital  
Boston, Massachusetts

## INVITED LECTURERS AND VISITING PROFESSORS

October 6-7, 2003

Dr. Robert Pugatch  
Department of Radiology  
School of Medicine  
University of Maryland

“Critical Care Imaging”

“Diffuse Lung Disease”

“Pulmonary Infections”

November 3-4, 2003

Dr. Gillian Newstead  
Department of Radiology  
Section of Breast Imaging  
University of Chicago

“Breast MRI”

“Digital Mammography and CAD”

“Subtle and Indirect Signs of Malignancy Including  
Interventional Evaluation”

January 12-13, 2004

Dr. Jonathan Kruskal  
Radiology  
Beth Israel Deaconess Medical Center  
Harvard Medical School

“Imaging the Complications of Liver Transplantation”

“How to Perform Doppler Ultrasound of Liver”

“Endorectal and Anal Ultrasound – Techniques and Clinical  
Applications”

February 2-3, 2004

Dr. William S. Ball  
Department of Radiology  
Children’s Hospital Medical Center

“Clinical Application of MRS in Pediatrics”

“Hemodynamics of Perfusion in the Pediatric Brain”

“Primer of Neurochemistry for the Neuroradiologist”

March 1-2, 2004

Dr. Jon A. Jacobson  
Department of Radiology  
University of Michigan Medical Center

“Pitfalls in Musculoskeletal MRI”

“Practical Musculoskeletal Sonography with MRI Correlation”

“Radiology of Subtle Fractures and Fracture with Hidden Implications”

April 5-6, 2004

Dr. Bruce Forster  
Department of Radiology  
Vancouver Hospital  
The University of British Columbia

“Coronary Artery Calcification: What’s the Score?”

“Eye Strain and the Radiologist: {revalent and Preventable”

“The Trouble with Tendons”

May 3-4, 2004

Dr. Dermot Malone  
Consultant Radiologist  
St. Vincent’s University Hospital

“Radiofrequency Ablation of Liver Metastases and Hepatocellular Carcinoma. Quo Vadis”

“Bowel Obstruction – Choosing and Using Diagnostic Tests”

“Developing an Effective Strategy for Imaging Focal Liver Lesions: Experience with the Combined use of MR Contrast Agents”