Ontario Consortium for Cardiac Imaging
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Annual Report to

Ontario Research and Development Challenge Fund

2001

Sunnybrook & Women's College Health Sciences Centre

Hospital for Sick Children

Lawson Health Research Institute

Ottawa Heart Institute Research Corporation

John P. Robarts Research Institute

University Health Network

Section A: Executive Summary:

Cardiac diseases are the leading causes of death and hospitalization in the developed world. In Ontario we have a unique concentration of expertise across all cardiac imaging modalities located at leading cardiac care institutions in Ottawa, London and Toronto. The Consortium will expand and transform individual efforts into a coordinated program to determine critical anatomic and functional information for assessment, treatment planning and intervention monitoring of heart disease in patients of all ages. This comprehensive research program incorporates a critical mix ranging from fundamental image quality improvement through nascent informatics tools development for image interpretation and database management.

The vision of our research over the next 4 years is to:

1. establish world-leading centres in cardiac imaging information for use in patient management.
2. train clinical and basic scientists in the high technology imaging area that will be important in the future of medicine and the medical imaging industry in Ontario.
3. increase the collaboration and synergy between the researchers in related areas and stimulate creation of intellectual property.

ORDCF support has allowed us to hire 73 new individuals. We have expanded our private sector partnerships to include additional money from existing partners. Our Inter-institutional Agreement has been executed, and our Executive and Management Boards formed within 6 months of the start date of the ORDCF contract.

Our web site is found at www.cardiacimaging.ca and contains a password protected "lab book" for the researchers to use as a communication tool.

Section B: Scientific Advances Against Schedule A

Anatomy and Function in Cardiac Development/ Congenital Heart Disease

This past year has seen the expansion of an ongoing protocol development and evaluation using MRI to plan and assess the outcome of minimally invasive artial septal defect closures. This combined effort of researchers at S&W and UHN now includes MR measures of ventricular volumes, blood flow, blood oxygen saturation, and real-time characterization of the septal defect in the study of adults before and after defect closure. These MR measures are compared with ultrasound and intra-operative data. This work is now being extended to the pediatric population through new collaborations including HSC researchers (Yoo, Macgowan) to determine the applicability of MR blood oxygen measurements in children. In addition, new hires at HSC are expanding the toolkit for this work through the evaluation of new approaches to characterizing pediatric cardiovascular anatomy with ultrasound, MR, and X-ray (Yoo, Smallhorn, Hornberger, Freedom), the development of real-time MR flow measurements (Macgowan), and the evaluation of 3D ultrasound methods for better anatomical characterization of defects (Smallhorn).

Two coils for imaging of neonates at 3T have been constructed (Thompson) and are in the process of being tested. A video camera will be incorporated in one coil to allow observation of the infant during the scan as a backup safety measure. A MR compatible PO2 monitor, ECG monitor and PCO2 monitor appropriate for this population were designed, purchased and integrated. Pulse sequences are being developed with a turbo flash Cine ready for functional evaluation of the heart, a 2D P-31/H-1 CSI sequence running on phantoms, and a true FISP sequence being enhanced for optimization.

Myocardial Characterization for Ischemic Heart Disease

Members of the OCCI have individually developed major new measures of viability. The symposium and recent activities demonstrate the real opportunity afforded by the OCCI to integrate this work to determine the best possible approach for this major clinical challenge. Highlights of the program included:

1. New developments in CT perfusion of the heart (Ting Lee)
2. A major advance in the use of delayed enhancement in MRI to identify infracted regions (Prato's lab is among the leaders in this field, as emphasized by our guest speaker, R. Judd)
3. Emerging MR measures of blood volume and oxygen saturation indicating the functional state of myocardium coming out of Wright's lab (Wright, Foltz)
4. A whole new field of characterizing myocardial perfusion and blood volume with ultrasound pioneered by Burn's Lab
5. Rigorous demonstration of advances in the gold standard of myocardial viability –multi-centre randomized controlled trial of FDG PET led by Beanlands at UOHI.

6. Development of radioisotope (Rb-82) generators for PET perfusion and viability imaging without the need for on-site cyclotrons (deKemp, Ruddy, Beanlands at UOHI).

These advances have set the stage for substantial new efforts in the area of myocardial viability. The tools advanced by Prato and others in identifying infarction are now being used by Merchant at UHN to characterize the success of alcohol ablation of myocardial tissue in cardiomyopathies. In the past year, a visiting scientist at S&W supported by the ORDCF, Marcotte, also performed some of the first comparative studies of MR, ultrasound and X-ray measures of perfusion in the same patients.

As a result of the OCCI province-wide collaboration, the LHRI in London will be installing the first hybrid PET/CT system in Canada. This system is a 50% clinical, 50% research facility that will accelerate the transitional application of new cardiac imaging technology from the research laboratory to the patient. This proposal's success was dependent on a) the CT technology developed by Dr. Ting-Yim Lee, licensed to GE Medical Systems and sold world wide; b) the realization that the hybrid PET/CT platform was ideal to further develop this technology and its market share with increased royalties coming back to Canada; c) the availability of canine models of coronary artery disease so that the proposed new technology could be first demonstrated in animals; and d) the support of the PET scientists at UOHI who are collaborating by sharing their radioisotope generator and infusion system technology for myocardial blood flow.

Imaging for Coronaries/Intervention

Another area of significant advances is in the characterization of coronary artery disease needed to plan, guide, and assess treatments. Rowlands and Robert have introduced new techniques to reduce dose in X-ray angiography. Wright's group has made several major advances in improving the quality of noninvasive MR coronary angiograms with the development of more precise prescription tools for real-time selection of cardiac phase for coronary image acquisition and the introduction of adaptive imaging methods. These methods exploit real-time acquisition of low-resolution images and on-the-fly analysis of these data to guide information acquisition and combination to build up high quality coronary images. These advances have recently resulted in US patent filings. The associated template matching tools are now also being exploited by Robert to simplify the display and archiving of X-ray coronary angiograms. The MR tools have recently been applied to pilot studies of coronary artery bypass graft assessment through a new collaboration between Wright and Fremes at S&W, and Merchant at UHN. Fremes was recently successful in renewed CIHR grant funding for a coronary artery bypass trial with an expanded role for imaging in outcomes assessment.

The past year has seen a significant expansion of peer-reviewed funding in London with successful CIHR and Heart and Stroke grants by Drangova and colleagues (notably Peters and Slomka) in the area of merging prior information with intra-

operative imaging for coronary revascularization interventions. Wright is a consultant on one of these grants for the purpose of linking in the advances in real-time MRI to interventional guidance, seeding another inter-institutional collaboration within the OCCI.

The OCCI has also served as the foundation for a new initiative to create an interventional cardiac lab at S&W for the development and evaluation of multiple modalities in imaging for cardiac intervention. This has resulted in a substantial commitment from S&W for space and funds in association with a recent successful CFI application for $6,109,294 (total project $ 15,273,233). This new effort not only links researchers already within the OCCI but brings in a new group of researchers who would like to exploit the imaging tools for planning, guidance, and assessment of a wide range of new therapies.

Image Fusion, Reporting

A Cardiac Imaging Information System (CIIS) task force was formed in the fall of 2001 to design a multi-modal image server and platform for analysis tools. The composition of the team includes the scientific officer (Wright), business officer (Keep), and individuals who have made major advances in last few years on managing patient information (Davies), nuclear images and image registration work (Slomka), and X-ray images (Robert) through computerized database and web tools. As part of ongoing OCCI development, a Technical Officer will be hired in 2002 to spearhead this integrated information system effort.

Section C: Tasks and Milestones

Summary

During our first year in operation, we have taken tremendous steps towards establishing our infrastructure and support network for the OCCI researchers. The business office was created and located at S&W as the first major step to providing a central office for completing the required financial reports, hosting the executive and management board meetings, seeking additional private sector funding and partners, executing the inter-institutional agreement, dispersing the funds, coordinating recruitment, creating the web site, as well as organizing and managing the first annual Imaging Network Ontario symposium featuring a day on cardiovascular imaging research. In addition, the INO operating strategy was submitted to the ORDCF (see Section F)

The executive board has been appointed and includes 3 Principal Scientists (deKemp, Drangova, Prato), a Scientific Advisor (Wright) and Business Officer (Keep). Quorum is 4 members. Two meetings of this committee were held in 2001 with minutes distributed. The Management Board consists of the Executive board members and 3 clinicians (Merchant, Ruddy, Wisenberg) and 2 private sector Partners (CPI – Boyle & GEMS - Phillips). Consensus is 80% on all policy decisions. Two meetings of this Board were held and the minutes distributed.

The inter-institutional agreement was executed in May 2001 to establish the policies and guidelines for the collaborative nature of our research including the dispersion of funds. This agreement correlates strongly to the ORDCF contract to ensure that all party's interests are protected.

The Website www.cardiacimaging.ca was put up in April of 2001. It contains highlights of our research objectives, bios on the principal researchers, a password protected section for all researchers, information on employment opportunities, links to INO symposium registration and agenda information, links to other INO ORDCF funded projects.

In the area of education, OCCI held a special viability symposium in Toronto on Friday, October 19, 2001 in collaboration with the ORDCF Centre for Vascular Imaging Research attended by 229 researchers and private sector partners. (see Section E) Outstanding presentations were made by clinical and basic imaging scientists from Ottawa, Toronto and London, and also by 3 students one from each of the three city centers. 30 articles were submitted in the student competition and printed in the Symposium abstract, with winners being announced by Maurice Bitran of the ORDCF Secretariat following the key note speaker Bruce McManus, Scientific Director, Institute of Circulatory and Respiratory Health, Canadian Institutes of Health Research. There were 11 talks directly related to Imaging Myocardial Viability, 3 from OCCI students and 3 international speakers.

Our first inter institutional PDF competition resulted in one successful project entitled Correction of Cardiac Motion Artifacts for 3-Dimensional Multi-Slice X-ray CT Applications. The first recipient, Dr. Waheed Younis, is a postdoctoral fellow. This individual will start in January 2002. This project supports the collaboration between Toronto's Defence and Civil Institute of Environmental Medicine's (DCIEM) imaging scientist Dr. Stergios Stergiopoulos, the Ottawa Heart Institute's Dr. Robert DeKemp and the Lawson Health Research Institute's Drs Glenn Wells and Ting-Yim Lee. They will be evaluating the translation of successful technology from X-ray CT to the new hybrid technology of PET/X-ray CT. As this new hybrid technology is projected to sell worldwide at a rate to exceed present sales of PET alone it is anticipated that this will be a significant opportunity to develop new "made in Ontario" technology which will be distributed by the imaging equipment manufacturers.

During year 1 we have expanded our laboratories by 8 scientists, 29 research engineers, technical support and post doctoral fellows and 30 graduate students as well as 6 administration positions. We also created the position of technical Officer in December 2001, interviewing 2 top candidates. The successful candidate will start in 2002. Our training/mentoring programs at our institutions have produced in 8.5 PhD, 6 MSc and 1 MD graduates since we began.

Over $500,000 of new equipment purchases directly related to supporting this research have been made in addition to many of these larger systems.

We have obtained and reviewed the IP policy at all institutions and in all cases with the exception of Lawson Research Institute, the Institution will own any IP developed by its researchers with payments of different levels to the inventor. Each policy has a provision for sharing of IP with its collaborators; therefore there are no issues with our group expanding their collaborative work with other participating institutions.

Our group has applied for 17 patents since the start of OCCI. There was one spin off company, Endopisis, established April 2001 to exploit the patents granted to Stergios Stergiopoulos. Each collaborating institution has been involved in seeking patents for their intellectual property.

Task: Governance

Milestones:
Year 1

- establish initial OCCI board membership, first board meeting **DONE**
- complete inter-institutional agreements **DONE**
- hire director and identify scientific advisor (executive team) **DONE**
- board meeting **DONE**
- confirm initial policies **DONE**
- establish guidelines for inter-institutional projects **DONE**
- associated distribution of funds **DONE**
- annual meeting **DONE**

Performance Measure:

- completed board meetings, distribution of minutes to membership **DONE**

Task: Communication / Collaboration

Milestones:

Year 1

- hire communications officer, establish OCCI website **DONE**
- develop linkages with Imaging Network Ontario (INO) website,Vascular Group **DONE**
- start speaker/workshop series rotating among participating institutions **2002**
- hold scientific symposium open to participants, broader community **DONE**

Performance Measures:

- completed symposia, workshops (annual plans for 1 symposium + 3 local workshops/ experiments/speakers with participation from multiple institutions) **SYMPOSIUM ONLY WORKSHOPS IN 2002**
- website hits **NOT TRACKED**
- invited talks by participants **TOTAL 92**
- joint projects, papers, and presentations involving multiple researchers in consortium **TOTAL 40 PUBLICATIONS and 47 ABSTRACTS**

Task: Administration

Milestones:
Year 1

- hire and identify accounting staff in the central office and local sites **DONE**
- establish common accounting platform **DONE**
- establish website documentation of projects and participants **DONE**
- select auditors **IN PROCESS OF RECEIVING QUOTATIONS**
- file quarterly expense reports and requests for payments **DONE**

Performance Measures:

- timely financial reporting **DONE**
- approved audits **NOT APPROPRIATE FOR 2001**
- completed annual reports of performance measures **DONE**

Task: Recruitment and Development of Research Personnel

Milestones:
Year 1

- finalize positions of recently hired personnel **DONE**
- identify mentors for recent and future new hires **DONE**

- post advertisements of available positions (including joint advertising with INO) **DONE**
- begin hiring process with majority of key scientists hired by end of year **HIRING COMMENCED**

Performance Measures:

- total scientific personnel involved in OCCI (target: majority of scientist hiring in association with consortium for immediate projects to be completed by end of Year 1; remaining positions filled in subsequent years following planned research activity - total of 19) **TOTAL HIRED IN YEAR 1 - 8**
- advancement/promotion of participants **STARTED**
- total trainees, grant funding, annual publications, presentations, awards **SEE SEPARATE RESULTS LISTED IN THIS SECTION**

Task: Training

Milestones:
Year 1

- post advertisements of available positions (including joint advertising with INO) **DONE FOR NEW POSITIONS**
- establish 'alumni' program maintaining links with graduating students as they move into academic, industrial positions **JUST BEGINNING**

Performance Measures:

- track new students, postdocs, clinical research fellows as well as technical staff joining the labs of OCCI scientific personnel (more than 90 new students, postdocs, and research fellows over next 5 years; 30 new technical staff following planned growth of research groups) **RECRUITED 8 SCIENTISTS, 29 RESEARCH ENGINEERS, TECHNICAL SUPPORT AND POST DOCTORAL FELLOWS, 30 GRADUATE STUDENTS 6 ADMINISTRATION POSITIONS.**
- track scientific presentations, publications by trainees **OVER 85 PUBLICATIONS INCLUDED TRAINEES**
- track those completing training (degrees earned) **8.5 PHD, 6 MSC AND 1 MD GRADUATES**
- compile list of initial employment of trainees by field and location (target: more than 50% of trainees working in Ontario 5 years after completion of studies) **NOT COMPLETED**

Task: Laboratory Development

Milestones:
Year 1

- system upgrades on CVMR systems **DONE**

- complete installation of new research CVMR system (UHN) **DONE**
- upgrade of CT scanners **DONE**
- 3D/contrast software upgrades on 4 clinical/research US scanners **DONE**
- installation of research US scanner **DONE**
- installation of research IVUS system **DONE**
- PET upgrade, complete prototype infusion system for PET scanner **DONE**
- upgrade of SPECT systems **DONE**

Performance Measures:
- inventory of research equipment and upgrades **DONE**

Task: Scientific Advances/Research Projects

Milestones:
Year 1
- initiate projects identified in project description **DONE**

Performance Measures:
- portfolio of demonstrative images on website **BUILDING DATA BASE**
- publications **TOTAL 134 PUBLICATIONS, 115 ABSTRACTS**
- presentations at scientific conferences **TOTAL 92 INVITED TALKS**

Task: Intellectual Property Development

Milestones:
Year 1
- complete documentation of intellectual property policies at participating institutions **DONE**
- inventory of current patents **STARTED**

Performance Measures:
- portfolio of patents, copyrighted software (currently approximately 45 issued or pending, 5 copyrighted software packages) **NOT COMPLETE TO DATE**
- patent disclosures **TOTAL OF 17 TO DATE**

Task: Technology Transfer / Industry Linkage

Milestones:
Year 1
- complete signed agreements for intellectual property sharing between current industrial partners and participant institutions **ONGOING**
- industry participation in scientific symposium **EXCELLENT**

Performance Measures:
- actual cash and in-kind contributions received from industry **TRACKING ON TARGET**

- licensing of IP to industrial partners **TWO LICENSES ISSUED**

Task: Program Development -- Growth and Sustainability

Milestones:
Years 1 to 5

- expansion of peer-reviewed grant funding held by participants **$5.75 M TO DATE**
- development of new contracts between industry and institutions **ONGOING**
- expansion of related activities, notably sponsored clinical trials at participating institutions **ONGOING**
- growth of Ontario-based activity of companies in this field **UNKNOWN AT THIS TIME**

Performance Measures:

- new agreements between industry and institutions **ONGOING**
- new grant funding to participants **$5.75 M TO DATE**
- expanded institutional revenues from related activity (clinical trials, licensing, etc.) **ONGOING**
- spin-off companies, licensing arrangements, Ontario-based employees in related companies **STARTING**

Section D: Publications

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18. SO Kasap and **JA Rowlands**, "Amorphous Chalcogenide photoconductors in imaging technologies" In: *Insulating and Semiconducting Glasses* Edited by: Punit Boolchand pp. 781-812 (World Scientific Press, Singapore, 2000).

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39. Kitsikis AD, **deKemp RA**, Seth R, Beauchesne LM, Hart R, **Ruddy TD**, **Beanlands RS.** Stress ^{82}Rb PET Normal Database for CAD Diagnosis: Development and Initial Validation. J Nucl Med 2001;Vol 42(5):359-96P.

40. Saab G, **de Kemp RA**, Ukkonen H, **Ruddy TD, Beanlands RSB**. Does Gated 18-F-Fluorodeoxyglucose Positron Emission Tomography Accurately Define Cardiac Function and Better Characterize Myocardial Tissue? ORDCF Imaging Network Ontario Symposium, Toronto, October 19-20, 2001.

41. Seth R, **DeKemp RA, Ruddy TD**, Hart B, Kitsikis A, Aung M, Levesque N, Gauthier D, Westerman L, **Beanlands RS**. Utility of Quantitative Analysis Over Qualitative Analysis of PET With ^{82}Rb in Three Vessel Coronary Artery Disease, ORDCF Imaging Network Ontario Symposium, Toronto, October 19-20, 2001.

42. Mohammad MH, Dalipaj MA, Golanowski LN, **Ruddy TD**. Comparison of Observer Variability of Stress ^{99m}Tc Sestamibi vs ^{99m}Tc Tetrofosmin Tomographic Imaging for Evaluation of Myocardial Perfusion and Wall Motion, ORDCF Imaging Network Ontario Symposium, Toronto, October 19-20, 2001.

43. Inability to achieve predicted stent diameters in minimally calcified coronary lesions: a 3-D intravascular ultrasound study. AJ Della Siega, EA Cohen, JTW Pang, M Madan, S Naqvi, S Radhakrishnan, **S Fort**. Can J Cardiol; 2001 Vol 17 Suppl C:214C.

44. Intimal hyperplasia inside stainless steel and gold-coated stents after implantation in native human coronary arteries: a randomised 3-D intravascular ultrasound study. **S Fort**, JTW Pang, A Della Siega, M Madan, S Naqvi, S Radhakrishnan, FS **Foster, S** Lee, EA Cohen. Can J Cardiol 2001; Vol 17 Suppl C:178C.

45. **G.A. Wright**, **N. Merchant**, G. Kim, J.A. Stainsby, X. Qi, G. Webb, "Magnetic Resonance Oximetry for Congenital Heart Disease," *2nd Annual Meeting of the Society for Cardiovascular Magnetic Resonance*, January 1999. Awarded 3rd prize for Best Presentation.

46. W.D. Foltz, **N. Merchant**, E. Downar, J.A. Stainsby, **G.A. Wright**, "Coronary Venous Oximetry using MRI," *7th Scientific Meeting of the International Society for Magnetic Resonance in Medicine*, 1:230, 1999.

47. W.D. Foltz, **N. Merchant**, **G.A. Wright**, "Assessing Spin-Echo Signal Decay Behaviour in the Myocardium In Vivo," *7th Scientific Meeting of the International Society for Magnetic Resonance in Medicine*, 2:1273, 1999.

48. M.S. Sussman, **G.A. Wright**, "The Correlation Coefficient Technique for Pattern Matching," *7th Scientific Meeting of the International Society for Magnetic Resonance in Medicine*, 3:2003, 1999.

49. M.S. Sussman, A.B. Kerr, J.M. Pauly, **N. Merchant**, **G.A. Wright**, "Tracking the Motion of the Coronary Arteries with the Correlation Coefficient," *7th Scientific Meeting of the International Society for Magnetic Resonance in Medicine*, 2:1267, 1999.

50. J.K. Kim, R.I. Farb, J.A. Derbyshire, J.A. Stainsby, G. Cheung, W. Montanera, P. Cooper, **G.A. Wright**, "Initial Blinded Comparison of First Pass Centric 3D Gd-MRA, 2DTOF MRA, and IADSA of the Carotid Arteries," *7th Scientific Meeting of the International Society for Magnetic Resonance in Medicine*, 1:204, 1999.

51. M.D. Noseworthy, J.K. Kim, J.A. Stainsby, **G.A. Wright**, "Biexponential T2 Analysis of Human Liver in the Fasted and Postprandial States: Potential for Monitoring Tissue Microcirculatory Changes," *7th Scientific Meeting of the International Society for Magnetic Resonance in Medicine*, 3:2148, 1999.

52. M.D. Noseworthy, G. Morton, **G.A. Wright**, "Comparison of Normal and Cancerous Prostate Using Dynamic T1 and T2* Weighted MRI," *7th Scientific Meeting of the International Society for Magnetic Resonance in Medicine*, 2:1102, 1999.

53. W.D. Foltz, **N. Merchant**, **G.A. Wright**, "Characterizing the Myocardial Blood Oxygen State In Vivo using MRI," *45th Scientific Meeting of Canadian Organization of Medical Physicists Conference,* p. 160-162, 1999. (Finalist, Young Investigator Award, COMP)

54. M.S. Sussman, **N. Merchant**, A. Kerr, J.M. Pauly, **G.A. Wright**, "Accurate Tracking of Coronary Artery Motion for MR Imaging," *45th Scientific Meeting of Canadian Organization of Medical Physicists Conference,* p. 218-220, 1999.

55. Y. Huang, C.A.Webster, **G.A. Wright**, "Analysis of Subtraction Methods in 3D MR DSA for Peripheral Vascular Disease," *8th Scientific Meeting of the International Society for Magnetic Resonance in Medicine*, 1:536, 2000.

56. J.K. Kim, M.S. Sussman, Y. Huang, D. Westman, R.I. Farb, J.M. Pauly, D.G. Nishimura, **G.A. Wright**, "Influence of Patient and Imaging Factors on Spatial Resolution of High Resolution 3D Gd-MRA of the Carotid Arteries," *8th Scientific Meeting of the International Society for Magnetic Resonance in Medicine*, 2:1231, 2000.

57. M.D. Noseworthy, X. Qi, J.A. Stainsby, **G.A. Wright**, "Examination of vx2-Tumors Using a 2-Pool Model with Proton Exchange and Dynamic Gd-DTPA enhanced MRI," *8th Scientific Meeting of the International Society for Magnetic Resonance in Medicine*, 2:1059, 2000.

58. X. Qi and **G.A. Wright**, "Using Population Data to Calibrate MRI-based Blood Oxygen Saturation Measurements in CHD Patients and Volunteers," *8th Scientific Meeting of the International Society for Magnetic Resonance in Medicine*, 3:1570, 2000.

59. J.A. Stainsby, T.S. Sachs, A. Chiu, **G.A. Wright**, "A Comparison of Respiratory Compensation Techniques As Applied to MR Oximetry," *8th Scientific Meeting of the International Society for Magnetic Resonance in Medicine*, 3:1699, 2000.

60. M.S. Sussman, N. Robert, A.B. Kerr, J.M. Pauly, **N. Merchant**, **G.A. Wright**, "Artifact-Free MR Fluoroscopic Coronary Image Combination with the Correlation Coefficient Technique," *8th Scientific Meeting of the International Society for Magnetic Resonance in Medicine*, 3:1703, 2000.

61. C.A. Webster, **N. Merchant**, D.S. Kucey, **G.A. Wright**, "Toward an Objective Measure of Image Quality for Peripheral Vascular MRA," *8th Scientific Meeting of the International Society for Magnetic Resonance in Medicine*, 3:1814, 2000.

62. **N. Merchant**, J. Crossin, V. Gruschen, **G. Wright**, "MR Imaging of Congenital Left to Right Shunts," *86th Scientific Assembly and Annual Meeting of the Radiological Society of North America (RSNA),* 2000.

63. R.I. Farb, J.K. Kim, C. McGregor, J.A. Derbyshire, R. Willinsky, P. Cooper, G. Cheung, M.L. Schwartz, **G.A. Wright**, "Real-time Auto Triggered Elliptical Centric Ordered 3D Gd-MRA for Evaluation of Intracranial AVMs," *39th Annual Meeting of the American Society of Neuroradiology*, November 2000.

64. C.H. Cunningham, **G.A. Wright**, M.L. Wood, "Feasibility of Adaptive Resolution Coronary Artery Imaging," *9th Scientific Meeting of the International Society for Magnetic Resonance in Medicine*, January 2001.

65. C.H. Cunningham, **G.A. Wright**, M.L. Wood, "Shortening Multiband RF Pulse Duration for Reduced Motion Sensitivity," *9th Scientific Meeting of the International Society for Magnetic Resonance in Medicine*, January 2001.

66. R. Dharmakumar, D. Plewes, **G.A. Wright**, "Parameters Affecting the MR Measurement of Pressure with Microbubbles," *9th Scientific Meeting of the International Society for Magnetic Resonance in Medicine*, January 2001.

67. J.K. Kim, M. Laliberte, R.I. Farb, R. Walcarius, **G.A. Wright**, "Cardiac-Gated High Spatial Resolution 3D Gd-MRA Technique for the Carotid Arteries," *9th Scientific Meeting of the International Society for Magnetic Resonance in Medicine*, January 2001.

68. X. Qi, **N. Merchant**, F. Walker, G.D. Webb, P. McLaughlin, J. Stainsby, **G.A. Wright**, "MRI Assessment of Atrial Septal Defects in Adults," *9th Scientific Meeting of the International Society for Magnetic Resonance in Medicine*, January 2001.

69. J.A. Stainsby, T. Goldman, M.S. Sussman, **G.A. Wright**, "Realtime MR with Physiological Monitoring for Improved Scan Localization," *9th Scientific Meeting of the International Society for Magnetic Resonance in Medicine*, January 2001.

70. M. Sussman, N. Robert, **G.A. Wright**, "Artifact-Free, Maximal-SNR, Efficient Image Combination for Coronary MR using the Correlation Coefficient Template Grid Matching Technique," *9th Scientific Meeting of the International Society for Magnetic Resonance in Medicine*, January 2001.

71. M. Sussman, **G.A. Wright**, "Non-ECG-Triggered, High-Resolution, Coronary Artery Imaging using Adaptive Averaging with Real-Time Variable-Density Spirals," *9th Scientific Meeting of the International Society for Magnetic Resonance in Medicine*, January 2001.

72. R. Dharmakumar, D.B. Plewes, **G.A. Wright**, "MR Manometry for Early Diagnosis of Pulmonary Hypertension," *Poster Abstract in Imaging Network Ontario – Annual Imaging Symposium*, October 19-20, 2001.

73. M. Sussman, **G.A. Wright**, "Submillimeter Coronary Artery Imaging Using Variable-Density (VD) Spiral Adaptive Averaging," *Poster Abstract in Imaging Network Ontario – Annual Imaging Symposium*, October 19-20, 2001.

74. W.D. Foltz, H. Huang, **S. Fort**, **G.A. Wright**, "Assessing the Myocardial Vasodilator Response to Intracoronary Adenosine Infusion using MRI Relaxation Times – A Study in Porcine Myocardium In Vivo," *Poster Abstract in Imaging Network Ontario – Annual Imaging Symposium*, October 19-20, 2001.

75. W.D. Foltz, **G.A. Wright**, "Vasodilator Response Assessment using MRI Relaxation Times," *Imaging Network Ontario – Annual Imaging Symposium*,

October 19-20, 2001.

76. R.S. Yoon, K.F. Hasanov T.P. Demonte, D. Jorgensen, **M.L.G. Joy**, Defibrillation Electrical Current Pathways in the Heart and Chest of a Pig. Book of Abstracts p53, Imaging Network Ontario, 1'st Annual Imaging Symposium, Toronto October 2001.

77. Patriciu, K. Yoshida, T.P. DeMonte, **M.L.G. Joy**, Detecting Skin Burns Induced by Surface Electrodes. Abstract Book, 23rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society #7.1.5-12 p 166, CD 1158, Istanbul October 2001.

78. Patriciu, T.P. DeMonte, **M.L.G. Joy**, J.J. Struijk, Investigation of Current Densities Produced by Surface Electrodes Using Finite Element Modeling and Current Density Imaging.. Abstract Book, 23rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society #5.1.4-14, CD 1157, Istanbul October 2001.

79. Greg J. Stanisz, Richard Yoon, **Michael Joy**, and R. Mark Henkelman, Why does MTR change with neuronal depolarization, Proceedings International Society for Magnetic Resonance in Medicine, IX'th Scientific Meeting and Exhibition, page 1192, April 2001.

80. Richard S. Yoon, Tim P. DeMonte, Dawn Jorgenson and **Michael L.G. Joy**, "Study of current pathways in porcine heart using current density imaging", Proceedings International Society for Magnetic Resonance in Medicine, IX'th Scientific Meeting and Exhibition, page 685, April 2001.

81. Tim P. DeMonte, Andrei Patriciu, **Michael L.G. Joy** and Johannes J. Struijk, Current densities produced by surface electrodes: comparison of MRI measurements and finite element modeling, Proceedings International Society for Magnetic Resonance in Medicine ,IX'th Scientific Meeting and Exhibition, page 686, April 2001.

82. Leili Torab and **Michael Joy**, "The forward problem of EEG source localization using current density imaging", Proceedings International Society for Magnetic Resonance in Medicine ,IX'th Scientific Meeting and Exhibition, page 921, April 2001.

83. **Michael L.G. Joy** Valeri P. Lebedev Richard Yoon, "Imaging Current Density in Living Animals Using MRI", Procedings of the IFESS 2000 CONFERENCE, pp1-4, June 18-20, 2000, Aalborg.

84. R.S. Yoon, **M.L. Joy**, "Characterization of spreading depressionin rodent neocortex using radio frequency current density imaging, Proceedings International Society for Magnetic Resonance in Medicine,VII Scientific

Meeting and Exhibition, page 810, May 1999

85. S. Blinder, A. Celler, **R.G. Wells**, D. Thomson, R. Harrop, ``Experimental verification of 3-D detector response compensation using the {OSEM} reconstruction method", 2001 IEEE Nuclear Science Symposium and Medical Imaging Conference. (San Diego; November 2001).

86. Tatsch K, Radau PE, Linke RP, Hahn K**, Slomka PJ**. Automated Analyses of Dopamine D2 receptor studies for optimizing differential diagnosis of Parkinsonian syndrome *Eur J Nucl Med* 1999;26:982

87. Barthel H, Lincke B, Winkler B, Radau P, **Slomka P**. Hesse H et al. Evaluation of a new voxelwise technique for analysis of brain perfusion SPECT data in acute stroke. *Eur J Nucl Med* 1999;26:1001

88. Radau RP, Linke R, **Slomka PJ**, Tatsch K. Optimized diagnosis of parkinsonism by automated quantification od doppamine receptor studies. *J Nucl Med* 1999;40;27P

89. Baum RP, Przetak CH, Proschild A, Mohr V, Vogelsberg H,Niesen A, **Slomka PJ** et al. Anato-metabolic imaging in postichemic mitral valve insufficiency – fusion of FDG-PET and electron beam computed tomography images – a new concept. Eur J Nucl Med 2000;27:S89

90. Radau PE, **Slomka PJ** Julin P, Svensson L, Wahlund LO. Automated analysis of HMPAO-SPECT of Alzheimer patients. *J Nucl Med* 2000:41:107P

91. **Slomka PJ**, Dey D, Przetak CH, Baum RP. Automated 3D spatial integration of F-18-FDG wholebody PET with CT. *J Nucl Med* 2000;41:59P

92. **Slomka PJ**, Hurwitz GA, Dey D, Przetak CH, Baum RP. Automatic 4-dimensional coregistration and fusion display of multimodality anatomical and functional cardiac images. Q J Nucl Med 2000;44:160.

93. Radau PE, **Slomka PJ** Julin P, Svensson L, Wahlund LO. Computer based diagnosis of Alzheimer's disease with voxel-based processing. Eur J Nucl Med 2000;27:962.

94. **Slomka PJ**, Dey D, Przetak CH, Baum RP. Automated registration of F-18-FDG wholebody Positron emission Tomography with CT. *Eur J Nucl Med* 2000;27:978.

95. Baum P, Przetak CG, Proeschild A, Vogelsberg A, Leonhardi A, **Slomka PJ**. Anato-Metabolic Imaging of Postischemic Mitral Valve Regurgitation: Fusion of FDG-PET and EBT Images--A New Concept (accepted Radiology 2000)

96. **Slomka PJ**, Dey D, Przetak CG, Baum RP. Automated nonlinear image registration of wholebody F-18-PET with thoracic CT *J Nucl Med* 2001;42:11P

97. Przetak CG, **Slomka P** , Proeschild A, Niesen A, Mohr A, Leonhardi J, Curtius JM , Baum RP. Fusion of cardiac ^{18}FDG-PET and EBT Images in postischemic Mitral Valve Insufficiency (PIM) - Anato-Metabolic Imaging. *J Nucl Med* 2001;42:60P

98. Radau PR, **Slomka PJ**. Constrained, localized warping registration reduces errors caused by hypoperfusion. *J Nucl Med* 2001;42:7P

99. **Slomka PJ**, Dey D, Przetak CG, Baum RP. Automated nonlinear warping of wholebody F-18-PET with thoracic CT using transmission maps. *Eur J Nucl Med* 2001;42:11P

100. Thompson K, **Thompson RT**, Sykes J, **Wisenberg G**. The Effects of NHE Inhibition in a Canine Cardiac Ischaemia/Reperfusion Model: A MRI/MRS Study, ORDCF Imaging Network Ontario Symposium, Toronto, October 19-20, 2001.

101. Foley LM, Yau MJ, **Thompson RT**, Brauer M. Hepatic Oxygenation Changes in Chronic Ethanol-Treated Rats Analysed by fMRI. International Society for Magnetic Resonance in Medicine 9th Scientific Meeting, April 21-27, 2001 Glasgow, Scotland, UK.

102. Devine C, Saab G, Picot PA, Doherty T, Tarnopolsky M, **Thompson RT**. The Effect of Glycogen Storage Diseases on Multi-Component T2 Relaxation of *In Vivo* Skeletal Muscle. International Society for Magnetic Resonance in Medicine 9th Scientific Meeting, April 21-27, 2001 Glasgow, Scotland, UK.

103. Thompson K, **Thompson RT**, Sykes J, **Wisenberg G**. The Effects of NHE Inhibition in a Canine Cardiac Ischemia/Reperfusion Model: A MRI/MRS Study. International Society for Magnetic Resonance in Medicine 9th Scientific Meeting, April 21-27, 2001 Glasgow, Scotland, UK.

104. Saab G, Picot PA, Devine CL, Marsh GD, and **Thompson RT.**. Two-Dimensional T_1 and T_2 Relaxometry of *In Vivo* Skeletal Muscle at 3 Tesla. International Society for Magnetic Resonance in Medicine 8th Scientific Meeting, April 1-7, 2000 Denver USA.

105. Saab G, Marsh GD, Casselman M, Devine CL, and **Thompson RT**. Multicomponent T_2 of Resting and Exercised Muscle Following Creatine Supplementation. International Society for Magnetic Resonance in Medicine 8th Scientific Meeting, April 1-7, 2000 Denver USA.

106. Thompson K, **Thompson RT**, Sykes J, **Wisenberg G**. Comparison of Isoflurane and Propofol Anaesthesia on Cardiac Function and pH During Ischaemia/Reperfusion. International Society for Magnetic Resonance in Medicine 8th Scientific Meeting, April 1-7, 2000 Denver USA.

107. Thompson K, **Thompson RT**, Sykes J, **Wisenberg G**. Na/H Exchange Inhibitor Effects on Myocardial Function & pH During Ischaemia/Reperfusion. International Society for Magnetic Resonance in Medicine 8th Scientific Meeting, April 1-7, 2000 Denver USA.

108. Devine CL, Saab G, and **Thompson RT**. Effects of Temperature on Multi-component T_2 Relaxation of In Vivo Skeletal Muscle. International Society for Magnetic Resonance in Medicine 8th Scientific Meeting, April 1-7, 2000 Denver USA.,

109. **Wisenberg G**, Thompson K, Sykes J, **Thompson RT**. Canadian Cardiovascular Society 52nd Annual Meeting, Quebec City, October 20, 1999.

110. Bellamy D, Pereira RS, McKenzie, **Prato FS**, **Thompson RT**, **Wisenberg G**. Tracer Kinetic Modelling in the Myocardium Using a Fast T_1 Mapping Method. International Society for Magnetic Resonance in Medicine 7th Scientific Meeting, May 21-25, 1999, Philadelphia USA.

111. Lekx KS, **Prato FS**, Sykes J, **Wisenberg G**. Assessment of a Canine Model of Hibernating Myocardium, ORDCF Imaging Network Ontario Symposium, Toronto, October 19-20, 2001.

112. Thornhill RE, **Prato FS**, Moran GR, **Wisenberg G**, Sykes J. Viability Imaging with Contrast Enhanced MRI: Importance of Injection Strategy and Associated Imaging Time, ORDCF Imaging Network Ontario Symposium, Toronto, October 19, 2001.

113. So A, Thornhill R, Hadway J, Sykes J, **Wisenberg G, Prato FS, Lee T-Y**. Quantitative Measurement of Myocardial Perfusion in a Canine Model of Myocardial Ischemia/Reperfusion Using a Helical CT Scanner, ORDCF Imaging Network Ontario Symposium, Toronto, October 19-20, 2001.

114. Barrea C, Valsangiacomo E, **Yoo S-J, Smallhorn JF**. The Use of Contrast Enhancement in the Evaluation of Congenital Pulmonary Venous Abnormalities, ORDCF Imaging Network Ontario Symposium, Toronto, October 19-20, 2001.

115. Barrea C, Coles JG, Williams WG, Van Arsdell GS, **Smallhorn JF**. Three-Dimensional Echocardiographic Evaluation of Atrioventicular Valves Enhances Surgical Decision Making in Pediatric Patients, ORDCF Imaging Network Ontario Symposium, Toronto, October 19-20, 2001.

Invited Talks

Dr. R. Beanlands

1. "Cardiac Metabolism Measured Using PET" (Turku, Finland May 1999)

2. "Myocardial Energetics and Efficiency (As Studied By Carbon-11 Acetate PET)" Cardiology Rounds, McMaster Medical Centre -Hamilton, Ontario (October 26, 1999)

3. "What Is the Role of PET in the Patient with Cardiac Disease?", E.S. Garnett Memorial Lecture - Hamilton, Ontario (October 26, 1999)

4. "Stressing Patients Undergoing PET Imaging", Symposium on Exercise Testing, Ambulatory Monitoring and Echocardiography - Ottawa, Ontario (November 26, 1999)

5. "Myocardial Metabolism and Efficiency", Ottawa-Carleton Regional Cardiovascular Group Retreat -Mont-Tremblant, Quebec (January 14-16, 2000)

6. "Outcome and Cost-Effectiveness of FDG PET in LV Dysfunction (The PARR 2 Study)", Ottawa City-Wide Nuclear Rounds - Ottawa, Ontario (January 26, 2000)

7. "PET and Recovery Following Revascularization -PARR 2" , University of Ottawa Heart Institute Research Rounds - Ottawa, Ontario (February 8, 2000)

8. PARR 2 Investigators/Coordinators Meeting Presentation. Toronto, Ontario. (Feb. 11, 2000)

9. "What is the Role of PET in the Patient with Cardiac Disease", Troisieme Conference Theodore Tahan - Sherbrooke, Quebec (March 1, 2000)

10. "PET and Recovery Following Revascularization -PARR 2", The Ottawa Hospital Clinical Epidemiology Rounds, Civic Site - Ottawa, Ontario (March 24, 2000)

11. "What is Cardiac PET", Section of Nuclear Medicine, OMA Central Tariff Committee - Toronto, Ontario (April 5, 2000)

12. "Myocardial Viability", 47th Annual Society of Nuclear Medicine Meeting - St. Louis, MO (June 6, 2000)

13. "How to Identify Myocardial Viability" (Case Studies), Read with the Experts, 47th Annual Society of Nuclear Medicine Meeting - St. Louis, MO (June 6, 2000)

14. "PET Scan Applications in Cardiology", Tomographie Par Emission de Positrons (TEP): Applications en Clinique et en Recherche - Laval, Quebec (June 9, 2000)

15. "PET and Recovery Following Revascularization - PARR 2" , PET Centre - Munich, Germany (June 2000)

16. "How PET Imaging Can Be Used in the Management of the Cardiac Patient", The Ottawa Hospital Grand Rounds, Civic Site - Ottawa, Ontario (Sept. 28, 2000)

17. Viability Imaging Workshop: "Assessing Myocardial Viability: An Interactive Session" (October 2000 -CCS Annual Meeting, Vancouver, BC).

18. "Myocardial Metabolism and New Applications of Cardiac PET", University of Ottawa Heart Institute Cardiology Grand Rounds - Ottawa, Ontario (December 20, 2000)

19. "Clinical and Research Applications of Cardiac PET", University of Ottawa Heart Institute Cardiac Rehabilitation Presentation - Ottawa, Ontario (January 23, 2001)

20. "How PET Imaging Can Be Used in the Cardiac Patient", London Health Sciences Centre Cardiovascular Rounds - London, Ontario (February 5, 2001)

21. "How To Identify Viable Myocardium Using FDG PET; Case Presentations", London Health Sciences Centre Nuclear Medicine Rounds - London, Ontario (February 5, 2001)

22. "Evaluation of Congestive Heart Failure", University of Ottawa Heart Institute First Annual Cardiac Imaging Symposium - Ottawa, Ontario (April 21, 2001)

23. "Evaluation of Coronary Artery Disease using PET", International Conference on Nuclear Cardiology - Vienna, Austria (May 2001)

24. "FDG PET Viability Imaging: Can It Alter Patient Management?", Society of Nuclear Medicine 26th Annual Western Regional Meeting - Vancouver, B.C. (October 11th, 2001)

25. "Does Cardiac PET Affect Patient Management?", Ontario Consortium for Cardiac Imaging and Cardiovascular Imaging Research Program of the ORDCF Symposium - Toronto, Ontario (October 19, 2001)

26. "Applications of Cardiac PET Imaging", Canadian Society of Nuclear Medicine - Montebello, Quebec (November 9, 2001)

Dr. S. Fort

27. The 2nd Canadian Workshop on IVUS and Physiologic Coronary Measurements, Course Co-Director. Sacre Coeur Hospital, Montreal. February 10-11, 2000

28. "Clinical Applications of IVUS - a Canadian Perspective" The 2nd Canadian Workshop on IVUS and Physiologic Coronary Measurements, Course Co-Director and Speaker Sacred Couer Hospital, Montreal. February 10-11, 2000

29. "What Is Needed In The Next Generation Of IVUS Systems". Second International Conference on Ultrasound Biomedical Microscopy. Windermere House, Lake Rosseau, Canada. September 8, 2000

30. "Intravascular Ultrasound: From Research to Routine Clinical Practice". Royal University Hospital, Saskatoon. September 20, 2000.

31. "Clinical Applications of Intravascular Ultrasound". Royal University Hospital, Saskatoon. September 21, 2000.

32. "Clinical Benefits of Intravascular Ultrasound". Foothills Hospital, Calgary, Alberta. February 20, 2001.

33. "The Routine Utilisation of IVUS during PCI: its' beneficial impact on procedure and outcome. Grand Rounds, Foothills Hospital, Calgary, Alberta. February 21, 2001

34. "Present and Future Research Using Intravascular Ultrasound". Biomedical Engineering Department, Sunnybrook & Women's College Health Sciences Centre. March 6, 2001.

35. "Intravascular Ultrasound: Why Cardiologists Use It". Cardiothoracic Surgery Rounds, Sunnybrook & Women's College Health Sciences Centre. March 7, 2001.

36. "Routine IVUS guidance for PCI?" Live Cardiovascular Demonstration Course, Chang Gung General Hospital, Kaohsiung, Taiwan. April 8, 2001.

Dr. C. Macgowan

37. Pulse-Wave Velocity Measured in One Heartbeat Using MR Tagging. International Society of Magnetic Resonance in Medicine, (2001).

38. One-Dimensional Particle Tracking of Fluid Motion Using Tagging. International Society of Magnetic Resonance in Medicine, (2000).

Dr. G.A. Wright

39. "MRI Assessment of Blood Oxygen State: Cardiac Applications," Institute of Biodiagnostics, National Research Council, Winnipeg, Manitoba, May 7, 1999.

40. "Characterizing Blood Oxygen Saturation in the Presence of Clariscan," XII International Workshop on MR Angiography, Lyon, France, October 4-7, 2000.

41. "New Developments for Cardiovascular MRI in Toronto", GE Medical Systems, Milwaukee, Wisconsin, November 2000.

42. "Imaging in the Cath Lab of the Future", World Congress for Pediatric Cardiology, Toronto, Canada, May 2001.

43. "MRI for Assessment of Cardiac Diseases", International Society for Heart Research, Winnipeg, Canada, July 2001.

44. "Real-time Guidance for Coronary MRA Acquisitions", XIII International Workshop on MR Angiography, Madison, Wisconsin, September 24-29, 2001.

45. "Cardiovascular MRI: Applications and Future Developments", Jilin University, Changchun, China, October 25, 2001.

46. "Advances in Real-time Applications for CVMR", PLA Hospital, Beijing, China, October 27, 2001.

47. "Imaging in the cath lab of the future", Interventional Cardiology Workshop, Whistler, BC Dec 1, 2001.

48. "Cardiac Imaging for Interventions", National Frontiers Program for Gene and Cell Therapy for Cardiorespiratory Disorders, Toronto, Ontario, Jan 12, 2002.

Dr. M.L.G. Joy

49. IEEE Engineering in Medicine and Biology Society, Istanbul October 2001.

50. International Society for Magnetic Resonance in Medicine, IX'th Scientific Meeting and Exhibition, April 2001 Glasgow.

51. IFESS 2000 CONFERENCE, June 18-20, 2000, Aalborg.

52. International Society for Magnetic Resonance in Medicine, VII Scientific Meeting and Exhibition, May 1999

Dr. Frank Prato

53. MR imaging of the heart. 42nd Ann Mtg Cdn Fed Biol Sci, 1999, Winnipeg Manitoba.

54. (with Pereira RS) The present and future roles of MRI, MRS and SPECT in ischaemic cardiac disease. Canadian College of Physicists in Medicine, symposium, 17/06/99, Sherbrooke Quebec.

55. Functional Imaging of Tissues by Kinetic Modelling of Contrast Agents in MRI Fourier: Euro Workshop on Advanced Signal processing: Theory and Implementation for Radar Sonar and Medical Imaging Systems MT-9467 Corfu, Greece, 2000.04.10-13.

56. Overview of R&D investigations at the Lawson Research Institute, UWO. Meeting with Representatives of European Commission DG-XIII, IST (Thierry Van der Pyl & Michel Bosco) University College, 2000.05.18, Toronto Ontario.

57. Myocardial Ischemia and Viability: a Clinician's Perspective MT-9467, North American Society for Cardiac Imaging (NASCI), First International Workshop on Coronary MR and CT Angiography, 2000.10.03, Lyon France.

58. Myocardial Ischaemia and Viability: Cardiac Imaging with MRI MT-9467, Sunnybrook and Women's College Health Sciences Centre Toronto, Ontario, 2000.10.27

59. Contrast Agents in Cardiac MR MT-9467, Society for Cardiovascular Magnetic Resonance Atlanta, Georgia, 2001.01.26-28.

Dr. P. J. Slomka

60. Automated analysis of cardiac and Brain SPECT. Functional imaging symposium under the auspices of Belgian Ministry of Health. Mol, Belgium. May 1999

61. Web based PACS system for medical imaging. Cytogen Inc. User's Meeting. Society of Nuclear Medicine June 1999

62. Image algorithms for automated multimodality image registration. Rochester University. USA. August 2000

63. Strategies for multimodality PET-CT and PET-MRI image registration. Chang Gung Memorial Hospital, Taipei, Taiwan. October 2000.

64. The use of Java in Telemedicine. Society of Nuclear Medicine. Computer Council Tampa, Florida, USA, Feb 2001

65. Java and PACS. German Society of Medical Physicists. Fulda, Germany May 2001.

66. Strategies for Image registration. Warsaw Military Hospital. Warsaw, Poland. May 2001

67. 3D cardiac quantification and image registration. INO Annual Symposium Oct 19, 2001 Toronto

68. Multimodality Image registration and fusion. Sherbrooke Medical Centre, Sherbrooke, Canada Oct 2001

69. 3D quantification of myocardial perfusion SPECT. Annual meeting of CSN Montebello, Canada. October 2001

70. PET-CT and SPECT MRI 3D cardiac image registration and quantification. Cedar Sinai Medical Centre Los Angeles, December 2001

Dr. S. Stergiopoulos

71. "Adaptive Processing to Correct for Cardiac Motion Artifacts in X-ray CT and to Improve Image Resolution in Ultrasound Medical Imaging Systems: MITTUG and New Roentgen Projects /European Commission, IST-10618 & EP-26764", World Congress 2000, Biomedical Engineering, Chicago, IL, July-2000.

72. "Technology Challenges on International Collaborative Efforts Associated with Ultrasound Technology", World Congress 2000 ON Biomedical Engineering, Chicago, IL, July-2000.

73. "Canadian R&D Efforts in Ultrasound Imaging Technologies associated with the European-Canadian Collaborative Project MITTUG", European Commission, IST-2000 conference, Nice-France, Nov-2000.

74. "Correction of Motion Artifacts in CT/X-ray Medical Tomography Imaging Systems", Robarts Research Institute, Univ. of Western Ontario, London, Ontario, August, 1999.

75. Stergiopoulos S., et al., "Pulse wave design using time reversal for cardiac ultrasound imaging", EAA/137th ASA meeting in Berlin Germany, 1999.

Dr. T. Thompson

76. **Thompson, RT**. Myocardial Viability Assessment: The MRS Window, ORDCF Imaging Network Ontario Symposium, Toronto, October 19, 2001.

77. Going from in vitro to in vivo: Localization Techniques and Discrepancies in Results. NMR Summer School, Faculty at University of Waterloo, June 11 - 16, 2001.

78. MR Spectroscopy: Clinical Potential and implications on new MR Technology, June 23, 1999. Bioelectromagnetics Society 21st Annual technical Meeting, Faculty.

Dr. P. Burns

79. European Contrast Symposium. Erasmus University, Rotterdam, January 2000. "The effect of bubble depletion on destruction-reperfusion flow measurements."

80. European Contrast Symposium. Erasmus University, Rotterdam, January 2000. "The future of contrast."

81. Bronco Symposium, Geneva, Switzerland, January 2000. "Imaging microbubble contrast -Where to from here?"

82. University of Virginia, Grand Rounds, Department of Cardiology, Charlottesville, March 2000. "Imaging microvascular perfusion with ultrasound contrast."

83. Crouse Stress Echocardiography Course, Kansas City, April 2000. Contrast perfusion stress imaging.

84. University of California at San Francisco, Grand Rounds, Department of Cardiology, June 2000.

85. American Society of Echocardiography, Chicago, June 2000. "Contrast Echo Principles and Instrumentation."

86. Echo Contrast Media 2001, Berlin, January 2001: "Physical behaviour of microbubble agents."

87. European Contrast Meeting, Erasmus University, Rotterdam, January 2001. "Optimal methods for imaging the myocardium."

88. University of Bristol, Bristol, UK, April, 2001. Ultrasound Physics: Fetschrift for Professor PNT Wells. "Nonlinear imaging."

89. The American Society of Echocardiography Annual Meeting, Seattle, WA, June 2001. "Bubble behaviour."

90. Ontario Research and Development Challenge Fund: Imaging Network Ontario Symposium, Toronto, October 2001. "Myocardial perfusion imaging using ultrasound contrast agents."

Dr. Gerald Wisenberg

91. **Wisenberg G**. The Clinical Challenge, ORDCF Imaging Network Ontario Symposium, Toronto, October 19, 2001.

Dr. Ting-Yim Lee

92. **Lee T-Y**, So A, Pan T. Myocardial Blood Flow and Viability Assessed with Contrast Enhanced X-ray CT, ORDCF Imaging Network Ontario Symposium, Toronto, October 19, 2001.

Section E: 2001 INO Symposium Agenda
Cardiovascular Day

07:30 Registration and Coffee

08:00 Welcome - Graham Wright, PhD
08:05 The Clinical Challenge - Gerald Wisenberg, MD
08:25 Delayed Enhancement Imaging with MRI - Robert Judd, ***PhD***
09:10 MRI Delayed Enhancement: Guidance of Percutaneous Coronary Intervention – Alexander Dick, MD
09:35 Myocardial Blood Flow and Viability Assessed with Contrast Enhanced X-Ray CT - Ting-Yim Lee, PhD
10:30 Myocardial Viability Assessment: The MRS Window - Terry Thompson, PhD
11:05 Myocardial Blood-Flow Imaging with Ultrasound - Peter Burns, PhD
12:00 Student Presentations
Viability Imaging with Contract Enhanced MRI: Importance of Injection Strategy and Associated Imaging Time - Rebecca Thornhill, LRHI
Vasodilator Response Assessment using MRI Relaxation Times - Warren Foltz, SWCHSC
Computer Simulations of Extravascular Density Imaging: A Correction for the Partial Volume Effect in Myocardial PET - Richard Wassenaar, UOHI
14:00 Myocardial Viability Assessment with PET: New Frontiers - Heinrich Schelbert, MD, PhD, presented by Gerald Wisenberg, MD
Automated Multimodality Registration and Quantification of Cardiac SPECT, PET, CT and MRI – Piotr Slomka, PhD
14:55 How Cardiac PET Affects Patient Management - Robert Beanlands, MD
15:30 Wrap-Up - Frank Prato, PhD
15:45 Keynote Address
Health Research in Canada: Image, Impact, Innovation, and Implications for National Well-Being
Bruce M. McManus, MD, FRCPC, PhD, FACC, FCAP
Scientific Director, Institute of Circulatory and Respiratory Health
Canadian Institutes of Health Research
16:45 Closing Remarks – Brian Rutt, PhD
Maurice Bitran will speak on behalf of ORDCF and announce winner of Poster Session
17:00 Student Poster Session and Reception

Section F: INO Operating Strategy

The Imaging Network Ontario (INO) Strategic Planning committee chairs, Drs. Michael Bronskill & Aaron Fenster, have created two committees to ensure that INO continues to provide leadership and direction for imaging research in Ontario in partnership with the ORDCF. This document outlines our plan of action and progress to date.

A. Operations Committee

Co-chairs: M. Bronskill and A. Fenster

Membership:

a) Principal investigators of all successful imaging proposals to ORDCF (Rutt, Wright, Yaffe, Sherar, McIntosh, Foster)

b) Business officers and project coordinators of successful imaging proposals to ORDCF (Keep, Wong, Williams)

Activities:

- plan annual symposia and workshops
- oversee website and publicity
- facilitate recruitment and audit activities for all
- address project issues that span multiple individual projects such as inter-institutional agreements, web sites, shared personnel, audit coordination

This committee is intended to meet approximately twice annually, or more frequently if required. It has met twice as a complete group in 2001. A large and successful symposium was held in Toronto on October 19th & 20th, 2001, with approximately 280 attendees.

The Managers of each successful consortium are interacting frequently on many aspects of the INO projects including preparation and filing of quarterly reports, inter-institutional agreements, research contract negotiations, annual symposium, additional corporate sponsorships of Ontario-based imaging research, and monitoring of research progress. Regular discussions are held on for planning workshops, budgets, and publicity.

B. Strategic Initiatives Committee

Co-chairs: M. Bronskill and A. Fenster

Targeted Membership:
- several industrial advisors from participating INO industrial partners such as GEMS, Siemens, Du Pont, Dalsa, etc, and other Canadian senior scientists with experience in industrial interactions. Individuals suggested include Morry Blumenfeld, Ph.D., Thomas Ruth, PhD, Ralf Brooks, etc.
- PIs of participating imaging proposals (Wright, Yaffe, Sherar, Rutt, McIntosh, Foster)
- other senior scientists of these projects, as appropriate
- Business Officer(s) for INO projects

Activities
- facilitate interactions between academic scientists and industrial partners
- develop mechanisms to further education in tech transfer
- facilitate the creation of joint academic/industrial positions for graduate students, postdoctoral fellows and scientists

Individuals on this committee were very active at the 2001 INO symposium, fostering interactions between the private sector and participants from multiple projects. Meetings are planned to be held at least annually.

What is not planned, for the immediate future, is an INO scientific advisory committee. Several of the funded projects have constituted excellent scientific advisory committees themselves, and these committees met in conjunction with the 2001 symposium. These meetings were judged to be very successful. At the moment, it is our opinion that duplication of this function at the INO level is unnecessary and possibly counterproductive.

M.J. Bronskill & A. Fenster
20Jan02