Cardiovascular Magnetic Resonance Imaging at Stony Brook
Clinical Applications in Pediatric Cardiology

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Cardiovascular magnetic resonance imaging (CVMRI) is quickly becoming an essential non-invasive imaging modality for the assessment of cardiovascular disease. This new and exciting imaging technology was developed as a collaborative effort by radiologists from the Department of Radiology and pediatric cardiologists from the Division of Pediatric Cardiology at Stony Brook since 2004. It has been used by pediatric cardiologists to focus on improving pediatric surgical treatment planning and for post-surgical follow-ups by monitoring those who had repair for various congenital heart defect and vascular anomalies. The full spectrum of imaging and diagnostic services at Stony Brook Pediatric Cardiology includes the use of this advanced imaging technology, which is not available through many pediatric healthcare systems. It is currently available at only a few locations on Long Island and is exclusive to eastern Suffolk County.

According to the American Heart Association (AHA) 2005 Heart Disease & Stroke Statistical Update, there are more than one million Americans with congenital cardiovascular defects and about 40,000 babies born per year with congenital heart disease in the United States. Congenital cardiovascular disease is the most common cause of infant death from birth defects; one in three of these infants have a heart defect. Life years lost before age 65 due to deaths from congenital cardiovascular disease is comparable to the life years lost from leukemia, prostate cancer and Alzheimer’s disease combined. In 2000, over 130,000 hospitalizations occurred in infants or children with congenital cardiovascular disease at a cost of $6.5 billion for hospital charges alone.

For decades, x-ray fluoroscopy guided catheterization has been the standard diagnostic and therapeutic procedure, although it is not without limitations and risk to patients. It has poor soft tissue details and relies on contrast shadows that do not convey three-dimensional information. In addition, ionizing radiation exposure in children also imparts a cancer risk. Echocardiography overcomes some of these limitations and has been the most commonly used non-invasive technique for cardiac diagnosis. However, echocardiography can be limited by suboptimal or unreliable imaging windows, geometric assumptions, limited imaging of anterior structures and great vessels around the heart, and operator-dependence.

CVMRI provides a non-invasive diagnostic tool complementing echocardiography and has advantages over echocardiography especially after corrective procedures. CVMRI uses a large magnet, radio waves and a computer to produce clear pictures of the heart and vessels without using harmful radiation. CVMRI enables the physician to evaluate not only anatomy but also physiology and function of the cardiovascular system, imaging heart and vessels from any angle. Using advanced post-processing software, a three-dimensional model of the heart and vessels can be reconstructed which can be viewed from all sides. Contrast enhanced MR angiogram (CE-MRA) provides information which would otherwise be provided by invasive angiography. In the assessment of congenital cardiovascular disease, angiography requires the placement of catheters in various systemic and pulmonary vessels to derive optimum information regarding the vascular anomalies and associated shunts. CE-MRA is non-invasive and free of the hazards of ionizing radiation. It dispenses with the need for iodinated contrast media, which is subject to dose-restrictions in the evaluation of infants and young children due to nephrotoxicity and other potential side effects. Gadolinium-based MR contrast agent used by CE-MRA is safe to use even in the pediatric age group. In certain situations, MRI contrast is not necessary because of excellent
Chairman’s Corner
by Donald P. Harrington, M.D., M.A., F.A.C.R.

One of the missions of the department and the institution is the education of our medical students, residents and fellows. I would like to thank Steven Perlmutter, M.D., Director of the Radiology Residency Program, Harris L. Cohen, M.D., Director of the Body Imaging Fellowship Program, Clemente T. Roque, M.D., Director of the Neuroradiology Fellowship Program and Elaine S. Gould, M.D., Director of the Musculoskeletal Fellowship Program and the entire faculty for their teaching skills and efforts. A special acknowledgement goes to Harris L. Cohen, M.D. who was awarded the Radiology Department Teacher of the Year Award and William H. Moore, M.D., who was awarded the 2006 Excellence in Teaching Award by the class of 2006.

I would like to wish the graduating fellows and residents the best in their new endeavors and look forward to seeing everyone again at our alumni and residency gatherings. Our new residents and fellows are on board and we look forward to working with them. Dr. Nancy Budorick also joined the faculty staff as a Professor of Clinical Radiology in the Division of Cross-sectional Imaging with expertise in obstetric and gynecological imaging.

A second part of that mission is the education of the technology staff to whom we offer congratulations to the first graduating class of the Nuclear Medicine Technology and Radiologic Technology Programs. This program is offered through the Health Sciences Center’s School of Health Technology and Management.

In the clinical area, it’s an exciting time for cardiovascular imaging. The department offers noninvasive cardiovascular imaging using state of the art MRI and CT. A recent clinical advance in conjunction with the cardiology division is the expansion of cardiovascular magnetic resonance imaging at Stony Brook and the remarkable changes this modality is making in the field of adult and pediatric cardiology. This expansion, in conjunction with cardiac CT angiography, is expected to surely affect the practice and treatment of cardiac patients in a non invasive environment.

We are also pleased with the installation of the FDG PET-CT Siemens biography 40 slice PET-CT scanner in the new Outpatient Imaging Center which is planned to open shortly. This facility, which will be located at the Ambulatory Care Pavilion, will provide an excellent quality of care and easy access for referring physicians and patients.

Residency and Fellow Graduation Dinner

The Residency/Fellow Graduation Dinner was held on June 15, 2006 at The Old Field Club in Setauket, New York. The event was sponsored by Fuji Medical Systems U.S.A. It was good to see Drs. Harold Atkins, Kathleen Finzel, Jane Bernier and Maureen Blazowski and Alice Jimenez. Congratulations to Douglas Dougherty, M.D., Ph.D., Rosemary Oliveri-Fitt, M.D., Nadia Shah, M.D., Sejal Shah, M.D., Ben Young, M.D., William Zucconi, M.D. in completing their four year Radiology Residency Program.

Almas Abbasi, M.D. completed an Abdominal Radiology Fellowship, Jack Fields, M.D. an MRI Fellowship, Robert Bernstein, M.D., Ph.D. a Neuroradiology Fellowship, and Paulito Tactacan, M.D. a Neuroradiology Fellowship. Christopher Savrides, M.D. completed a year of training as a junior attending.

Dr. Harris Cohen was the recipient of the “Teacher of the Year Award” and William Zucconi the “Resident Teacher of the Year Award”. Drs. Ferrett’s “Unknown Case Contest” was won by William Zucconi, M.D. who received a textbook of his choice. William Zucconi, M.D. also received the “Roentgen Resident/Fellow Research Award” (RSNA Research and Educational Fund) for his accomplishments in radiological investigation.

Many thanks to Dr. Steven Perlmutter, Director of the Residency Program and Linda Erickson, Coordinator of the Residency Program for their efforts. Also many thanks to the faculty and support staff for their hard work and dedication.
Cardiac Magnetic Resonance Imaging

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CVMRI is particularly useful to delineate complex congenital heart disease anatomy and vascular anatomy, to evaluate both right and left ventricular function, to quantify flow and pressure across valves, chambers, shunts or vessels, and to define cardiac tumors. CVMRI may aid clinical decision making in the following congenital cardiovascular diseases for both pre-surgical planning and post-surgical monitoring:

- Cardiac Tumors (fig. 1)
- Tetralogy of Fallot (TOF, fig. 2)
- Coarctation (fig. 3)
- Transposition of great vessels (TGV, fig. 4)
- Single Ventricle/hypoplastic left heart syndrome (HLHS, fig. 5)
- Partial anomalous pulmonary venous drainage (PAPVD, fig. 6)
- Vascular rings (fig. 7)

Because any movement during the MRI will blur the picture, young patients usually are sedated. Most of the older patients (>7–8 year old) may be able to collaborate throughout the exam without any sedation.

Patient appointments can be made by calling 631-444-3452. Dr. Meng can be reached at 631-444-8192. Drs. Biancianiello, Morelli and Balluz can be reached at 631-444-2725.

News in the Department

New Positions and Promotions

Elaine Gould, M.D., was named Director of the Imaging Center at the Ambulatory Care Pavilion.

Charles Mazzarese, M.P.S., R.T. was promoted to Technical Director of the Imaging Center at the Ambulatory Care Pavilion.

Louis Caronia, R.T. was promoted to Assistant Director and Supervisor of the Cat Scan area.

Congratulations to Electra Kaloudis, M.D. on being selected by the Radiologic Society of North America (RSNA), Association of University Radiologists and American Roentgen Ray Society (ARRS) to attend the Introduction to Research Program at the RSNA.

Congratulations to William Moore, M.D. who received the Class of 2006 Award for Excellence in Teaching.

Congratulations to Harris L. Cohen, M.D. who was named as one of the best doctors in the New York Magazine’s annual “Best Doctors in New York” issue.

Steven Perlmutter, M.D. was elected Vice President Suffolk County Medical Society and Vice President Suffolk Academy of Medicine.

Elaine Gould, M.D. was named the Educational Chairperson (2005 -2006) and treasurer (2006-2007) of the Long Island Radiological Society, Inc.

Haifang Li, Ph.D. collaborated on a research project applying fMRI to study romantic love with Dr. Arthur Aron, Professor of Psychology at Stony Brook University and Dr. Helen Fisher, Research Professor of Anthropology at Rutgers University. The results suggest that romantic love uses subcortical reward and motivation systems to focus on a specific individual, that limbic cortical regions process individual emotion factors, and that there is localization heterogeneity for reward functions in the human brain. The research also reveals that men and women who have been rejected by a partner show increased activity in areas of the brain that link to anxiety, obsessive/compulsive behaviors, high-risk decision making, and anger management.

Joe Whitton and Bill Stanley, Program Directors of the Radiologic Technology and Nuclear Medicine Technology Programs offered through the School of Health Technology and Management, would like to take this opportunity to thank all those who participated in the successful clinical education of our students. As a result of your dedication and hard work, the 27 students who graduated from our programs in June have been very successful in passing their certification exams and beginning their careers as healthcare professionals. Their success would not have been possible without your efforts. Thank you.
New Faculty

Nancy E. Budorick, M.D. joined the faculty staff as a Professor of Clinical Radiology in the Division of Cross-sectional Imaging. Dr. Budorick received her medical degree at Loyola University Stritch School of Medicine in Maywood, Illinois. After completing an Internal Medicine internship at the University of Chicago, she returned to Loyola University Medical Center for her residency in Diagnostic Radiology. Dr. Budorick subsequently completed a Cross-sectional Imaging fellowship at the University of California in San Diego, California, where she remained on staff until taking a position at Columbia University Medical Center in New York. She has had adjunct appointments at the Veterans Administration Medical Center in San Diego, California and in Northport, New York. Dr. Budorick is Board Certified in Radiology, with expertise in Obstetric and Gynecological imaging. She is a fellow of the American College of Radiology (ACR) and the Society of Radiologists in Ultrasound (SRU) and a member of the American Institute of Ultrasound in Medicine (AIUM), the Radiologic Society of North America (RSNA) and the New York State Radiological Society.

New Residents

Anthony Gilet, M.D. received his medical degree at SUNY Syracuse and completed a one-year Internal Medicine internship at Winthrop Mineola, New York.

Craig Hendler, M.D. received his medical degree at SUNY Buffalo and completed a one-year Internal Medicine internship at Westchester Medical Center in Valhalla, NY.

Zareena Hussain, M.D. received her medical degree at the New York Medical College and completed a one-year Internal Medicine at Kaiser Permanente Medical Center in Santa Clara, California.

Seth Klein, M.D. received his medical degree at SUNY Buffalo and completed a one-year Surgery internship at SUNY Stony Brook.

New Fellows

Neil Denbow, M.D. is a Musculoskeletal fellow. He received his medical degree and completed his residency at the McGill University in Montreal, Canada, and then completed a Vascular/Interventional Radiology fellowship at the University of Montreal/Notre Dame Hospital. Following his fellowship, he was an Assistant Professor in the Interventional Radiology section at Yale University for the past eight years.

Annrose Thomas Deshong, M.D. is an Abdominal Radiology fellow. She received her medical degree at Albert Einstein School of Medicine in the Bronx, New York and completed her Radiology residency at Beth Israel Medical Center, New York. Dr. Deshong also completed a Neuroradiology and Magnetic Resonance Imaging fellowship at SUNY Stony Brook.

Lectures

Walter Huda, Ph.D., Professor and Director of Radiological Physics in Radiology at the SUNY Health Science Center at Syracuse, New York presented a Grand Rounds on “Dose and Image Quality in CT” on Friday, March 31, 2006.

Mark Schweitzer, M.D., Director of Musculoskeletal Radiology, Professor of Orthopedic Surgery at the Hospital for Joint Diseases at New York University Medical Center in New York, New York presented a Grand Rounds on “Fracture Complications” on Tuesday, March 14, 2006.

Javier Beltran, M.D., Professor and Chairman, Department of Radiology at the Maimonides Medical Center at Brooklyn, New York presented a Grand Rounds on “Internal Impingement Syndromes of the Shoulder: Pathology, Biomechanics and MRI Manifestations” on Tuesday, November 7, 2006.
FDG PET-CT Imaging for Benign Processes

By Robert Matthews, M.D.

FDG PET-CT imaging has emerged as the best tool for the clinician in the staging and restaging of various malignancies. FDG is a radioactive glucose analog that is injected intravenously into the patient where it becomes trapped in cells to provide a record of glucose metabolism. FDG PET-CT tumor imaging is based on malignancy having a higher metabolic rate compared to normal surrounding tissue. Thus, cancer cells appear as hot spots compared to normal uptake. Unknown to many in the medical field, PET cameras were commercially available even before CT or MRI imaging systems were invented.

FDG PET-CT imaging is not only limited to evaluation of malignancy. Many benign processes related to infection and inflammation also have enhanced uptake on PET scan and can be diagnosed and monitored. One good example of this is the use of FDG PET-CT imaging for the evaluation of systemic sarcoidosis (fig 1). PET scan can accurately show the extent of both pulmonary and extrapulmonary sarcoidosis, as well as, provide surveillance of treatment response. Another indication for PET scan is the estimation of viable myocardium within infarcted heart muscle (fig 2). This can be used to determine if patients are candidates for revascularization procedures, such as bypass surgery or angioplasty.

FDG PET-CT has many neurological applications. PET imaging is well established for seizure focus determination. This not only facilitates the diagnosis of seizures, but aids both clinicians and surgeons in seizure treatment. FDG PET-CT can also be used for the diagnosis of Alzheimer’s disease allowing for early patient management (fig 3).

The Department of Radiology is expecting the arrival of a permanent Siemens Biograph 40 slice PET-CT scanner in the new Outpatient Imaging Center.

Figure 1. FDG PET-CT showing patient with active sarcoidosis within lymph nodes of the neck and mediastinum.

Figure 2. FDG Cardiac PET showing viable myocardium within the inferior and lateral walls of the heart that were thought to represent infarcted tissue on the sestamibi perfusion scan.

Figure 3. 3D reconstructed PET images demonstrating decreased parietotemporal metabolism in a patient with severe Alzheimer’s disease.
27th Annual Radiology Research Seminar

The twenty-seventh annual Radiology Research Seminar was held on Monday, May 15, 2006. This program is designed to provide a forum for exchange of information and discussion about clinical and basic research in the area of diagnostic radiology and other imaging modalities. Presentations were given by the following residents from the Department of Radiology, Stony Brook School of Medicine and Winthrop University Hospital, Mineola.

Charles Girard, M.D.
Application of Texture Analysis to Dynamic Contrast Enhanced Breast Magnetic Resonance Imaging

David Winger M.D.
Infectious Spondylitis: MR and Clinical Predictors of a Positive Biopsy Result

William Zucconi, M.D.
UVE Assessment by Simplified Single Slice Vertical Long Axis Measurement Using Steady State Free Processing (SSFP) acquisitions: How Reliable is it?

John Fantauzzi, M.D.
Use of Percutaneous Discectomy Device for Aspiration and Drainage of Intervertebral Discs

Mohit Naik, M.D.
Multi-detector CT Pulmonary Angiogram in the Assessment of Myocardial Infarction

Khaldoon Al Dulaimy M.D.
Dynamic Infrared Imaging for the Detection of Malignancy

Publications 2005-2006


Lehnert J, and Zhao Z. High voltage protection in active matrix flat-panel images. Proc. SPIE 6142, 0S-1-10.


Moore WH, and Baram D. Pulmonary Infection from Chronic Lymphocytic Leukemia. J Thor Imag. 2006;21, 172-175


(top from left to right) Terry M. Batton, Ph.D., Director of the Medical Physics Track in Biomedical Engineering, Charles Girard, M.D., David Winger, M.D., John Fantauzzi, M.D.; (bottom from left to right) Harris L. Cohen, M.D. (Associate Chair of Research Activities), Khaldoon Al Dulaimy M.D., William Zucconi, M.D., Mohit Naik, M.D.)
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