

Tractography gives neurosurgeons edge in planning, resection

Spinal cord tractography at Le Bonheur Children's is helping neurosurgeons assess patients, plan tumor resections and preserve function.

Neurosurgeons are working alongside Neuroradiologists Asim Choudhri, MD and Matthew Whitehead, MD, who can analyze white matter pathways on an MRI image to depict which way nerve bundles are shifted in relation to a tumor. Diffusion Tensor Imaging, an MRI sequence, is processed into tractography data which maps out the white matter pathways in the brain and spine.

Preliminary data was presented at the 2011 American Association of Neurological Surgeons/Congress of Neurological Surgeons Pediatric Section Meeting in Austin, Texas.

"Understanding where the nerve fibers cross helps us know what to expect neurologically and how much we can resect without disrupting function," said Frederick Boop, chief of Pediatric Neurosurgery at Le Bonheur Children's Hospital.

Some tumors push white matter nerves to the side and can be safely resected without "cutting" the white matter. Other tumors can encase or infiltrate the nerve fiber bundles, and full resection would require those fibers to be cut. In such cases, other treatment such as radiotherapy or chemotherapy would be a better alternative. Tractography shows where the encased nerve fiber bundles lie, allowing surgeons to spare them and preserve function.

"Previously we have known what function is controlled by different areas of gray matter, but we couldn't separate out individual nerve fibers within the white matter," Choudhri said. "Tractography gives surgeons a better chance at preserving function."

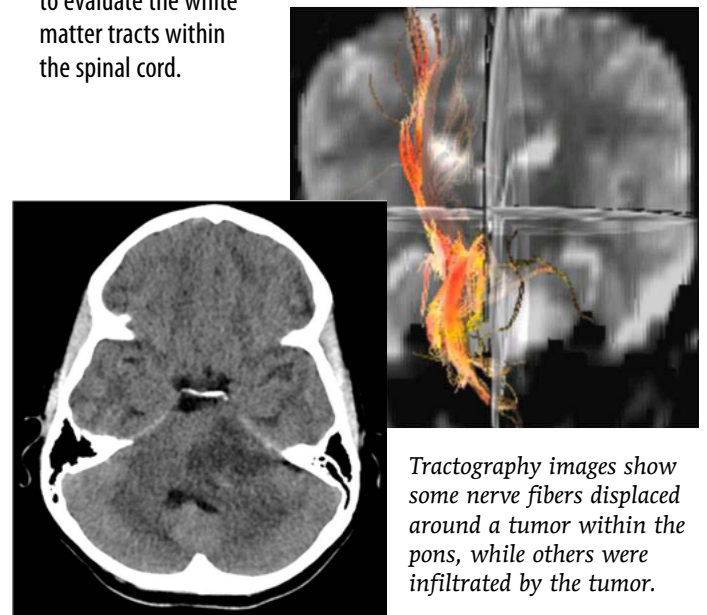
The Neuroscience Institute has used spinal cord tractography routinely for a year now – pairing neuroradiologists and surgeons together in surgical planning. This technology can also be applied to tumors of the brain. When a child with a tumor or seizures receives an MRI, the neuroradiologist orders the diffusion tensor imaging

sequence. The data is processed to map out white matter pathways involved in particular functions.

"The specific pathways tested will vary for each tumor depending upon the location and what pathways are expected to be in that location," Choudhri said.

The tractography data is then fused to the MRI scan and reviewed with neurosurgeons prior to resection. Together, they plan an approach to maximize tumor resection while preserving function. Neurosurgeons can then use the tractography to counsel patient and family on possible postoperative deficits and possible rehabilitation needs.

Le Bonheur has also performed spinal cord tractography on more than 20 spinal cord tumors and other spinal cord abnormalities to evaluate the white matter tracts within the spinal cord.



Tractography images show some nerve fibers displaced around a tumor within the pons, while others were infiltrated by the tumor.

McCullers named Pediatrics chair, pediatrician in chief

Pediatric Infectious Disease Researcher Jon McCullers, MD, has been named chair of the Department of Pediatrics for The University of Tennessee Health Science Center (UTHSC) and pediatrician in chief for Le Bonheur Children's Hospital.

McCullers is an accomplished translational researcher who has built a National Institutes of Health-funded laboratory focused on the study of co-infections. He has made important discoveries on the interactions between influenza viruses and bacteria such as Streptococcus pneumoniae and methicillin-resistant Staphylococcus aureus (MRSA) that result in fatal pneumonia.

"We believe Dr. McCullers will continue to build a world-class academic pediatric department and forge enduring relationships between the University, Le Bonheur and St. Jude," said Le Bonheur President and CEO Meri Armour, MSN, MBA. "In his new role, he will drive our research efforts, enhance our residency programs and care for our children."



Jon McCullers, MD, left, has been named chair of the Department of Pediatrics for The University of Tennessee Health Science Center (UTHSC) and pediatrician in chief for Le Bonheur Children's Hospital.

McCullers is the primary investigator for a \$3.2 million grant from the Centers for Disease Control and Prevention researching Etiology of Pneumonia in the Community (EPIC) to determine both the incidence

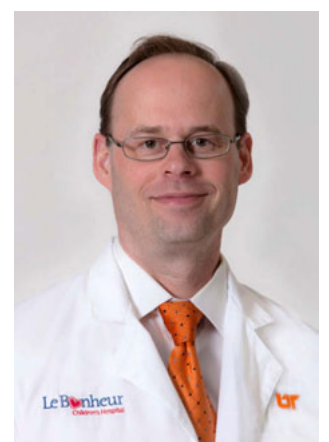
and cause of community-acquired pneumonia in hospitalized children. He is a full faculty member at St. Jude Children's Research Hospital and served as an adjunct faculty member at UTHSC.

"As a distinguished physician scientist, we believe Dr. McCullers is a role model for future faculty in the Department of Pediatrics," said UTHSC College of Medicine Executive Dean David M. Stern, MD. "Dr. McCullers will lead our efforts to deliver differentiated care through discovery and evidence-based pathways that can impact the health care of children here and throughout the nation."

McCullers is a fellow of the Infectious Diseases Society of America (IDSA) and serves on the IDSA Pandemic Task Force, advising the United States government on issues pertaining to bioterrorism and the threat of severe acute respiratory infection outbreaks.

A native of the Hampton Roads area of Virginia, McCullers graduated from The University of Virginia in 1989. He received his medical degree from the University of Alabama at Birmingham, where he completed his internship and residency. McCullers also completed a pediatric infectious disease fellowship at UTHSC and St. Jude.

McCullers and his wife, pediatrician Lauren Mitchell, MD, have two young boys.



Jon McCullers, MD

NEUROIMAGING PIONEER BRINGS EXPERTISE TO LE BONHEUR



Andrew Papanicolaou, PhD

Andrew Papanicolaou, PhD, has been named director of Clinical Neurosciences at Le Bonheur Children's. He also serves as professor and chief for the Division of Clinical Neuroscience at The University of Tennessee Health Science Center.

Papanicolaou comes to Memphis from The University of Texas Health Science Center at Houston Medical School, where he served as professor and director of the Center for Clinical Neurosciences at the Children's Learning Institute.

"Dr. Papanicolaou is an international expert in the use of magnetoencephalography (MEG) for functional brain mapping," said James Wheless, MD, medical director of the Neuroscience Institute. He founded the first professional society dedicated to the clinical use of MEG and has pioneered its clinical use.

Papanicolaou has special interest in specification of brain mechanisms of linguistic affective and cognitive function, brain activity markers of developmental disorders and localization of sources of epileptiform activity. Papanicolaou is the principal investigator of a National Institutes of Health study, \$1.6 million grant for the Texas Center for Learning Disabilities.

Le Bonheur reports initial data in national surgical quality program

Le Bonheur Children's is helping establish national pediatric surgical quality standards that are expected to improve care for children across the country.

The hospital is serving as a beta test site for the American College of Surgeons National Surgical Quality Improvement Program (NSQIP)-Pediatrics – an outcomes-based, risk-adjusted surgical quality program. As a test site, Le Bonheur is working to identify adverse events that occur 30 days or less after pediatric surgical procedures and determine common characteristics associated with those adverse outcomes.

"This program should make surgeries safer in all areas of the country," said Max Langham, MD, medical director of Pediatric Surgery at Le Bonheur Children's. "We hope that this helps define what modern surgical care for children looks like."

Cases excluded from the 2010 NSQIP analysis period included: anyone older than 18 years of age, trauma, brain-death organ donors, cardiac, transplant and concurrent cases (procedure performed by a different surgical team under the same anesthetic). Data also only included the first five cases for appendectomy, herniorrhaphy, laproscopic cholecystectomy, tonsillectomy/adenoidectomy and gastrostomy cases.

For the Le Bonheur site, NSQIP data included

1181 cases abstracted in 2010. The 1181 cases crossed a handful of pediatric surgical specialties, including general surgery, otolaryngology, neurosurgery, orthopaedic surgery, urology, and plastic surgery.

Of those cases included in the analysis, 11.94 percent -- or 141 -- had adverse events. Three of those cases were mortalities. Data also showed that infections were the largest single source of adverse events (79 of 1181 cases).

"These are excellent results, which are comparable to the best children's hospitals in the country. What we found is that pediatric hospitals – including Le Bonheur – are successful at unique, complex pediatric cases that you don't see all the time," Langham said. "It further promotes the idea that children's hospitals do the best job of caring for children."

Data collected from the Le Bonheur site will be included in the larger national quality improvement program by the American College of Surgeons to help improve care and lower costs for pediatric medicine across the country. Le Bonheur will continue to contribute surgical data to the program.

"We are excited to be able to participate in this program and further develop quality standards for pediatric surgery," Langham said.

Daily talks help families cope with epilepsy

Daily group meetings in Le Bonheur's Epilepsy Monitoring Unit (EMU) are helping patients and caregivers better understand and cope with a diagnosis of epilepsy. The nurse-led conversations open the doors for parents to ask questions, and support systems often develop that extend past the hospital stay.

EMU Patient Care Coordinator Laura Robinson, RN, said that life for these parents can be very challenging, so the conversations are designed to help parents cope.

"Because our patients and their families are here for a week's stay, we are seizing the opportunity for daily group meetings. In these meetings we can educate patients and caregivers about their medications and disease, and we can help them better understand and cope with the diagnosis of epilepsy and how to live with it after discharge," she said.

Patients in the EMU typically stay in the unit for five days of monitoring beginning on Monday.

Each of the daily discussions has a specific topic designed to help parents care for a child with epilepsy. For example, "Working Wednesday" focuses on helping parents explain their child's condition to teachers and classmates, as well as, providing resources to share with the school.

"In these meetings we can educate patients and caregivers about their medications and disease, and we can help them better understand and cope with the diagnosis of epilepsy and how to live with it after discharge."

Laura Robinson, RN
Le Bonheur Epilepsy Monitoring Unit
Patient Care Coordinator

The EMU nursing staff designed the format after a thorough literature review. They discovered a need for nursing research in the area of parental coping and childhood epilepsy. The conversations supplement the one-on-one education that nurses provide families.

The nursing staff is conducting research to measure the effectiveness of the program over six months. In the first eight weeks, Robinson said the parent surveys revealed that parents are learning coping skills and feel more prepared to manage their child's disease. The survey also indicated that in repeat admissions, almost two-thirds of the parents said they learned more disease-specific information in the group settings than in individual settings.



Nurse Danielle Scarbrough, RN, leads a conversation about first aid for seizures during the daily group meetings for patients and families in the Epilepsy Monitoring Unit.

Early med school curriculum integrates clinical, basic science

Pediatric faculty members for The University of Tennessee's College of Medicine have noticed a trend: medical students are learning good basic science in the first two years of medical school, but that's about it.

Those faculty members are working now to integrate basic science curriculum with clinical application in the first two years of medical school – work they hope will help students retain knowledge.

"We're trying to integrate basic science with what they would see clinically," said Russell Chesney, MD, retired chair of the Department of Pediatrics and a nephrologist at Le Bonheur Children's Hospital. "Students tend to do better on boards when they have applied real-world science. Not only is it trying to integrate application, but it encourages people to work as a team."

As part of the curriculum, students are first responsible for reading a set of text. Then, students are divided up in the classroom and given a set of questions

based on the assigned reading that they must answer together. Once they are able to work out those answers, they are given a real-life scenario with a history and physical exam, background on the case, and then questions about a real-life diagnosis.

For example, on a recent lesson, students read text on iRAT Osteogenesis Imperfecta and then answered – as a team – 10 multiple choice basic science questions on the topic. They were then presented with a case of a 5-month-old boy, brought to the Emergency Department, because a nanny heard a "pop" while the infant was kicking during a diaper change. Team members used information about the patient to make a diagnosis for the child.

"American medicine needs to be more integrated," Chesney said. "With this approach, they are really applying more 'adult learning' to the concept."

Short Scripts

Knott-Craig named Grand Master of Cardiology

Christopher Knott-Craig, MD, was recently named Grand Master by the American Board of Cardiology.

The designation recognizes physicians for lifetime achievement, excellence in cardiovascular care and high ethical and humanitarian principles. Grand Master distinction is the organization's highest honor.

Knott-Craig is the chief of Pediatric Cardiothoracic Surgery and co-director of the Heart Institute at Le Bonheur Children's. He also serves as a professor at The University of Tennessee Health Science Center.



Christopher Knott-Craig, MD

Bagga receives Young Faculty Investigator Award

Bindiya Bagga, MD, recently received Southern Society for Pediatric Research's 2012 Young Faculty Investigator award for her work in elucidating the role of the secretory antibody, Immunoglobulin A, in the elimination of RSV from the body and in its role in protecting against human RSV infections. The honor is awarded based on scientific merit and originality of the research. Bagga presented her work at the organization's meeting this spring.

Her research was also awarded top honor at the Pediatrics Research Day hosted by Le Bonheur in November.



Bindiya Bagga, MD

Radiologists to attend AUR educational programs

Pediatric Radiologist Brian Green, MD, recently attended the AUR-Agfa Radiology Management Program, a two-day program that focuses on management and leadership skills. The program was held at the Association of University Radiologists' (AUR) annual meeting in San Antonio, Texas.

Pediatric Radiologist Eric Hutchins, MD, attended the AUR –Phillips Academic Faculty Development Program for junior radiology physician faculty members. The program, held during the AUR annual meeting in March, provides opportunity for professional development.

Cohen Elected to RadioGraphics Editorial Board

Harris L. Cohen, MD, was recently appointed to the editorial board of *RadioGraphics* – the premier education journal in diagnostic radiology and one of the two major radiology journals published by the Radiological Society of North America. Cohen will manage all pediatric imaging content. Cohen is Le Bonheur's medical director of Radiology and chairman of The University of Tennessee's Department of Radiology.



Harris Cohen, MD

EOS images to enhance orthopaedic program



Le Bonheur can now capture head-to-toe images of children in a standing, weight-bearing position with its new EOS imaging system. The system provides considerable reduction in radiation dosage – up to 89 percent less than computed radiography – and captures images in less than one minute.

Choudhri presents at national meeting, elected as ASNR senior member

Neuroradiologist Asim F. Choudhri, MD, recently led eight educational and scientific presentations at the Annual Meeting of the Radiological Society of North America. He also presented a plenary session on the use of mobile devices in medicine. A Certificate of Merit was awarded to Choudhri and UT Radiology resident Rano Chatterjee for their presentation on diffusion tensor imaging/tractography. Others in his research group include UT Radiology Department Chair Harris Cohen, MD, and UT/Le Bonheur Pediatric Radiology Fellows Veru Sheorain and Anand Raju. Choudhri was recently elected as a senior member of the American Society of Neuroradiology – a distinction few full-time pediatric neuroradiologists have received.

Choudhri recently lectured at the University of Maryland on functional MRI and at Johns Hopkins University on intraoperative MRI for brain tumors. He also taught a three-day course in Neuroradiology provided by the American College of Radiology, lecturing on topics including brain tumors, congenital brain malformations and temporal bone pathology.



Asim Choudhri, MD

Cardiologist Anthony honored with lectureship

Longtime Pediatric Cardiologist Courtney Anthony, MD, died on Jan. 6. A former chief of Pediatric Cardiology at UT and Le Bonheur, Anthony directed the outpatient training program for cardiology fellows, pediatrics residents and medical students. In honor of his dedication to teaching and patient care, the annual "Courtney L. Anthony Memorial Lectureship in Pediatric Cardiology" has been established.



Courtney Anthony, MD

Beaty named College of Medicine's Outstanding Alumnus

The University of Tennessee College of Medicine has named James H. Beaty, MD, a 2011 Outstanding Alumnus. The award recognizes extraordinary services to one's alma mater and the medical profession.

Beaty, who graduated from the college in 1976, is a professor of orthopaedics for the College of Medicine and is an orthopaedic surgeon with Le Bonheur and Campbell Clinic Orthopaedics.



James H. Beaty, MD

Cunningham presents at ASH meeting

Melody Cunningham, MD, medical director of Palliative Medicine at Le Bonheur, recently co-chaired a first-ever session on palliative care at the annual meeting of the American Society of Hematology, an international meeting of more than 20,000 attendees.

The session, titled "Palliative Patients Live Longer: Uncloaking the Mystery," introduced the audience to the breadth of palliative care and the role of palliative care that extends well beyond end-of-life care.



Melody Cunningham, MD

DeVincenzo to speak to European Science Foundation

Infectious Disease Specialist, John DeVincenzo, MD, has been invited to speak to the European Science Foundation (ESF) about the concept of creating antivirals using RNA-interference mechanisms. The ESF is a European organization focused on collaborative research efforts across Europe in all scientific fields.

DeVincenzo will speak at the Medical Sciences' conference – titled Antiviral RNAI: From Molecular Biology Towards Applications – held in Poltusk, Poland, on June 11.



John DeVincenzo, MD

Le Bonheur launches MDA Clinic

Le Bonheur Children's has added an MDA clinic to provide comprehensive care for families of children with muscular dystrophy. In partnership with the Muscular Dystrophy Association, the clinic combines neurology, orthopaedics, cardiology, pulmonology, physical therapy, social work and clinical nutrition. MDA clinics also serve as sites for clinical trials of the latest experimental therapies and drugs.

Trauma centers team up to expand pediatric research

Investigators at Le Bonheur Children's are joining a handful of other children's hospitals across the country to expand pediatric trauma research.

The research group is currently studying five trauma-related projects with hopes of understanding the incidence of, and best treatment for, specific questions. Hospitals involved in the study include Le Bonheur, Arkansas Children's Hospital, Dell Children's Medical Center, Children's Medical Center of Dallas, The Children's Hospital of The University of Oklahoma and Phoenix Children's Hospital.



Le Bonheur Children's has joined five other children's hospitals to expand trauma research.

"Traditionally, pediatric trauma centers haven't conducted a lot of research, largely because not all centers have adequate trauma numbers," said James "Trey" Eubanks, MD, medical director of Trauma Services at Le Bonheur Children's.

"Because we are able to pool our data, we can conduct research on some of those hard-to-answer questions in our field and improve the standard of care for all pediatric trauma victims."

Le Bonheur was named a Level 1 pediatric trauma center by the American College of Surgeons in 2011 – the only ACS Level 1 pediatric center in a 400-mile radius.

Each of the six centers has developed a trauma project to lead, while all centers participate in each project. At Le Bonheur, Eubanks and his team are studying the incidence, evaluation and treatment of blunt cerebrovascular injuries (BCVI) in pediatric trauma victims.

The team is studying whether the incidence of BCVI is similar in adults and children, and whether providers are using proper screening to identify BCVI. The Memphis team has identified six conditions that require screening with the study: belt marks or soft tissue injury to the neck, a broken neck, skull-base fractures, facial fractures, hangman's injury and neurological conditions not consistent with the injury.

Researchers are studying the past 18 months of data at each hospital to see how frequent BCVI is in trauma victims, and how often one of the six conditions in the study presented to providers.

In addition to the Memphis-based study, the research group is looking at other projects including: duodenal injury in children 6 years or younger, whether children in rollover accidents experience more injuries than non-rollover accidents, management protocol for spleen injuries, and the usefulness of internal, educational trauma materials.

Anti-RSV therapy research finds new progress

Infectious Disease Specialist John DeVincenzo, MD, is continuing research on respiratory syncytial virus (RSV), the most common cause of infant hospitalization.

DeVincenzo is conducting several anti-RSV therapy programs now. Highlights of his lab's current research include:



Respiratory Syncytial Virus expert and Infectious Disease Specialist John DeVincenzo, MD, is conducting several new anti-RSV therapy programs in his lab.

- DeVincenzo's lab has established a funded research program with The Eli and Edythe L. Broad Institute of MIT and Harvard. The program is evaluating the viral mutations that occur during human RSV infections. "The rate of mutation, and the specific areas of mutation within the virus, can give us insight into where the immune system attacks the virus, thereby forcing the virus to mutate so as to "escape" the immune system," DeVincenzo said. "By looking in this mirror, we can actually evaluate the parts of the immune system that are important in the control of RSV infections in humans."
- The lab's drug development program is studying the effects of a new fusion inhibitor compound to see at which concentrations it can inhibit RSV. The antiviral RSV therapy is in the middle of a Phase 1 clinical trial, with plans for a spring or summer trial in humans experimentally infected with RSV. The program is in partnership with MicroDose Therapeutics and Gilead Sciences.
- DeVincenzo's RNA interference (siRNA) RSV antiviral program is now in a Phase 2b international clinical trial in lung transplant recipients. The randomized, double-blind, placebo-controlled trial has completed enrollment. DeVincenzo will soon analyze data from that trial, which involves 34 sites in the United States, Australia, Germany, Canada and France. The study – in partnership with Alnylam Pharmaceuticals – is the largest study of an RSV antiviral ever in adults.

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