In 2013, Le Bonheur Children’s Neuroscience Institute cared for more than 11,000 children affected by tumors, epilepsy and other neurological conditions. Highlights include:

- The Institute has continued to experience growth volumes – 44 percent in inpatient and 60 percent in outpatient since 2008.
- The Institute is ranked among the nation’s top pediatric hospitals for neurology and neurosurgery by U.S. News & World Report.
- The Institute has added four specialists to increase access, including a neurologist focusing on headaches, a neuroradiologist, a neuropsychologist and a clinical neuroscientist.
- Sixty percent of our patients come from outside our primary service area.
- Our Institute patient volumes have grown 78 percent since 2010.
- Our Neuroscience Institute’s combination of advanced diagnostic technology – Magnetoencephalography (MEG), Functional MRI (fMRI), Transcranial Magnetic Stimulation (TMS) and Intraoperative MRI (iMRI) – is unmatched by any other children’s hospital.

2013 BY THE NUMBERS*

- 6,180 Patient days
- 2,415 EEGs
- 55 fMRIs
- 164 Magnetoencephalography (MEG) studies
- 71 Transcranial Magnetic Stimulation (TMS) studies
- 2,026 Epilepsy Monitoring Unit monitored days
- 8,500 Neurology clinic visits
- 200 Brain tumor cases
- 739 Neurosurgery cases

**Joint St. Jude and Le Bonheur Brain Tumor Survival Rates Include:**

<table>
<thead>
<tr>
<th></th>
<th>1 Year</th>
<th>5 Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medulloblastoma</td>
<td>91.9%</td>
<td>62.4%</td>
</tr>
<tr>
<td>Ependymoma</td>
<td>100%</td>
<td>75.2%</td>
</tr>
<tr>
<td>Glioma</td>
<td>91.5%</td>
<td>76.6%</td>
</tr>
<tr>
<td>Craniopharyngioma</td>
<td>100%</td>
<td>100%</td>
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</tbody>
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Case study: **Sclerotherapy reduces lymphatic malformation of the face**

Arionna Banks, 4, presented with a macrocystic lymphatic malformation along her jaw line. “Like the majority of children with lymphatic malformations she had repeated painful swelling of the lesion with viral upper respiratory infections,” said Medical Director of Interventional Neuroradiology Lucas Elijovich, MD.

Arionna had one attempt at surgical resection that did not significantly reduce the size of the lesion. The last bout of swelling was so severe it caused breathing problems due to compression of her airway and required hospitalization.

Elijovich performed one sclerotherapy session with intralesional ultrasound-guided injection of doxycycline and bleomycin. Arionna experienced significant reduction in her lymphatic malformation.

Her father, Jamarvis Banks, said, “Arionna is doing a lot better. She’s back to her regular self now that the swelling has gone down. She loves making faces and posing for pictures.”

**MEG and EEG with sedation**


EEG areas can be identified and functional brain mapping can be successfully performed under sedation with propofol. The researchers summarize their experience of MEG data acquisition with sedation.

Magnetoencephalography (MEG) measures the field generated by the brain's electrical currents noninvasively. MEG is currently used for localization of epileptiform activity sources and for presurgical functional brain mapping. Such mapping with MEG requires patients to be cooperative and lie still on their back for as long as 10 minutes at a time. For this reason, acquiring successful MEG in very young children, developmentally delayed individuals, and patients with skeletal abnormalities proves to be a challenge.

In the past several years, this group has undertaken research aimed at the effective use of sedation during MEG to identify epileptogenic areas and perform functional brain mapping in very young or developmentally delayed individuals.

**Same day tri-modality functional brain mapping prior to resection of a lesion involving the eloquent cortex: Technical feasibility**


Multidisciplinary preoperative consultation can be performed rapidly and aid in pre-surgical planning without excessively delaying surgical management of patients with lesions surrounding the eloquent cortex.

The researchers describe the case of a right-handed patient with a lesion centered in the left inferior perioral cortex who underwent functional MRI (fMRI), magnetoencephalography (MEG) and transcranial magnetic stimulation (TMS) on a single day to facilitate maximal lesion resection while preserving eloquent cortex and eloquent white matter tracts. The total time for the tri-modality non-invasive mapping was four hours — with a gap of 20 minutes and 45 minutes between modalities. Tri-modality functional brain mapping can be performed in a single afternoon with appropriate coordination.

Complementary and concordant data from different modalities increase the confidence with accuracy of the mapping, which is required to perform surgery within or adjacent to highlight eloquent parenchyma. The team has since performed a single session tri-modality workup on 10 additional patients without study compromise due to patient fatigue.

**Pediatric Neurologist Diana Lebron, MD, and Pediatric Neuroradiologist Adeel Siddiqui, MD, recently joined Le Bonheur Children’s Neuroscience Institute.**

Lebron is a certified headache specialist and board certified pediatric neurologist. She comes to Memphis from Houston, where she worked at Texas Children’s Hospital and Baylor College of Medicine. She studied medicine at Robert Wood Johnson Medical School in Piscataway, N.J. She completed fellowships in pediatric neurology and pediatric neurogenetics at New York University School of Medicine/Bellevue Medical Center. Lebron also serves as an assistant professor with the University of Tennessee Health Science Center (UTHSC).

Lebron has worked on clinical trials to help show that triptans (Maxalt, Treximet and Zomig) provide relief for pediatric episodic migraines. She is involved in novel treatments for children with chronic daily headaches, such as IV Magnesium, Coenzyme Q10, Botox and nerve blocks. Lebron’s interests extend to secondary headache types, such as post traumatic headaches, headaches due to Ehlers Danlos Syndrome, headaches due to idiopathic intracranial hypertension and Cervicogenic headaches.

Siddiqui joins Le Bonheur Neuroradiologist Asim F. Choudhdi, MD, to expand advanced neuroimaging of brain tumors, seizure disorders and traumatic brain injury. He completed fellowships in neuroradiology at Beth Israel Medical Center, advanced neuroimaging at Johns Hopkins Hospital and informatics research at Massachusetts General Hospital.

Siddiqui is an expert in the meaningful use EHR (electronic health record) incentive program, image utilization management and accountable care organizations. He is a member of the American College of Radiology’s Meaningful Use and Traumatic Brain Injury policy committees.

His primary research interests include traumatic brain injury, functional MRI, and tumor imaging of the brain as well as the head and neck. Siddiqui is also an assistant professor of radiology at the UTHSC.

**Le Bonheur opens Neurosurgical ICU**

Le Bonheur’s Neuroscience Institute opened a six-bed Neurosurgical Intensive Care Unit (Neuro ICU) in January 2013. The unit cares for patients after an elective neurosurgery — primarily brain tumor, epilepsy and spine surgery patients. The Neuroscience Institute performs approximately 750-800 neurosurgeries each year. The unit served 240 patients in the first year with an average length of stay 2.9 days.

Frederick Boop, MD, chairman of the Department of Neurosurgery and co-director of Le Bonheur’s Neuroscience Institute, and Stephanie Storgion, MD, pediatric critical care specialist, are the unit’s medical directors.

“Le Bonheur is one of the few children’s hospitals in the country to have the volume to support a dedicated pediatric Neuro ICU,” said Boop. “As our Neuroscience Institute continues to grow, so does the complexity of the patients referred here from around the country and around the world. A dedicated critical care unit for neurosurgery patients has taken us to the next level of capability.”
iMRI contributes to decreased returns to OR in brain tumor surgeries

L e Bonheur Children’s intraoperative MRI (iMRI) is credited with helping neurosurgeons reduce returns to the operating room for residual tumor by 84 percent in two years. The iMRI, which can provide structural brain images without moving the patient from the surgical table, opened in the hospital’s neurosurgical suite in February 2011. Rates improved from a baseline of 6.98 per 100 cases in 2010 to 1.29 per 100 cases in 2012.

Le Bonheur is home to the nation’s largest pediatric surgical brain tumor program in the country. The program — a partnership between Le Bonheur and St. Jude Children’s Research Hospital — has grown 48 percent in the past two years. In 2012, 155 children underwent brain tumor surgery at Le Bonheur.

“iMRI is an invaluable tool for me,” said Paul Klimo, MD, complete resection of arteriovenous malformation (AVM) and in tumor biopsies.”

In 2012, 47 percent of Le Bonheur’s brain tumor surgeries were performed using iMRI – and none of those surgeries required returns to the OR for residual tumor.

In addition, the iMRI also eliminates the need, in many cases, for additional sedation that would be needed for post operative MRI, or additional surgeries for residual tumor.

IN BRIEF

Neurosurgeon Alex Sanford dies

Robert A. “Alex” Sanford, MD, died on Oct. 17 after a battle with cancer. Sanford founded Le Bonheur’s pediatric surgical brain tumor program — a collaboration with St. Jude Children’s Research Hospital, the University of Tennessee Health Science Center and Semmes-Murphey Neurologic and Spine Institute. The brain tumor program has grown to be the largest program of its kind in the country.

Sanford was honored in 2010 by the American Association of Neurological Surgeons/Congress of Neurological Surgeons Section on Pediatric Neurological Surgery as recipient of the Franc Ingraham Award for distinguished service. He was one of fewer than 10 neurosurgeons ever bestowed this high honor.

A vitally important mission for Sanford was recruiting and training the next generation of neurosurgeons. Even during the years he fought his illness, Sanford spent time teaching, advising residents and fellows and encouraging staff and physicians to continue their mission of saving children’s lives.

Medical Director of Pediatric Neurosurgery at Le Bonheur Children’s.

“We are now able to leave the OR with the knowledge of whether a tumor was completely resected or not. If not, then it is almost always because the residual tumor cannot be safely resected. Almost all of my tumor operations are done using it. I’ve also used it to demonstrate knowledge of whether a tumor was completely resected or not. If not, then it is almost always because the residual tumor cannot be safely resected. Almost all of my tumor operations are done using it. I’ve also used it to demonstrate knowledge of whether a tumor was completely resected or not. If not, then it is almost always because the residual tumor cannot be safely resected. Almost all of my tumor operations are done using it. I’ve also used it to demonstrate complete resection of arteriovenous malformation (AVM) and in tumor biopsies.”

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In addition, the iMRI also eliminates the need, in many cases, for additional sedation that would be needed for post operative MRI, or additional surgeries for residual tumor.

Bissler to lead Tuberous Sclerosis Center of Excellence

Le Bonheur Children’s Hospital has expanded its Tuberous Sclerosis Center of Excellence with the addition of Pediatric Nephrologist John Bissler, MD. Bissler, the new chief of Nephrology for Le Bonheur, comes to Memphis from Cincinnati Children’s Hospital Medical Center.

The Tuberous Sclerosis Center of Excellence is a multidisciplinary clinic where children have access to pediatric experts in cardiology, neurology, pulmonology and urology in one setting. The physician researchers who care for TS patients are also involved in studies to better understand the disease and develop innovative treatment options.

Neurologist Jim Wheless, MD, serves as the co-director. Both Bissler and Wheless serve as members of the Tuberous Sclerosis Alliance’s Professional Advisory Board.

Concussion program launches

Neurosurgeon Paul Klimo, MD, is part of a new multidisciplinary Concussion Management Team at Semmes-Murphey Neurologic and Spine Institute. The team includes specialists in the areas of clinical neurology, neuropsychology, neuroradiology, neurosurgery, psychiatry and physical therapy. The clinical team works closely with parents, coaches, athletic trainers, employers and school officials to develop an appropriate return-to-work, return-to-school or return-to-play plan.

Save the date: Neurology Update

The eighth annual Greater Mid-South Pediatric Neurology Update is set for April 25-26, 2014, at The Westin Memphis, Beale Street.

The seminar has been designed to encompass state-of-the-art practices and trends in treating pediatric neurology patients. Faculty who are both clinically and academically oriented will address relevant issues and provide valuable information and insight into situations commonly presented to subspecialists in pediatric neurology. This will be performed using case-based learning and didactic lectures with time for questions and answers.

The event will also include the inaugural Kayden R. Vinson Distinguished Scholar Award and Lecture by Alex Paciorekowki, MD, from the University of Rochester Medical Center.

For more information or to register, visit www.methodistmd.org or call 901-516-8933.