



# Pediatric Neurosurgery

## Why Choose Us:

- Consistently superior outcomes
- Largest epilepsy, spasticity, craniosynostosis, and brain tumor programs in the region
- Chosen site for setting patient care protocols with pioneers in the field
- Short wait times for appointments

To refer a patient, call

**510-428-3319** or **800-550-1529**

[www.childrenshospitaloakland.org](http://www.childrenshospitaloakland.org)



# Pediatric Neurosurgery at Children's Hospital & Research Center Oakland

## How to Refer

Call 510-428-3319 or  
800-550-1529

Monday to Friday  
8:30 a.m. to 5 p.m.

Fax: 510-597-7034

Email: [psun@mail.cho.org](mailto:psun@mail.cho.org)

- Short wait times for appointments
- Phone consults available
- Outpatient services in Oakland, Walnut Creek, Reno and Modesto.
- After hours/weekends: All calls should be directed to 510-428-3000.

## Children's Neurosurgery Statistics



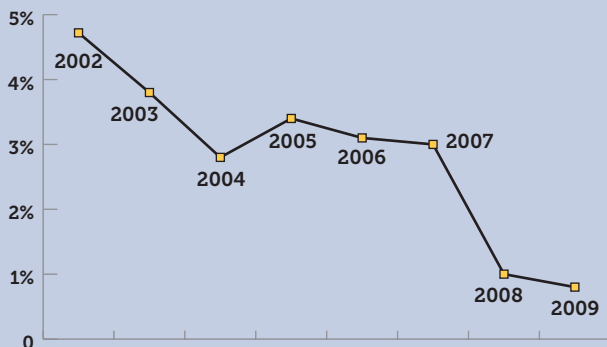
Since 2000, the surgical volume increased from 240 cases to almost **400 cases a year**.



Average 30-day mortality rate on craniotomies, excluding trauma = **0.0%**.

### CHILDREN'S VENTRICULAR SHUNT INFECTION RATE, 2002-09

The shunt infection rate in 2009 = **0.45%**.



## GUIDE TO COMPREHENSIVE SERVICES

### We Offer:

**The most comprehensive spasticity program in Northern California.** The Peacock Center for Cerebral Palsy & Movement Disorders program honors Warwick Peacock, MD, a pioneer in selective dorsal rhizotomy surgery, and a consulting member of the Children's Hospital affiliate team. **Page 5**

**Brain tumor and neuro-oncology programs** with consulting physician Jonathan Finlay, MD, the leading U.S. pediatric neuro-oncologist. Neuro-oncology director Joe Torkildson, MD, and oncologist Caroline Hastings, MD, see the largest number of brain tumors in the adjoining 10 counties, as well as patients from out of state. **Page 6**

**A surgical epilepsy program** led by Rachel Kuperman, MD. The program offers treatment-resistant patients a chance at major improvement and possible cure. **Page 8**

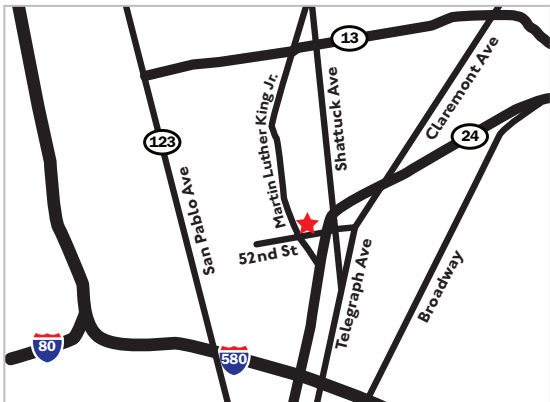
**A multidisciplinary program for complex pediatric spinal disorders** that combines orthopedics, rehabilitation, and physical therapy. Children with complex spinal disorders have the most favorable outcomes when treated collaboratively by an orthopedic spine surgeon and a pediatric neurosurgeon. **Page 9**

**A screening clinic for head shape and sacral dimple disorders**, with no initial imaging required. The clinic is managed by nurse practitioner Sue Ditmyer and physician assistant Patrick Wong. **Page 10**

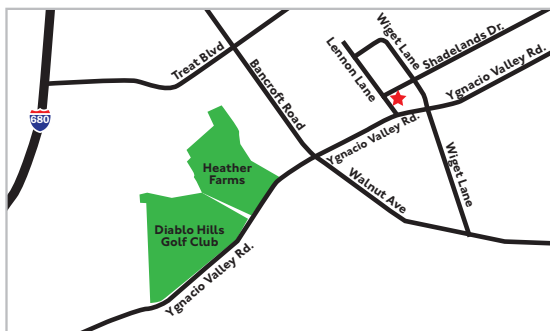
**Advanced treatment of hydrocephalus.** Endoscopic third ventriculostomies have eliminated the need to place VP shunts in some patients, and rapid acquisition MRI scans protect children from unnecessary exposure to radiation. **Page 11**

## Neurosurgery Clinic Locations

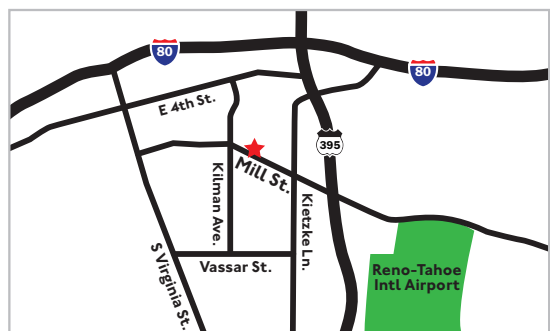
Children's Hospital Oakland  
 Outpatient Center, 5th floor  
 744 52nd St., Oakland, CA 94609  
 510-428-3319



Children's Specialty Care Walnut Creek  
 2401 Shadelands Dr., Suite 180  
 Walnut Creek, CA 94598  
 925-939-8687



Renown Regional Medical Center  
 Pediatric Specialty Suite  
 1155 Mill St., Reno, NV 89502  
 510-428-3319



## Children's Hospital & Research Center Oakland

Northern California's regional pediatric medical center

510-428-3000



Children's Hospital & Research Center Oakland has helped improve children's health in the Bay Area and northern California for almost 100 years. In addition to being a tertiary care center for the region's sickest children, the hospital serves as a major primary care provider for children in the East Bay. Children's offers 30 services, representing all major pediatric medical and surgical subspecialties. The medical center has the only pediatric Level 1 trauma center in northern California exclusively for kids—as well as:

- A 44-bed Neonatal Intensive Care unit;
- A 23-bed Critical Care unit;
- A 12-bed Pediatric Rehabilitation unit; and
- A 26-bed Hematology/Oncology unit including a 12-bed immuno-compromised unit for Blood and Marrow Transplantation and Oncology patients.

[www.childrenshospitaloakland.org](http://www.childrenshospitaloakland.org)

# Neurosurgery Care Team

**Peter P. Sun, MD**

Chief, Pediatric Neurosurgery  
*Listed in Best Doctors in America,  
2006-2010 (Best Doctors, Inc.)*

**Kurtis I. Auguste, MD**

Director, Epilepsy Surgery  
*Listed in Best Doctors in America, 2010  
(Best Doctors, Inc.)*

**Christine Aguilar, MD**

Director, Rehabilitation Medicine  
*Listed in Best Doctors in America, 2010  
(Best Doctors, Inc.)*

**Jonathan Finlay, MD**

Neuro-Oncologist, Childrens  
Hospital Los Angeles

**Robert Haining, MD**

Rehabilitation Medicine  
*Listed in Best Doctors in America,  
2007-2010 (Best Doctors, Inc.)*

**Caroline Hastings, MD**

Hematologist/Oncology  
*Listed in Best Doctors in America,  
2007-2009 (Best Doctors, Inc.)*

**Scott Hoffinger, MD**

Division Chief, Orthopedics  
*Listed in Best Doctors in America,  
2007-2010 (Best Doctors, Inc.)*

**Nicolle Ionascu, MD**

Neuro-Psychology

**Rachel Kuperman, MD**

Medical Director, Epilepsy Program

**Ali Mostajeean, MD**

Epilepsy Program

**Jacob Neufeld, MD, MSPH**

Rehabilitation Medicine

**Jim Policy, MD**

Chief, Spinal Surgery

**Joe Torkildson, MD**

Neuro-Oncology Program

**Seth Ubogy, MD**

Neuro-Psychology

**Janine Cole, RN**

Neurology

**Susan Ditmyer, PNP**

Clinical Nurse Coordinator,  
Neurosurgery

**Shirley Duran**

Administrative Coordinator,  
Neurosurgery

**Pat Farsca, MA, CCLS**

Child Life Specialist

**Dina Hankin, PhD**

Psychology

**Kayla Lewis**

Surgical Planner, Neurosurgery

**Jessica Martin, PT**

Rehabilitation Medicine

**Jennifer Oryn, MA, CCLS**

Child Life Specialist

**Keri Rash, LCSW**

Social Worker, Neurosurgery

**Sarah Reyes**

Out-of-Area Liaison, Neurosurgery

**Traci Thomas, PA-C**

Physician Assistant, Neurosurgery

**Patrick Wong, PA-C**

Physician Assistant, Neurosurgery

*Affiliate Team Members*

**Warwick Peacock, MD**

Consultant, Spasticity  
Management Program

**Nalin Gupta, MD**

Attending Physician,  
UCSF, Dept. of Neurosurgery

**Michael Sheinberg, MD**

Attending Physician,  
Children's Hospital Oakland

**Gordon Tang, MD**

Attending Physician,  
Alta Bates Medical Center

**We are the regional leader in complex pediatric neurosurgical care**

- Consistently superior outcomes from our multidisciplinary approach to care
- Largest epilepsy, spasticity, craniiosynostosis, and brain tumor programs in the region
- Chosen site for setting patient care protocols with pioneers in the field, including Warwick Peacock, MD, and Jonathan Finlay, MD
- Short wait times for appointments



# Peacock Center for Cerebral Palsy and Movement Disorders

We have the largest spasticity program in the region.

Children with cerebral palsy often cannot walk, due to spasticity in their legs. The Children's Peacock Center for Cerebral Palsy and Movement Disorders is led by neurosurgeon Peter Sun, MD, orthopedic surgeon Scott Hoffinger, MD, and Rehabilitation Medicine physiatrists Jacob Neufeld, MD, MSPH, Christine Aguilar, MD, and Robert Haining, MD.

Warwick Peacock, MD, the modern pioneer of selective dorsal rhizotomy in the U.S., has chosen Children's Hospital Oakland to continue his innovative work in the treatment of spasticity. The center bears his name in recognition of this distinguished honor.

## PROCEDURES FOR TREATING CEREBRAL PALSY (CP) AND SPASTICITY

Selective dorsal rhizotomy surgery (SDR) was popularized in North America by Children's Hospital Neurosurgery consultant Warwick Peacock, MD. Dr. Peacock taught the operation to the neurosurgeons who now perform the majority of rhizotomies in the U.S.

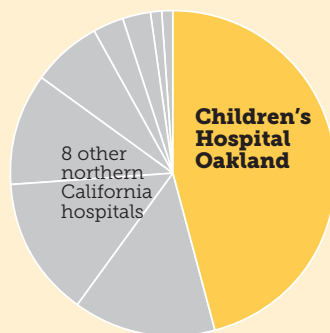
Rhizotomy reduces spasticity in the lower extremities of children with spastic diplegia. Combined with intensive rehabilitation and subsequent orthopedic surgery, rhizotomy enables some children with spastic diplegia to become lifetime walkers, instead of being confined for life to a wheelchair.

Another procedure for patients with cerebral palsy involves surgical placement of a pump to deliver Baclofen to the intrathecal space in the spine. Baclofen reduces spasticity and pain, improving the patients' quality of life, and allowing them to be cared for more easily.

### INPATIENT SPASTICITY CASES, 2008-09

Children's treated nearly half of all of northern California's pediatric spasticity cases in 2008-09.

Primary & Secondary Service Areas (Alameda, Contra Costa, Marin, San Francisco, San Joaquin, Santa Clara, Solano, Sonoma, Stanislaus); Ages 0-17; ©2010 Children's Hospital & Research Center Oakland



## CASE STUDY: Creighton, 9

**Overview:** Born premature at 25 weeks with cerebral palsy.

**Treatment:** Surgery corrected the spastic diplegia by selectively cutting dorsal nerve rootlets determined to be improperly balancing the brain and muscle signals to Creighton's legs.

**Outcome:** Following eight weeks of intense physical therapy, Creighton can now walk on his own without using a cane.

**Testimonial:** Creighton's mother says, "We had a year to digest whether SDR surgery was a good decision for us. Taking into account how much we valued Dr. Sun's skills and opinions, I was ready to follow him anywhere."



Dr. Peacock with Creighton

# Brain Tumors / Neuro-Oncology

Children's Hospital has one of California's largest pediatric brain tumor centers. We offer world-class care in a dedicated environment for children. Our unique multidisciplinary team includes the pediatric neurosurgery program members, as well as specialists from Oncology, Radiation Therapy, Neuropsychology, Neurophysiology, and other specialties.



CT scanner with real time imaging

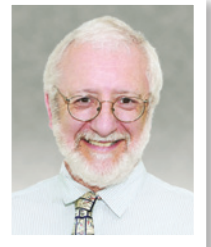


## PROCEDURES FOR TREATING BRAIN TUMORS

**Neurosurgery.** Successful brain tumor treatment usually begins with a skilled surgical resection to minimize risks to the brain and spinal cord. The neurosurgical operating room at Children's Hospital is equipped with state-of-the-art technology to monitor neurological functioning while the child is asleep. Surgeons employ dedicated ultrasound and intraoperative CT scanners for real-time imaging, with computer-assisted frameless navigation to maximize safety through the latest imaging techniques.

**Oncology.** Joe Torkildson, MD, and Caroline Hastings, MD, lead the medical oncology brain tumor treatment team, joined by Jonathan Finlay,

MD, a world-renowned neuro-oncologist from Childrens Hospital Los Angeles. We are the only pediatric medical center in northern California to offer the "Head Start" protocols designed by Dr. Finlay to avoid radiation in treating malignant brain tumors in young children.

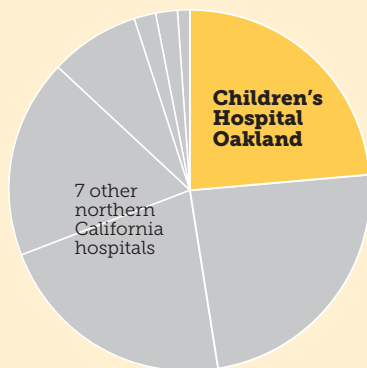


Dr. Finlay

**Radiation Therapy.** When radiation cannot be avoided, Patrick Swift, MD, and the staff of Alta Bates Comprehensive Cancer Center collaborate with the Children's Hospital physicians to offer skilled and meticulous radiation therapy. Our goal is always to optimize the chances for a cure, while minimizing potential side effects.

### INPATIENT BRAIN TUMOR CASES, 2009

Children's performed nearly a quarter of all of northern California's pediatric inpatient brain tumor surgeries in 2009.



Primary & Secondary Service Areas (Alameda, Contra Costa, Marin, San Francisco, San Joaquin, Santa Clara, Solano, Sonoma, Stanislaus); Ages 0-17; ©2010 Children's Hospital & Research Center Oakland

**Neuropsychology.** Brain tumors can affect a child's development; however, early recognition and expert intervention can help minimize any lasting effects. Board-certified neuropsychologists Seth Ubogy, MD, and Nicolle Ionascu, MD, use extensive tests and clinical observation to understand the child's cognitive development as a basis for treatment and educational planning. Psychologist Dina Hankin, PhD, works with families and school systems to help patients reach their developmental and educational potential.

**Other specialties.** The Children's Hospital staff includes a pediatric endocrinologist, physiatrist, neurologist, and ophthalmologist, all of whom are available to help care for our brain tumor patients, as needed.

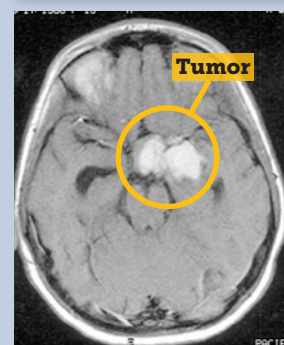
### CASE STUDY: Madeline, 20

**Overview:** After Madeline turned 13, she suffered from double vision and peripheral field vision loss. Examination revealed a large tumor in her brain that was impinging on her optic nerve.

**Treatment:** Two surgeries and chemotherapy.

**Outcome:** Madeline is in remission and attending UC Berkeley with a major in engineering.

**Testimonial:** Marie Ziser, Madeline's mother, says, "I can't tell you enough nice things about Peter Sun. His abilities as a surgeon are second to none. Fifteen hours after her first surgery, she was actually doing crossword puzzles in the recovery room."



# Epilepsy Surgery

## CASE STUDY:

### Rayna, 15

**Overview:** Rayna was three days old when she was diagnosed with a large tumor that took up almost the entire left side of her brain. The only presenting symptom was a bulging fontanelle. Surgery removed 25% of the tumor, and subsequent surveillance MRIs, performed without chemotherapy or radiation, revealed the tumor was gone.

At age 12, Rayna began having partial focal seizures of the right leg that caused her to fall frequently. Despite treatment with three antiepileptic medications, she continued to have seizures daily.

**Treatment:** In June 2008, Dr. Sun performed a functional hemispherectomy to stop the seizures by disconnecting the two hemispheres of her brain.

**Outcome:** Since the surgery, Rayna has not had a seizure. She is now off all medications. She is able to walk without falling and can even run. She is more articulate and doing better in school.

**Testimonial:** Rayna's mother says, "It's amazing that Rayna has no more seizures. We're thrilled."



## Children's treated over 39% of northern California's pediatric inpatient epilepsy cases in 2008-09.

Children's Hospital is the only hospital in northern California with two pediatric epileptologists—Rachel Kuperman, MD, and Ali Mostajean, MD. The surgical program is headed by Kurtis Auguste, MD.

### PROCEDURES FOR TREATING EPILEPSY

Most epilepsy patients can be successfully treated with either a single or combination of medications. However, some children do not respond to medications. Surgery in these cases can significantly reduce or cure the seizures.

### TYPES OF SURGERY

**Resective Surgery** - Can significantly reduce or even completely control seizures. This surgical treatment requires pre-operative testing to assess a patient's candidacy. The first step is an EEG (electroencephalogram) test that monitors the brain's electrical activity in order to identify where the seizures originate. If the seizures appear to originate in a specific area, a variety of tests are performed including neuropsychological testing and functional MRI to evaluate how safely the affected portion of the brain can be removed. Additional information may be collected with a grid of electrodes placed on the surface of the brain. The surgery then removes the area of the brain where the seizures originate. The types of resections are:

- *Temporal lobectomy:* A portion of the temporal lobe is removed to alleviate the seizures.
- *Lobar resection:* A portion of the frontal, parietal, or occipital lobe is removed after it is determined that this can be done safely.

**Disconnection Surgery** - A second method that can eliminate seizures without removing significant amounts of tissue. For patients who are determined to be adequate candidates, disconnecting regions of the brain from each other can prevent the spread of abnormal electrical activity that leads to full-scale seizures.

- *Anatomic or Functional Hemispherectomy:* The half of the brain that is generating continuous seizure activity is either removed or disconnected from the other half. This surgery is reserved for young patients or patients where the function is transferable to the other hemisphere.
- *Corpus Callosotomy* - The structure connecting the two halves of the brain, the *corpus callosum*, is disconnected preventing seizures from crossing right-to-left or vice versa.

**Vagal Nerve Stimulator Program** - For patients with refractory epilepsy where the seizures are not localized to one part of the brain. This procedure involves minor surgery to implant an electrical stimulator that sends regular electrical pulses through the vagus nerve to the brain to reduce the onset and/or frequency of seizures.



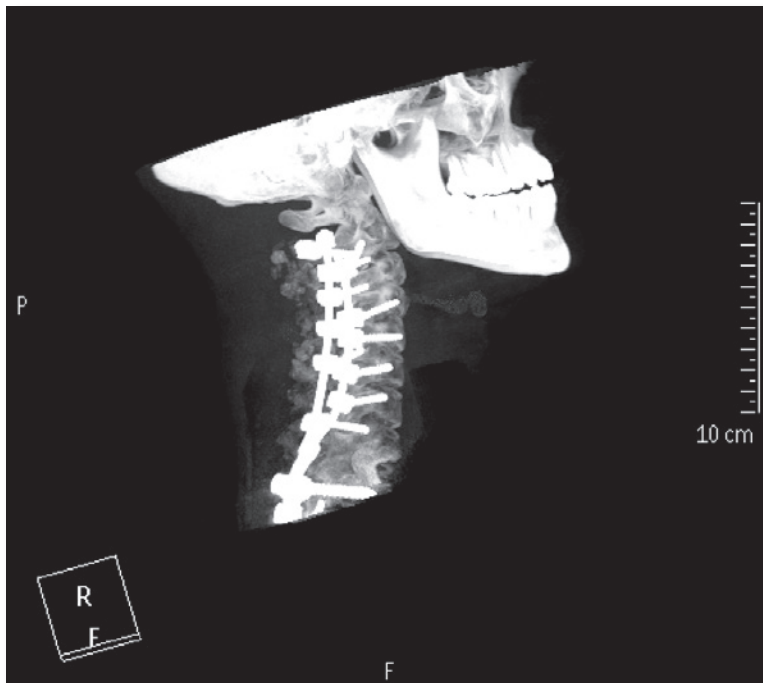
# Complex Pediatric Spinal Disorders Center

The Complex Pediatric Spinal Disorders Center is led by Chief of Pediatric Neurosurgery, Peter Sun, MD, and Chief of Spinal Surgery, Jim Policy, MD, assisted by a team of physical therapists and specialists in physical medicine. Patients who require complex surgery are operated on by both Dr. Policy and Dr. Sun. Those who require medical management receive a suggested treatment plan by Jessica Martin, PT, and Jacob Neufeld, MD, MSPH, of Pediatric Rehabilitation Medicine.

## PROCEDURES FOR TREATING SPINAL DISORDERS

Children can have some of the most complex and challenging spinal disorders. The delicate bones of a growing child, and their intimate relationship to the spinal cord and other nerves, call for a multidisciplinary approach to treatment. Patients with the most complex spinal disorders achieve the best results when neurosurgeons and orthopedic surgeons work together.

Complex instrumentation as well as surgical decompression are needed to fix these disorders.



Complex spinal instrumentation in children

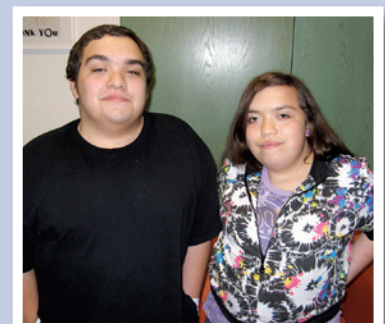
## CASE STUDY: **Forest, 16 and Angelina, 15**

**Overview:** Siblings Forest and Angelina both had severe kyphoscoliosis (curvature of the spine in two planes) of greater than 100 degrees. After surgery at another hospital, Forest was unable to walk, while Angelina was growing weaker, and both of their curves were worsening.

**Treatment:** Both siblings underwent 12-hour surgeries with Dr. Sun and Dr. Policy. The curves were corrected and stabilized.

**Outcome:** Both are now walking.

**Testimonial:** "My kids can walk now as a result of surgery at Children's," says Forest and Angelina's mother. "I'm not moving to join my family elsewhere because I don't trust anyone else to take care of my children."



# Craniosynostosis and Head Shape

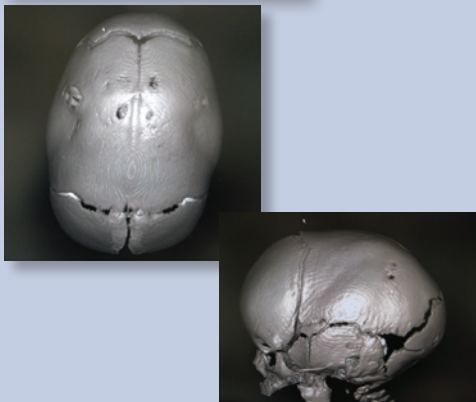
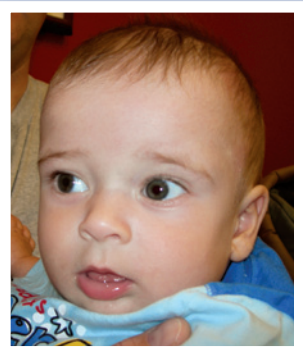
## CASE STUDY: Samuel, 15 months

**Overview:** Samuel was born with a dolicocephaly (head shaped like a boat) and was referred to Children's Hospital to be evaluated for possible craniosynostosis. Examination and a CT scan with 3D reconstruction diagnosed sagittal synostosis.

**Treatment:** Because Samuel was referred soon after birth, he was a candidate for minimally invasive endoscopically assisted surgical correction. Two small incisions were made in his scalp, and swelling was minimal. Samuel was discharged post-op after three days. He wore a helmet for four months as adjunctive treatment.

**Outcome:** Samuel has a normally shaped head.

**Testimonial:** Samuel's mother says, "His head shape is perfect now!"



## We have the largest craniosynostosis program in the region.

The American Academy of Pediatrics' "Back to Sleep" campaign, initiated in the early 1990s, reduced the number of patients suffering from SIDS by over half. However, the program brought an increase in plagiocephaly, or misshapen heads in infants. The Children's Hospital neurosurgery program offers a screening and education clinic for parents. Clinic staff are able to evaluate patients without a need for imaging. Those with severe deformities are treated with helmets by experienced helmet orthotists. The helmets are fitted and adjusted on site at Children's Hospital, saving parents multiple visits.

When head shape deformities are caused by craniosynostosis and surgery is needed, our center offers the most experienced surgical team in the region in minimally invasive endoscopically assisted techniques that leave only two one-inch incisions.

## PROCEDURES FOR TREATING CRANIOSYNOSTOSIS

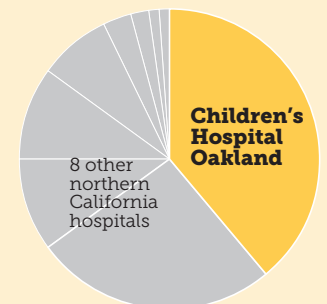
Infants diagnosed before the age of three months may be candidates for a minimally invasive, endoscopically assisted procedure. The advantages of the procedure are less blood loss, less swelling, and a shorter hospital stay. Patients will require helmet therapy for up to six months.

For patients not receiving the minimally invasive procedure, an open craniotomy is performed, and the bones of the skull are removed and reattached using plates and screws in a more normal shape. Patients who undergo this procedure usually require a blood transfusion and a hospital stay of 4 to 7 days.

## INPATIENT CRANIOSYNOSTOSIS CASES, 2008-09

Children's treated over 39% of all of northern California's pediatric inpatient craniosynostosis cases in 2008-09.

Primary & Secondary Service Areas (Alameda, Contra Costa, Marin, San Joaquin, Santa Clara, Solano, Sonoma, Stanislaus); Ages 0-17; ©2010 Children's Hospital & Research Center Oakland



# Hydrocephalus

Hydrocephalus is a disorder caused by a mismatch between the production and absorption of cerebral spinal fluid (CSF), resulting in excess CSF in and/or around the brain. Hydrocephalus can be present at birth, as in aqueductal stenosis. It can also be caused by an obstruction to the flow of CSF, for example by a tumor, by an infection such as meningitis, or by trauma.

## PROCEDURES FOR TREATING HYDROCEPHALUS

The most common treatment for hydrocephalus involves placing a shunt in the fluid-filled cavity in the brain. A valve and distal catheter are attached to the shunt to drain the fluid to the peritoneum, pleura, or the atrium of the heart.

The treatment of hydrocephalus continues to advance. For many patients, endoscopic third ventriculostomies can eliminate the need for VP shunts. Another important advance is “quick scan MRI” to avoid the radiation dangers of CT imaging. Hydrocephalus patients, who were previously imaged by repeat CT scans, are now almost exclusively imaged for ventricle size in our program by a single two-minute quick-scan sequence. The scan requires no sedation for young children, because its rapid image acquisition tolerates movement.



**Quick Scan MRI:** A two-minute quick scan MRI can be performed without sedation or exposure to radiation, with help from a parent if needed (parent's fingers visible in image).

## PROCEDURE RISKS

**Infection.** At Children's Hospital, our shunt infection rate has decreased to a remarkable 0.45%, thanks to the use of best-practice protocols, as well as topical, intrathecal, and standard IV antibiotics.

**Shunt failure.** Our revision rates have lowered through the use of programmable shunts that reduce overdrainage.

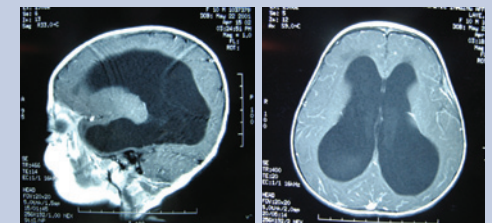
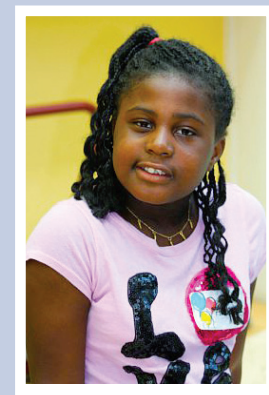
## CASE STUDY: Amber, age 9

**Overview:** Amber had a shunt placed when she was born with congenital hydrocephalus from aqueductal stenosis.

**Treatment:** As Amber grew older she became a candidate for surgery to create a new opening in the brain to bypass the blockage. When her original shunt malfunctioned, she underwent an endoscopic third ventriculostomy.

**Outcome:** Amber's shunt was removed. Her hydrocephalus is now managed without a medical device.

**Testimonial:** Amber says, "No more shunt in me!"





## **Pediatric Neurosurgery**

Children's Hospital & Research Center Oakland  
744 52nd St., Oakland, CA 94609

**To refer a  
patient, call  
510-428-3319  
800-550-1529**

## **Neurosurgery Services**

Brain Tumors / Neuro-Oncology

Congenital anomalies

Craniosynostosis and Head Shape

Epilepsy Surgery

Hydrocephalus

Spasticity

Spinal disorders

