



# insidesurgery

## FETAL TREATMENT CENTER

As the birthplace of fetal surgery, the UCSF Fetal Treatment Center is an international leader in treating diseases in utero. Professor Emeritus Michael Harrison, MD, the center's founder, performed the world's first open fetal surgery at UCSF in 1981.

Now under the direction of Associate Professor Hanmin Lee, MD, the center has a team of experts who provide the full range of fetal interventions, tailoring treatment to each specific family and problem. "For many families, we are the end of the road," said Lee. "A lot of families tell us, 'Before we got to you, we didn't have hope.'" Lee is an expert in minimally invasive neonatal surgery, and has pioneered the application of these techniques to fetal surgery.

Every fetal surgery has at least two patients – the mother and the fetus – and sometimes more, in the case of twins. When presenting different options to families, the most important consideration is the safety of the mother and her reproductive potential. Minimally invasive approaches can reduce the potential harm to the mother, and may also result in less preterm labor – the major complication of fetal intervention.

The Fetal Treatment Center receives about 350 referrals annually. Jody Farrell, RN, MS, PNP, the center's clinical coordinator, obtains the history from the referring physician and has the obstetric records sent to UCSF for review.

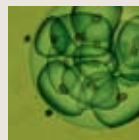
About 250 families come to UCSF for a multidisciplinary counseling session with geneticists, obstetricians, pediatric and fetal surgeons, ultrasonographers,

neonatologists, social workers and other specialists. Pregnant families meet with up to eight specialists in one day. Then, the following week, the patient is presented before the Fetal Treatment Center team, and recommendations are forwarded to the patient and referring physician. This multidisciplinary conference is attended by about 50 specialists.

The team works together to develop a complete, accurate diagnosis, made possible in part by UCSF's outstanding radiology and cardiology departments. "We have a lot of experience in watching these disorders over time, and being able to predict which ones get better on their own, and which ones are going to get worse and put the fetus at risk," said Professor Diana Farmer, MD, a fetal surgeon, surgeon in chief of UCSF

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#### LETTER FROM THE CHAIR

This issue of *Inside Surgery* describes some of the latest advances in fetal surgery and pediatric plastic and reconstructive surgery. UCSF is the birthplace of fetal surgery; Michael Harrison, MD, performed the first open fetal surgery here in 1981, and we continue to have more experience with fetal surgery and endoscopic fetal intervention than any other institution in the world. Now under the direction of Hanmin Lee, MD, the Fetal Treatment Center continues to pioneer new interventions for congenital defects, and to provide long-term follow-up care through the LIFE Clinic.

William Hoffman, MD, leads the Division of Plastic and Reconstructive Surgery, offering a coordinated, multidisciplinary approach to craniofacial anomalies, including cleft lip, cleft palate and craniosynostosis, as well as birthmarks and vascular anomalies. Scott Hansen, MD, is a hand surgeon, skilled in the full range of procedures available to reconstruct a useful hand, including toe-to-thumb transfer.

I am also delighted to announce the opening of the Connie Frank Transplant Center, the UCSF Center for Bioengineering and Tissue Regeneration, and the laboratory of Jason Pomerantz, MD, in the UCSF Craniofacial and Mesenchymal Biology Program's new facilities.

These are just a few of the exciting developments in the UCSF Department of Surgery. I am pleased to share these updates with you.

Sincerely,

**Nancy L. Ascher, MD, PhD**  
Professor and Chair, Department of Surgery



Benioff Children's Hospital and chief of the Division of Pediatric Surgery. In many cases, fetuses do not require intervention, or can be treated after birth. "We partner extensively with patients' referring doctors, because often the best recommendation is for patients to go back and deliver at home," said Farmer.

Another strength of the Fetal Treatment Center is that surgeons also conduct laboratory research, helping to bring the latest innovations to patients as soon as possible. "Our trademark is judicious and ethical application of novel and emerging technologies and procedures," said Lee. "We accomplish this by having robust animal data, conducting novel interventions in the context of trials, when appropriate, and bringing all the different experts together in one room to discuss new enterprises."

### Developing Innovative Treatments

The Fetal Treatment Center provides interventions for the most severe fetal conditions. The most common anomaly seen by the center is Twin-Twin Transfusion Syndrome (TTTS), in which identical twins sharing a placenta and blood vessel connections develop an imbalance in blood circulation. There may be significant transfer of blood from one twin to the other, causing dehydration for the twin with insufficient blood, and cardiac failure for the twin receiving too much blood. Neither will survive without intervention. Lee led a clinical trial to determine optimal treatment for TTTS. Fetal surgeons insert a straw-sized scope and use a thin laser fiber to photocoagulate the blood vessels connecting the twins, separating the blood supplies and often saving one or both fetuses.

Lee was also a leader in discovering improved treatment for some forms of congenital cystic adenomatoid malformation (CCAM), also known as congenital pulmonary airway malformation (CPAM). CCAMs occur when a cystic piece of abnormal lung tissue replaces one lobe of the lung. Although many CCAMs can



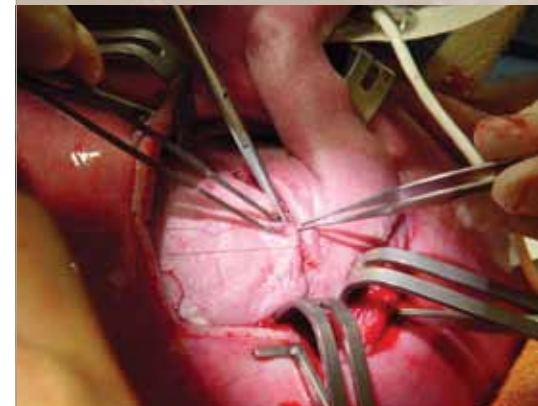
*Drs. Tippi MacKenzie, Doug Miniati, and Michael Harrison (back row, left to right).*

*Drs. Hanmin Lee, Diana Farmer, and Shinjiro Hirose (front row, left to right).*

be treated postnatally, fetuses with CCAM that also develop hydrops experience almost 100 percent mortality.

However, about a decade ago, the Fetal Treatment Center team observed that several pregnant women who had fetuses with microcystic CCAMs and hydrops received preoperative steroids before fetal surgery, but then declined surgery at the last moment. Nevertheless, their fetuses survived. Lee is currently leading a trial to determine whether administering steroids prenatally in such cases provides a better treatment alternative. "The hypothesis is that steroids drive lung maturation in the CCAMs to become more normal lung tissue," said Lee. Preliminary data indicate that fetuses with microcystic CCAMs and hydrops that are treated with steroids have an 80 percent survival rate, compared with about 50 percent for open fetal surgery, and less than 10 percent with no treatment.

Farmer leads the MOMS (Management of Myelomeningocele Study) clinical trial, comparing whether patients with spina bifida benefit from fetal surgery compared to postnatal surgery. She was the senior author of a paper published in February 2011 in the *New England Journal of Medicine*, demonstrating that



*Fetal chest closure after open thoracotomy for CCAM resection.*



*Uterine stapling device, developed at UCSF to enable a bloodless entry into the gravid uterus.*

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prenatal surgery for myelomeningocele reduced the need for shunting and improved motor outcomes at 30 months. Prenatal surgery had been associated with maternal and fetal risks, particularly an increased risk of preterm delivery. The eight-year trial was stopped early because results were positive.

“Up until spina bifida, we would only consider fetal surgery in cases of life or death for the newborn,” said Farmer. “Now, after three decades of no maternal deaths in this country from open fetal surgery, we’re asking if the risks are justified to consider just making fetuses better. Based on our findings, it appears that fetal surgery can provide a better option for these patients than waiting to treat them after birth.”

Another common condition is congenital diaphragmatic hernia (CDH), in which a hole in the fetus’s diaphragm allows the abdominal organs to migrate into the chest, compressing the lungs. Harrison developed an intervention to occlude the fetal trachea, stimulating lung development by blocking the exit of fetal lung fluid. This fluid forces the lungs to expand, and can then displace the abdominal organs out of the chest. Assistant Professor Doug Miniati, MD, is developing a new device that intermittently occludes the trachea, which may support more normal lung development.

Harrison is now developing a new way to seal the uterine membrane during fetal surgery. “The limiting factor in all fetal intervention is premature rupture of the membranes,” he said. “Whether we use a needle, laser or knife, we have to open the membranes to access the

fetus. When those membranes come off the uterine wall, they cause preterm labor and delivery.”

Building on 30 years of experience – he had to invent many of the tools and devices used in fetal surgery himself – Harrison was recently awarded an FDA stimulus grant to fund the Pediatric Device Consortium. This group of physicians, scientists, engineers, designers and students collaborates on developing devices specifically designed for children. Harrison is working with chemists and engineers to develop a gel-like adhesive that can be delivered to the space between the muscle of the uterine wall and the membrane, preventing spread of amniotic fluid into this space after fetal intervention. “A lot of the chemistry of this adhesive will derive from the science of how ocean creatures like mollusks stick to rocks,” said Harrison.

Other Fetal Treatment Center innovators include Assistant Professor Shinjiro Hirose, MD, and Assistant Professor Tippi MacKenzie, MD. Hirose, an expert in minimally invasive fetal surgery, is currently investigating improved treatments for gastroschisis, a congenital defect in which the anterior abdomen does not close properly, allowing the intestines to protrude outside the fetus. MacKenzie, a fetal surgeon, investigates mechanisms of tolerance induction following in utero stem cell transplantation. This could eventually lead to novel fetal treatments for metabolic problems such as sickle cell anemia, immune deficiencies and diabetes.

“Now, almost all diseases are identified and diagnosed before birth,” said Farmer. “We want to correct defects before birth, so there are no more birth defects – there are just fetuses that got treatment. I want the spina bifida kids to be able to walk when they’re born. [If we were successful], no child would ever get diabetes, and sickle cell anemia would be eliminated. I think it’s doable. The latest frontier is correcting the fetal origins of adult disease.”



*Newborn identical twins treated with laser surgery at 19 weeks gestation for twin-twin transfusion syndrome.*



*A patient who was treated by the Fetal Treatment Center, the Intensive Care Nursery and Pediatric Surgery for hydrops from a massive sacrococcygeal teratoma.*

## LIFE Clinic

In addition to diagnosing fetal disease, counseling families, and performing fetal intervention when appropriate, the Fetal Treatment Center provides long-term follow-up care to patients through its LIFE Clinic – the Long-term Infant-to-adult Follow-up and Evaluation Program.

## FETAL TREATMENT CENTER CASE STUDY

### EXITing CHAOS: Kalmin's Story

After a two-year journey to become pregnant, Marci and Paul conceived a child – only to hear the words every expectant parent dreads: “There’s a big problem here.”

An ultrasound at 20 weeks showed that their fetus had CHAOS (Congenital High Airway Obstruction Syndrome), an exceedingly rare condition in which a tracheal obstruction blocks the flow of lung fluid, distends the lungs and can adversely affect the heart.

Their radiologist had seen six other cases; none survived. In fact, there are only a handful of CHAOS survivors in the world. However, another doctor referred them to Associate Professor Hanmin Lee, MD, director of the Fetal Treatment Center at UCSF, whose faculty are among the world’s leading experts in this condition. “Dr. Lee returned our phone call that evening,” said Paul. “He explained our son’s condition and discussed options, and we felt optimistic.”

Within a week, Marci and Paul traveled 800 miles to UCSF for assessment. After extensive counseling, the couple ultimately chose to have experimental fetal surgery at 23 weeks. Lee and his team fetoscopically inserted a needle through the uterus and down the fetus’s mouth to create a small hole in the tracheal blockage. It was unclear whether the surgery had been successful. However, after Marci and Paul returned home, ultrasounds indicated that fluid had slowly drained out of the fetus’s lungs through the surgically created hole in the trachea, allowing the lungs to develop.

Marci went into labor at 27 weeks, and was medically flown back to UCSF. She gave birth at 30 weeks using the EXIT procedure (ex utero intrapartum treatment), a special type of C-section delivery developed at UCSF in which the umbilical cord remains temporarily attached, allowing a continuous supply of oxygenated blood. The surgical team opened her uterus, performed a tracheostomy, and began ventilation before disconnecting the 3 pound, 5 ounce baby from the placenta.

“Kalmin spent the first three months of life in the UCSF Neonatal ICU,” said Marci. “That experience bonded our family to the UCSF team.” Marci and Paul called UCSF frequently for advice, and relied on Lee’s expertise when making choices throughout their son’s journey. Local surgeons have conducted multiple surgeries to reconstruct Kalmin’s airway.

Kalmin, now 2, is running and breathing on his own without a tracheostomy. After his latest bronchoscopy and chest X-ray, Kalmin was discharged by his pulmonologist. “The pulmonologist said if you didn’t know his history, you would never know he had a lung condition,” said Marci.

“Fetal treatment gave us more than the possibility of life – they gave us the possibility of laughter,” said Marci. “At 16 months we heard our son laugh for the first time.” Now Kalmin is learning to talk. His latest word: “Yes.”

The clinic started in 2002, and now serves almost 200 children who received either prenatal or postnatal treatment for congenital anomalies, including congenital diaphragmatic hernia, esophageal atresia, pulmonary sequestration, CCAM/CPAM, sacrococcygeal teratoma, choledochal cysts, imperforate anus, Hirschsprung’s disease, and other conditions. Children are followed into adulthood.

In addition to assessing fetal surgery patients’ long-term outcomes and screening for related comorbidities, the clinic helps provide resources on how to best manage these diseases. “We try to pull together what the standards are for caring for each patient, given their different conditions, and put that in a letter to their primary care provider,” said Barbara Bratton, RN, MS, PNP, clinical coordinator for the LIFE Clinic.

“It’s like a cancer survivors’ clinic,” said Farmer. “Before, the fetuses died. Now that patients are living with these different deformities and birth defects, we support them into adolescence and adulthood as they learn to live with these conditions.”

### CONSULTATIONS AND REFERRALS:

For more information, please contact the Fetal Treatment Center at [fetus@surgery.ucsf.edu](mailto:fetus@surgery.ucsf.edu) or 1 (800) RX-FETUS.

#### WEB RESOURCES:

**UCSF Fetal Treatment Center**  
[fetus.ucsfmedicalcenter.org](http://fetus.ucsfmedicalcenter.org)

**Spina Bifida Clinical Trial**  
[www.spinabifidamoms.com](http://www.spinabifidamoms.com)

**New England Journal of Medicine**  
[www.nejm.org/doi/full/10.1056/NEJMoa1014379?query=featured\\_home&#t=abstract](http://www.nejm.org/doi/full/10.1056/NEJMoa1014379?query=featured_home&#t=abstract)

**Pediatric Device Consortium**  
[www.pediatricdeviceconsortium.org](http://www.pediatricdeviceconsortium.org)

**LIFE Clinic/UCSF Pediatric Surgery**  
[pedsurg.ucsf.edu/life-clinic.aspx](http://pedsurg.ucsf.edu/life-clinic.aspx)



*CHAOS (Congenital High Airway Obstruction Syndrome) is a rare and usually fatal condition. Kalmin, a fetal patient (shown at top at 1 month old in the UCSF Neonatal ICU, and above in a recent photo), received experimental prenatal surgery which allowed his lungs to develop in utero.*

## PEDIATRIC PLASTIC AND RECONSTRUCTIVE SURGERY

Pediatric plastic and reconstructive surgeons at UCSF treat patients with a wide range of conditions, including craniofacial, birthmark and vascular anomalies and hand problems. They offer a multidisciplinary, coordinated approach to complex cases, depth and breadth of expertise, and excellent outcomes.

### Center for Craniofacial Anomalies

The Center for Craniofacial Anomalies provides a comprehensive approach to conditions affecting the face, head and neck. “We come up with a coordinated plan that spans from birth until patients turn 21,” said Professor William Hoffman, MD, chief of plastic and reconstructive surgery at UCSF. “It’s a long-term relationship and commitment.”

The center includes plastic surgeons, oral surgeons, orthodontists, geneticists, a social worker, nurse practitioner, speech pathologist and other specialists, and is directed by Karin Vargervik, DDS, an orthodontist and the Larry L. Hillblom Professor in Craniofacial Anomalies. The center actively follows 700 patients, seeing most every year.

The most common conditions include cleft lips and palates. Hoffman and Assistant Professor Jason Pomerantz, MD, usually perform cleft lip repair at 3 months of age. The palate can affect breathing; for safety reasons, cleft palate repair is usually performed around 9 months, when the patient is larger but before speech develops. Eighty-five percent of patients without developmental disorders develop normal speech after a first procedure; some patients require a second procedure to reach this benchmark.

Surgeons usually close cleft patients’ gums with a bone graft surgery at age 8 or 9, partnering closely with orthodontists to ensure teeth alignment and adequate upper jaw growth. As chair of the California Coalition of Clefts and Craniofacial Teams, Hoffman played a leadership role in advocating a new state law categorizing medically necessary dental and orthodontic services for cleft palate and associated craniofacial anomalies as a medical expense. The law became effective on July 1, 2010.

The Center for Craniofacial Anomalies also established a specialty clinic for microtia, in which children are born with an underdeveloped or missing ear. Professor Lawrence Lustig, MD, an otolaryngologist, reconstructs the ear canal, and can implant a bone-anchored hearing aid (BAHA) under the hairline.

This is particularly helpful in providing children with one functional ear a directional sense of hearing. Hoffman reconstructs the external ear, using a rib graft. Usually this procedure is performed around age 8, which allows the ribs to grow large enough to create an ear that matches the existing ear in size.

Another specialty clinic focuses on craniosynostosis, the premature fusing of one or more bones in the skull and face during fetal development, which results in abnormal skull growth. In partnership with neurosurgeons, Hoffman and Pomerantz work with pediatric neurosurgeons to reshape patients’ skulls, often using absorbable plates and screws. Patients with severe facial deformities may benefit from distraction osteogenesis, which gradually stretches out skull and facial bones. This tech-

### SAMANTHA RUSSO: CRANIOSYNOSTOSIS CASE STUDY

“You know you’re doing the right thing when your kid is happy going to see her doctors,” said Sharyn Russo.

Her daughter, Samantha, was diagnosed at 2 months old with bilateral coronal synostosis, a congenital disorder in which the bones of the skull fuse prematurely. By the time she was 1 year old, she had had several craniofacial operations at a university hospital near their home to treat the condition.

Her craniosynostosis recurred, creating ongoing complications. When she was 4, Samantha began losing motion on one side. Her parents brought her to UCSF, where she was evaluated by Professor Warwick Peacock, MD, a neurological surgeon. He diagnosed a Chiari type I malformation, a downward displacement of the brain at the base of the skull. The condition, caused by the re-fusing of her skull plates, constricted the brain’s ability to grow normally. Peacock and Professor William Hoffman, MD, chief of plastic and reconstructive surgery, performed bony decompression surgery that same evening.

Since then, Samantha has been followed in the Center for Craniofacial Anomalies at UCSF to monitor her facial growth and development. This allowed coordination of orthodontic and surgical care. When she was 11, Hoffman performed a LeFort III advancement of the midface. The 13-hour surgery



nology can advance the face 20 to 25 mm from the skull, 5 to 10 mm farther than is possible with other techniques. Distraction is often done at a point in the child's growth that minimizes the need to repeat it – usually age 7 to 9.

“These procedures help a child look as normal as possible, and can also improve their breathing and ability to chew,” said Hoffman. “It’s a combination of improving appearance and functionality.”

### CONSULTATIONS AND REFERRALS:

For more information, please contact the Center for Craniofacial Anomalies at (415) 476-2271.



Assistant Professor Jason Pomerantz, MD (left), and Professor William Hoffman, MD, chief of plastic and reconstructive surgery at UCSF



Samantha Ruso (pictured in the two left photos, before surgeries, and in the two right photos, after surgeries) received a planned sequence of operations at UCSF to treat Crouzon syndrome, which includes craniosynostosis (premature fusion of the cranial bones) as well as deficiency in growth of the maxilla and central face.

involved cutting the upper jaw and cheekbones as a unit to advance them forward, then bone grafting from her hip to fill in the spaces. The surgery rebuilt the eye sockets, allowing Samantha to close her eyes during sleep as well as correcting her bite.

“I just love UCSF,” said Sharyn. “The doctors listen to the patients and the parents. I can call and get Dr. Hoffman or someone else on the phone. If something abnormal comes up, Dr. Hoffman will say, ‘Bring her on up.’”

After one surgery, Samantha developed a localized infection, which might have required further surgery for drainage.

“Samantha started crying, and I started crying,” said Sharyn. Hoffman offered an alternative: If the family could bring her in every day for two weeks, he would drain the infection himself, thus avoiding surgery. “I said, ‘We’ll do it,’” said Sharyn.

The continuing premature fusion of her cranial plates created septal deviation, resulting in difficulty in nasal breathing and possibly sleep apnea. When she was 14, Hoffman performed a septorhinoplasty to straighten her nasal septum. He also performed osseous genioplasty to correct her retruded chin. In these procedures Hoffman applies techniques that are also used in cosmetic surgery; for example, to correct residual flat contour of the cheeks, he used autologous fat injection from her abdomen. Despite Samantha’s many surgeries, her facial scars are not visible.

“My main concern is that she’s able to breathe and see,” said Sharyn. “Dr. Hoffman not only helped her breathe better, he also helped her look better. Kids don’t tease her any more. She’s a totally different girl now, and her self-esteem is really high.” Samantha recently started high school, where she is a straight-A student and a star volleyball player.

## PEDIATRIC HAND SURGERY

UCSF hand surgeons treat a wide range of anomalies related to genetic mutations, amniotic band syndrome, burns, trauma and other causes.

“Every child is different,” said Assistant Professor Scott Hansen, MD, chief of hand and microvascular surgery. “As a pediatric hand surgeon, my goal is to reconstruct a useful hand.”

The most common congenital hand condition is syndactyly. Surgeons can separate webbed fingers, which otherwise will contract the hand because of the different lengths of connected digits. Patients with Apert syndrome display bony abnormalities of the hand; by studying X-ray images, surgeons can determine which fused digits are possible to release. “We can always separate one or two of the digits, but sometimes we leave the hand as a mitten hand,” said Hansen. “The decision is based on what structures are there, and whether you can make a useful digit.”

Forty percent of the hand’s functionality comes from the thumb. If a child is born with four functional fingers but no thumb, often the best option is pollicization, in which the index finger is moved over to the thumb position – providing a thumb and three fingers.

In other cases, the best treatment is pediatric toe-to-thumb transfer. For example, a young child with a thumb amputation is likely to do better by transferring a toe onto the partial thumb rather than pollicization. Likewise, if a child has only two fingers on the ulnar portion of the hand, transferring a toe to the thumb position would likely be the best solution. For pediatric toe transfer, surgeons generally transfer the second toe rather than the great toe, because its absence is less noticeable to the casual observer.

UCSF is one of only a few centers in California to offer this technically challenging procedure. The operation takes about six hours, and requires two teams of microsurgeons to prepare the hand and the foot. Surgeons dissect the toe and transfer it to the hand, connecting it with nerves and blood vessels, which are only 1 mm in diameter. Postoperative hospitalization usually lasts five to seven days. The cast is removed after three weeks, and the patient immediately begins therapy to learn how to use his or her new thumb. If necessary, thumb position can be perfected by using serial, moldable splints.

The range of eventual nerve function in the new thumb ranges from protective to near normal, and the thumb continues to grow with the child’s hand. The foot has no healing issues, and after recovery, children can run and perform normal activities.

For both toe-to-thumb transfer and pollicization, it is recommended that surgery be performed before 3 years of age, while children’s brains are still very pliable and easily accept a transferred toe as a thumb. “Around 3 or 4, the brain starts patterning what the child has, and after the age of 5, the child cannot adapt as well,” said Hansen.

Hansen has transferred both second toes to the hands of children with no fingers at all, giving them a thumb and a finger and the ability to have a pincer grasp. “That’s obviously given them a lot, to go from nothing to being able to pick things up and use their hand appropriately,” said Hansen. “We don’t do these operations to give a child five functional digits. We really focus on what we can do functionally for these children to be able to play sports and get on with their lives.”

### CONSULTATIONS AND REFERRALS:

For more information, please contact Scott Hansen, MD, at (415) 353-4217 or [shansen@sfghsurg.ucsf.edu](mailto:shansen@sfghsurg.ucsf.edu).



Scott Hansen, MD



*Syndactyly, or webbed digits, is the most common congenital hand condition. Above, before and after a pediatric patient’s surgery to separate the right middle and ring fingers.*

### WEB RESOURCES:

To read two of Dr. Hansen’s recent articles related to pediatric toe-to-thumb transfer, please see

[www.ncbi.nlm.nih.gov/pubmed/19568146](http://www.ncbi.nlm.nih.gov/pubmed/19568146)

[www.ncbi.nlm.nih.gov/pubmed/17478259](http://www.ncbi.nlm.nih.gov/pubmed/17478259)



## BIRTHMARK AND VASCULAR ANOMALIES CENTER

The UCSF Birthmark and Vascular Anomalies Center (BVAC) was founded in 1991 to provide care to patients with vascular growths such as hemangiomas, other vascular tumors, and vascular malformations including venous, lymphatic, arteriovenous and mixed malformations. It is the only center of its kind in Northern California.

“People tend to refer to all of these anomalies as hemangiomas, but it’s very important to distinguish between real hemangiomas and vascular malformations,” said Hoffman. “Hemangiomas traditionally get bigger in infancy, and then gradually regress, or involute. True vascular malformations tend to progress over time, and there are a variety of associated syndromes.”

Hoffman co-directs the center with Professor Ilona Frieden, MD, director of pediatric dermatology, and Professor Christopher Dowd, MD, an interventional radiologist. With their colleagues, they published a recent study that found only 22 percent of the center’s patients had been assigned correct, specific diagnoses before coming to BVAC.

To help determine a correct diagnosis, a multidisciplinary team of specialists – including the three co-directors, a dermatologic surgeon and an otolaryngologist – conducts a physical exam and reviews MRI scans and pathology reports. BVAC then tailors a plan for each patient from a full range of treatment options.

For hemangiomas, medical therapy using propranolol has in some cases improved patients’ conditions within days, though long-term outcomes are still under review. Dermatologists can administer laser treatment for some lesions. Some vascular malformations and hemangiomas can be removed surgically; plastic surgeons provide tissue grafts or reconstruction as necessary.



*(Top) Patient with lobular capillary hemangioma of left face, and (above) after staged resection of hemangioma, wedge lip resection and complex flap closure.*

In other cases, radiologists can sclerose lymphatic or venous malformations, injecting an irritant which causes the vessels to thrombose and collapse. While it may not be possible to remove exceptionally large malformations, the center can provide interventions to control bleeding and growth.

The team often recommends surgical removal of pigmented birthmarks to decrease risk of melanoma and reduce disfigurement. Surgeons implant a silicone balloon, called a tissue expander, under normally pigmented skin adjacent to the birthmark. The tissue expander is injected weekly with saline for about three months, gradually increasing the normal skin above it until there is enough to replace the lesion.

“Although there are scars involved with these procedures, we try to hide these in the natural junction lines, such as the side of the nose and along the brows and hairline,” said Hoffman. “We really apply techniques used in cosmetic surgery.”

### CONSULTATIONS AND REFERRALS:

For more information, please contact the Birthmark and Vascular Anomalies Center at (415) 353-7823 or [bvac@derm.ucsf.edu](mailto:bvac@derm.ucsf.edu).



*William Hoffman, MD*



*Ilona Frieden, MD*



*Christopher Dowd, MD*



## CONNIE FRANK TRANSPLANT CENTER OPENS

The Connie Frank Transplant Center at UCSF opened to patients on June 14, 2010.

A philanthropic visionary, Connie Frank recognized that a need existed for patients and caregivers in the Transplant Service at UCSF. “When the patients come to the clinic, we know they are receiving world-class treatment, but they need a place that gives them a better sense of comfort and care,” said Frank.

Throughout the nearly two-year-long process, Frank and her husband, Evan Thompson, were involved every step of the way. “Connie’s keen sense of design and detail has transformed the center into what it is today – an incredible place for our patients and their families, as well as our faculty and staff,” said Professor John Roberts, MD, chief of the Division of Transplant Surgery.

The design of the Transplant Center celebrates the intimacy of giving and the healing power of inspirational views. Upon entering the space, patients and visitors are welcomed by staff and breathtaking views of the Golden Gate Bridge and downtown San Francisco. From the interior of the space, the use of filtered daylight and framed views provide a constant connection to the exterior. The exterior becomes part of the exam and consultation rooms that are located at the perimeter of the



*(Top) At the May 22, 2010, dedication of the Connie Frank Transplant Center are, from left, Evan Thompson, Connie Frank and Mark Laret, chief executive officer of UCSF Medical Center. (Above) Dr. Nancy Ascher, professor and chair of the Department of Surgery, smiles at the dedication event.*

building and are framed by floor-to-ceiling windows.

Designed around the patient, the facility unites all staff and services to provide a comfortable and familiar home. Throughout the center, the design welcomes patients and encourages family involvement in the healing process through ample visitor space. The Connie Frank Transplant Center is an instrument of giving that will continue to support patients and their families for years to come.

A 10,300-square-foot space located on the 7th floor of our Ambulatory Care Center (400 Parnassus Avenue), the Connie Frank Transplant Center houses 5 faculty and 38 staff members. During the course of the year, our faculty will consult with over 3,000 patients.

## CENTER FOR BIOENGINEERING AND TISSUE REGENERATION OPENS

With generous support from the K.H. Hofmann Foundation, the UCSF Center for Bioengineering and Tissue Regeneration opened on the Parnassus campus in July 2010, under the direction of Associate Professor Valerie Weaver, PhD.

“This is a center for transdisciplinary research, integrating basic cell biology and clinical perspectives with skills and concepts from the physical sciences,” said Weaver, a biochemist who joined the faculty in 2006. “We hope to serve as a bridge.”

Weaver’s own lab investigates how intrinsic and extrinsic mechanical forces mediated by the extracellular matrix and cellular cytoskeleton influence molecular mechanisms to affect diverse processes such as stem cell fate and cancer pathogenesis. Weaver recently published a paper in *Cell* reporting that increased linking in the extracellular matrix is associated with tumor stiffness, and that inhibiting cross-linking prevented cancer development.

Her many collaborations with other UCSF investigators include discovering how force modulates cardiovascular, mandible and hematopoietic stem cell differentiation; working with fetal surgeons to better understand lung dynamics and the physical and mechanical loading problems associated with congenital diaphragmatic hernia; and helping develop novel materials to assist with wound healing.

Weaver is also collaborating with UC Berkeley physicist Jan Liphardt, PhD, bioengineers Sanjay Kumar, MD, PhD, and Gerard Marriott, PhD, UCSF bioengineer Tejal Desai, PhD, and bioinformatics expert Hana El-Samad, PhD, to apply physics concepts and engineering approaches to develop novel approaches to cancer diagnostics, prognosis and therapy. Liphardt and Weaver were recently awarded a five-year, \$15.6 million grant from the National Cancer Institute to form the Physical Sciences-Oncology

Center. The group includes over 50 physicists, bioengineers, mathematicians and bioinformatics experts as well as researchers from the clinical and biological sciences.

The Center for Bioengineering and Tissue Regeneration includes space for 20 researchers, imaging rooms with atomic force, traction force and fluorescent microscopes, and a biomaterials room. Weaver envisions the center as a resource for the entire research community. "We're training people from UCSF as well as other universities, and can then link them with other investigators with complementary expertise," said Weaver.

On September 8, 2010, the Center for Bioengineering and Tissue Regeneration hosted a daylong symposium for 75 scientists from the National Cancer Institute, UCSF, UC Berkeley, Lawrence Berkeley National Laboratory, and other institutions, including Stanford. In addition to seminars and discussion groups, concurrent workshops were held to

familiarize breast cancer advocates and biologists with physical sciences approaches to studying cellular and tissue behavior, such as demonstrating the use of atomic force to probe the mechanical properties of breast tissue, and teaching physicists, cancer advocates and bioengineers about histology. Weaver and her colleagues are planning more workshops in the future.

"UCSF is the place to do this, because it has such a history of collaborative efforts," said Weaver. "Dr. Nancy Ascher and the K.H. Hofmann Foundation were visionaries to support the creation of the center, which permits truly cross-disciplinary research to be conducted. Being in a position to bring together and train this talented group of young scientists in this beautiful and constructive space is a real privilege. I have high hopes that by acting as a bridge between the life sciences and physical sciences, the center will facilitate new experimental directions and yield some new exciting research findings."



Valerie Weaver, PhD



Jason Pomerantz, MD

## POMERANTZ LAB OPENS

Assistant Professor Jason Pomerantz's laboratory has joined the UCSF Craniofacial and Mesenchymal Biology (CMB) Program in its new facilities on the Parnassus campus.

Pomerantz, who joined the faculty in 2009, is a physician-scientist whose research focus is tissue regeneration. He seeks to understand how different regenerative capacities arose among species such as salamanders, and ultimately hopes to develop novel approaches to repair and regenerate human tissues.

"My basic research focuses on developing new ways to treat defects in form and function, particularly for conditions for which there are no good medical or surgical solutions, such as amputated limbs or severe congenital facial defects," said Pomerantz. His current research investigates ways to temporarily alter gene expression to mimic other species' potent regenerative mechanisms. Pomerantz is a plastic surgeon, specializing in pediatric and reconstructive surgery, including treatment of craniofacial anomalies.

"It's people like Jason who will make the difference, because you have to have one foot in the clinical arena and one foot in the lab to conduct true translational research," said Professor William Hoffman, MD, chief of plastic and reconstructive surgery.

In his new state-of-the-art lab, Pomerantz is working next to colleagues from the medical and dental schools who are also investigating craniofacial and mesenchymal problems. "It fosters interaction and collaboration with other labs with complementary interests and expertise," said Pomerantz.

The CMB Program is based in the UCSF School of Dentistry, and is directed by Assistant Professor Ophir Klein, MD, PhD.



Ophir Klein, MD, PhD

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Mark R. Laret, Chief Executive Officer,  
UCSF Medical Center

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### June 2 - 4, 2011

Critical Care Medicine and Trauma, Mark Hopkins Hotel, San Francisco. Sponsored by the Department of Anesthesia and Perioperative Care. Chairs: Michael A. Gropper, MD and Rochelle Dicker, MD, FACS.

### June 24 - 25, 2011

8th Biennial UCSF Plastic Surgery Update, Sir Francis Drake Hotel, San Francisco. Sponsored by the UCSF Department of Surgery. Chairs: William Y. Hoffman, MD, and David M. Young, MD.

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