NEUROtransmitter

A PUBLICATION OF SANTA BARBARA NEUROSCIENCE INSTITUTE AT COTTAGE HEALTH SYSTEM

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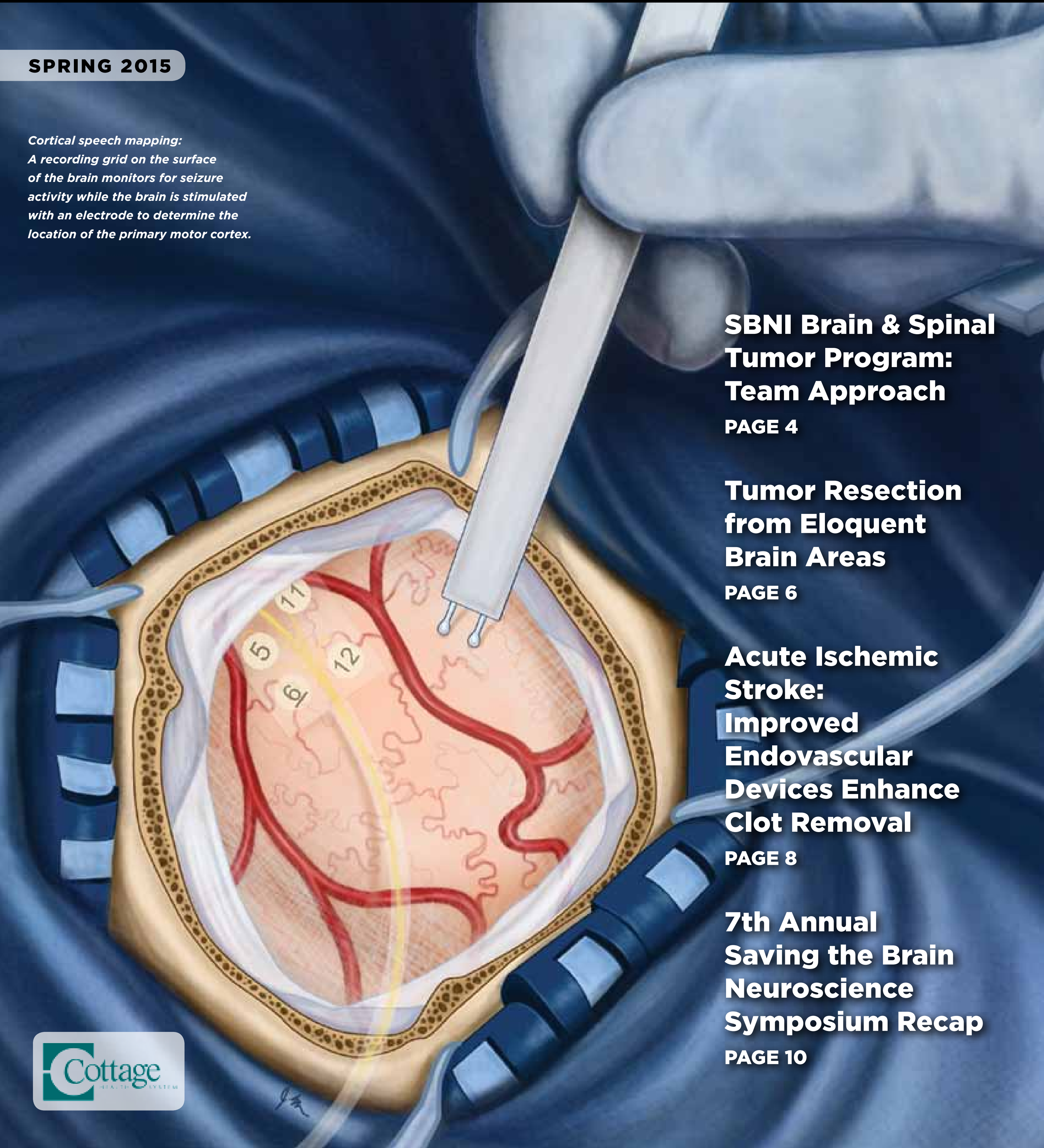

Cortical speech mapping: A recording grid on the surface of the brain monitors for seizure activity while the brain is stimulated with an electrode to determine the location of the primary motor cortex.

Table of Contents

Thomas H. Jones, MD
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Philip R. Delio, MD
Medical Editor, Neurology

Alois Zauner, MD
Medical Editor, Neurosurgery

Sean Snodgress, MD
Medical Editor, Neuroradiology

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About Santa Barbara Cottage Hospital and Cottage Health System

The not-for-profit Cottage Health System is the parent organization of Santa Barbara Cottage Hospital (and its associated Cottage Children's Hospital and Cottage Rehabilitation Hospital), Santa Ynez Valley Cottage Hospital and Goleta Valley Cottage Hospital.

The Santa Barbara Neuroscience Institute at Cottage Health System is a physician-led initiative established to focus on medical conditions over the full cycle of care. The Institute aims to deliver the highest value to the patient by incorporating best practices, applying resources judiciously, and measuring and reporting outcomes relentlessly.

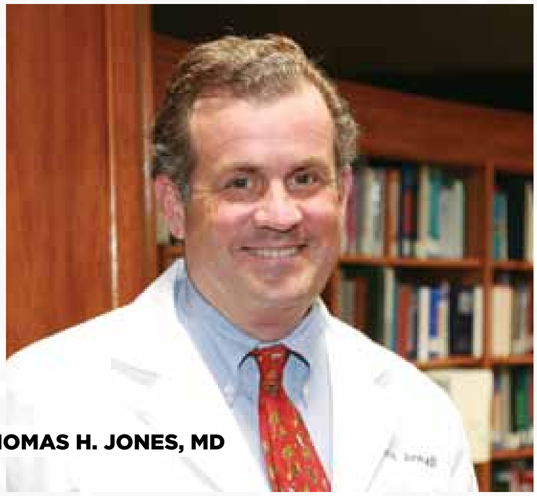
On the Cover

Cortical speech mapping: A recording grid on the surface of the brain monitors for seizure activity while the brain is stimulated with an electrode to determine the location of the primary motor cortex.

Dear Colleagues,

Welcome to the spring 2015 issue of NEUROtransmitter. If you are not already familiar with our magazine, NEUROtransmitter is a publication of The Santa Barbara Neuroscience Institute at Cottage Health System. It is intended to familiarize the physician community across our region with the comprehensive, high-quality neurological and neurosurgical services we offer at SBNI.

In this issue, we are highlighting one of the most significant additions to SBNI in recent years – the Brain and Spinal Tumor Program and its Medical Director, John Park, MD, PhD. As Dr. Park and I explain in further detail in our respective articles on pages 4 and 5, the program brings to the Central Coast region an advanced level of specialized care more typically found in large academic medical centers in major urban areas such as Los Angeles and San Francisco. Dr. Park's impressive background and international reputation for his expertise in the surgical treatment of patients with primary and metastatic brain tumors, particularly those in eloquent brain areas, have been key to the successful launch of the program.



THOMAS H. JONES, MD

Dr. Park has also contributed to this issue a fascinating article and case study (on pages 6 and 7) describing his success in resecting tumors within or adjacent to eloquent brain regions. The article goes on to conclude that the combined use of intraoperative MRI and intraoperative electrical brain stimulation of the language and motor areas during surgery may allow the resection of tumors that were previously thought to be unresectable, with a significantly decreased risk to the patient of experiencing a new neurologic deficit and a corresponding increase in survival and quality of life.

On pages 8 and 9, Robert Taylor, MD, an interventional stroke neurologist and neurocritical care expert, offers an interesting overview of the rapid technological changes that endovascular devices used in the treatment of acute ischemic stroke have undergone over the last 10 years and how this is allowing physicians to remove clots from brain blood vessels more efficiently and more effectively. Accompanying his article, Dr. Taylor offers a case study describing clot thrombectomy for an ischemic stroke patient.

Annually, for the past seven years, SBNI has presented the Saving the Brain Neuroscience Symposium, a day-long conference in Santa Barbara designed to educate neurologists, neurosurgeons, registered nurses, primary care, emergency department, internal medicine, and other healthcare practitioners about advances in the neurosciences. In our final article, on pages 10 and 11, Philip R. Delio, MD, a stroke neurologist and medical director of stroke services at Santa Barbara Cottage Hospital, gives a comprehensive synopsis of this year's symposium. As Dr. Delio points out, we once again had an impressive selection of speakers from all areas of the neurosciences. They encompassed the best neuroscientists both locally and nationally, covering topics ranging from headaches to neurocritical care to nursing challenges in caring for complex neurologic disease.

I hope you enjoy our publication and find the articles interesting and informative. Please do not hesitate to contact me if you would like any additional information about SBNI and our services.

Sincerely,

THOMAS H. JONES, MD
Neurosurgeon and Medical Director
Santa Barbara Neuroscience Institute
at Cottage Health System

SBNI Brain and Spinal Tumor Program Emphasizes Sub-Subspecialization and a Team Approach

BY THOMAS H. JONES, MD, NEUROSURGEON AND MEDICAL DIRECTOR
SANTA BARBARA NEUROSCIENCE INSTITUTE AT COTTAGE HEALTH SYSTEM

At SBNI, our team of caregivers works together to maximize the outcome of each patient.

A NEW MODEL OF CARE in neurosurgery has emerged over the past several decades. State-of-the-art neurosurgical treatment today is primarily provided in regional referral centers by teams of sub-subspecialists who have the combined experience and expertise needed to tackle the most difficult cases, at the molecular level. Nowhere is this multidisciplinary team approach more critical than in the treatment of complex brain and spinal tumors.

Our goal in creating the Brain and Spinal Tumor Program at Santa Barbara Neuroscience Institute (SBNI) at Cottage Health System was to bring this advanced level of specialized care – more typically found in large academic medical centers – to the Central Coast region. The effort required a significant investment in equipment, infrastructure, technology, training and personnel, including the recruitment of a nationally known brain tumor neurosurgeon to lead SBNI's growing team of sub-subspecialists and help develop the institute as a regional referral center for treatment of brain and spinal tumors.

Led by Distinguished Brain Tumor Surgeon

John Park, MD, PhD, Medical Director of the Brain and Spinal Tumor Program, came to SBNI from the National Institutes of Health (NIH), where for 13 years he was the primary brain tumor surgeon for the National Cancer Institute (NCI). Dr. Park, who earned his medical and graduate degrees at Harvard Medical School, specializes in the surgical treatment of patients with primary and metastatic brain tumors, particularly those in eloquent brain areas.

In addition to his extensive experience in brain tumor surgery, Dr. Park has performed significant, cutting-edge research as a principal investigator of a basic and translational science laboratory at the NIH. He has authored numerous clinical, translational and basic science publications, including an article on the management of recurrent brain tumors that appeared recently in the *Journal of Neurosurgery*. He has received awards from the American Brain Tumor Association, the Joint Pediatric Section of the American Association of Neurological Surgeons, the Congress of Neurological Surgeons, the New England Cancer Society, and the Neurosurgery Research and Education Foundation.

As a neurosurgery resident and medical staff member at Brigham and Women's Hospital, the site of the world's first intraoperative magnetic resonance imaging scanner (MRI), Dr. Park gained extensive experience with this powerful imaging tool. The intraoperative MRI has been shown to offer a potentially life-extending surgical option for patients with brain tumors once considered inoperable. Dr. Park went on to develop the intraoperative MRI program at the NIH. He now brings all of his experience and knowledge to the SBNI as we prepare to open our new angio/brain tumor surgical suite with intraoperative MRI. Santa Barbara Cottage Hospital will be one of only four hospitals in California with this type of advanced surgical suite when it opens in 2015.

Close Collaboration by Multidisciplinary Team

Given the complexity of treatment for brain and spinal tumors today, a multidisciplinary team approach is essential. For example, therapy for difficult-to-treat intrinsic brain and spinal tumors, particularly gliomas, is now largely shaped by genetic analysis of the pathology specimens. Obtaining the best outcome for the patient, therefore, necessitates close collaboration by the neurosurgeon, neuropathologist and neuro-oncologist, among many others.

Supporting Dr. Park and our other neurosurgeons at SBNI is a highly distinguished team of sub-subspecialists. They offer a critical mass of expertise, including radiologists with subspecialty training in neuroradiology, as well as radiation therapy experts who are trained in performing stereotactic radiosurgery, a less invasive approach involving pinpoint targeting and delivery of a highly concentrated dose of radiation to the tumor site. SBNI also offers sophisticated brain-mapping capabilities that are rarely seen outside an academic medical center setting. By exposing a patient's brain, sometimes under local anesthesia, stimulating the cortex, and mapping out the speech and motor areas, these critical brain regions can be protected during brain tumor resection.

Our neuro-oncologist – Jonathan Laurence Berkowitz, MD, PhD – has developed special expertise in brain tumor treatments and, like Dr. Park, is very familiar with cutting edge clinical trials and protocols for patients with malignant tumors. SBNI also has an endocrinologist who is trained to work with the neurosurgeons in managing the treatment of patients with pituitary tumors.

Advanced Imaging and Surgical Technologies in Santa Barbara

BY JOHN PARK, MD, PHD, neurosurgeon and Medical Director of the Brain and Spinal Tumor Program at the Santa Barbara Neuroscience Institute at Santa Barbara Cottage Hospital

John Park, MD, center, assisted by Michele Ogawa, RN, Clinical Nurse Coordinator, at left, and Hugo Ruiz, Surgical Technician, at right, use stereotactic navigation to help locate and surgically remove a meningioma, while minimizing the size of the incision in the patient's skull.

At SBNI, we employ some of the most advanced imaging and surgical technologies available to treat brain and spinal tumors. Typically, these technologies and treatments are found only in major academic medical centers and rarely in a community the size of Santa Barbara.

The advantage to both our patients and our referring physicians is that individuals who come to us for treatment of brain and spinal tumors can receive cutting-edge care without having to endure the inconvenience and uncertainty of traveling to a large, unfamiliar facility in a distant city. Instead, they can receive highly personalized, state-of-the-art care right here in their hometown or within an easy drive of where they live.

The expertise we offer at SBNI includes sophisticated brain-mapping techniques that maximize the safe removal of tumors located in critical brain regions. When removing tumors from the language areas of the brain, the patient is sedated while the neurosurgeon opens the skull to gain access to the brain. The patient is then brought out of sedation so he or she can interact with the neurosurgeon during the procedure. Using these techniques, we can monitor the patient's language functions during surgery and thereby avoid causing any postoperative deficits in speaking, comprehension or reading. For patients with tumors located in or near the motor areas of the brain, tumor removal can be safely performed under general anesthesia as identification and preservation of the cortical and subcortical motor pathways can be carried out using electrical stimulation and electromyography.

Our new intraoperative MRI, which will come online in 2015, will add to our ability to surgically remove some of the most difficult-to-treat tumors. This powerful imaging tool helps neurosurgeons precisely distinguish between healthy and diseased tissue, enabling us to safely resect the maximal amount of tumor.

Other advanced treatments offered at SBNI include neuro-endoscopy, a minimally invasive procedure in which a tumor of the brain or skull is removed through a small hole in the patient's skull, mouth or nose. As an example, we routinely use state-of-the-art endoscopic equipment to safely remove tumors of the pituitary gland through a small hidden incision in the back of the nasal cavity.

This combination of cutting-edge technology and state-of-the-art, personalized care, offered within the unique healing environment of Santa Barbara Cottage Hospital, is what makes our program exceptional.

Because of the large number of neurosurgical patients who come through our intensive care unit, our nursing staff is highly skilled at managing their care. Additionally, the hospital has invested in providing a very high level of nursing care by hiring nurses and nurse educators with advanced degrees in neurosurgical care. And finally, once patients leave the hospital, SBNI offers a dedicated rehabilitation hospital with experts in rehabilitating people who are recovering from brain or spinal surgery.

In summary, 21st century medical care is complex and requires not only the care of an excellent subspecialist like Dr. Park, but a team of caregivers working like a pit crew to maximize the outcome of each patient.

To learn more about the Brain and Spinal Tumor Program or to request an appointment, contact Gary Milgram, Service Line Director, at (805) 569-7550 or gmilgram@sbch.org

Tumor Resection from Eloquent Brain Areas

BY JOHN PARK, MD, PHD, BRAIN TUMOR NEUROSURGEON AND MEDICAL DIRECTOR OF THE BRAIN AND SPINAL TUMOR PROGRAM AT THE SANTA BARBARA NEUROSCIENCE INSTITUTE AT SANTA BARBARA COTTAGE HOSPITAL

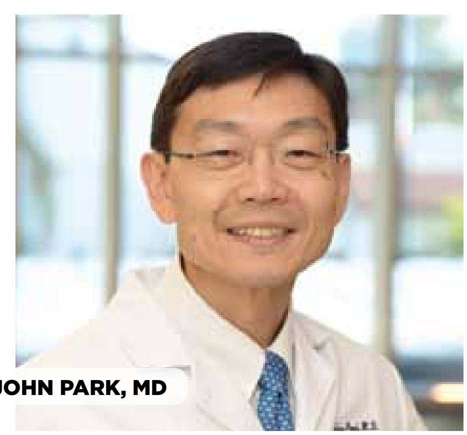
Combined use of intraoperative MRI and intraoperative electrical brain stimulation may allow for resection of tumors previously considered unresectable, with a significantly decreased risk of new neurologic deficit, potentially prolonging survival and increasing quality of life.

Brain areas are defined as being eloquent if injuries to these areas result in deficits of neurologic function. The removal of tumors within or adjacent to eloquent brain regions is a complex challenge that requires a multidisciplinary team approach. The benefits of resecting as much tumor as possible to increase survival must be carefully balanced with the risks of compromising neurologic function and decreasing quality of life. The use of intraoperative electrical stimulation for the identification of language and motor areas has greatly facilitated the safe removal of many tumors previously considered inoperable.

"Eloquent cortex" refers to areas on the surface of the brain necessary for language, motor and sensory functions. Examples include the cortical regions of the dominant, generally left, hemisphere inferior frontal lobe, superior temporal lobe and angular gyrus for language function, the bilateral posterior frontal lobes for voluntary movement, the bilateral anterior parietal lobes for tactile sensation and the bilateral medial occipital lobes for vision. An "eloquent brain area" is a region of eloquent cortex and its associated subcortical structures as injury to the latter can also result in loss of function.

Potential Survival Advantage of Less Residual Tumor

While it may appear intuitive that removing more of a benign or malignant primary brain tumor such as a glioma results in longer patient survival, there has never been a randomized, placebo-controlled clinical trial demonstrating this. Numerous retrospective studies, however, suggest a survival advantage in patients who have less residual tumor following surgery. A recent review article identified and analyzed 43 articles on the topic published between 1990-2012. Eleven pertained to low-grade or benign gliomas while 32 addressed high-grade or malignant gliomas. In each of the low-grade articles, there was a survival benefit to greater extent of resection and many of the studies also reported that a greater extent of resection was associated with a decrease in the rate at which low-grade tumors transformed into high-grade tumors. The high-grade tumor articles reported varying degrees of benefit with greater extent of resection, but the overwhelming majority (11 of 14) of the larger studies, defined as those that included 200 or more patients, did show an association between increased extent of resection and increased survival. A later study published in 2014 by authors at SBNI and the National Institutes of Health reported that even patients with recurrent high-grade gliomas survived for longer if they had less residual tumor following surgery. Of the 97 patients enrolled in this study, 38 (39.2 percent) were found to have no gross residual tumor on their postoperative MRI scan. The resection of many of these tumors in an intraoperative MRI-equipped operating suite facilitated the achievement of this relatively high rate of total resection.


JOHN PARK, MD

The radical resection of brain tumors located within or adjacent to eloquent brain regions can, however, lead to new neurological deficits. In a retrospective study of 306 patients with glioblastoma tumors, 19 patients (6 percent) acquired new motor deficits and 15 (5 percent) acquired new language deficits versus 272 patients (89 percent) who were free of new deficits following surgery. The median survivals of the three groups were 9.0 months ($P < 0.05$) and 9.6 months ($P < 0.05$) versus 12.8 months, respectively. The corresponding two-year survivals of the three groups were 8 percent and 0 percent versus 23 percent, respectively. In a separate study of 88 patients, new motor deficits ($P = 0.003$) and new language deficits ($P = 0.035$) were independent predictors of worsened quality of life following glioma surgery. The surgical management of eloquent brain region tumors, therefore, requires a delicate balance between maximal resection and the avoidance of new neurological deficits.

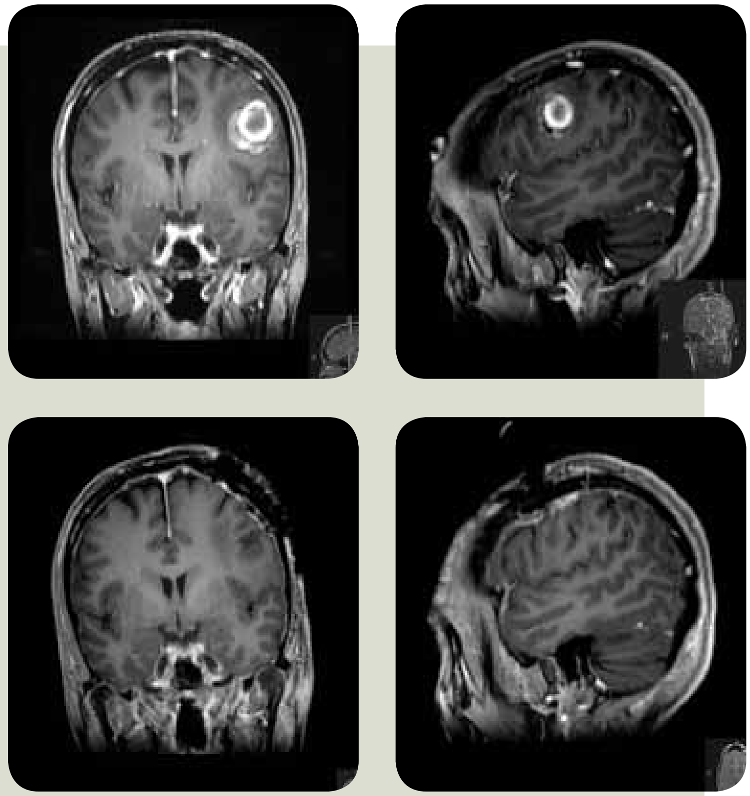
Need for Highly Skilled Multidisciplinary Team

A highly skilled multidisciplinary team including a neuroanesthesiologist, a neurophysiologist, a neuropsychologist and a neurosurgeon with extensive experience in the intraoperative assessment of language and motor functions is necessary for the accurate identification and anatomic preservation of eloquent brain areas. The resection of tumors located in potential motor function areas can be performed with patients either "awake" under conscious sedation

CASE STUDY: Speech Mapping

An otherwise healthy 45-year-old right-handed man presented to the Santa Barbara Cottage Hospital emergency room following a one-minute episode of jaw twitching and approximately three hours of difficulty speaking. On neurological examination, his mental status was intact with the exception of some mild hesitancy of speech. Cranial nerves II-XII were within normal limits with the exception of a subtle right facial droop. The remainder of his neurological examination was within normal limits. His general medical examination revealed a skin lesion in the mid upper back that was suspicious for melanoma. A CT scan of the brain demonstrated a 2.8 cm diameter hemorrhagic lesion in the left inferior frontal lobe. A subsequent MRI of the brain confirmed the hemorrhagic lesion and revealed it to be contrast enhancing with surrounding edema. A CT scan of the lungs, abdomen and pelvis was unremarkable.

Given the location of the lesion in the inferior left frontal, it was recommended to the patient that he undergo a craniotomy from presumed tumor resection using stereotactic imaging guidance and intraoperative cortical speech mapping. The surgery was performed under monitored anesthesia care and speech mapping revealed the lesion to be directly underneath the primary motor speech area. The lesion was therefore resected using an oblique approach through an adjacent gyrus. A gross total resection was achieved and, postoperatively, there were no speech or facial motor deficits. The lesion turned out to be a melanoma metastasis.



Pre- and postoperative contrast-enhanced T1-weighted MRI images of the lesion in the left inferior frontal lobe. Intraoperative cortical speech mapping revealed the lesion to lie underneath Broca's area. A gross total resection was achieved using an oblique approach and the patient experienced no postoperative speech or facial motor deficits.

or "asleep" under general anesthesia, with the usual practice at Santa Barbara Cottage Hospital being the latter. In contrast, the resection of tumors located in potential language areas requires patients to be awake and interactive. The intraoperative identification of an individual patient's presumed motor and language regions begins with direct electrical stimulation of the cortex overlying or adjacent to the tumor to be resected. A constant current generator and bipolar stimulating electrodes are used to deliver biphasic square wave pulses with a fixed frequency and duration. Stimulation is generally initiated at a low current setting of 1.5 mA and the current is gradually increased to a maximum of 6 mA until an expected response is initiated. This direct stimulation of the brain is thought to cause the depolarization of neurons within a 5 mm radius of the electrode tips. In motor cortex stimulation, this depolarization leads to electromyographically detected muscle contractions that are monitored by a neurophysiologist. In language cortex stimulation, it leads to speech arrest, inability to name objects shown on flash cards, or inability to read numbers as assessed by a neuropsychologist.

If a stimulated cortical area appears to be functionally silent as evidenced by an absence of muscle contractions or the lack of disruption of a language task, it is generally deemed to be safe for resection. As non-eloquent cortical tissue and tumor tissue are removed and the underlying white matter is exposed, the white matter itself is similarly stimulated, but with a greater maximum current as needed. Again, muscle contractions or the disruption of language functions are closely monitored. If an eloquent cortical or subcortical area is identified, the tissue in this area, even if it contains gross tumor tissue, is generally left undisturbed to avoid the acquisition of permanent neurological deficits. During both motor and language mapping, continuous electrocorticography is used to monitor after-discharge potentials, an indication of subclinical seizure activity.

Conclusion

With the combined use of intraoperative MRI and intraoperative electrical brain stimulation, tumors that were previously thought to be unresectable may now be resectable with a significantly decreased risk of experiencing a new neurologic deficit. This in turn may lead to longer survival and increased quality of life for patients.

For an expanded version of this article with footnotes, please visit www.sbni.org. To learn more about the Brain and Spinal Tumor Program or to request an appointment, contact Gary Milgram, Service Line Director, at (805) 569-7550 or gmilgram@sbch.org

Improvements in Endovascular Devices Allow Efficient Removal of Clots from Brain Vessels in Acute Ischemic Stroke

BY ROBERT TAYLOR, MD, STROKE AND NEUROVASCULAR CENTER OF CENTRAL CALIFORNIA

Endovascular devices used to treat acute ischemic stroke have undergone rapid technological changes over the last 10 years.

Wikimedia Commons

THE FDA approved the first device to remove blood clots in patients with brain ischemia, called the MERCI (Mechanical Embolus Removal in Cerebral Ischemia) retriever, in August 2004. Since then, there have been several newer and better devices and techniques developed.

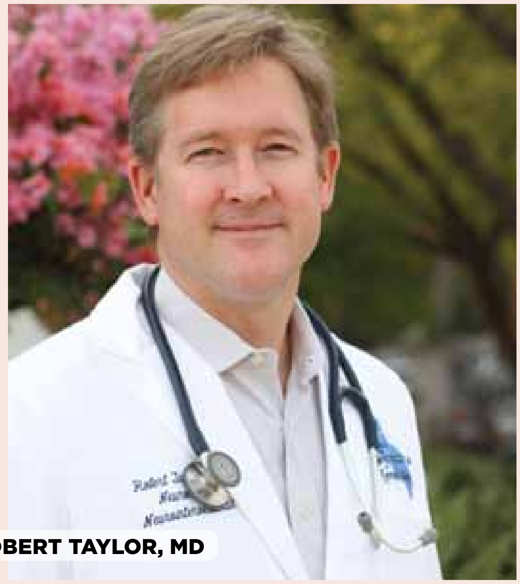
The MERCI retriever itself underwent several design changes, including the addition of a new proximal support catheter to improve clot retrieval efficiency. The Penumbra aspiration catheter system received FDA approval for use of revascularization of patients with acute ischemic stroke in 2008, but it too has undergone design improvements since then.

Stent retrievers were first approved by the FDA in 2012 and appear to have high rates of complete revascularization (greater than 80 percent), which is better than the MERCI retriever in at least two clinical trials. However, clinical trials showing better neurological outcomes with the use of these devices are lacking. By the time a clinical trial is complete, the device technology may become outdated, which was the case for a recent NIH-funded trial called Interventional Management of Stroke (IMS). The IMS trial took nearly 10 years to complete from phase I to the end of the phase III trial, so the trials do not reflect the latest technology. Recent publications describing the technique of combining a stent retriever with an aspiration catheter have demonstrated near complete/complete recanalization rates as high as 95 percent, whereas the IMS trial had near complete/complete recanalization rates of only 42.5 percent. Neurological outcomes have been consistently shown to be better with better recanalization, so it seems intuitive that the newer devices will likely lead to better outcomes in future trials.

Improvements in the devices are quickly allowing some practitioners to remove clots from brain blood vessels with surprising efficiency and good outcomes in a variety of clinical scenarios.

For more information on treatments for acute ischemic stroke and other services available at the Santa Barbara Neuroscience Institute at Cottage Health System, visit www.sbni.org

CASE STUDY: Clot Thrombectomy for Ischemic Stroke



ROBERT TAYLOR, MD

A 78-year-old woman with a history of atrial fibrillation, not on anticoagulation, was found on the floor with a left hemiparesis, left facial droop and incomprehensible speech. The symptoms had resolved within one hour. She was admitted to her local hospital. The following morning she had a similar event. MRI brain showed no acute infarct, but MRA showed a right middle cerebral artery (MCA) occlusion. She was transferred to our center for further management. CT angiogram of the head showed a right proximal middle cerebral artery occlusion most likely from a thrombus. She was admitted to the Neurological Intensive Care unit. The systolic blood pressure was maintained 120-150 mm Hg. She had two more TIA events whenever her blood pressure dropped to 120 mm Hg. A repeat MRI brain showed a few punctate ischemic strokes in the right MCA territory but large right hemisphere perfusion deficit. It was decided to offer clot thrombectomy on a compassionate use basis due to the very high risk of progressive infarction with resulting significant disability, despite the late time window from onset.

The patient was taken to the angiography suite and placed under general anesthesia with maintenance of systolic blood pressure of 140 mm Hg or higher. See Figure 1 for procedure details. The patient woke up from the procedure neurologically intact and was later discharged to home with no neurological deficit. As neuroendovascular devices are improving, we are able to treat stroke patients, in a wider range of clinical scenarios, with greater efficiency and success.

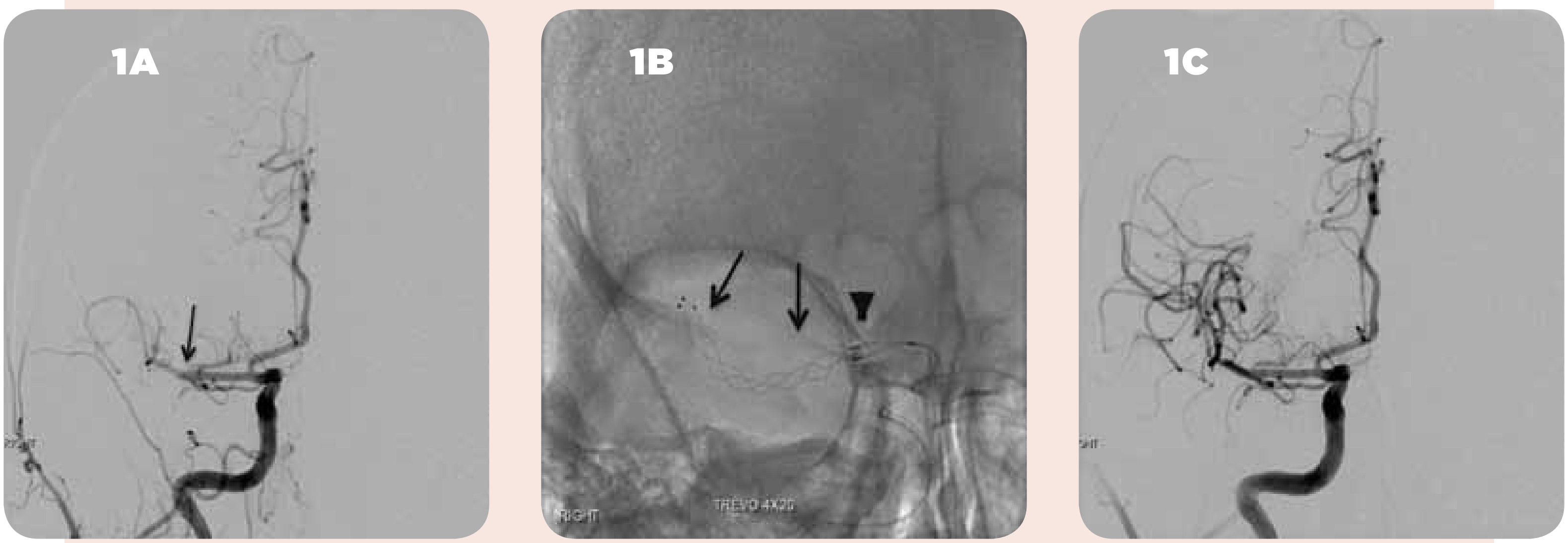


Figure 1A. **Digital subtraction angiography over the head with the injection of iodinated contrast into the right internal carotid artery confirmed a mid-right M1 occlusion (arrow).**

Figure 1B. **A technique combining direct clot aspiration with a stent retriever was used. The Penumbra 5 MAX ACE aspiration catheter was placed at the proximal end of the thrombus (arrowhead) and a stent retriever (Trevo) device (arrows) was placed across the entire clot. The aspirator was turned on and the stent retriever pulled into that catheter in order to retrieve the entire clot and not lose clot fragments to distal branches.**

Figure 1C. **Repeat digital subtraction angiography over the head showed complete recanalization of the vessel resulting in thrombolysis in cerebral ischemia (TICI) 3 flow.**

7th Annual Saving the Brain Neuroscience Symposium Featured the Best Local and National Neuroscientists

BY PHILIP R. DELIO, MD, STROKE NEUROLOGIST AND MEDICAL DIRECTOR OF STROKE SERVICES AT SANTA BARBARA COTTAGE HOSPITAL

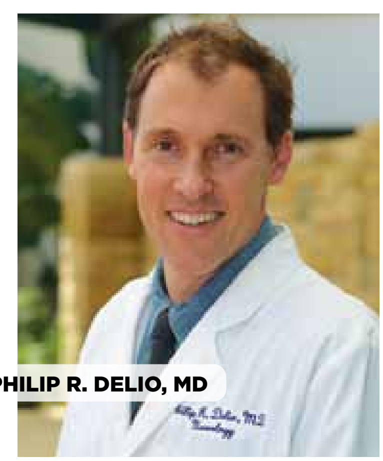
The 7th annual Saving the Brain Neuroscience Symposium presented by Santa Barbara Cottage Hospital was a tremendous success this year. Staying true to the original intent of the symposium, the 2014 meeting offered an impressive selection of speakers from all areas of the neurosciences. This year's speakers encompassed the best neuroscientists both locally and nationally, covering topics ranging from headaches to neurocritical care to nursing challenges in caring for complex neurologic disease.

Michel Kliot, MD, neurosurgeon and past speaker (at left), with Randall M. Chesnut, MD, neurosurgeon and invited guest speaker. Dr. Chesnut gave a compelling talk titled "Re-evaluating the Role of ICP Monitoring in Traumatic Brain Injury."

The meeting began with a summary by Thomas H. Jones, MD, Medical Director of the Santa Barbara Neuroscience Institute at Cottage Health System, of the current landscape of the practice of medicine in a constantly changing health care model, one which challenges us to think beyond what we *can* do for patients in an effort to consider what we *should* do for patients. Certainly, food for thought in this complex era of cost containment and potential rationing of health care on a national level.

Robert Cowan, MD, Director of the Headache Program at Stanford University School of Medicine, and well known to locals as prior Director of the Keeler Center for Headache in Ojai, provided an insightful overview of complex headache disorders. He underscored the importance of treating patients with chronic headache pain differently from those with episodic headaches, since, despite the similar symptomology, the pathophysiology of these entities may be quite distinct.

We were incredibly fortunate to have Randall M. Chesnut, MD, from Harborview Medical Center at the University of Washington, a neuroscientist who quite literally "wrote the book" on intracranial pressure monitoring, present his views on ICP monitoring in the ICU, and the controversies surrounding that subject. He underscored that while ICP monitoring clearly provides essential information in neurocritical care patients, we have much to learn about how best to monitor and treat ICP in complex neurologic disease.



PHILIP R. DELIO, MD

Historical Perspective on the Neurosciences

Probably the most entertaining lecture of the day came from Daiwai M. Olson, PhD, RN, from the University of Texas Southwestern, who provided a wonderful historical perspective on the neurosciences, teaching us that advances in medicine and science can often be as much about fortuitous happenstance as true brilliant effort. He clearly recognizes that we only move forward by first recognizing where we have been.

In the multifaceted area of stroke and cerebrovascular disease, we had a series of impressive local speakers. They included C. Alan Brown, MD, of the Santa Barbara Cardiovascular Medical Group, who covered the latest changes in recognition and treatment of atrial fibrillation, a growing problem and a more frequently recognized cause of stroke. In this era of new oral anticoagulants, advanced monitoring technology for detecting atrial fibrillation and novel treatment options to actually correct this arrhythmia, we have clearly come a long way since the days of simple echocardiograms, 24-hour Holter monitors and warfarin.

I was delighted to be invited to speak

The Saving the Brain Steering Committee (from left to right): Charleen Strebel, Christy Block, Herb Tews, Gary Milgram, Philip R. Delio, MD, Thomas H. Jones, MD, Laura Canfield, Ian McClellan and Lorie Loomis. Not present, Alois Zauner, MD.

this year, and tried to cover the "hottest" topics in stroke therapy, which, in my opinion, center on how to treat acute stroke patients more rapidly and effectively. As our choices of therapy expand beyond simple thrombolytics with tPA, all stroke centers need to strive for treating patients as quickly as possible, and we hope to offer acute therapies for some previously excluded patients such as wake-up strokes. We still have much to do to improve treatment times and refine patient selection for stroke, but many centers are clearly setting an example of how effective acute therapies can be if administered quickly and specifically.

Current Aneurysm Therapies and Neurocritical Care

Two members of the Stroke and Neurovascular Center of Central California gave impressive summaries of the current state of aneurysm therapies and neurocritical care. Samuel Hou, MD, a new member of the neurovascular team at Cottage Hospital, gave an excellent overview of how to approach intracranial aneurysms, the choices of therapies, and the complex decisions surrounding when to treat asymptomatic lesions. Similarly, Robert Taylor, MD, an interventional stroke neurologist and neurocritical care expert, discussed the challenges faced in managing neurointerventional patients post procedure. It is clear that individuals who have had neurointerventional procedures have different care requirements than other stroke patients, and he offered tremendous insight into how to insure the best outcome for these patients, via a regimented system of monitoring and treatment that underscores the cooperation between ICU nurses and physicians.

In the area of neuro-oncology, we were fortunate to have John Park, MD, PhD, a dedicated tumor neurosurgeon previously with the National Institutes of Health and now Medical Director of the Brain and Spinal Tumor Program at the Santa Barbara Neuroscience Institute at Santa Barbara Cottage Hospital, outline the current best practices in the treatment of brain tumors. Specifically, Dr. Park described how intraoperative MRI (scheduled for installation at Cottage Hospital in 2015) can make a tremendous difference in the operative success of brain tumor resection.

Probably the most touching lecture of the day was by Laura Canfield, MSN, from Cottage Hospital Critical Care, who recounted with heartfelt emotion the story of a particular ICU patient and her road to recovery, as told through the eyes of her husband. She provided a remarkable insight into the struggles that family members and nursing face in the day-to-day care of a critically ill patient, and the story of this patient's recovery certainly motivates us all, nurses as well as physicians, to continue to fight for our sickest patients. The rewards can far exceed the effort.

As the field of neurosciences is continually changing, and therapeutic interventions continue to involve, we are already excited about the topics and potential speakers to come in 2015.

Please save the date for the 8th Annual Symposium which will be held on Friday, Oct. 9, 2015 at Fess Parker's Doubletree Resort in Santa Barbara. For more information, contact Gary Milgram, Program Coordinator, at (805) 569-7550 or gmilgram@sbch.org.

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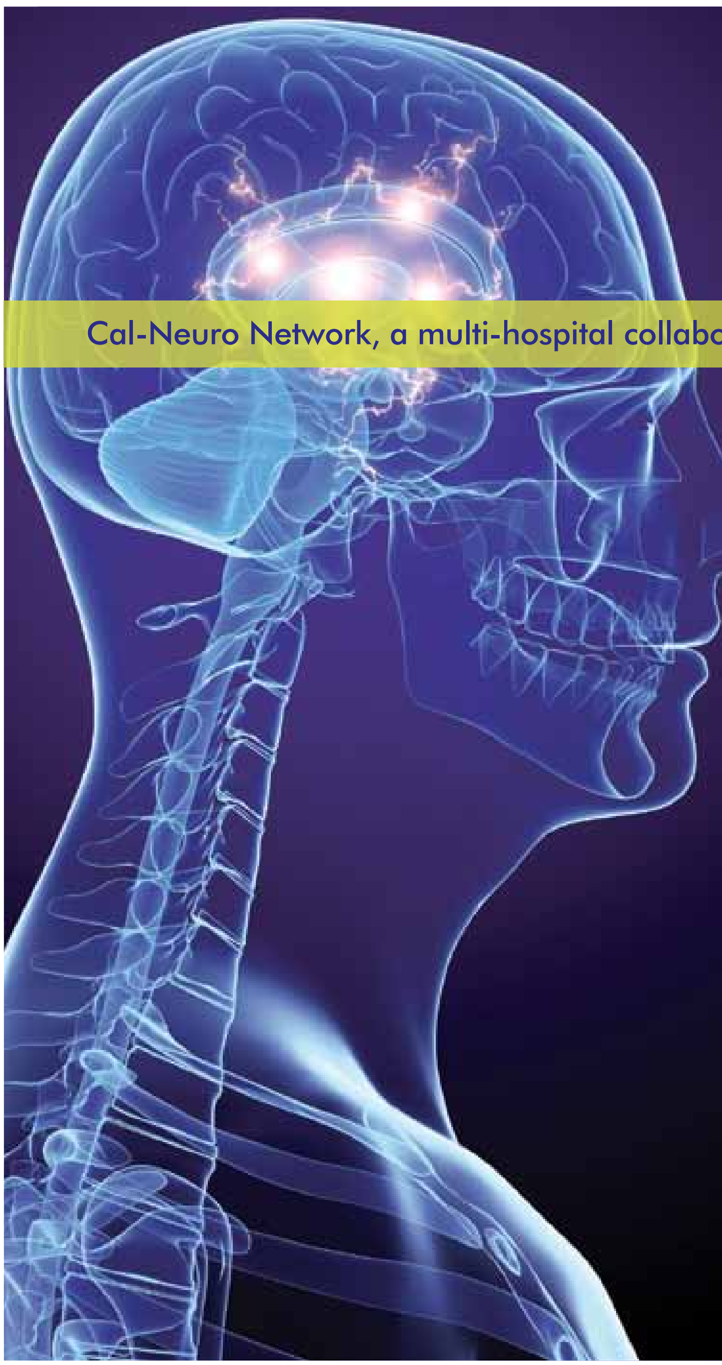

Cal-Neuro NETWORK

Cal-Neuro Network, a multi-hospital collaborative established by Santa Barbara Cottage Hospital

What is the Cal-Neuro Network? The Cal-Neuro Network is a multi-hospital collaborative established by Santa Barbara Cottage Hospital (SBCH) for the care and advanced treatment of neurologic emergencies. As a Certified Stroke Center, SBCH has formed this network to offer its resources to patients and physicians in the surrounding communities and beyond.

Why have a network at all? While the significant investments in neuroscience technology and human resources are not feasible for all hospitals, every patient should have access to the highest levels of care possible.

When do I access the network? It is important to note that the network does not take the place of neuroscience resources in your local hospitals. The network is to be contacted only after consultation with your local on-call neurologist and/or local neurosurgeon.

How do I learn more? Please contact Gary Milgram, Service Line Director at gmilgram@sbch.org or call (805) 682-7111 x82008.

24-HOUR CONSULTATION

Ischemic Stroke, ICH, SAH, AVM, brain aneurysm and other neurovascular emergencies

Transfer Center:
1-888-MY-CAL-NEURO
(1-888-692-2563)