NEUROtransmitter

A PUBLICATION OF SANTA BARBARA NEUROSCIENCE INSTITUTE AT COTTAGE HEALTH SYSTEM

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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: This illustration by Joshua Emerson highlights the obstruction of cerebrospinal fluid flow across the foramen magnum from prolapse of the cerebellar tonsils.

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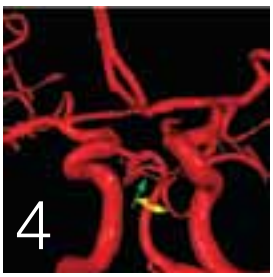
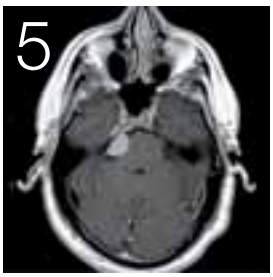




> “It is time physicians take charge and not wait passively while our federal government imposes more restrictions on our ability to innovate and improvise.”

Dear Colleagues,

The delivery of health care for diseases affecting the nervous system is among the most expensive in the medical arena. During my career, I have witnessed the proliferation of expensive diagnostic tools and costly therapeutic options for diseases as diverse as multiple sclerosis, brain tumors and aneurysms.

Physicians as a group, and specialists in particular, have been early to adopt high-tech medicine, however rarely consider costs in our personal treatment algorithms. Unfortunately, many of the expensive treatments we have adopted have not proven effective by Level I scientific evidence (i.e. prospective randomized controlled trials) or rigorous comparative-effectiveness trials. We can no longer continue to practice medicine in this way.

Since the 1960s, healthcare expenditures have increased by approximately 10 percent annually—more than double the inflation rate. Currently, hospital costs account for 31 percent and physicians 21 percent of total healthcare spending. By 2015, total healthcare expenditures are projected to reach $4 trillion and represent 20 percent of the gross domestic product (GDP). If we continue to practice this way, we are projected to spend 40 percent of our GDP on health care by 2040.

A core reason I thought we should form Santa Barbara Neuroscience Institute at Cottage Health System was to begin the important reformation of local medical care from the ground up. It is time physicians take charge and not wait passively while our federal government imposes more restrictions on our ability to innovate and improvise. To borrow terminology from the book *Redefining Health Care* by Michael Porter and Elizabeth Teisberg, we are forming “integrated practice units” to manage neurologic diseases over the entire spectrum of care.

Our goal will be to measure outcomes and keep altering what we do to improve outcomes and lower costs along the way. As Porter and Teisberg have written, “unrestricted competition based on results is the best and only real cure for the problems of medical errors, under-treatment or over-treatment.”

By the simplest measurement, value in medicine is determined by the health outcome per dollar of cost. Our aim is to deliver the highest possible value.

Sincerely,

Thomas H. Jones, MD
Neurosurgeon and Medical Director
Santa Barbara Neuroscience Institute

Non-Invasive
Optimal Vessel Analysis at
Santa Barbara Neuroscience Institute

The VasSol Non-invasive Optimal Vessel Analysis (NOVA) system is the latest addition to the diagnostic imaging repertoire available at Santa Barbara Neuroscience Institute at Cottage Health System. This technique, which was brought online at SBNI in October 2009, is changing the way physicians diagnose and treat neurovascular conditions.

> "Non-invasive optimal vessel analysis enables us to make precise decisions, which precludes the use of invasive procedures in the diagnosis of intracranial and vascular diseases, a benefit for patients and clinicians."
>
> —Alois Zauner, MD, neurosurgeon and neurointerventionalist at Santa Barbara Neuroscience Institute at Cottage Health System

NOVA IS PERFORMED at Cottage as a complement to magnetic resonance (MR) angiography and is used primarily to evaluate the arteries that deliver blood flow to the brain. The additional information NOVA provides allows physicians to better triage patients with a variety of diseases affecting these vessels.

Sean Snodgress, MD, Neuroradiologist

"MR, CT [computed tomography] and conventional angiography all provide valuable information about the arteries that supply blood flow to the brain; however, these technologies have their limitations," says Sean Snodgress, MD, one of the neuroradiologists at the Cottage Center for Advanced Imaging. "Angiographic techniques outline anatomy and allow us to estimate the caliber of a stenosis or define the location and morphology of an aneurysm. However, NOVA is the only technique that allows us to quantify blood flow within a vessel. NOVA tells us not only that there is a stenosis, but how much that stenosis is impacting the flow of blood to the brain."

NOVA combines time-of-flight MR acquisitions with MR angiography to provide a detailed snapshot of the arterial circulation, indicating flow volumes and directions on each of the major vessels. NOVA generates a report consisting of a surface rendering of vascular anatomy, a flow summary with age-matched reference values and arterial waveforms within each of the sampled vessels throughout the cardiac cycle. The technology is non-invasive, involves no radiation exposure and can be performed without the use of intravenous contrast material.

MANIFOLD USES FOR NOVA

NOVA technology assists in the evaluation of patients with carotid stenosis.

"With NOVA results, we can determine if a patient needs medication or surgical intervention, such as intracranial stenting," says Alois Zauner, MD, neurosurgeon and neurointerventionalist at Santa Barbara Neuroscience Institute.

Following standard magnetic resonance (MR) angiography, the vessels to be evaluation for Non-invasive Optimal Vessel Analysis (NOVA) flow volume analysis are chosen and subsequently indicated on images such as this one. Here, the basilar artery is evaluated with the region of interest indicated in yellow and an adjacent arrow denoting the direction of flow in the vessel. The flow volume through that vessel is calculated using phase contrast techniques and tabulated in chart form for analysis.

In addition, NOVA provides a non-invasive technique for determining the continuing effectiveness of a stent.

"One of the situations in which I find NOVA most helpful is with patients who have already undergone stenting," says Dr. Snodgress. "Evaluation for a recurrent in-stent stenosis is very difficult utilizing CT or MR angiography because of the imaging artifacts the stents create. NOVA allows us to quantify the flow passing through the stented vessel, and for the first time we have a noninvasive technique that tells us whether the stent is still doing its job."

POTENTIAL APPLICATIONS

NOVA analysis is not limited to neurovascular imaging.

"This system can evaluate flow within most of the arteries in the body," says Dr. Snodgress. "For example, NOVA could be used to assess blood flow in the renal arteries in hypertensive patients or to quantify flow in the arteries of the lower extremities in patients with claudication."

ACCESS TO ADVANCED TECHNOLOGY

The Cottage Center for Advanced Imaging is the only facility in the area with NOVA capabilities.

"NOVA enables us to make precise decisions, which preclude the use of invasive procedures in the diagnosis of intracranial vascular diseases, a benefit for both patients and clinicians," says Dr. Zauner.

To learn more, visit www.sbni.org or e-mail us at neuro@sbch.org.

Schwannoma Case Study: **Use of Novalis Tx™ Technology for Treatment of Cranial Nerve Lesion**

Case Presentation: A 48-year-old male presented with intermittent facial spasms resulting from a benign tumor which was also compressing the brainstem.

THE PATIENT HAD been suffering from intermittent facial spasms for approximately one year before the tumor was diagnosed. Before determining the best treatment option, the patient's neurologist, Richard Lowenthal, MD, conferred with Thomas H. Jones, MD, neurosurgeon and medical director of the Santa Barbara Neuroscience Institute, and Thomas Weisenburger, MD, FACR, radiation oncologist and medical director of the Cancer Center of Santa Barbara. The team decided that stereotactic radiosurgery would be the safest, most cost-effective, and also efficacious option. They also decided—given the close proximity of the tumor (most likely a trigeminal schwannoma) to the brainstem and cranial nerves—that fractionated rather than single-dose treatment would be safest for the patient.

The patient came to the Cancer Center of Santa Barbara five days a week for a total of 28 treatments, each 20 minutes in duration. Before each treatment, the patient was positioned and stereoscopic images taken with the Novalis ExacTrac 6-D stereo X-ray targeting system. ExacTrac utilizes a robotic couch that precisely positions the patient without requiring the use of a head ring to synchronize algorithms.

Treatment involved eight arcs, each lasting about one-third of a minute, making the total radiation exposure time about four minutes per visit. The total radiation dosage that the patient received was 50.4Gy, and the range of the high-energy beam was 6Mev.

The patient tolerated treatment very well, experiencing only mild fatigue, and continued to work full time throughout the course of treatment. His outcome was successful.

STATE-OF-THE-ART TECHNOLOGY

Radiation therapy for the treatment of schwannomas is successful in 95 percent of cases. Using the Novalis Tx radiosurgery system, patients benefit from the most minimally invasive and cost-effective treatment available. Novalis Tx offers a highly versatile platform for radio-guided imaging therapy and procedures, and has proven successful in treating tumors located in the brain with wide indication for tumors of the lung, liver, spine and kidney.

"We are able to treat patients with tumors considered inoperable right here in Santa Barbara rather than sending them to facilities in Los Angeles," says Dr. Weisenburger. "Novalis Tx delivers precisely focused high-energy radiation to sensitive locations. The shortened treatment time possible with this system results in lower overall radiation exposure for the patient compared with traditional technology."

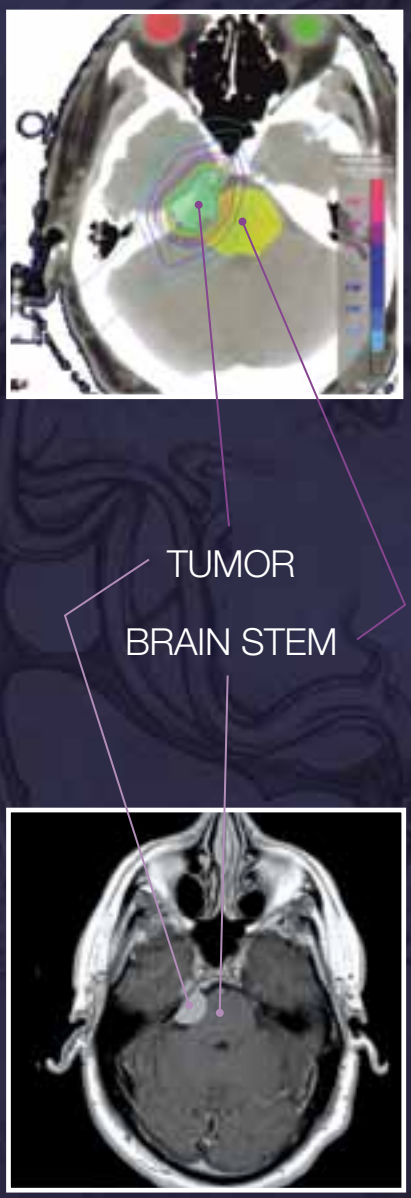
For more information about the Cancer Center of Santa Barbara or to refer a patient, call (805) 682.7300. To learn more about our services, visit ww.ccsb.org.

PATHOPHYSIOLOGY AND TREATMENT OF SCHWANNOMAS

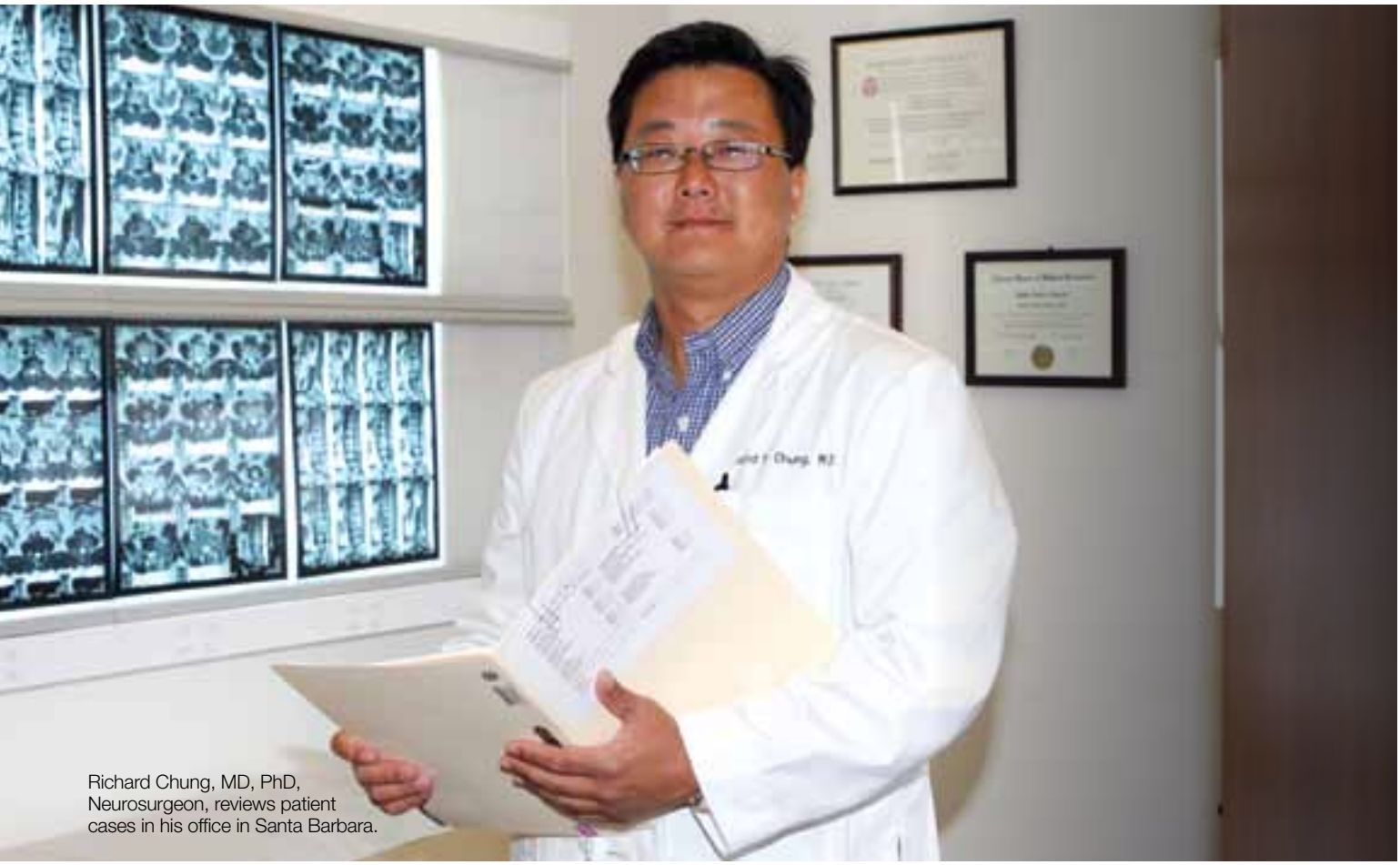
Patients with these tumors often present with loss of function in the distribution of the nerves involved. If a patient is asymptomatic, a lesion may be incidentally discovered during computed tomography or magnetic resonance imaging for another purpose. Schwannomas arise from the nerve sheath and may exhibit a growth pattern of compact, elongated spindle cells in irregular streams or looser mixes of cystic spaces and tissue. They account for between 6 and 8 percent of intracranial neoplasms and can result in nerve dysfunction and brainstem compression. With stereotactic radiosurgery, rates of tumor control in vestibular schwannomas measuring less than 3cm exceeds 95 percent.

Thomas Weisenburger, MD,
Radiation Oncologist

Radiation planning axial CT with contrast revealing isodose treatment lines with 95 percent of dose delivered in green area, which corresponds to tumor and minimal subclinical doses received by adjacent brainstem and temporal lobe



Axial T1 MRI with gadolinium showing the enhancing white tumor on R compressing the brainstem and involving the fifth cranial nerve



Richard Chung, MD, PhD, Neurosurgeon, reviews patient cases in his office in Santa Barbara.

Chiari Malformations: Improving Diagnoses

A usually congenital cerebellum formation disorder, adult-onset Chiari malformation is often under-diagnosed and may benefit from surgical intervention in certain cases.

CHIARI MALFORMATION (CM) is a structural defect classified by severity and the area of the cerebellum affected (see "CM Types"). Primary or congenital CM, which may be due to genetic mutation or nutrient deficiency, is characterized by space compression that puts pressure on the brain and spinal cord. A less common form, acquired or secondary CM, emerges in adults if cerebrospinal fluid (CSF) is drained from lumbar or thoracic areas of the spine due to injury, infection or other causes.

With CM, the cerebellar tonsils extend into the foramen magnum. Because the spinal cord is typically the only matter in this orifice, the presence of cerebellar tonsils can block CSF flow. Syringomyelia (CSF-filled cyst or "syrinx" within the spinal cord) may result. Hydrocephalus (excess CSF in the brain) is another potential related condition.

CM is estimated to occur in one of 1,000 births, although advances in diagnostic imaging suggest the incidence may be higher due to the delay of some symptoms until adulthood. Spinal curvature, whether scoliosis or kyphosis, is common in those in with CM. Myelomeningocele, which can occur in those with Type II CM, increases risk of developing tethered cord syndrome later in life.

DIAGNOSIS AND TREATMENT

Diagnosis of Type I CM typically follows a patient presenting with motor skill deficiencies, such as lack of hand coordination. Muscle weakness, dysphagia, hearing loss, vomiting, insomnia, tinnitus or dizziness may also occur. Refractory, usually occipital-predominant, headaches accentuated by Valsalva maneuvers such as straining, coughing, or sneezing are a hallmark.

Clinicians should flag refractory headaches combined with neurological symptoms and be aware that skull and spine anomalies will be apparent in an estimated 30 to 50 percent of patients with Type I CM. Arriving at a conclusive diagnosis for this condition can be complicated and a rigorous evaluation before recommending a treatment pathway and collaboration with a neurologist can enhance diagnosis.

> “Chiari malformation can be overlooked because the majority of symptomatic patients do not have neurological symptoms, only headaches. Headaches are so common in the general population that many patients have undergone extensive treatments for other common conditions such as migraine or tension type headaches before an imaging study is eventually done.”
>
> —Richard Y. Chung, MD, Neurosurgeon, Santa Barbara Neuroscience Institute at Cottage Health System

Computed tomography (CT) scan can aid in visualizing structure but often overlooks both Chiari malformation and syringomyelia. Magnetic resonance imaging (MRI) scan is considered the definitive diagnostic tool and should be utilized to view structural abnormalities and determine the cerebellum’s extension into the spinal canal. MRI sagittal views well demonstrate the extent of descent of the cerebellar tonsils. If any suggestion of a syrinx is evident, a cervical and/or thoracic MRI may also be indicated.

Cerebrospinal fluid flow dynamic studies also can be used and are evaluated at four regions: peribulbar cistern, foramen magnum, and ventral and dorsal spinal subarachnoid spaces.

TREATMENT OPTIONS

In the event of asymptomatic diagnosis, watchful waiting combined with patient education for symptoms may be indicated. If patient headaches respond to anti-inflammatory medications, surgery may be delayed. Prophylactic surgery, which requires significant recovery time, is not indicated for Type I CM.

The treatment approach generally followed at Santa Barbara Neuroscience Institute at Cottage Health System is conservative. When patient symptoms are chronic and CSF flow is severely restricted by syringomyelia, surgery may be indicated to repair these functional disturbances and stop progressive central nervous system damage.

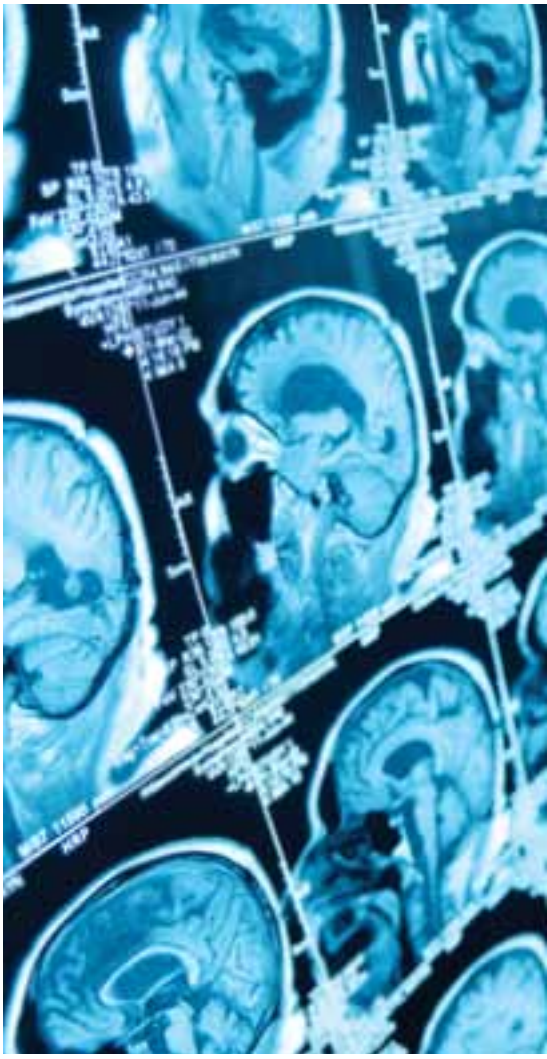
The most common surgical approach is posterior fossa craniectomy or posterior fossa decompression. This is done in conjunction with a cervical laminectomy and involves exposing and enlarging the dura, using synthetic material graft or harvested tissue, to relieve pressure on the cerebellum and establish CSF flow. Brain tissue is not typically resected except when reoperations are needed.

“The typical operative procedure involves removal of the suboccipital bone, as well as the C1 and possibly C2 lamina, depending on the downward extent of the tonsils,” says Richard Y. Chung, MD, neurosurgeon at Santa Barbara Neuroscience Institute at Cottage Health System. “The dura is expanded with a graft to enlarge the area. I will occasionally bipolar coagulate the lower tips of the tonsils to have them retract to improve CSF flow, but this is not always needed.”

Outcomes are generally good in terms of resolution of headaches. When significant neurologic symptoms or deficits are present, recovery of those issues can be more variable and may take weeks or even months to resolve with no guarantee of the degree of resolution. Patients rarely require reoperation, except in the event of postoperative complication such as infection or CSF leak.

“Patients who present with persistent headaches unresponsive to treatment or with features atypical of common conditions such as migraines merit imaging and referral to a neurologist for evaluation,” says Dr. Chung. “For patients’ benefit, I recommend primary care physicians keep some of these less common conditions in mind.”

To learn more, visit www.sbni.org or e-mail neuro@sbch.org.



Type I
In this, the most common form of Chiari malformation (CM), the cerebellar tonsils extend into the foramen magnum without disturbing the brain stem. The only CM that can be acquired through injury, illness or other causes, Type I may not cause symptoms and is typically diagnosed in adolescents or adults, often during examination for another condition.

Type II
In Type II CM, cerebellar and brain stem tissue both extend into the foramen magnum. This congenital condition also may be accompanied by myelomeningocele, a form of spina bifida that occurs when the spinal canal and backbone do not close before birth, resulting in spinal protrusion and possible paralysis. This formation is known as Arnold-Chiari malformation, named after the researchers who researched the condition.

Neuroscience by the Beach

The University of California, Santa Barbara (UCSB) may not have a medical school, but researchers at the university are nonetheless making important contributions to our understanding of the nervous system and how it can go awry.

by Anna Davison, senior writer, College of Engineering, University of California, Santa Barbara

RESEARCHERS' INSIGHTS are aiding the search for better treatments—perhaps even cures—for debilitating disorders such as Alzheimer's disease, autism and macular degeneration.

UCSB's interdisciplinary ethos encourages diverse disciplines, so insights from neuroscientists, psychologists, bioengineers, systems biologists, chemists and others are brought to bear on important problems in neuroscience.

UCSB scientists are using advanced tools like genomic analyses, nanoscale imaging techniques and functional magnetic resonance imaging (fMRI) to investigate the structure and function of the brain and other components of the nervous system, and to explore the neural basis of behavior.

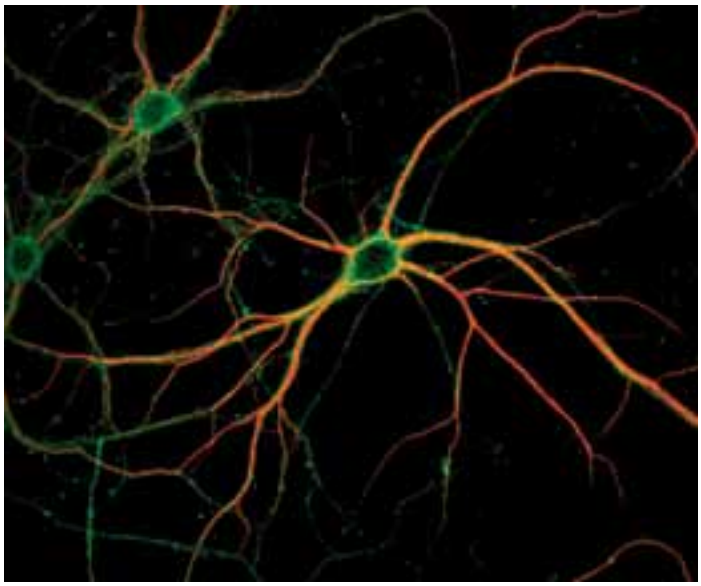
The work is being done across a number of UCSB departments—psychology, chemistry, mechanical engineering, chemical engineering, electrical and computer engineering, and molecular, cellular and developmental biology—and in various interdisciplinary centers, among them the Neuroscience Research Institute, the Alzheimer's Disease Research Center, the Center for the Study of Macular Degeneration, the Institute for Collaborative Biotechnologies and the Sage Center for the Study of the Mind.

Pierre Wiltzius, UCSB's dean of science, says the neuroscience research now underway represents some of the most exciting work being done at the university. The focus on understanding the development and normal functioning of the nervous system—how we learn, how we encode memories and how we perceive the world—is a valuable perspective, Wiltzius says, because "it's difficult for clinicians to step back and think about understanding a healthy person."

SPECIFIC PROJECT AREAS

Researchers at UCSB are studying how stem cells differentiate into the exquisitely specialized components of the nervous system. They're particularly interested in the visual system, and the university is the site of a research program on age-related macular degeneration, which focuses on understanding the cellular, molecular and genetic factors that contribute to the disease, and developing diagnostic and therapeutic tools to tackle it.

Neuroscientists at UCSB are looking at how Alzheimer's disease ravages the brain—in particular, at the amyloid plaques that are a hallmark of the disease—and how its progression might be slowed, stopped or perhaps even reversed.



Researchers at The University of California, Santa Barbara (UCSB) are studying the functioning of neurons and other components of the nervous system.
Photo: Sourav Banerjee, UCSB

Another brain disorder being investigated is autism, and UCSB scientists are studying the complex genetic underpinnings of the condition.

Using tools such as fMRI and electroencephalography, UCSB researchers are investigating individual differences in cognition and performance, such as attention and decision-making, in relation to brain structure and function. Scientists at the university are also studying how the brain deals with complex information and how it functions in virtual environments—work that puts UCSB at the leading edge of neuroscience research.

Future issues of *NEUROtransmitter* will cover some of the neuroscience research areas at UCSB in greater depth.

MUCSB Neuroscience Research Institute
http://www.nri.ucsb.edu/

UCSB Brain Imaging Center:
http://www.bic.ucsb.edu/

UCSB Department of Psychology:
http://www.psych.ucsb.edu/department/about/about.php

Benefits of Specialized Neurocritical Care

Santa Barbara Neuroscience Institute at Cottage Health System recently expanded specialized services by adding a neurointensivist who treats patients hospitalized for acute neurological conditions.

DEDICATED TO THE CARE of very critical patients with problems of the central nervous system, Mauricio Gomez, MD, neurointensivist at Santa Barbara Cottage Hospital, treats patients who suffer from life-threatening neurological conditions, including brain tumors; muscle diseases, such as myasthenia gravis or Guillian-Barré Syndrome; spinal cord disorders; status epilepticus; stroke; subarachnoid, intracerebral, subdural and intraventricular hemorrhages; and traumatic brain injury.

"I collaborate with neurosurgeons and subspecialists, using the latest treatment modalities for patients requiring neuroendovascular or neurointerventional care," says Dr. Gomez. "After patients leave the intensive care unit (ICU), a neurologist also becomes involved to provide treatment and contribute to continuity of care."

> "A growing body of evidence supports the Neurocritical Care Society's position that complex, life-threatening neurological diseases are best cared for by a multidisciplinary team with special expertise in neurocritical care."
>
> —Wendy Wright, MD, chair of the Advocacy Committee and member of the Board of Directors of the Neurocritical Care Society

NEURO-SPECIFIC TRAINING

Neurointensive care can positively affect the outcomes of patients who suffer from stroke or other neurological conditions, according to Dr. Gomez, who came to Cottage in October 2008 after completing his two-year neurology fellowship training in neurotrauma and neurocritical care at the University of California at Los Angeles.

A neurointensivist is trained in outcome-based clinical practices for critically ill patients diagnosed with stroke, neuromuscular respiratory failure, intracerebral or subarachnoid hemorrhage, traumatic brain and spinal cord injury, and other severe neurological conditions. Because treatment for complex neurocritical conditions may call on the expertise of specialists from a range of disciplines, the neurointensivist expedites collaboration and communication among clinicians to ensure quality of care, patient safety and, when necessary, adherence to advance directives.

Complications commonly experienced by neurointensive care patients may call for management of co-morbid conditions, including respiratory disorders, liver or kidney failure and infections. The neurointensivist is prepared to respond to these developments in addition to performing a range of medical services for neurocritical care inpatients, from central line placement and brain pressure monitoring to ventilator management.

The neurointensivist's role also includes frequently updating family members on the condition of a patient in neurointensive critical care.

To learn more, visit www.sbni.org or e-mail neuro@sbch.org.

Mauricio Gomez, MD, Neurointensivist

Patient and Family Education

When a patient is admitted for neurointensive care at Santa Barbara Cottage Hospital, Mauricio Gomez, MD, neurointensivist at Santa Barbara Neuroscience Institute, makes a special effort to attend to the needs of the patient's family. The relationship between a neurointensivist, the intensive care unit staff and family members is vital. Communication about the patient's condition and potential outcomes is essential for effective care.

"Delivering frequent family updates is crucial," says Dr. Gomez. "I report to the family at least every other day to keep them apprised of the neurological condition, the care we are recommending, and the prognosis for meaningful recovery. Similarly, I assist in arranging the next step for the patient outside of the ICU through collaboration with neurologists and other internal medicine specialists."

A Diagnosis of Exclusion

Thoracic outlet syndrome (TOS) is caused by the compression of the brachial plexus or the subclavian vein or artery. The diagnosis of TOS is generally made on the basis of history and physical examination and rarely on imaging studies or neurophysiological testing.

NEUROGENIC THORACIC OUTLET syndrome (TOS) can result from a neck trauma or repetitive stress movement injuries—such as using keyboards or working on assembly lines—which may cause changes in the scalene muscles, resulting in compression of the transiting nerves of the brachial plexus. Venous or arterial TOS may also occur due to the overdevelopment of muscles, as is seen in bodybuilders.

Diagnostic screening may include the elevated arm stress test (EAST), which is designed to trigger symptoms or obliterate the radial pulse, sometimes producing an audible bruit over the subclavian artery in the scalene triangle. Electrodiagnostic tests are only positive in 20 percent of patients in subsequently confirmed TOS.

"Neurotoxin [Botox®] treatment allows the scalene muscles to relax, enabling patients to engage in effective physical therapy," says Barry Ross, MD, physical medicine and rehabilitation physician at Cottage Rehabilitation Hospital. "Physical therapy is often the most effective conservative treatment because it improves structural or postural issues that contribute to patient symptoms."

One of many interventions utilized by Barry Ross, MD, physical medicine and rehabilitation physician, to treat patients with thoracic outlet syndrome and other musculoskeletal and neurologic conditions is aquatic therapy, which is available at The Tuohy Foundation Aquatic Center at Cottage Rehabilitation Hospital.

In patients with chronic disabling symptoms who have failed physical therapy, trigger point injections and, perhaps, scalene Botox injections, surgery may be required. With the possible exception of patients with surgical ribs, transaxillary first rib resection is the procedure of choice. Good results can be expected in 70 to 80 percent of these patients.

DIAGNOSIS AND TREATMENT

TOS is characterized by exertional pain, numbness, and weakness in the affected shoulder and arm. Ipsolateral headaches, hand swelling and Raynaud's phenomenon are frequently noted.

"TOS is an underappreciated cause of shoulder and arm pain," says Dr. Ross. "It is important for physicians to recognize the symptoms of TOS in their patients and refer them to specialists experienced in effectively treating this condition."

For more information or to refer a patient to Keck Center for Outpatient Services, contact the Cottage Rehabilitation Hospital outpatient admissions office at (805) 569-8900.

Cal-Neuro NETWORK

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.

Cal-Neuro NETWORK

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

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)

Testing the Efficacy of a PFO Closure Device

At Santa Barbara Cottage Hospital, Santa Barbara Neuroscience Institute physicians recently participated in a multi-center clinical trial to investigate the connection between stroke and patent foramen ovale (PFO).

THE CLOSURE I trial evaluated the safety and efficacy of the STARFlex® Septal Closure System versus best medical therapy in patients with a stroke and/or transient ischemic attack (TIA) due to presumed paradoxical embolism through a PFO. Results of the study, which involved 900 patients, are expected to be available this fall. Over the final two years of the study, Cottage was one of the top enrolling sites in the country, with medical personnel such as Phil Delio, MD, stroke neurologist and medical director of the stroke program at Cottage, and Zarith Alvarado, stroke nurse coordinator at Cottage, screening approximately 16 patients.

"We pride ourselves in pushing to explore the limits of the fields of stroke and neurology," Dr. Delio says. "This research is important for determining how we manage and care for patients with complex stroke."

STUDY SPECIFICS

Participants in the study were between 18 and 60 years old, had a PFO and, during the six months prior to the study's start, had experienced a stroke or TIA not due to another cardiac or vascular condition. Individuals were randomized to Coumadin® or aspirin or to closure with the STARFlex device. Followup occurred at intervals over two years, with participants in the medical therapy arm observed for recurrent stroke or TIA.

"A large percentage of patients who suffer cryptogenic stroke have a PFO," says Joseph Aragon, MD, FACC, FSCAI, cardiologist and director of the structural heart disease program at Cottage and division director of the department of cardiology at the Sansum Clinic. "We lack concrete evidence that closing these PFOs reduces the risk of a second event in comparison to medical therapy. If this trial clearly demonstrates that closing PFOs works better than medical therapy, the closure procedure will become much more prevalent, especially among young patients who dislike the prospect of taking medication for an indefinite period."

For more information about stroke care or research at Santa Barbara Neuroscience Institute, visit www.sbni.org or e-mail neuro@sbch.org.

This image shows the GORE HELEX Septal Occluder after deployment. The device sits within the patent foramen ovale (PFO) tunnel, and the two discs provide a barrier between the left and right atria.

Joseph Aragon, MD, Cardiologist, and Krista Johnson, CRT, in the cardiac catheterization laboratory at Santa Barbara Cottage Hospital.

Parameters for PFO Screening

"PFO [patent foramen ovale] is usually found in people younger than 60 who have had a first stroke or TIA [transient ischemic attack], in those with unexplained recurrent neurological events or in a migraine patient with a diffuse white matter injury and an abnormal MRI [magnetic resonance imaging] test," says Joseph Aragon, MD, FACC, FSCAI, cardiologist and director of the structural heart disease program at Santa Barbara Cottage Hospital and division director of the department of cardiology at the Sansum Clinic. "Those patients really should be screened for PFO."

Testing should include a transesophageal echocardiogram (TEE) and Valsalva maneuver. A diagnosis, however, does not necessarily mean the PFO should be closed. In very young patients, especially those who have not had recurrent stroke, Dr. Aragon often does not recommend PFO closure, as this may prevent a patient from undergoing valve treatments involving the atrial septum if required in the future.

Cottage HEALTH SYSTEM

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The 3rd Annual Neuroscience Symposium of the Central Coast featuring nationally recognized guest speakers, along with experts in the Neurosciences from Santa Barbara Cottage Hospital

On behalf of Cottage Health System, Dr. Alois Zauner and Dr. Philip Delio cordially invite you to attend

This year, our focus will be on:

- **Neuroscience Update** by Alois Zauner, MD
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- **Neurocritical Care** by Chad Miller, MD
- **Intracranial Tumors** by Susan Chang, MD
- **Neuroscience Research** by Frank Doyle III, PhD
- **Neuroscience Research** by Erkki Ruoslahti, MD, PhD
- **Neuroscience Research** by Ryszard Pluta, MD
- **Stroke Update** by Jeffrey Saver, MD
- **Spinal Cord Injury** by Allan Levi, MD
- **Case Presentation and Patient Interview** by Philip Delio, MD
- **Heart Disease and Stroke** by Joseph Aragon, MD
- **Neuroscience Nursing** by Jennifer Youngblood, RN, ACNP

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