SPRING 2013: ISSUE 3

NEURO-INNOVATION

News from the Stanford Neurology & Neurosurgery Departments

STANFORD HOSPITAL & CLINICS

CHAIRMEN'S MESSAGE

Stanford's commitment to collaborative multidisciplinary research among our faculty and our strong clinical partnerships with referring physicians—regionally, nationally and internationally—foster world-class patient care and exceptional outcomes. This Neuro-Innovation issue highlights our novel collaborative model and defines the future of neuroscience at Stanford.

Our clinical and research programs combine the strengths of Stanford Hospital & Clinics and Lucille Packard Children's Hospital (LPCH) to deliver world-class patient care. Over 130 full-time School of Medicine neurology and neurosurgery faculty and affiliated hospital-based faculty provide comprehensive neuroscience clinical services. Propelled by Northern California's burgeoning population, Silicon Valley technology, and extraordinary School of Medicine and Hospital leadership, major expansion is underway of both Stanford Hospital & Clinics and LPCH that will transform patient care in the 21st century (www.sumcrenewal.org).

This issue features our unique partnership between Stanford and local affiliates, exemplifying our focus on collaboration as we mobilize experts in acute and chronic **traumatic brain injury**, including specialists in rehabilitation and epidemiology, to improve care and outcomes for polytrauma patients.

Frank M. Longo, MD, PhD
George E. and Lucy Becker Professor
Chairman, Department of Neurology and Neurological Sciences

Gary K. Steinberg, MD, PhD
Bernard and Ronni Lacroute-William Randolph Hearst Professor of Neurosurgery and the Neurosciences
Chairman, Department of Neurosurgery

We also showcase our pioneering multigenerational model for patients with complex diseases of the peripheral nerves and muscles. Specialists at **Stanford Hospital & Clinics** and **LPCH** work together to treat patients over their lifespan in a newly renovated state-of-the-art outpatient Neuromuscular clinic for adult patients.

In October 2012, **Stanford Stroke Center** received the nation's first Comprehensive Stroke Center certification by the Joint Commission. Our neurologists, neurosurgeons, neuroradiologists, nurse specialists, basic scientists and clinical researchers, led by our original founders, provide the most advanced complex stroke care possible. We are proud of our multidisciplinary team that achieved this tremendous milestone.

Underscoring our dedication to excellence from bench to bedside, Stanford scientists continue to demonstrate exciting results, such as small-molecule therapeutics and naturally occurring brain proteins that reduce the effects of stroke and stimulate functional recovery in animal models. These discoveries have translational potential as future stroke therapeutics. Over 70 international basic and clinical neuroscientists and rehabilitation specialists joined us at our inaugural 2012 **Spinal Cord Injury Symposium** to advance the field of regenerative medicine in spinal cord injury. The new **Jill and John Freidenrich Center for Translational research** is a state-of-the-art hub for the multiple clinical trials we have underway and include in this issue of Neuro-Innovation.

We are committed to our partnerships with referring physicians and look forward to your inquiries at 1.800.800.1551. We welcome opportunities to collaborate with you on basic research, clinical trials and patient care as we strive to make a positive difference in every patient's life.

We invite you to join us November 1–2 for the 2013 Breakthroughs in Neurologic Therapies CME course in San Francisco, California, for our latest clinical and research updates.

INSIDE THIS ISSUE

Huntington's Disease Society of America
Pacific Southwest REGION

Rosalind Chuang, MD, clinical director of Stanford's multidisciplinary Huntington's Disease/Genetic Ataxia clinic was honored May 10, 2013, by the Huntington's Disease Society of America at their Dinner of Hope event. Each year, the Society recognizes outstanding leaders in Northern California for their significant contributions to business, medicine and philanthropy. This honor reflects Dr. Chuang's clinical leadership and commitment to providing world-class compassionate care for patients and families affected by Huntington's Disease.

Nation's First Comprehensive Stroke Center Certification

The Stanford Stroke Center, established in 1992 as one of the first multidisciplinary centers of its kind, was the nation's first recipient of the Comprehensive Stroke Center Certification in 2012, awarded by The Joint Commission. The multidisciplinary team of complex stroke care specialists is honored to be recognized with the highest level of center certification.

Stroke Center team (left to right). Front Row: Stephanie Casal, RN, MS, CNS; interventional neuroradiologist Michael Marks, MD; neurosurgeon Gary Steinberg, MD, PhD; JJ Baumann RN, MS, CNS. Back row: neurologist Greg Albers, MD; Joli Vavao MSN, ACNP, CNRN; Teresa Bell-Stephens, CNRN; Mary Marcellus, RN.

As a global leader in stroke research and treatment, the Center has received a number of awards for clinical excellence and has provided care for more than 25,000 patients with cerebrovascular disorders. In addition, consistently ranking as one of the most prolific research groups in the nation, Stanford has developed major advances in medical therapies, neurosurgical techniques and interventional neuroradiology procedures.

The Neurocritical Care Program has made key advances in the diagnosis of intracerebral hemorrhage and prognosis of coma. Stanford neuroscientists have helped clarify the basic mechanisms of stroke-induced brain injury and have pioneered several new imaging techniques.

The three visionary founders of the Center are still actively innovating and leading cutting edge complex stroke care. "The Stanford Stroke Center's foundational philosophy is key to its success," says Center director Greg Albers, MD. "To partner neurosurgery, neurology and interventional neuroradiology seemed sensible," he adds, "but it was a unique concept then. We were confident that this approach would be fruitful, and the administrators at Stanford Hospital and the University supported us."

Over 50 hospitals initially applied for the certification, involving a rigorous review process requiring extensive documentation to set a center apart from what the Joint Commission currently requires for the 1,000 hospitals in the nation designated as primary stroke centers. In addition to treating stroke, comprehensive centers must demonstrate their ability to deal with the most challenging neurosurgical and neuroradiological cases, including expertise in arteriovenous malformation procedures, complex aneurysm clipping and endovascular coiling techniques. These facilities must have interdisciplinary teams of neurointerventionalists, neuroradiologists, neurosurgeons, and endovascular technicians equipped with the latest high-tech surgical tools and sophisticated brain imaging capabilities.

One of the Center's essential elements, particularly commended by The Joint Commission surveyors, is the monthly meeting of the Stroke Interdisciplinary Team. This collaboration encourages networking and discussions that are valuable because of their frankness.

Stroke is the fourth leading cause of death and the most common cause of adult disability. More than 795,000 strokes occur in the United States each year; as the population ages, it is estimated that the number of strokes will increase substantially over the next decade. During the Center's third decade, even more dramatic breakthroughs are anticipated in stroke research. Stanford's clinical, educational, and research programs continue to innovate and the tremendous support the Center has received from the community is greatly appreciated. ■

Breakthrough in Hunt for Stroke Therapeutics

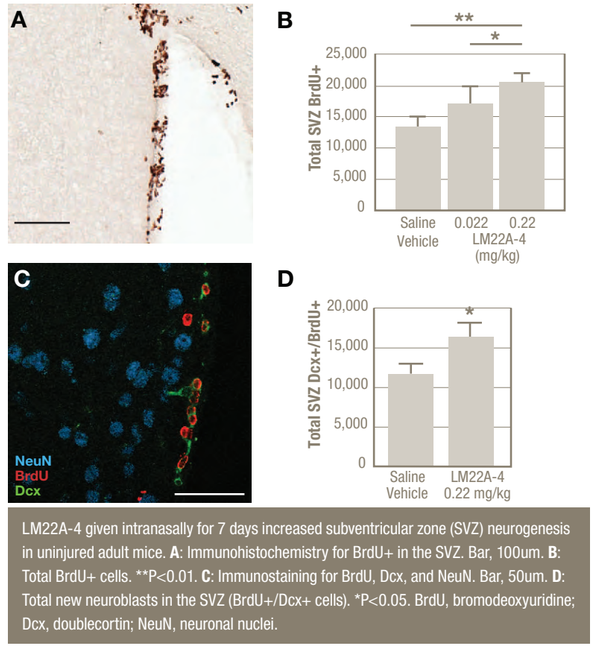
αB-crystallin breaks tPA's treatment window barrier

In a recent study led by Gary Steinberg, MD, PhD, and Lawrence Steinman, MD, the George A. Zimmermann Professor of Neurology and Neurological Sciences and of Pediatrics, mice treated with αB-crystallin—a naturally occurring anti-inflammatory found by Dr. Steinman to reduce brain inflammation in animal models of multiple sclerosis—demonstrated reduced infarct sizes even when administered up to 12 hours after stroke. This is well beyond the 4.5 hour treatment window of the only approved drug for stroke, tissue plasminogen activator (tPA).

This groundbreaking work, published in *PNAS*[1] has important implications as tPA can only dissolve blood clots, whereas αB-crystallin interferes with the post-stroke inflammatory processes that contribute to brain damage and thus may offer a therapeutic role. Co-first authors Ahmet Arac, MD, and Sara Brownell, PhD, found that mice engineered to lack αB-crystallin experienced worse infarcts and more brain inflammation, and that re-introduction of αB-crystallin into these deficient mice significantly reduced lesion sizes. αB-crystallin treatment in wild-type animals also decreased the ability of certain immune cells to secrete deleterious molecules in the post-stroke brain. Of note, plasma levels of αB-crystallin were elevated in mice after stroke and in human stroke patients—especially in younger patients, whose recovery from stroke is often accelerated, though not in patients older than 80 years, whose strokes are often more catastrophic. Future studies aim to confirm these results and test extended time-windows as well as optimal dosaging.

Small molecule enhances post-stroke recovery

Stanford researchers, led by senior author Marion Buckwalter, MD, PhD, assistant professor of neurology and neurological sciences, and neurosurgery, are applying small molecule therapeutics to post-stroke recovery. Their promising results, recently published in *Stroke*,[2] show that a small molecule designed to target one of two receptors on neurons for brain-derived neurotrophic factor (BDNF) can stimulate the birth of new neurons from the brain's resident stem cells and improve functional recovery in adult mice after ischemic stroke. This molecule, called LM22A-4, showed efficacy even when administration didn't start until 3 days after stroke onset. This means that the compound, rather than limiting stroke's initial damage, enhanced recovery. The experimental mice, trained in maneuvers before undergoing stroke, were administered daily doses of LM22A-4 for 10 weeks starting at post-stroke day 3 and had their motor skills tested. All showed significant functional improvement over their non-treated counterparts. Importantly, LM22A-4 administration also doubled the numbers of new mature and immature neurons adjacent to the stroke-damaged area of the brain. ■



LM22A-4 given intranasally for 7 days increased subventricular zone (SVZ) neurogenesis in uninjured adult mice. **A**: Immunohistochemistry for BrdU+ in the SVZ. Bar, 100um. **B**: Total BrdU+ cells. **P<0.01. **C**: Immunostaining for BrdU, Dcx, and NeuN. Bar, 50um. **D**: Total new neuroblasts in the SVZ (BrdU+/Dcx+ cells). *P<0.05. BrdU, bromodeoxyuridine; Dcx, doublecortin; NeuN, neuronal nuclei.

Excellence Spans the Continuum of Polytrauma Care

Odette Harris, MD, MPH, treats acute traumatic brain injured patients as well as subacute and chronic patients in her role as associate chief of staff, polytrauma, and director of Defense Veterans Brain Injury Center at the Veterans Affairs Palo Alto Health Care System Polytrauma System of Care (VAPAHCS PSC). This gives her a unique opportunity to think upstream and downstream in terms of enhanced outcomes for her polytrauma patients.

Odette Harris, MD, MPH

Most trauma departments are compartmentalized. "Traditionally we briefly see the patients and their rehab specialists after surgery," she says, "but in this new model we can see how effective our methods are across a continuum of care and communicate with our embedded neuropsychology and physical medicine and rehabilitation colleagues."

A unique partnership between the VAPAHCS, Stanford and Santa Clara Valley Medical Center (SCVMC) brings data together from experts treating a wide range of civilian, veteran and active duty patients with a lifetime of follow-up care. At the forefront of clinical standards, with a world-class trauma team supported by a network of subspecialties in rehabilitation and epidemiology, these Stanford partnerships inform the field by contributing to guidelines in severe traumatic brain injury (TBI) across the entire disease matrix.

Dr. Harris has expertise in epidemiology, which she applies to her fellowship with the Clayman Institute of Gender Studies at Stanford[1] in a unique qualitative and quantitative study analyzing the outcome metrics for polytrauma on women. In her latest research, she has proposed a retrospective cohort study to evaluate differences between women and men who have suffered from TBI and are receiving care at VAPAHCS PSC. From this unique patient population, baseline information such as injury mechanism, health status, psychiatric assessments and quality of life indicators will be collected. With over 1,000 patients in this population, and at least 60 female participants expected, her research group will track them over time and evaluate utilization of services, quality of life, and psychological status. These data will provide a unique window into key morbidities and how they translate into predictive models and inform forward thinking cost containment strategies. The qualitative portion of the project features digital storytelling. Women tell their own stories, supported by therapists experienced in the field of women and associated trauma.

Dr. Harris, associate professor of neurosurgery and director of brain injury, is also involved with the ProTECT III clinical trial examining the therapeutic potential of progesterone in TBI.[2] Dr. Harris points to her colleague Greg Goodrich, PhD, whose research with collaborators led to a national directive mandating vision screening for all TBI patients.[3] The TBI research forum on March 15 created a unique networking experience across all levels of expertise.[4]

Stanford's innovative atmosphere continues to attract world-class experts with essential qualities of authenticity, ethics, passion and hard work who then partner to develop trust and ask each other "How are you changing the world?" ■

Neurospine and Orthopaedics Forge Collaboration

At Stanford neurosurgeons and orthopaedic surgeons share their highly specialized skills.

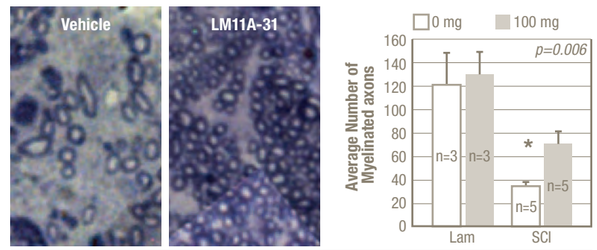
John Ratliff, MD

John Ratliff, MD, associate professor of neurosurgery and co-director of Stanford Neurosurgery Spine Program, and the neurosurgery team hold monthly case review meetings with orthopaedic colleagues to strategize, reduce complications and improve patient outcomes. This provides Stanford teams an innovative multidisciplinary platform from which to launch prospective studies over the entire spectrum of care in trauma surgery. Working with Eugene Carragee, MD, Ivan Cheng, MD, and other orthopaedic colleagues on an ambitious prospective data accrual study, Dr. Ratliff aims to maximize the quality of patient outcomes by leveraging the robust capabilities of Stanford's medical informatics and clinical services. Dr. Ratliff and Dr. Cheng, along with Richard Olshen, PhD, and Ray Balise, PhD, from the Biostatistics and Health Research and Policy departments, have recently been awarded a prestigious grant from the Orthopaedic Research and Education Foundation,[5] one of only five in the nation, titled "Developing a patient-centered clinical tool for assessment of risk of perioperative complications in spine surgery procedures."

Dr. Ratliff highlights the partnership that Graham Creasey, MD, professor of neurosurgery and the Paralyzed Veterans of America Professor of Spinal Cord Injury Medicine, spearheaded between Stanford, SCVMC, the VAPAHCS and other regional institutions to provide the commercial infrastructure and unparalleled research environment necessary for spinal cord injury clinical trials. It is difficult to pull all the required components together for a complex clinical trial site as was the case for the Geron stem cell trial. Stanford's dedicated infrastructure accelerates the pace of research, fosters innovation and advances therapeutic development. With open dialogue between world-class surgeons and a wide spectrum of interdisciplinary researchers, the future is bright for NeuroSpine at Stanford. ■

Potential First in Class Treatment for Spinal Cord Injury

In a major breakthrough, LM11A-31 promotes functional recovery in a mouse model of spinal contusion injury. This non-peptide small molecule demonstrated the ability to cross the blood brain barrier following oral administration, as well as the blood spinal cord barrier, without toxic effects. The study, a collaboration between Frank Longo, MD, PhD, professor and chair of neurology and neurological sciences, and colleagues from The Ohio State University, University of California at San Francisco and Stanford University, was recently published in *The Journal of Neuroscience*.[6] Administered beginning 4 hours after injury, and twice daily thereafter, CNS/plasma levels were exceptionally favorable. Improved motor behavior, especially gait and overall coordination, was observed. Spinal cord injury leads to death of oligodendrocytes and loss of myelin. LM11A-31 administration led to a twofold increase in the number of spared oligodendrocytes and an accompanying increase in myelinated axons (see figure), an effect similar to that seen following cell transplantation after spinal cord injury. This novel, noninvasive, mechanism-based therapeutic blocks proNGF binding to the low-affinity p75 NGF receptor, thereby inhibiting degenerative signaling and loss of oligodendrocytes and myelin. The potential clinical dose is modest, 600 mg for a 70 kg human, and shows great translational promise. Additional studies will assess further efficacy by extending the treatment duration across the established degeneration period of greater than 450 days after the initial injury, as this study accounted for only approximately 10% of that potential therapeutic window. ■



Following spinal cord injury there is a loss of myelinated axons (left). Treatment with LM11A-31 leads to sparing of myelinated axons (right).

STANFORD HOSPITAL & CLINICS

Regeneration Reporter Mouse

In both the clinic and laboratory, Thomas Rando, MD, PhD, professor of neurology and neurological sciences, has devoted his career to the study of muscle diseases, in particular the muscular dystrophies caused by mutations in the dystrophin gene (Duchenne muscular dystrophy), the caveolin-3 gene (limb-girdle muscular dystrophy 1C) and the dysferlin gene (limb-girdle muscular dystrophy 1B). Dr. Rando studies skeletal musculature to understand the biology and genetic mechanisms involved in homeostasis and disease states while building models toward novel therapeutics.

Thomas Rando, MD, PhD

There is still no cure or effective therapy for muscular dystrophies, only temporizing interventions such as corticosteroid use, surgical tendon release and assisted ventilation. While these interventions may improve the quality and length of life in some patients, Dr. Rando believes the discoveries necessary to advance truly beneficial therapies for patients depend on animal models that reflect human disease progression.

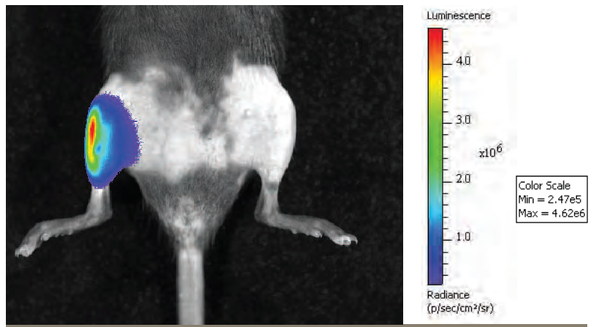
An exciting recent study from Dr. Rando's laboratory is reported in *Journal of Clinical Investigation*.[1] Lead author Katie Maguire, PhD, and colleagues created a successful mouse model of limb girdle Muscular Dystrophy 2B that safely and *non-invasively* tracks dystrophic disease progression over time. They call it the "regeneration reporter" mouse.

This mouse model vastly improves on standard histological analysis of individual mouse tissue slices—a labor- and time-intensive strategy that provides mostly qualitative information at one time point, on only one area of muscle. The reporter model allows real-time *quantitative* monitoring of disease progression *in a living animal over time* with bioluminescent signaling of muscle stem cells, specifically, that express the luciferase gene. When the stem cells proliferate in response to muscle degeneration caused by the disease, luciferase expression increases.

The regeneration reporter mouse in this study was monitored over 18 months. Dr. Rando and his group found that clinical disease progression strongly correlates with increases in bioluminescent signals in this dystrophic model. Moreover, onset of disease can be detected before it is histologically evident. This technology is also applicable to all murine models of muscular dystrophy. The future of regenerative medicine and preclinical evidence of disease rests on outcomes such as these.

Dr. Rando sees this model, to be shared with researchers around the globe, as an extremely effective noninvasive tool to test potential therapeutics. He believes that sharing data with other researchers leverages Stanford's expertise and accelerates the clinical translation of laboratory discoveries.

"Stanford is such a rich environment for collaboration," Dr. Rando says, "there is an exceptional colleague around every corner and the opportunity to apply state-of-the-art technology to translate basic laboratory research into clinically relevant advances." With regard to these kinds of studies, Dr. Rando points to the value of facilities such as the Richard M. Lucas Center for Imaging, which is devoted to research in magnetic resonance imaging (MRI), spectroscopy (MRS) and computed tomography (CT) imaging and a collaborative model by design, that offers state-of-the-art imaging technologies for studies ranging from basic biology to clinical therapeutics. ■



Control "Regeneration Reporter" mouse showing significant and quantifiable bioluminescent illumination of muscle stem cells activated in the right hindlimb muscle in response to muscle injury.

Comprehensive Clinic for Neuromuscular Disorders

John W. Day, MD, PhD, has expanded upon the transitional care model often used in diseases like cystic fibrosis to a visionary modality he calls family-based treatment.

John Day, MD

As director of the Neuromuscular Division and Clinics, Dr. Day has advanced clinical research, clinical trials and the concept of multigenerational patient care in order to organize a comprehensive effort to combat and conquer diseases of the peripheral nerves and muscles. These include the muscular dystrophies (myotonic, Duchenne, limb girdle, facioscapulohumeral and congenital muscular dystrophies), motor neuron disorders, neuromuscular junction disease and peripheral neuropathies. With patients and families foremost in mind, Dr. Day's research seeks to define and understand genetic causes, to clarify the molecular and cellular consequences of genetic change, to determine the multisystemic features that are an underappreciated but clinically significant consequence of these diseases, and to develop and improve methods to manage and treat them.

Dr. Day, professor of neurology and neurological sciences, and pediatrics, describes the unique Stanford Hospital and Lucille Packard Children's Hospital (LPCH) partnership as a commitment to deploying the resources necessary to meet the needs of families with these complex and ultimately fatal diseases. Improved outcomes are a result of dedicated resources that provide advanced diagnostic and patient/disease management, as well as access to neurologists, neuropathologists, advanced care providers, social workers, genetic counselors, physical therapists, and occupational therapists who are all experienced with the unique features of neuromuscular disease.

As a Muscular Dystrophy Association (MDA) designated hospital, Stanford Hospital & Clinics has an on-site coordinator to help patients access services. Stanford's MDA/ALS Clinic is staffed by clinicians experienced in coordinating care with experts in pulmonary medicine, physical and occupational therapy, social work, and augmentative communication.

Dr. Day is passionate about educating patients, families, trainees and clinicians, and regularly participates in outreach programs. Speaking with trainees and practicing physicians he commonly emphasizes the importance of identifying cryptic neuromuscular disorders (for example, elevated transaminases, often assumed to imply liver disease, can instead result from muscle damage that is easily revealed by checking serum CK). He also stresses that neuromuscular disorders frequently have effects beyond those on nerves and muscles, with the underlying genetic abnormalities directly altering cardiac and gastrointestinal function, and frequently affecting cognitive function and behavior. Neuromuscular disorders aren't rare, affecting hundreds of thousand Californians, so diagnosing them correctly and understanding their complex effects can begin to finally reduce the mortality and morbidity of these devastating conditions. ■

One family exemplifies the importance of this new approach. The youngest member of the family was born with severe generalized weakness that resulted in inadequate breathing, requiring a tracheostomy and fulltime mechanical ventilation for the first 9 months of life. Further complicating her development, her weakness interfered with her ability to speak or use sign language. Even though these severely weak patients are often deemed hopeless, and support is withdrawn, with awareness of recent evidence that this patient's strength would improve, both she and her mother (several family members having been shown to be affected) received optimal, aggressive, multidisciplinary support (initially with Dr. Day and other providers outside California, but now at LPCH and Stanford Hospital Neuromuscular Clinics); the patient, now 6 years old, is ambulatory, breathing without tracheostomy or ventilator support, and mainstreamed in school, where she is doing extremely well. Clearly family-based support and up-to-date information on disease prognosis and management can significantly affect outcome.

Stanford Neuromuscular team (left to right). Back row: Safwan Jaradeh, MD; Les Dorfman, MD. Third row: Carly Siskind, MS, LCGC; Karolina Watson, RN-CANP; Judy Henderson, MA, CCC-SLP; S. Charles Cho, MD. Second row: Julie Mello, DPT; Jennifer Fisher; Kristina Zekos-Ortiz, RRT, AE-C; Hannes Vogel, MD. Front row: Roma Patel, PA-C; Michileen Oberst, LCSW; Shirley Paulose, MS; Angelica Martinez; John W. Day, MD, PhD; Neelam Goyal, MD; Yuen So, MD, PhD.

Stanford Opens State-of-the-Art Clinical Trials Center

Photo Credit: Mark Estes

On October 17, 2012, Stanford opened the Jill and John Freidenrich Center for Translational Research, a patient-centered 30,000 sq. ft. facility for designing and conducting human-subject clinical trials, located on campus adjacent to Stanford Hospital & Clinics and Lucile Packard Children's Hospital.

The Center features 27 patient stations, an infusion center, a sample collection laboratory, two phlebotomy rooms and an outdoor play area with a separate entrance for pediatric subjects. All the personnel required to manage the human side of clinical trials—nurses, nutritionists and psychologists—are on site. There are also specialized rooms for informed consent discussions, remote observation, sleep studies and exercise physiology testing.

For questions about the following clinical trials, please contact our clinical trials research coordinator Maria Coburn at **650.736.9551** or **mcoburn@stanford.edu**

NEUROSURGERY

An Open Label, Multicenter, Single Arm Study of Pasireotide LAR in Patients with Rare Tumors of Neuroendocrine Origin
For patients with disease progression despite standard therapy or for whom no standard therapy is available.
PI: Laurence Katznelson, MD
(NCT00958841)

A Phase I/IIA Study of the Safety and Efficacy of Modified Stromal Cells (SB623) in Patients with Stable Ischemic Stroke
SB623 will be implanted into the peri-infarct region of the brain between 6-24 months after stroke.
PI: Gary K. Steinberg, MD, PhD
Sub-PI: Neil Schwartz, MD
(NCT01287936)

Radiosurgical Neuromodulation for Refractory Depression
Co-PIs: Hugh Brent Solvason, MD, PhD and John R. Adler, MD
(NCT01403441)

BrainGate2: Feasibility Study of an Intracortical Neural Interface System for Persons with Tetraplegia
To obtain preliminary device safety information and to demonstrate the feasibility of people with tetraplegia using the System to control a computer cursor and other assistive devices with their thoughts. Additionally to determine the participants' ability to operate communication software, such as e-mail, simply by imagining the movement of their own hand. The study is invasive and requires surgery.
PI: Jaimie Henderson, MD
(NCT00912041)

Comparison of overall survival post-CyberKnife radiosurgery treatment of patients with 1–3 versus 4 or more brain metastases
PI: Steven D. Chang, MD
Co-PIs: Judith A Murovic, MD, Griff Harsh, MD, Gordon Li, MD, Iris C. Gibbs, MD, Scott Soltys, MD, Steve Hancock, MD
(NCT01778764)

CyberKnife Radiosurgery and Quality of Life
Pain control and quality of life improvement after treatment with CyberKnife radiosurgery for spinal metastases.
PI: Steven Chang, MD
(NCT01163539)

A Phase II Study of Rindopepimut/GM-CSF in Patients with Relapsed EGFRvIII-Positive Glioblastoma
To determine if adding the experimental vaccine rindopepimut (also known as CDX-110) to bevacizumab can slow tumor growth and improve progression-free survival of patients with relapsed EGFRvIII positive glioblastoma.
PI: Gordon Li, MD
(NCT01498328)

Effects of Growth Hormone on Cognition and Cerebral Metabolism in Adults
To elucidate the effects of growth hormone replacement in patients with growth hormone deficiency on cognitive function using structural and functional neuroimaging and cognitive testing.
PI: Laurence Katznelson, MD
(NCT01007071)

A Phase I Trial of Vorinostat Concurrent with Stereotactic Radiotherapy in Treatment of Brain Metastases from Non-Small Cell Lung Cancer
PI: Griff Harsh, MD
(NCT00946673)

Familial Intracranial Aneurysm (FIA) Study
To explore genetic and environmental factors associated with the incidence of familial intracranial aneurysms. The study continues to enroll non-familial affected patients.
PI: Gary K. Steinberg, MD, PhD
(NCT00071565)

Progesterone for the Treatment of Traumatic Brain Injury (ProTECT III)
To determine if intravenous (IV) progesterone, started within 4 hours of injury and given for a total of 96 hours, is more effective than placebo for treating victims of moderate to severe acute traumatic brain injury.
Stanford PI: Jim Quinn, MD
Sub-PI: Marco Lee, MD
(NCT00822900)

A Study of Amifostine for Prevention of Facial Numbness in Patients Receiving Stereotactic Radiosurgery for Trigeminal Neuralgia
Co-PIs: Clara Choi, MD, PhD and Scott Soltys, MD
(NCT01364259)

A Phase I/II Trial of Fractionated Stereotactic Radiosurgery to Treat Large Brain Metastases
To determine the optimal radiation dose.
Co-PIs: Scott Soltys, MD and Clara Choi, MD, PhD
(NCT00928226)

A Phase I/II Trial of Temozolomide and Hypofractionated Radiotherapy in the Treatment of Supratentorial Glioblastoma Multiforme
To determine the safety and effectiveness of 1 week versus 6 weeks of hypofractionated radiotherapy in combination with temozolomide.
Co-PIs: Scott G. Soltys, MD and Clara Choi, MD, PhD
(NCT01120639)

A Study of Patient Reported Outcomes After Stereotactic Radiosurgery for Trigeminal Neuralgia
PIs: Clara Y.H. Choi, MD, PhD and Scott G. Soltys, MD
(NCT01364285)

Investigation of DTI MRI as a Correlate to Pain Relief and Facial Numbness in Patients Following Stereotactic Radiosurgical Rhizotomy for Trigeminal Neuralgia
PIs: Clara Choi, MD, PhD and Scott Soltys, MD
(NCT01364272)

RADIOLOGY/NEURORADIOLOGY

Quantifying Collateral Perfusion in Cerebrovascular Disease
This study utilizes MRI to improve the detection and assessment of collateral blood vessels in patients with diseases of the brain, such as moyamoya disease and stroke.
PI: Greg Zaharchuk, MD, PhD
(NCT01419275)

INTERVENTIONAL NEURORADIOLOGY

Vitesse Intracranial Stent Study for Ischemic Therapy (VISSIT)
This study is evaluating a new intracranial stent for intracranial stenosis.
PI: Michael P. Marks, MD

NEUROLOGY

Migraine Prophylaxis with BOTOX in Adults
To study the long-term efficacy, safety and tolerability of BOTOX (onabotulinumtoxinA) for the prophylaxis of headaches in adult patients with chronic migraine.
PI: Sheena K. Aurora, MD

Population-based Studies of the Prevalence and Predisposing Factors of Peripheral Neuropathy
In collaboration with epidemiologists at UC Berkeley, the study investigates the potential environmental or occupational risk factors for peripheral neuropathy.
PI: Yuen So, MD, PhD

HDE Post-Approval Study (PAS) of NeuRx DPS™ for ALS
Further investigation on the benefits and risks of diaphragmatic pacing to preserve respiratory function in patients with amyotrophic lateral sclerosis (ALS).
PI: Yuen So, MD, PhD
(NCT01605006)

An Exploratory Study to Assess Two Doses of GSK2402968 in the Treatment of Ambulant Boys with Duchenne Muscular Dystrophy
PI: Yuen So, MD, PhD
(NCT01462292)

Tissue Banking of Blood, Spinal Fluid or Skin Biopsy for the Research of Neurological Diseases
PI: Yuen So, MD, PhD

A Phase 4 Study to Evaluate the Efficacy and Safety of Alglucosidase Alfa Produced at the 4000 L Scale for Pompe Disease
PI: John Day, MD, PhD
(NCT01526785)

Inherited Neuropathies Consortium
PI: John W. Day, MD, PhD

A Phase III Efficacy and Safety Study of Ataluren (PTC124) in Patients with Nonsense Mutation Dystrophinopathy
PI: John W. Day, MD, PhD

Subject Database and Specimen Repository for Neuromuscular and Neurodegenerative Disorders
PI: John W. Day, MD, PhD

Development and Validation of a Disability Severity Index for Charcot-Marie-Tooth Disease
PI: John W. Day, MD, PhD
(NCT01455623)

Clinical and Genetic Characterization of Myotonic Dystrophy
PI: John Day, MD, PhD

A Study to Assess the Safety, Tolerability, and Pharmacokinetics of Multiple Doses of ISIS 396443 Delivered Intrathecally to Patients with Infantile-Onset Spinal Muscular Atrophy
PI: John W. Day, MD, PhD

Brain Networks in Neurodegenerative Diseases
To prospectively evaluate the application of FDG PET to aid in the diagnosis of Parkinson's disease and other atypical Parkinsonian syndromes.
PI: Kathleen Poston, MD, MS

The Parkinson's Genetic Research Study (PaGeR)
Co-PIs: Kathleen Poston, MD, MS and Rosalind Chuang, MD
(NCT01558479)

To Evaluate the Efficacy and Safety Of Ocrelizumab in Comparison to Interferon Beta-1a (Rebif) in Patients With Relapsing Multiple Sclerosis
PI: Jeffrey Dunn, MD
(NCT01412333)

CLINICAL TRIALS

STANFORD HOSPITAL & CLINICS

To investigate the long term safety, tolerability, and efficacy of ACT-128800 (Ponesimod) in patients with relapsing remitting Multiple Sclerosis
PI: Jeffrey Dunn, MD
(NCT01093326)

An Extension Protocol for Multiple Sclerosis Patients Who Participated in Previous Studies of Alemtuzumab
PI: Jeffrey Dunn, MD
(NCT00930553)

Biobank For MS And Other Demyelinating Diseases
To establish a large, longitudinal collection of high quality samples and data from subjects with MS, selected other demyelinating diseases as a shared resource to scientists researching the causes, sub-types, and biomarkers of MS and related demyelinating diseases.
PI: Jeffrey Dunn, MD
(NCT00445367)

Prognostic Value of MRI and Biomarkers in Comatose Post-cardiac Arrest Patients (COMA)
To assess the value of state-of-the art brain imaging techniques (MRI), and blood tests in predicting outcome in these patients.
Co-PIs: Greg Albers, MD and Karen Hirsch, MD

Glyburide Advantage in Malignant Edema and Stroke
Phase II trial of RP-1127 (Glyburide for Injection) in patients with a severe anterior circulation ischemic stroke who are likely to develop malignant edema.
PI: Gregory Albers, MD

Platelet-Oriented Inhibition in New TIA and Minor Ischemic Stroke (POINT) Trial
A phase 3 study to determine if aspirin and clopidogrel together reduces the risk of stroke, heart attacks and other complications compared to aspirin alone.
PI: Gregory Albers, MD
(NCT00991029)

Prognosis of Critically Ill Neurological Patients
To determine how well health care providers can predict future neurological outcomes, if they differ in the prediction of outcome, and to assess outcomes of this patient population.
PI: Anna Finley-Caulfield, MD

Transient Ischemic Attack (TIA) Triage and Evaluation of Stroke Risk
PI: Gregory Albers, MD
(NCT01423201)

Insulin Resistance Intervention After Stroke Trial (IRIS)
To determine if pioglitazone will reduce the overall risk for fatal or nonfatal stroke or MI among non-diabetic men and women over age 44 years with insulin resistance and recent ischemic stroke or TIA.
PI: Maarten Lansberg, MD
(NCT00091949)

CRISP: A multi-center cohort study of acute stroke patients who are treated with endovascular therapy
The study is designed to determine optimal CT perfusion criteria to select patients for endovascular stroke treatment.
PI: Maarten Lansberg, MD, PhD
(NCT01622517)

Phase 3 Study to Evaluate the Efficacy and Safety of Desmoteplase in Subjects with Acute Ischemic Stroke (DIAS-4)
PI: Maarten Lansberg, MD, PhD
(NCT00856661)

A Phase II Study of MEDI-575 (Monoclonal Antibody) in Adult Subjects with Recurrent Glioblastoma Multiforme
To evaluate the progression-free survival at 6 months in adult subjects treated with MEDI-575.
PI: Lawrence Recht, MD
(NCT01268566)

Diagnostic Utility of MRI in Intracerebral Hemorrhage
To measure the impact of state-of-the-art brain imaging technology on the diagnosis and treatment of patients with a spontaneous ICH to improve patient outcome.
Co-PIs: Marion Buckwalter, MD, PhD and Chitra Venkat, MD
(NCT00363662)

Resting-State Functional MRI for Diagnosing Alzheimer's Disease
The goal is to develop a resting-state functional connectivity biomarker able to detect signal in MCI and to distinguish AD from non-AD dementia at the single-patient level.
PI: Michael Greicius, MD, MPH

Clot Lysis: Evaluating Accelerated Resolution of Intraventricular Hemorrhage Phase III (CLEAR III)
To determine if EVD placement with low-dose rt-PA improves modified Rankin Scale scores at 6 months compared to subjects treated with EVD placement with placebo.
PI: Chitra Venkat, MD
(NCT00784134)

High Dose Deferoxamine in Intracerebral Hemorrhage
Intravenous injection of iron chelation agent desferoxamine as a neuroprotective agent for attenuating perihematomal secondary neuronal injury and edema in patients with spontaneous intracerebral hemorrhage.
PI: Chitra Venkat, MD
(NCT01662895)

ACE-Seniors (Activities for Cognitive Enhancement of Seniors)
A randomized trail of healthy older adults to assess effects of innovative activities on remediation of age-related cognitive decline.
PI: Victor Henderson, MD, MS
(NCT01094509)

A Phase II Trial of MABT5102A on Brain Amyloid and Related Biomarkers in Patients with Mild to Moderate Alzheimer's Disease (BLAZE)
PI: Geoffrey Kerchner, MD, PhD

The Aging Brain: Risk for Dementia
This study will enroll older individuals with or without cognitive problems with the goal of determining which factors are most predictive developing dementia.
PI: Geoffrey Kerchner, MD, PhD

Safety and Efficacy Evaluation of Threshold Sound Conditioning by Conditioning-enhanced Hearing Aid
PI: Jaime Lopez, MD

Microstructural Brain Imaging Using Ultra-High Field 7-Tesla MRI
This study aims to find the earliest structural changes corresponding to Alzheimer's disease and other neurodegenerative conditions and to correlate these changes with memory and other behavioral measures.
PI: Geoffrey Kerchner, MD, PhD

Stroke Hyperglycemia Insulin Network Effort (SHINE) Trial
To determine safety and therapeutic benefit of treating hyperglycemic acute ischemic stroke patients with targeted glucose concentration (80mg/dL - 130 mg/dL).
Pls: James Quinn, MD
(NCT01369069)

A Phase II, Single Arm, Open Label Study of NKTR-102 in Bevacizumab-resistant High Grade Glioma
Co-Pls: Lawrence Recht, MD and Seema Nagpal, MD
(NCT01663012)

An International Study of Rindopepimut/GM-CSF with Adjuvant Temozolomide in Patients with Newly Diagnosed, Surgically Resected, EGFRvIII-positive Glioblastoma (ACT IV)
PI: Lawrence Recht, MD
(NCT01480479)

Efficacy of Carboplatin Administered Concomitantly With Radiation and Isotretinoin as a Pro-Apoptotic Agent in Other Than Average Risk Medulloblastoma/PNET Patients
PI: Paul Fisher, MD
(NCT00392327)

A Molecular Biology and Phase II Study of Imetelstat (GRN163L) in Children with Recurrent High-Grade Glioma, Ependymoma, Medulloblastoma/ Primitive Neuroectodermal Tumor (PNET) and Diffuse Intrinsic Pontine Glioma (DIPG).
PI: Paul Fisher, MD

Risk-Adapted Therapy For Young Children With Embryonal Brain Tumors, High-Grade Glioma, Choroid Plexus Carcinoma Or Ependymoma (SJYC07)
PI: Paul Fisher, MD
(NCT00602667)

A Phase II Randomized Trial of Lenalidomide in Pediatric Patients with Recurrent, Refractory or Progressive Juvenile Pilocytic Astrocytoma and Optic Pathway Gliomas
PI: Paul Fisher, MD
(NCT01553149)

Phase I Study of Rindopepimut After Conventional Radiation in Children With Diffuse Intrinsic Pontine Gliomas
Safety and efficacy analysis of treating pediatric diffuse intrinsic pontine glioma patients with the EGFRvIII peptide vaccine after conventional radiation.
PI: Paul Fisher, MD
Sub-PIs: Albert J Wong, MD, Michael S.B. Edwards, MD, Michelle Monje-Deisseroth, MD, PhD and Gordon Li, MD
(NCT01058850)

Phase II/III Study of Vorinostat and Local Irradiation OR Temozolomide and Local Irradiation OR Bevacizumab and Local Irradiation Followed by Maintenance Bevacizumab and Temozolomide in Newly Diagnosed High Grade Glioma
PI: Paul Fisher, MD
(NCT01236560)

Phase III Study Evaluating Limited Target Volume Boost Irradiation and Reduced Dose Craniospinal Radiotherapy 18.00 Gy and Chemotherapy in Children with Newly Diagnosed Standard Risk Medulloblastoma
PI: Paul Fisher, MD
(NCT00085735)

Comprehensive Molecular Analysis of Tumor Samples Derived From Patients with Diffuse Brainstem Glioma—A Pilot Study
PI: Paul Fisher, MD
(NCT00899834)

Phase II Screening Trial of Temozolomide with Irinotecan versus Temozolomide, Irinotecan plus for Recurrent/Refractory Medulloblastoma/ CNS PNET of Childhood
PI: Paul Fisher, MD
(NCT01217437)

Phase II Clinical Trial Evaluating the Efficacy and Safety of GDC-0449 in Children with Recurrent or Refractory Medulloblastoma
PI: Paul Fisher, MD
(NCT01239316)

Phase III Randomized Trial of Post-Radiation Chemotherapy in Patients with Newly Diagnosed Ependymoma Ages 1 to 21 years
PI: Paul Fisher, MD
(NCT01096368)

Phase I and Pharmacokinetic Study of AZD6244 for Recurrent or Refractory Pediatric Low Grade Glioma
PI: Paul Fisher, MD
(NCT01089101)

Phase II Study of Sunitinib in Recurrent, Refractory or Progressive High Grade Glioma and Ependymoma Brain Tumors in Pediatric and Young Adult Patients
PI: Paul Fisher, MD
(NCT01462695)

Phase II Trial of Response-Based Radiation Therapy for Patients with Localized Central Nervous System Germ Cell Tumors (CNS GCT)
PI: Paul Fisher, MD
(NCT01602666)

Immunologic Profile of Patients with Newly Diagnosed Medulloblastoma at Initial Diagnosis and During Standard Radiation and Chemotherapy
PI: Paul Fisher, MD
(NCT01233479)

A Phase II Placebo-Controlled Trial of Modafinil to Improve Neurocognitive Deficits in Children Treated for a Primary Brain Tumor
PI: Paul Fisher, MD
(NCT01381718)

Migraine Prophylaxis with BOTOX in Children
To study BOTOX (Botulinum Toxin Type A) purified neurotoxin complex for headache prophylaxis in adolescents (children 12 to < 18 years of age) with chronic migraine
PI: Sheena Aurora, MD

NEW FACULTY

NEUROSURGERY

Jun Ding, PhD
Assistant Professor of Neurosurgery

Dr. Ding studies functional organization of motor circuits in the brain, particularly cortico-thalamo-basal ganglia networks, using electrophysiology, 2-photon microscopy, optogenetics and genetics. He aims to construct functional circuit diagrams and establish causal relationships between activity in specific groups of neurons, circuit function, animal motor behavior and motor learning, as well as help construct psychomotor disorder circuit diagrams for disorders such as Parkinson's disease.

Mehrdad Shamloo, PhD
Associate Professor (Research) of Neurosurgery and Comparative Medicine and by courtesy of Neurology

Dr. Shamloo studies the pathology underlying nervous system injury and neurologic disorders, such as stroke, Alzheimer's disease and autism, focusing on mechanisms that lead to functional and behavioral malfunction. He uses experimental and transgenic rodent models, in conjunction with experimental therapeutic approaches, such as small molecule therapeutics, to accelerate discoveries into novel treatments. Major focuses are the beta 1-adrenergic receptor and signaling cascade and Npas4, a transcription factor.

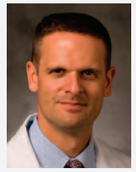
Suzanne Tharin, MD, PhD
Assistant Professor, Neurosurgery

Dr. Tharin is a neurosurgeon-scientist with clinical interests in complex spine surgery and in correction of cervical deformity. The long-term goal of her laboratory research is the repair of damaged corticospinal circuitry. She is investigating microRNA controls over the development of corticospinal motor neurons, as well as over their response to spinal cord injury, with a view to enhancement of cortical regeneration.

Fahd R. Khan, MD, MSE
Clinical Assistant Professor of Neurosurgery

Dr. Khan practices neurosurgery at the Stanford Neurosurgery Clinic in Los Gatos. His specialty interests include pain management, degenerative spine conditions and movement disorders. He brings extensive training in deep brain stimulation, epilepsy surgery, interventional pain management as well as stereotactic and functional neurosurgery.

Pediatric Neurosurgery



Gerald A. Grant, MD
Acting Associate Professor of Neurosurgery

Dr. Grant is a neurosurgeon-scientist at Lucile Packard Children's Hospital with clinical interests in pediatric brain tumors, pediatric epilepsy surgery, Chiari malformations, minimally invasive endoscopy, and endoscopic craniofacial surgery. Dr. Grant runs a translational brain tumor laboratory focusing on the blood-brain barrier and is investigating novel ways to improve drug delivery into the brain. He also is an Air Force veteran and has a longstanding interest in traumatic brain injury.

NEUROLOGY

Epilepsy and Intraoperative Monitoring

Scheherezade Le, MD
Clinical Assistant Professor of Neurology and Neurological Sciences

Dr. Le is an adult general neurologist with specialty training in epilepsy, electroencephalography and intraoperative monitoring. Her clinical and research interests include tuberous sclerosis and waveform analysis of transcranial motor evoked potentials.

Headache

Sheena K. Aurora, MD
Clinical Associate Professor of Neurology and Neurological Sciences

Dr. Aurora specializes in headache disorders and novel treatments for migraines. She is active on several committees and boards and is a national leader in headache research. As lead investigator for the PREEMPT1 trial Dr. Aurora oversaw approval of BOTOX for chronic migraines. Her current clinical research efforts involve transcranial magnetic brain stimulation for the treatment of headaches.

Movement Disorders

Camilla Kilbane, MD
Clinical Assistant Professor of Neurology and Neurological Sciences

Dr. Kilbane specializes in the evaluation and treatment of movement disorders. She provides comprehensive care for patients, such as patient assessment for unconfirmed diagnoses, second opinions, medication management, neurostimulator adjustments for patients after DBS and botox treatment.

Neurocritical Care

Karen G. Hirsch, MD
Assistant Professor of Neurology and Neurological Sciences and by courtesy of Neurosurgery

Dr. Hirsch cares for critically ill patients with neurological disorders in the intensive care unit. Her research focuses on novel imaging techniques such as functional brain imaging in patients with cardiac arrest and traumatic brain injury. She also studies methods of non-invasive measurement of cerebral blood flow, oxygenation, and cerebrovascular autoregulation and how these parameters can be targeted to improve outcome in patients with neurologic injury.

Neuromuscular Disorders

Neelam Goyal, MD
Clinical Assistant Professor of Neurology and Neurological Sciences

Dr. Goyal specializes in the diagnosis, management and electrophysiological testing of neuromuscular diseases. Her research interests include ALS and sleep, hereditary neuropathies and neuromuscular junction disorders.

Pediatric Neurology

Katherine Mackenzie, MD
Clinical Assistant Professor of Neurology and Neurological Sciences

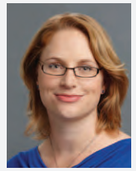
Dr. Mackenzie directs Lucile Packard Children's Hospital movement disorders clinic, focusing on disorders such as dystonia, chorea, tremor, ataxia, tics and Tourette's Syndrome.

Cynthia J. Campen, MD, MS
Clinical Assistant Professor of Neurology and Neurological Sciences

Dr. Campen practices at Lucile Packard Children's Hospital in child neurology and pediatric neuro-oncology, and is the assistant residency director for Child Neurology. Dr. Campen's research interests include epidemiology of childhood brain tumors, late effects of brain tumor treatments and intracranial vasculopathy.

Christopher Lee-Messer, MD, PhD
Clinical Assistant Professor of Neurology and Neurological Sciences

Dr. Lee-Messer practices at Lucile Packard Children's Hospital in child neurology. His research interests are on the role of neuronal microcircuits in information processing and development as well as optogenetics.



Courtney Wusthoff, MD
Assistant Professor of Neurology and Neurological Sciences

Dr. Wusthoff is a neonatal neurologist and co-director of the new Lucile Packard Children's Hospital Neuro Neonatal Intensive Care Unit. Her research focuses on the use of EEG monitoring in critically ill neonates, to identify those at neurologic risk and guide treatment.

Brenda Porter, MD, PhD
Associate Professor of Neurology and Neurological Sciences

Dr. Porter is a pediatric neurologist with specialty training in epilepsy. She uses medications, brain stimulation devices, ketogenic diet and surgical approaches to treat a child's seizures and improve their overall brain health. Her research focuses on improving epilepsy surgery outcomes, novel molecular approaches to prevent epilepsy and understanding the cause of sudden unexplained death in epilepsy.

Innovative Neurogenetics Program Exemplifies Partnership

Dr. Steven Chang had a vision: a clinic with the interdisciplinary complexity to match the needs of patients with neurogenetic disorders who often spend a lifetime navigating medical specialties with various doctors who may have little communication with each other.

Neurogenetics team (left to right). Back row: Iris Gibbs, MD; Carlos Casas-Reyes, MD; Mirna Godoy; Jocelyn Malott, NP; Luz Tovar; Vee Vo. Front row: Steven Chang, MD; Evalina Salas; Margi Knupfer; Joy Sabig, NP; Maria Ronquillo; Lynn Adler, RN.

Improved outcomes and quality of life for these patients are now a reality at Stanford's Clinical Neurogenetics Oncology Program, the first program of its kind in Northern California.

Along with his four days a week in clinic, Dr. Chang has an innovative partnership model that is just as likely to see him making outreach visits, with referral forms preprinted in Vietnamese, to a community neurologist's office as it is to see him leverage Stanford's electronic medical record technology to send notes to a referring physician as a patient is wheeled to the recovery room. He believes that soon, through the efforts of the Stanford Neuromolecular Innovation Program (SNIP) research group, these patients will have access to less expensive, minimally invasive testing to screen for neurogenetic biomarkers.

Through the support and commitment of Stanford to the bench-to-bedside approach of personalized medicine, Dr. Chang, professor of neurosurgery and the Robert C. and Jeannette Powell Neurosciences Professor, is able to provide multigenerational care to families with incredibly complex needs. The dedicated multidisciplinary team includes specialists in neurosurgery, neurology, neuro-ophthalmology, neuroradiology, neurooncology, neurointerventional radiology, dermatology and genetics who use a patient-centered approach with state-of-the-art services. Personalized treatment plans may include CyberKnife radiosurgery, neurointerventional radiology procedures and neurosurgical interventions.

Coordinated care allows a patient to schedule all appointments with a wide range of specialists in a span of one or two days, thereby ensuring that disease monitoring and management take place with the least difficulty for the family. Communication is essential, so the team actively monitors and makes improvements to this process. A patient can either call or email the clinical care coordinator with symptoms and often be seen the next day. Preprinted forms are available to speed the referral process and the feedback loop is a priority, as Dr. Chang believes that the best partnership is an equal one between Stanford and referring physicians. He is often on the phone with referring physicians for updates on their patients, and feels this goes a long way to honoring the relationship already established before the referral.

"We are here to act as a backstop, providing support and filling in the gaps with our specialty expertise," he says, "and we absolutely respect the trust a patient has developed with their referring doctor." The Clinical Neurogenetic team has extensive expertise in handling the most complicated cases. These include autosomal recessive diseases, such as hereditary hemorrhagic telangiectasia, and autosomal dominant diseases, such as neurofibromatosis (NF) Type 1 & Type 2, schwannomatosis, Von Hippel-Lindau (VHL) disease, tuberous sclerosis and Sturge-Weber syndrome.

Stanford has the longest institutional experience with CyberKnife and VHL[1] and has been named a Clinical Care Center of Excellence by the VHL Family Alliance.[2]

Partnerships with other national support groups include the National Acoustic Neuroma Association[3] and the Neurofibromatosis Network.[4] Many of these patient support networks hold their regular meetings at Stanford.

Data collected from lifetime monitoring are essential to the research in the SNIP laboratory, and to Lori Shoemaker, PhD, who was recruited by Dr. Chang and Dr. Steinberg to lead this basic science research effort at Stanford.

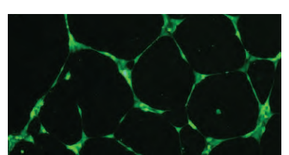
Lori Shoemaker, PhD

The laboratory currently focuses on two rare cerebrovascular diseases—brain arteriovenous malformations (AVMs) and Moyamoya disease (MMD). Research in this field is challenging as there are currently no suitable animal models for these two diseases, so Dr. Shoemaker's research is based entirely on human samples, including blood and tissue obtained during surgery.

The support of patients and their families in this effort is crucial to advancing knowledge of these diseases, understanding what causes them and learning how to better diagnose and treat patients with AVMs and MMD.

Using existing human cell lines in culture is also an important research tool for testing hypotheses, as is shown in the image of human endothelial cells forming vessel-like tubes in culture. Dr. Shoemaker recently discovered that human brain AVMs acquire abnormal expression of proteins that are usually associated with lymphatic vasculature. As the brain does not normally have a lymphatic system, this may have the potential to change the way the underlying basic disease biology is understood.

The research and clinical groups are currently working together to develop translational approaches to understand what these basic research advances mean to patients and their treatment and outcomes, including their risk of hemorrhage. ■



Human endothelial cells forming vessel-like tubes in culture

To refer adult patients to any Neuroscience service at Stanford please call **650.723.6469**.

MD Help Line
1.866.742.4811

Transfer Center/LifeFlight
1.800.800.1551

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Stroke Center

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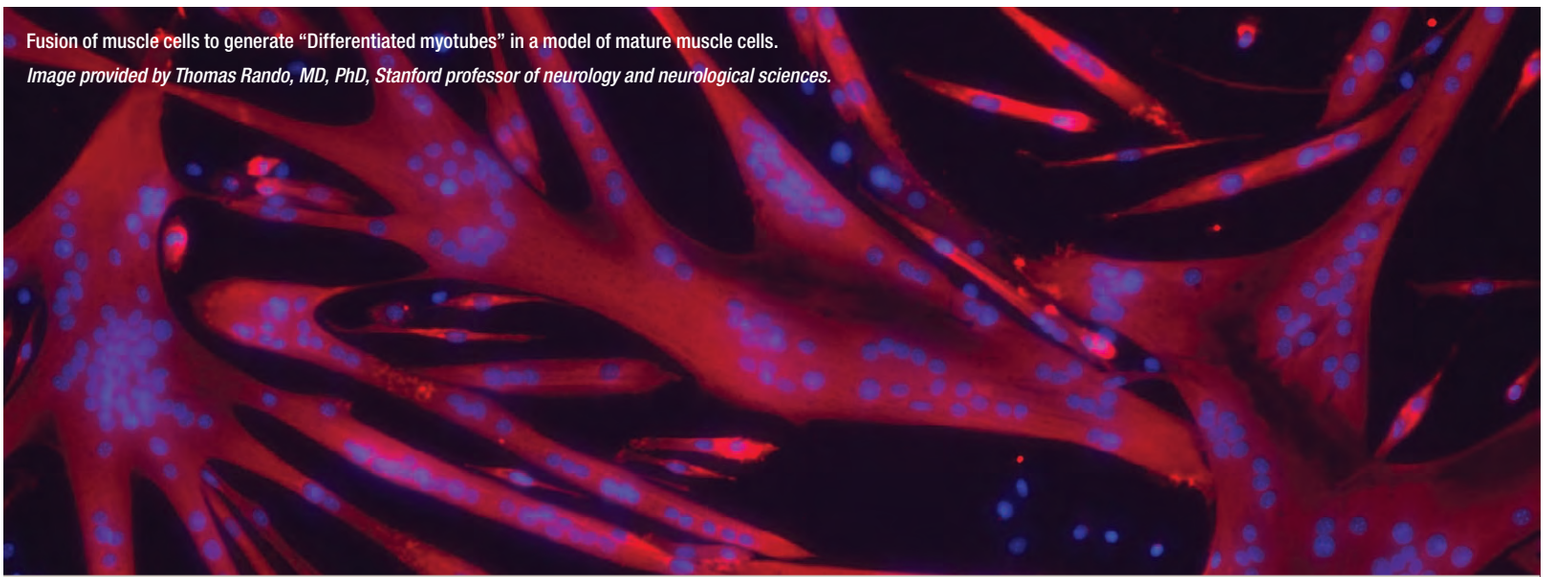
Science Writers/Editors
Greta L. Beekhuis and Cindy H. Samos

Design
Nicole Dacumos and Vivian Liberti

Stanford Hospital & Clinics
Office of Neuroscience Business Development
300 Pasteur Drive
Stanford, CA 94305-5305



Fusion of muscle cells to generate "Differentiated myotubes" in a model of mature muscle cells.
Image provided by Thomas Rando, MD, PhD, Stanford professor of neurology and neurological sciences.

SPRING 2013: ISSUE 3

NEURO-INNOVATION

News from the Stanford Neurology & Neurosurgery Departments

STANFORD
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