Swedish Neuroscience Institute
A force for clinical excellence, innovative research and quality medical education

2016 ANNUAL REPORT
In calendar year 2015, patients from 43 out of 50 states and the District of Columbia turned to the Swedish Neuroscience Institute (SNI) for medical care. Additionally, patients came to SNI from many places outside the United States, including countries such as Canada, England, Germany, Scotland, Spain and Sweden. In the first half of 2016, patients from an additional three states made SNI their source for care, reinforcing that SNI has become a national — and international — destination for neurological and neurosurgical care.

To support increasing demand, especially from throughout Washington and the Greater Puget Sound Area, SNI offers care in multiple locations and further expands access through its TeleHealth programs.
Expanding Access
During the last 12 years, SNI has greatly expanded its reach. The SNI network of community partners in the Greater Puget Sound Area allows neurologists and neurosurgeons to offer patients care closer to where they live. As a result, many patients who are scheduled for procedures at SNI in Seattle are able to locally receive their pre-procedure evaluations and post-procedure follow-up care. As Swedish’s affiliation with Providence Health Services continues to mature, SNI’s population-based approach to the delivery of care continues to grow. While it is most appropriate to consoli-date state-of-the-art technology and to provide highly sophisticated procedures at Swedish’s Cherry Hill or Issaquah campuses, other services are more easily distributed throughout the network. Offering patients this kind convenience is one of the hallmarks of SNI’s patient-centered care and it is instrumental in the 33 percent growth in the number of patients SNI cared for between January 2014 and December 2015.

SNI’s network of care also extends to more remote areas within Washington, as well as locations outside the state. SNI’s telemedicine network continues to expand to serve communities throughout the Pacific Northwest that do not have local neuroscience resources. Currently SNI offers TeleNeurology, TeleMovement Disorders and TeleStroke programs in multiple locations. SNI also sends specialists to communities in Alaska, including a neurosurgery fellowship rotation at the Alaska Native Medical Center in Anchorage, a Level II trauma center. The neurosurgery fellows and attending physicians provide coverage for the medical center 24 hours a day throughout the year.

Employing Expertise
The number of specialists on staff at SNI is another measure of its growth during the last several years. For example, since 2013 the number of SNI-employed neurologists has grown from 27 to 64, an increase of 137 percent. The medical staff includes a team of five neurointensivists, with plans to add several more. State-of-the-art facilities, a robust education program and forward-thinking clinical research attract medical staff to SNI. The fundamental focus on quality outcomes through extraordinary patient-centered care keeps them here.

Setting the Benchmark
Whether evaluating new technologies, such as the Hybrid Assistive Limb (HAL®) device, expanding the use of focused ultrasound or building new operating-room capability, SNI is determined to be at the forefront of facility, technology and therapy innovations. It is about creating an environment that allows personalized care to flourish, clinical research to thrive and optimal outcomes to become the standard by which other programs assess themselves. At the Swedish Neuroscience Institute, being a force in clinical excellence, innovative research and quality medical education is an aspiration, a tradition and a catalyst for the future.
Neurology

During the last two years, the Neurology program at the Swedish Neuroscience Institute (SNI) has grown significantly to meet the needs of the community. The neurology medical staff has seen 137 percent growth, from 27 SNI-employed neurologists in 2013 to the current 64. SNI added new community partners, such as Puget Sound Neurology in Edmonds and Providence Regional Medical Center in Everett, and distributed services to two additional Swedish locations — Redmond and Ballard. This growth has made Swedish neurology services accessible to many more patients, and has also allowed for the expansion of the breadth and scope of available care.

Approaching neurology services from a population-based perspective, SNI channels its growth to address both an aging population and the significant overall population growth in the Greater Puget Sound Area. Neuromuscular medicine, including a new ALS Clinic, neuro-endocrinology and neuro-ophthalmology have all been part of this focus on community needs.

Research is an integral part the Neurology program at SNI. Many neurologists at SNI participate in both investigator-initiated and sponsored drug and device trials, as well as basic science studies that may lead to earlier diagnosis and treatment of neurological diseases.
**Neuromuscular Medicine**

During the last year, SNI initiated a new focus in neuromuscular medicine to address the unmet needs of patients with disorders of the peripheral nervous system, such as peripheral neuropathy, myasthenia gravis, ALS, carpel tunnel syndrome and other neuromuscular diseases. With SNI’s dedicated expertise, access has improved and patients in the Pacific Northwest are getting the care they need in a timely manner.

*The ALS Clinic at Swedish under Dr. Elliott’s leadership is as comprehensive as a clinic can be. We invest three hours every three months and everything that impacts my life as a person living with ALS is addressed. — Patient Neil C.*

Three neurologists and two physiatrists are the foundation for a new ALS Clinic at SNI. However, in a three-hour initial appointment at the clinic patients receive a comprehensive, multidisciplinary evaluation by a team that also includes specialists from nursing, palliative care, nutrition, speech therapy, and occupational and respiratory therapy, as well as a social worker and a representative of the local chapter of the ALS Association. Consultation with a genetic counselor is also available for patients and their families with familial ALS. Following the appointment, the team meets to discuss the evaluation and a summary letter outlining the plan of care is sent to the patient. The clinic’s mission is to preserve quality of life, improve function and preserve the ability to enjoy independent living as long as possible.

ALS is a complex disease. It is critical to conduct research to find a cure, to identify ways to diagnose and treat ALS, and to develop devices that give patients the freedom they need. Currently, SNI’s ALS experts are working with Microsoft’s Enable Team to develop an eye-gaze-driven wheelchair — a unique opportunity due to the proximity of Microsoft and SNI. Other studies that are under way include a biomarker study to assist with diagnosis, a therapeutic drug study designed to test efficacy on disease progression, and a bioregistry to be used for future anatomic and basic science research.

**Neuro-Endocrinology**

Neuro-endocrinology is an important and integral subspecialty within SNI. Working closely with neurology, neuro-oncology and neurosurgery, neuro-endocrinologists add another layer of expertise to the comprehensive evaluation of disorders of the nervous system. This new partnership recognizes the importance of the interaction between the pituitary, hypothalamus and the brain on hormonal regulation that may affect many aspects of human metabolism (e.g., weight regulation, diabetes mellitus, osteoporosis), quality of life and cardiovascular risk. For example, a patient with non-specific headache symptoms, or memory, focus or sleep issues may first see a neurologist, but a referral to a neuro-endocrinologist could identify an incidental pituitary tumor as the underlying cause.

*Dr. Yuen has given my life back. I was completely debilitated by acromegaly and he has brought me to a place where I can function and live a full life. His care has been life-changing. — Patient Judy*

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Another example of patients with incidentally discovered pituitary tumors are those with traumatic head injury and subarachnoid hemorrhage who have first been referred to a neurologist. These patients require a neuro-endocrinology referral for further evaluation to develop future treatment plans that may include surveillance and conservative long-term monitoring, or the possibility of pituitary surgery and/or cranial irradiation.

Neuro-endocrinologists are also actively involved in clinical research. Presently they are conducting several large studies in collaboration with both national and international pituitary centers, and are also planning and submitting for approval several additional investigator-initiated studies.

**Neuro-Ophthalmology**

Building on a long-standing relationship, the largest neuro-ophthalmology practice in the region was fully integrated into SNI in 2015 with four fellowship-trained neuro-ophthalmologists moving into new clinical space on the Swedish Cherry Hill campus. Through a shared electronic health record (Epic), the neuro-ophthalmologists are able to effectively coordinate care with other neuroscience specialists throughout SNI.

The clinic’s location, next to the Balance Center and in the same building as the Swedish Multiple Sclerosis Center, makes it extremely convenient for patients with balance or movement disorders or MS to be evaluated and receive care for related eye conditions. The neuro-ophthalmologists have provided an MS Eye Clinic for many years. The clinic is dedicated to common visual symptoms associated with MS, such as double or unsteady vision, and visual symptoms due to optic nerve or brain visual pathway disease. A satellite neuro-ophthalmology clinic located in Bellevue, Wash., further expands access to care and offers patients the added convenience of receiving care closer to their homes or places of work.

The neuro-ophthalmologists are also involved in clinical research. Most notably, the neuro-ophthalmology team has been a long-term participant in the Idiopathic Intracranial Hypertension Treatment Trial (IIHTT), sponsored by the National Eye Institute of the National Institutes of Health. The IIHTT is the largest prospective study of IIH, testing whether diet/weight loss work as well as combining diet/weight loss with acetazolamide. The study, which was completed in 2015, proved what neuro-ophthalmologists believed — using acetazolamide in conjunction with diet and weight loss is safe and effective. Looking forward, the neuro-ophthalmology team is working on additional studies, including an international trial of a novel experimental therapy using intravitreal injections to treat acute monocular blindness from non-arteritic anterior ischemic optic-neuropathy (NA-AION).
Balance Center

The Balance Center at the Swedish Neuroscience Institute (SNI) is a recent addition to the programs and services offered patients throughout the Pacific Northwest. Under the leadership of Judith White, M.D., Ph.D., who came to Swedish after establishing balance centers first at Lahey Hospital & Medical Center in Burlington, Mass., and then at Cleveland Clinic in Ohio, SNI opened its balance center to address a growing concern — especially for individuals 65 years and older.

Statistics from the Centers for Disease Control and Prevention (CDC) that show a marked increase in the death rate from unintentional falls in adults 65 years and older (from less than 42,000 in 2004 to nearly 58,000 in 2013) give substance to the CDC’s designation of fall prevention as one of its priorities. According to the Washington Department of Health, falls were the leading cause of injury-related hospitalizations in 2010 and the third leading cause of injury-related deaths in the state. Older adults accounted for two thirds of those hospitalizations and 83 percent of the deaths. Therefore, fall prevention has become both a national and a statewide priority.

Falls are the leading cause of fractures, trauma hospitalization and death due to injury. The CDC estimates that one out of three older adults will fall each year, but fewer than half of those individuals will tell a doctor due to embarrassment or the fear of losing their independence. SNI and Dr. White established the comprehensive, multidisciplinary center to provide a safe, non-threatening place for older adults, especially those who have had one or more prior falls, to be evaluated, and to work collaboratively with primary-care providers to help reduce the risk of falls in their patients.

The one-stop/one-day process was designed to be quantitative and evidence-based. It brings together otolaryngologists, audiologists, vestibular technicians and physical therapists to evaluate the patient for inner ear inflammation or vertigo, which may affect the patient’s balance and ability to walk. As part of the SNI, the centers medical staff can easily arrange additional consultations and services as needed.

Opening the Balance Center has led to opportunities for related research studies, including a study of diagnostic specificity and sensitivity of various vestibular evoked myogenic potentials (ocular and cervical), which is part of the center’s diagnostic assessment. As the center continues to grow and evolve, the medical staff will explore additional research opportunities.

According to the CDC, more than 2.5 million older adults seek emergency medical care each year for a fall and more than 700,000 are hospitalized because of a fall injury (typically to the head or hip). While still in its infancy, the Balance Center at SNI is implementing best practices that will allow it to take its place on the leading edge of reducing injuries and deaths due to falls.

My dizziness was a frightening experience. Dr. White was incredibly responsive and when it was done — no more dizziness. I was extremely pleased with Dr. White and the Swedish Balance Center. — Patient Peggy
Multiple Sclerosis

The National Multiple Sclerosis Society estimates that 400,000 people in the United States and 2.3 million people worldwide are living with MS. With the U.S. prevalence rate twice as high in northern states than in southern states, and the Pacific Northwest having one of the highest rates of MS, it is quite logical that the Swedish Neuroscience Institute (SNI) would have a robust MS program.

Physical, Emotional and Community Wellness

The Swedish MS Center is much more than just a center to diagnose and treat MS patients. It is the single most comprehensive program in the country and is recognized as a national leader in its approach. The foundation of SNI’s MS program is effectively blending compassionate clinical care with services that support the physical and emotional challenges of living with MS. The center — and a staff that is never satisfied with the status quo — has been setting the benchmark for other MS programs since it first opened.

The center has a dedicated MS rehabilitation physician — one of only seven in the country. Due to increased patient volumes, the center added a staff member who provides hand treatments and equipment evaluations, and also fills the role of MS adventure guide. This position is truly unique. The sole responsibility of the guide is to get patients with MS back into life’s activities. MS predominantly affects young adults who are in their prime, active years. Helping patients reintroduce activities into their lives is both physically and mentally important to their continued progress. A “Sip, Eat and Relax” tour of a Seattle neighborhood, indoor rock climbing,
adaptive cycling, river rafting and art projects help patients overcome both the physical and mental challenges of living with MS while socializing with others.

The facility and the approach to patient care are what make the center unique. In 2015, there were nearly 8,100 diagnostic, treatment and/or support visits at the center — a 66 percent increase over 2013. Another 1,088 MS-related visits were provided at other clinics throughout Swedish in 2015. In 2016, the MS Center is on track to have close to 9,000 visits.

The center offers a broad range of services, including five support groups, two Pilates and two yoga classes, music therapy, a reading group and a gym that patients can use for free. Most recently, the center added weekly “Get Your Music Back” lessons for guitar, keyboard and drums, and a book club. Most notably, the center hosts an annual art show as a way of raising public awareness of MS and to showcase the artwork of individuals in the Pacific Northwest who have been touched by this disease.

There are currently 14 drugs that the U.S. Food & Drug Administration (FDA) has approved as disease modifying therapies for MS, with one more expected to achieve FDA approval in 2016. Physicians at the MS Center have been involved with approximately two-thirds of the studies for drugs that are currently on the market and are participating in more than two dozen clinical research studies on new drugs that hold promise for future treatment. For example, MS specialists are studying ecuizumab for relapsing neuromyelitis optica, BOTOX® for treating spasticity, a combination of fingolimod and glatiramer acetate for patients with relapsing-remitting MS, and siponimod (BAF312) for patients with secondary progressive MS. Researchers are also investigating whether autologous stem cell transplantation in combination with high-dose immunosuppressive therapy may be effective in treating patients with poor prognosis MS.

MS touches every part of a patient’s life. The MS Center is setting the standard for programs around the world by effectively combining evidence- and research-based medical care with wellness, fitness, education and support to address the whole person and his or her specific needs. This holistic approach to MS is making a difference for patients and their families.
Epilepsy care at the Swedish Neuroscience Institute (SNI) is a true testament to continuity of care. Patients who begin their epilepsy care as children at SNI are able to seamlessly transition into adult care.

Demand for services has led to the hiring of several additional pediatric and adult epiletologists, specialized nurse practitioners and additional neurophysiology staff, the acquisition of new technology and the expansion of SNI’s inpatient adult and pediatric monitoring capability.

In 2014 and 2015, the pediatric epilepsy specialists at SNI focused additional resources on becoming a regional resource for two forms of genetic epilepsy, tuberous sclerosis and Dravet syndrome. Tuberous sclerosis is a multi-organ medical condition that requires close collaboration among multiple specialties, including nephrology, neurology, transplantation, ophthalmology, neurosurgery and adult epilepsy, all of which are available at Swedish. Dravet syndrome, one of the results of an SCN1A mutation, is a rare form of intractable epilepsy that is severely debilitating and places young children at increased risk of sudden death.
In addition to beginning the Dravet syndrome clinic, the pediatric epilepsy specialists also began two new drug studies that may hold some promise for these young patients. One study is testing synthetic CBD, which doesn't cause psychosis, to control seizures in children with Dravet syndrome. The other study is testing the safety and efficacy of fenfluramine, a seizure-controlling agent that has a unique mechanism of action mediated by the serotonin receptors. It has been shown to be effective in open label studies in Belgium for more than five years.

The National Association of Epilepsy Centers has accredited the Swedish Epilepsy Center as a level IV program, acknowledging the center’s national reputation for medical and surgical treatment of seizure disorders. It is the designated referral center for complex epilepsy surgeries for NAEC level III affiliates at Providence Portland and Providence Spokane.

While the majority of patients with epilepsy can be successfully treated with medication, nearly one-third require surgery. Swedish continues to be the primary referral site and only center in the Pacific Northwest actively implanting the RNS® System by NeuroPace, a device that monitors and treats epilepsy in adults ages 18 and older. Additionally, SNI added laser interstitial thermal therapy (LIT) as a minimally-invasive ablative approach to treating epilepsy and StereoEEG as a companion to LIT to diagnose where seizures are originating in patients with focal epilepsy. For a great majority of medically refractory epilepsy patients, these procedures are curative.

The Clinical Neurophysiology (CNP) Lab, which experienced record growth in 2015, is one of only a handful of labs in the western United States to be accredited by the American Board of Registration of Electroencephalogragphic and Evoked Potential Technologists. The lab provides advanced electrodiagnostic services for the Epilepsy Center, including eight adult and six pediatric epilepsy monitoring beds and long-term monitoring in the neonatal and pediatric intensive care units, as well as intraoperative monitoring to protect central and peripheral nervous systems during surgery.
Movement Disorders

A synergy exists at the Swedish Neuroscience Institute (SNI) that benefits patients with chronic neurological conditions, such as those with various movement disorders. Medical therapies, minimally invasive procedures, surgical interventions and new non-incisal technologies give specialists the options they need to tailor treatment plans to patients’ specific needs. This type of coordinated approach to the diagnosis and treatment of patients is particularly important in a subspecialty like movement disorders that has seen volumes triple in less than three years.

In recent years several new symptomatic medication therapies have entered clinical care for patients with Parkinson’s disease. For example, in early 2015 the U.S. Food and Drug Administration (FDA) approved RYTARY™, an extended-release capsule form of carbidopa/levodopa, which has been the mainstay medical treatment of Parkinson’s for decades. At the same time, the FDA also approved Duopa™, a gel formulation of carbidopa/levodopa. Duopa is continuously infused directly into the small intestine. Both of these new therapies are aimed at reducing disabling motor fluctuations that occur as Parkinson’s disease...
progresses. In early 2016, the FDA approved pimavanserin (Nuplazid™) for psychosis associated with Parkinson’s Disease. It has a mechanism that is unique from other available antipsychotic medications that are poorly tolerated by most patients with Parkinson’s disease. It now gives patients a safer treatment option for a symptom that has significant impact on quality of life.

New technology in SNI’s operating suites, including intraoperative, high-resolution CT scanning capability, has made deep brain stimulation (DBS) a safer and more efficient process. Intraoperative imaging verifies probe placement as a possible alternative to keeping the patient awake for testing. This may allow more patients to have surgery performed while they are asleep, while still achieving the best possible outcome.

Among the most promising advancements is SNI’s status as the first hospital in the Pacific Northwest to offer FDA-approved focused ultrasound treatment for medication-refractory essential tremor (ET). ET affects more than 10 million people in the United States, and millions worldwide. Focused ultrasound is an outpatient treatment option that offers patients immediate improvement following the procedure. Treatment requires a single session with no anesthesia, which allows patients to quickly return to their normal daily activities.

This new technology allows for the precise targeting of tissue to be treated. The U.S. Food and Drug Administration (FDA) first approved focused ultrasound as a treatment for neuropathic pain and obsessive-compulsive disorder (OCD). In 2015, the technology was used at SNI as part of an early-stage clinical trial examining the efficacy of using it to treat patients with metastatic brain cancer, and also in clinical trials to treat patients with essential tremor (ET) and Parkinson’s disease. Since then, the FDA has approved focused ultrasound as a treatment for patients with ET, and SNI was the first hospital in the Pacific Northwest to offer this innovative new treatment.

Focused ultrasound is a marriage of technologies. With the patient’s head immobilized in a frame and water circulating through a cap to keep the brain cool, the neurosurgeon uses an MRI scanner intraoperatively to focus up to a thousand ultrasound waves of energy to ablate tissue deep inside the brain. The imaging provides the necessary precision to treat the targeted tissue while avoiding other important structures. Because focused ultrasound is performed as an outpatient procedure, patients are able to quickly return to normal activity. Alternative treatments are available for patients who are not eligible for focused ultrasound. Swedish is the only hospital in the country that offers four therapies for ET: medication management, deep brain stimulation (DBS), GammaKnife® and focused ultrasound.

Focused ultrasound was also used in a clinical trial at SNI to treat patients with Parkinson’s. With additional research, focused ultrasound could be one of the treatment options for various brain disorders.
Stoke and TeleStroke

At the end of 2014, Swedish Cherry Hill received the American Heart Association’s Stroke Gold-Plus Quality Achievement Award and was named to the association’s Target: Stroke Honor Roll, recognizing the exceptional stroke care provided at the Swedish Neuroscience Institute (SNI). One year later, in November 2015, DNV-GL Healthcare, a national accrediting organization for acute care and critical access hospitals, awarded SNI’s Cherry Hill stroke program its Comprehensive Stroke Center Certification. The certification integrates requirements related to the Centers for Medicare and Medicaid (CMS) Conditions of Participation for Hospitals, with the Guidelines of the Brain Attack Coalition and recommendations of the American Heart Association and the American Stroke Association.

This type of recognition underscores the success SNI has had in developing a stroke program that provides the highest quality of stroke care not only to patients in the Seattle area, but also to communities throughout Western Washington through onsite services and its TeleStroke Program.

The Washington Department of Health has designated Swedish Cherry Hill a Level I Comprehensive Stroke Centers. Swedish Edmonds, Swedish First Hill and Swedish Issaquah are designated Level II centers, which acknowledges their stroke-trained staff, clinical and administrative infrastructure and support programs for stroke patients. Swedish Ballard is a Level III stroke center, treating and evaluating acute stroke patients and admitting them to a Level I or II hospital when necessary.

Stroke Follow-Up Care

According to the National Stroke Association, recurrent strokes account for about one quarter of the nearly 800,000 strokes in the United States each year. The increased risk of another stroke is particularly high during the year immediately following the original stroke. To address this risk, patients who receive acute care for stroke at Swedish, as well as referred patients from other hospitals, are scheduled for follow-up appointments at the Swedish Stroke Clinic. Working in partnership with the patient’s primary-care provider, follow-up care focuses on secondary stroke prevention through medication management and recommendations for lifestyle changes. Some patients transition easily to a healthy lifestyle and receive most of their follow-up care from their primary-care providers. Patients with more complex medical issues and multiple co-morbidities, such as those recovering from arterial dissection, or diagnosed with moyamoya or fibromuscular dysplasia, may have long-term relationships with the Stroke Clinic. The goal, however, is to transition all stroke patients to long-term follow up in the primary-care setting.
Door-to-Needle Time

The stroke team continues to actively pursue new strategies that will further reduce its already low door-to-needle time (DTN) — the time it takes to administer tissue plasminogen activator (tPA), a potent clot buster, to stroke patients upon arrival in the emergency department. Since 2011, Swedish times have regularly been lower than the standards set by The Joint Commission and the goals of the American Heart Association’s Target: Stroke. For example, in 2015 the mean DTN time for the stroke team at Swedish Cherry Hill was 39.9 minutes.

Results from multiple research studies published in 2015 supported the approach Swedish has been taking with patients presenting at Cherry Hill with acute ischemic stroke. For several years, the team has administered alteplase, a clot-busting medication, and also performed intra-arterial therapy using a stent retrieval device to remove the clot. These therapies are time sensitive. The use of alteplase for acute stroke has been endorsed by the American Heart Association up to four and one-half hours out from the onset of stroke, while the use of intra-arterial therapy has been endorsed up to six hours out from the onset of symptoms. Both of these therapies work by re-establishing blood flow in an artery in the brain that has a clot in it. Once blood flow is restored, the improvement in some patients can be dramatic.

TeleStroke

In 2007, SNI made a commitment to use technology to help Washington communities reduce door-to-needle times. What began with two Swedish emergency departments — one at Swedish Ballard and one in Issaquah — has now grown to include all Swedish emergency departments, inpatient units at Swedish Issaquah, Providence Medical Center Everett and seven community hospital TeleStroke partners. SNI’s team of neurologists receives more than 500 calls per month from various providers across the state of Washington. Providers have access to a neurologist 24 hours a day, seven days a week through the services provided by SNI. These calls are not limited to stroke. The neurologist can remotely review head imaging films, including CT and MRI films, at any Swedish or TeleStroke partner site. He or she can also provide emergent video consultations with Swedish and partner sites, if needed, for patients presenting with hyperacute stroke symptoms who may be candidates for rescue therapies, such as a clot-busting medication and/or intra-arterial therapy.
Brain Tumors

The Swedish Neuroscience Institute (SNI) and the Swedish Cancer Institute (SCI) have a close collaborative relationship when it comes to diagnosing and treating patients with benign or malignant brain tumors. Neurosurgery, with or without chemotherapy and radiation, remains the gold standard for treating accessible brain tumors. Many surgical procedures are done endoscopically with a much smaller incision than a traditional craniotomy, promoting a faster recovery. For tumors that are not easily accessible, SNI is fortunate to have available two stereotactic radiosurgery platforms, CyberKnife® and GammaKnife®, which allows neurosurgeons to select the best possible radiosurgery treatment for each individual patient.
Neurosurgeons at SNI have state-of-the-art operating suites with advanced imaging, such as BrainLab Aero-i CT, and computer-guided navigation equipment to provide the safest and highest quality surgical procedures. Additionally, a neurophysiologist is available during any requested brain or skull base surgery to provide intraoperative neuromonitoring, which helps ensure surgeons are able to avoid neural elements that control key functions.

Most recently, SNI added diffusion tensor imaging (DTI) to its OR technology. DTI is an advanced MRI-based neuroimaging technique to visualize the brain’s white matter tracts. The resulting 3D model is called a “diffusion tensor” and provides a color-coded map that displays how the brain’s neurons are wired. Neurosurgeons use this intraoperative tool as a direct roadmap when removing brain tumors and navigating around crucial nerve fibers. Damage to these fibers can lead to neurologic deficits, including pain, loss of sensation and even paralysis. DTI can significantly improve surgical accuracy during a brain tumor resection and enables providers to customize their surgical approach to minimize damage to healthy brain tissue.

The Ben & Catherine Ivy Center for Advanced Brain Tumor Treatment

Since its opening in 2009, The Ben & Catherine Ivy Center for Advanced Brain Tumor Treatment has taken its place among the premier brain tumor centers in the country. Having a collaborative medical staff that includes neurosurgeons, neuro-oncologists, neuroradiologists, neuropathologists, neuropsychologists, neuro-oncology nurses and a social worker is of immeasurable value to patients.

Of equal importance is the on-site comprehensive brain-tumor research laboratory that allows neuropathologists to rapidly perform genetic analysis of brain tumors and provide critical information that helps The Ivy Center’s medical staff develop personalized treatment plans that will produce the best possible outcomes.

The Ivy Center’s medical staff includes Charles Cobbs, M.D., the Gregory Foltz, M.D., endowed director of The Ben & Catherine Ivy Center for Advanced Brain Tumor Treatment, Tara Benkers, M.D., medical director of neuro-oncology, and Jerome Graber, M.D., a neuro-oncologist who recently came to SNI from Montefiore Medical Center in New York.

There are many innovative research projects under way at The Ivy Center, including several for patients with newly diagnosed and recurrent glioblastoma multiforme (GBM), one of the most aggressive and deadliest forms of brain cancer. Since 2013, Dr. Benkers has brought on nearly a dozen clinical trial therapies to expand access to experimental therapies for patients in the Pacific Northwest who have been diagnosed with GBM. Access to therapies that are not yet publicly available, including immunotherapies, vaccine therapies, targeted therapies, gene-based biologics and novel modified chemotherapeutics, is one of the benefits of receiving care at a nationally recognized research institute.

The Susan J. McGregor Viral Glioblastoma Immunotherapy Program is one of many examples at Swedish of philanthropy advancing research. The program is based on research Dr. Cobbs began more than 15 years ago. Working with

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Institute for Systems Biology (ISB) in Seattle and Fred Hutchinson Cancer Research Center, researchers are leveraging new technologies to extract proteins from tumors and to build a tumor profile that would help identify proteins that all of the tumors share. The goal is to produce a potent immunotherapy vaccine that would target those specific proteins, thus killing the proteins and the tumor.

In 2015, The Ivy Center began a high-thru-put cancer stem cell project — the first of its kind in the world to use a patient’s own cancer stem cells to drive therapy decisions. The project’s theory is based on the knowledge that cancer stem cells are a subset of tumor cells and that GBM recurs if the cancer stem cells are not killed by chemotherapy or radiation. Removing these cells, growing them in the lab and using robotics to subject them to thousands of existing compounds can help determine which drugs or combination of drugs is most effective without subjecting the patient to multiple courses of chemotherapy.

The Ivy Glioblastoma Atlas Project (Ivy GAP), which was conceived in 2006 and launched in 2009 as a partnership between The Ivy Center, Seattle’s Allen Institute for Brain Science and The Ben & Catherine Ivy Foundation, is a major research initiative focusing on mapping the gene activity in brain tumors. The Ivy GAP is a foundational resource for exploring the anatomic and genetic basis of glioblastoma at the cellular and molecular levels. The intent of this collaborative effort is to give researchers universal access to a massive amount of tumor genomic information and anonymized patient clinical information as a catalyst for innovative research that will lead not only to a better understanding of GBM, but also to novel new therapies that improve clinical outcomes and survival.

Another exciting research project is evaluating the safety of the ExAblate Transcranial system for brain tumors. The system uses MRgFUS technology, which combines MRI to visualize body anatomy and monitor treatment in real time with high-intensity focused ultrasound to thermally ablate tissue inside the skull.

This noninvasive procedure is performed through the patient’s intact skull.
Cerebrovascular

Cerebrovascular medicine is a rapidly changing neuroscience subspecialty. The acquisition of innovative new technologies and a commitment to education keeps the cerebrovascular team at the Swedish Neuroscience Institute (SNI) at the leading edge of clinical excellence. Cameron McDougall, M.D., medical director of cerebrovascular surgery for Western Washington and a nationally recognized neuro-interventional surgeon and educator, joined SNI in early 2016. McDougall and the center’s team of cerebrovascular surgeons, which includes Johnny Delashaw, M.D.; Yince Loh, M.D.; Stephen Monteith, M.D.; and Akshal Patel, M.D., along with their colleagues at Providence Regional Medical Center Everett, are a regional resource for complex open and endovascular neurological procedures, such as carotid endarterectomy, surgery to repair intracranial aneurysms and microvascular decompression for cranial neuropathies. The Cerebrovascular Center is one of the largest enrollment centers for many multicenter, national clinical trials, and is a respected center for continuing education and fellowship training opportunities.

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Whereas clipping has decreased in use, inserting platinum coils into intracranial aneurysms has continued to increase in frequency. During the last few years, CV specialists at SNI have added a third procedure to their list of treatment options for patients with aneurysms — the Pipeline™ flow-diverting stent. The flow diverter, which directs flow away from the aneurysm and back to the normal vessel lumen, becomes part of the circulatory system. In essence, it reinforces the blood vessel wall and slows blood flow in and out of the aneurysm leading to its thrombosis. The aneurysm eventually atrophies and disappears because it is no longer being fed by blood. Having three treatment options gives additional flexibility in determining the best option for each patient. Which procedure is used depends on the location and size of the aneurysm, whether it has ruptured and various patient considerations, such as choice and suitability for a craniotomy versus an endovascular procedure. The goal for the entire CV team, many of whom are dual trained in open and endovascular techniques, is to identify the most effective, but lowest-risk treatment for each patient.

Intraoperative angiography capability in SNI’s hybrid operating suite is technology that enhances patient safety during complex procedures. For example, during a clipping procedure for an aneurysm, intraoperative angiography that is performed while the patient is still draped and under anesthesia can show whether the aneurysm has been successfully removed. This real-time visibility allows the procedure to continue without interruption and avoids having to bring the patient back into the OR and a second round of anesthesia.

With advanced technology and expertise, SNI is a compelling location for exceptional professional education and fellowship training. The one- and two-year fellowships in cerebrovascular microsurgery and/or neuro-endovascular treatment provide comprehensive subspecialty training for neurosurgeons. Currently,
three full-time fellows are gaining valuable experience in the diagnosis and management of a wide range of cerebrovascular disorders, including cerebral aneurysms, arteriovenous malformations (AVMs), vascular neoplasm and Moyamoya disease. Training includes open cerebrovascular surgery, diagnostic angiography and endovascular procedures, such as embolization, stenting, microvascular decompression and coiling. The Seattle Science Foundation (SSF), which is adjacent to SNI at Swedish Cherry Hill, provides a state-of-the-art bioskills and tele-education center to further enhance fellowship training. The SSF venue also supports SNI’s cerebrovascular continuing medical education courses, such as its Cranial Ultrasound Course and the annual Cerebrovascular Symposium and Merrill P. Spencer, M.D., Endowed Lectureship. The Spenser Lecture honors a physician, professor, researcher and stroke prevention pioneer who gained an international reputation for his groundbreaking work with Doppler ultrasound technology.
The pursuit of innovation, clinical excellence, meaningful research and quality education is the foundation of the spine program at the Swedish Neuroscience Institute (SNI). As a result of the affiliation between Swedish and Providence Health & Services and an aging U.S. population, there has been an unprecedented increase in complex spine cases, including patients with benign and metastatic tumors, spinal deformity, spinal cord injuries, infections and revision fusion surgeries.

Technology is a key factor in providing high-quality spine care. Ultra-high-end intraoperative imaging and high magnification visualization supports precise implant localization. SNI surgeons are leaders in using the lateral surgical approach, a minimally disruptive procedure that employs sophisticated nerve-monitoring technology to help avoid the risk of vascular and/or neural injury when treating spinal deformities. Additionally, in collaboration with the Swedish Cancer Institute, access to both GammaKnife® and CyberKnife® stereotactic radiosurgery platforms gives surgeons treatment options for spine tumor care that limit radiation exposure and promote full recovery.

To meet that demand, SNI’s spine surgeons have made a commitment to provide emergent spine care around the clock. With state-of-the-art dedicated neuro operating suites, highly skilled surgeons and an exceptional nursing staff work side-by-side to ensure patients receive the safest, most compassionate care with a common goal — to alleviate pain and restore independent function.

Very few hospitals have the expertise and available range of implant options, both those approved by the U.S. Food and Drug Administration and those currently under study. Grafts, artificial

percent increase in SNI spine visits from January 2014 to December 2015

35
discs, fixation and stabilization devices, and other motion preserving technologies are mainstays of the treatment arsenal for SNI’s spine surgeons.

SNI was an early adopter of multimodal pain management in an effort to combat the potentially deleterious side effects of opioids. This approach to managing pain following spine surgery is critical to having patients participate in their recovery. Local pain management, including anesthetic strips, IV-pain medication, ultra-long-duration anesthetic, pain medications and ice blankets create a menu of options that keep the patient comfortable, responsive and available to participate in the recovery process, while also reducing the risk of blood clots and lung and wound infections.

Fellowship training and regional and national professional programs are at the heart of the surgical spine education program. Complex spine cases and continuing medical education courses are presented through spine case conferences and the neuroscience grand rounds series. These educational opportunities have highly respected speakers from throughout the world. Sessions are also available to physicians worldwide via the highly sophisticated telecommunication facility at the Seattle Science Foundation and an online video archive. Annual specialized courses include advanced approaches to spine surgery, trauma management and spine tumor treatment, as well as the very popular ONE Spine Master’s Course and ONE Spine Residents and Fellows Course. The ONE Spine courses bring together orthopedic surgeons and neurosurgeons to advance the art and science of modern spinal care.

The Complex and Minimally Invasive Spine Fellowship, which began with just one fellow, now hosts five neurosurgery- and orthopedic-trained surgeons for a year of intensive training in evaluating and treating a broad spectrum of adult spinal disorders. As a high-volume, tertiary spine care center that focuses on blending neurosurgical and orthopedic spine services, SNI is well positioned to give fellows experience in all areas of spine care, including trauma, tumors, infection and degenerative conditions.

Research is an integral part of the spine program at SNI. In addition to several retrospective studies of procedural outcomes to advance understanding and focus on improving safety and outcomes, the spine team participates in procedural and device studies, as well as studies involving surgical approaches and equipment that may help prevent permanent spinal cord damage and/or improve function where there is permanent damage. For example, the RISCIS multicenter study is evaluating the effect of riluzole on outcomes in patients with acute traumatic spinal cord injury. The team is also participating in a pilot study using Cyberdyne’s Hybrid Assistive Limb® (HAL©) with patients who have lost function in their lower extremities due to spinal cord injury. The study will assess how much using an exoskeleton can improve function. (See page 24 for more information about the HAL clinical trial.)

David A. Hanscom, M.D.
Neurotology and Skull Base Surgery

The Center for Hearing and Skull Base Surgery provides a comprehensive and collaborative approach to hearing disorders and skull base surgery. Combining the most advanced diagnostic and surgical techniques with leading-edge technologies allows the center’s team to deliver the highest level of care for those who live with hearing loss, deafness and chronic ear problems, and for patients with tumors and disorders of the skull base.

As recently as 2010, there were no employed neurotology or audiology specialists at Swedish. Today, the center’s neurotology/audiology staff includes two board-certified neurotologists, Douglas D. Backous, M.D., and Sean O. McMenomey, M.D.; two physician assistants; and four audiologists, including the new director of the Hearing Implant Program, Alyson Mellish, AuD, CCC-A. The skull base surgical team comprises four neurosurgeons.

Neurotology and Audiology Services

The center’s neurotology team diagnoses and treats patients of all ages, including newborns, from throughout the Pacific Northwest. Neurotology specialists at the center provide cochlear, auditory brainstem, middle ear and bone integrating implantation, as well as diagnosing and treating facial nerve disorders, otosclerosis, chronic otitis media, acoustic neuromas, neurofibromatosis type-2 and inherited ear malformations.

In addition to his clinical responsibilities, Dr. McMenomey is also a weekly host of the popular Doctor Radio channel on Sirius XM, taking questions from callers across North America who want advice about hearing loss and diseases related to otolaryngology.

The center’s audiology specialists focus on improving access for patients who need hearing loss evaluations, including basic audiologic testing, neurophysiologic testing and vestibular testing, and providing assessments for hearing aids, assistive-listening and osseointegrated devices and cochlear implants. They are also centralizing pediatric services, such as diagnostic auditory and vestibular assessments, amplification, cochlear implantation and aural rehabilitation, and standardizing protocols and processes from the clinic to the operating room. Coordinating care among multiple providers, with attention to care quality and safety, is a major initiative that is currently under way.

Clinicians at the center have a deep understanding of the challenges facing patients as they choose to pursue their ability to communicate with spoken language. The goal is to provide an excellent experience for patients and their families — making that journey seamless and streamlined. The center’s research program supports its goals by focusing on optimizing hearing outcomes with implantable devices.

Plans are under way to provide cochlear implant evaluations and programming at Swedish Issaquah. The intent is to provide the same excellent services that are now available at Swedish Cherry Hill, but to make receiving that care more convenient for patients living east of Seattle.
Additionally, the center’s audiology team has built a truly collaborative relationship with the otolaryngologist at SNI’s new Balance Center, working together to help reduce the risk of falling for patients with balance issues related to inner-ear disorders.

As the Center for Hearing and Skull Base Surgery grows, and demand and complexity of cases increases, the team has focused on improving access for all patients, and ensuring quality patient experiences and referring clinician communications. This is particularly important as the care-delivery model now includes satellite hearing implant partnerships in Washington’s Tri-Cities region (Richland, Kennewick and Pasco), and in Anchorage and Fairbanks, Alaska. While neurotology and cochlear implant surgery on patients from these areas is still performed in Seattle, pre-operative evaluations and post-operative follow-up care is provided by teams of audiologists and otolaryngologists in the respective regions.

**Skull Base Surgery**

A team of four physicians manages the high-volume demand for skull base surgery at SNI. They diagnose and treat benign and malignant skull base tumors using the latest techniques and technologies, including microsurgery and stereotactic radiosurgery, to remove the tumor while preserving the greatest possible neurological function. While the majority of skull base patients require surgical treatment for tumors, the team is also skilled at surgically repairing spinal fluid leaks and fractures of the skull base, and treats cerebral aneurysms and deep-seated infections of the skull base bone.

**Education**

Through a unique partnership with the Seattle Science Foundation (SSF), the providers at the Center for Hearing & Skull Base Surgery continue their deep commitment to offering professional education for surgeons, primary-care clinicians, audiologists and patients. The center hosts an annual ear and sinus course (SOAR) and a bi-annual on-site JapanLab for 40 Japanese surgeons. The week-long JapanLab is also transmitted live and with no time delay to about 15 locations in Japan. This annual hands-on learning, which benefits from SSF’s exceptional Bio-Skills Lab and technology capabilities, has gained in popularity over the years. Today, Japanese surgeons are eager to attend JapanLab and to be part of the faculty.

SNI’s one-year Skull Base Surgery and Neurotology fellowships provides fully trained neurosurgeons hands-on training from some of the most knowledgeable multi-disciplinary specialists in the country. The fellowships include the diagnosis, treatment and management of patients with skull base tumors or neurotology disorders using the latest techniques and technologies.
Today there are more than 25 physicians at SNI involved in about 100 investigator-initiated and sponsored research protocols with more than 1,000 research participants. Many of these studies are collaborations with universities and research institutes across the country.

For example, through the National Institutes of Health-funded NeuroNEXT consortium, SNI is conducting trials of a vasopressin 1a receptor antagonist (SRC246) in irritable subjects with Huntington’s disease, as well as ibudilast for progressive multiple sclerosis (MS). SNI physicians have teamed up with the Allen Institute in Seattle to collect and preserve human brain tissue for cortical neuronal cell type classification. This tissue bank will provide valuable insight for research in brain tumors, epilepsy and possibly other neurological conditions. Surgeons are participating in several multicenter studies, including a study of the efficacy and safety of riluzole to reverse acute spinal cord injury and a prospective study of Reverse Medical’s Barrel® vascular reconstruction device.

Other SNI studies hold great promise for future research, such as the phase I hlgM22 study (Acorda). While the primary outcome of this study is safety in repairing the damage from MS, its mechanism of action — promoting remyelination of axons damaged by the inflammatory activity of MS — could signal the potential for neurological repair, which will warrant further research.

A particularly exciting new research direction at SNI is a pilot study for neuronally controlled rehabilitation of spinal-cord injury patients, and also some stroke and multiple sclerosis patients. This novel Japanese technology, called HAL® (Hybrid Assistive Limb®), uses an external motorized brace to move the limbs in a coordinated fashion. The study will assess how well HAL picks up on nerve signals in the legs to strengthen weakened muscle groups, which could potentially help nerve reorganization occur in a process called “neuroplasticity.” Cyberdyne designed this technology with the intent of helping patients get stronger on their own, with improved function and less spasticity.

SNI is also involved in the search for treatments for underserved and/or orphan diseases, such as Dravet and Cushing syndromes, and neuromyelitis optica. Orphan diseases seldom gain the same kind of notoriety that broader-based diseases, such as breast cancer or HIV, have achieved. This research is vital to finding new treatments for these rare diseases, and also to gaining a better understanding and finding better ways to diagnose them.

With a shared commitment to helping patients at Swedish — and throughout the world — researchers at SNI are seeking innovative new ways to improve the prevention, diagnosis and treatment of neuroscience diseases.
Brain Tumor
A071101 heat shock protein vaccine, GEMB: A Phase II randomized trial comparing the efficacy of heat shock protein-peptide complex-96 (HSPPC-96) (NSC #725085, Alliance IND #15380) vaccine given with bevacizumab vs. bevacizumab alone in the treatment of surgically resectable recurrent glioblastoma multiforme (Principal Investigator: Graber)
A071401 Meningioma: Phase II Trial of SMO/AKT/ NF2 inhibitors in progressive meningiomas with SMO/AKT/ NF2 mutations (Principal Investigators: Graber)
A221101 Armoredafinil for fatigue: A Phase III randomized, double-blind, placebo-controlled study of armofadinil (nuvigil) to reduce cancer-related fatigue in patients with high grade glioma (Principal Investigator: Graber)
A221208 BeST trial, brain mets: Randomized Phase II study: Corticosteroids + bevacizumab vs. corticosteroids + placebo (BeST) for radionecrosis after radiosurgery for brain metastases (Principal Investigator: Graber)
Act IV: An international, randomized, double-blind, controlled study of rindopepimut/GM-CSF with adjuvant temozolomide in patients with newly diagnosed, surgically resected, EGFVRvIII-positive glioblastoma (Principal Investigator: Hanson)
A Phase 0/1 Study of Combination Drug Therapy for Glioblastoma Based on Personalized Cancer Stem Cell (CSC) High-Throughput Drug Screening (HTS) (Principal Investigator: Cobbs)
Archer TPI 287 17: Phase I/2 dose-escalation study of TPI 287 in combination with bevacizumab followed by randomized study of the maximum tolerated dose of TPI 287 in combination with bevacizumab versus bevacizumab alone in adults with recurrent glioblastoma (Principal Investigator: Bankers)
Archer TPI 287 18: Phase 2 dose-escalation study of TPI 287 in combination with bevacizumab in adults with recurrent or progressive glioblastoma following bevacizumab alone (Principal Investigator: Bankers)
BMS CA209-143: A randomized Phase IIb open label study of nivolumab or nivolumab in combination with ipilimumab versus bevacizumab in adult subjects with recurrent glioblastoma (Principal Investigator: Bankers)
BT002: Evaluate the safety of MRI-guided focused ultrasound thermal ablation of brain tumors performed through intact human skull using the ExAblate transcranial system. (Principal Investigators: Montieth/Cobbs)
Cobbs Allen Brain Tumor Collection: Human brain tissue collection and preservation for cortical neuronal cell type classification (Principal Investigator: Cobbs)
DC-Vax: A Phase II clinical trial evaluating DCVax®-brain, autologous dendritic cells pulsed with tumor lysate antigen for the treatment of glioblastoma multiforme (Principal Investigator: Cobbs)
DCVax Expanded Access: An expanded access protocol for the treatment of glioblastoma multiforme in patients with already manufactured DCVax®-L, autologous dendritic cells pulsed with tumor lysate antigen who have screen-failed protocol 020221 (Principal Investigator: Cobbs)
EF-14: A prospective, multi-center trial of NovoTTF-100A together with temozolomide compared to temozolomide alone in patients with newly diagnosed glioblastoma (Principal Investigator: Benkers)
EORTC Protocol: ABT 414 alone or ABT 414 plus temozolomide versus lornustine or temozolomide for recurrent glioblastoma: a randomized phase II study of the EORTC Brain Tumor Group (Principal Investigator: Benkers)
Extension: A continuation protocol for patients previously enrolled in a study of Toca 511 (Principal Investigator: Cobbs)
Gene transfer: A Phase 1 ascending dose trial of the safety and tolerability of Toca 511 (Principal Investigator: Cobbs)
Glioblastoma: A randomized Phase 2 single-blind study of temozolomide plus radiation therapy combined with nivolumab or placebo in newly diagnosed adult subjects with MGMT-Methylated (tumor O-6-methylguanine DNA methyltransferase) glioblastoma (Principal Investigator: Benkers)
Glioblastoma: A randomized phase 3 open-label study of nivolumab vs temozolomide each in combination with radiation therapy in newly diagnosed adult subjects with unmethylated MGMT (tumor O-6-methylguanine DNA methyltransferase) glioblastoma (Principal Investigator: Benkers)
ICT-107: Study of immunotherapy in newly diagnosed glioblastoma: A phase II randomized double-blind, controlled study of ICT-107 with maintenance temozolomide (TM) in newly diagnosed glioblastoma following resection and concomitant TMZ chemotherapy (Principal Investigator: Bankers)
REAT: A Phase II study of rindopepimut/GM-CSF in patients with relapsed EGFVRvIII-positive glioblastoma (Principal Investigator: Bankers)
VB-111: A phase 3 randomized controlled double-blind, open-label, placebo-controlled multi-center study of VB-111 combined with bevacizumab versus bevacizumab monotherapy in patients with recurrent glioblastoma (Principal Investigator: Bankers)
Endocrine
Acrostudy: A multicenter, post-marketing surveillance study of pegvisomant therapy in patients with acromegaly (Principal Investigator: Yuen)
AEZS Growth Hormone Study (Ergomed): Confirmatory validation of oral macimorelin as a growth hormone (GH) stimulation test (ST) for the diagnosis of adult growth hormone deficiency (AGHD) in comparison with the insulin tolerance test (Principal Investigator: Yuen)
COR-003 Cushing’s: An open-label study to assess the safety and efficacy of COR-003 (25, 42Keto-cortisol) in the treatment of endogenous Cushing’s syndrome (Principal Investigator: Yuen)
Growth Hormone Deficiency (GHD): A phase 3, multicenter study designed to evaluate the efficacy and safety of a long acting high product (MOD-4023) in adult subjects with growth hormone deficiency (Principal Investigator: Yuen)
Growth Hormone Extention: An open-label, long-term extension study of the safety and efficacy of somavertan (VRS-317) in adults with growth hormone deficiency (Principal Investigator: Yuen)
Hypercortisolemia B2219: A multicenter, randomized, open-label, Phase IV study to investigate the management of pasireotide-induced hypercortisolemia with incretin based therapy or insulin in adult patients with Cushing’s disease or acromegaly (Principal Investigator: Yuen)
ISIS-GCCR: ISIS’s investigational product, ISIS-GCRPs, is a second-generation 2’ methoxyethyl chimeric antisense oligonucleotide (ASO) designed to inhibit glucocorticoid receptor (GCR) production (Principal Investigator: Bryois)
Novartis SOM2130B2410 Cushing’s observational: Non-interventional study for the generation of long term safety and efficacy data of pasireotide s.c. in patients with Cushing’s disease (Post-Authorization Safety Study) (Principal Investigator: Yuen)
Pharmacokinetics and pharmacodynamics of different dosing regimens of pegvisomant administration and its effects on of GH/IGF axis-related biomarkers, insulin sensitivity, β-cell function, and postload glucose tolerance in humans (Principal Investigator: Yuen)
QoL Acromegaly: Effects of growth hormone receptor antagonism and somatostatin analog administration on quality of life (Principal Investigator: Yuen)
REAL-1 growth hormone: A multicenter, multinational, randomized, parallel-group, placebo-controlled (double blind) and active-controlled (open) trial to compare the efficacy and safety of once weekly dosing of NNC0195-0092 with once weekly dosing of placebo and daily Norditropin FlexPro in adults with growth hormone deficiency (Principal Investigator: Yuen)
SOM Roll-over 2412 Signor: An open-label, multicenter pasireotide roll-over protocol for patients who have completed a previous Novartis-sponsored pasireotide study and are judged by the investigator to benefit from continued pasireotide treatment (Principal Investigator: Yuen)
Epilepsy
VITAL study Adult Growth Hormone: An open-label, dose-finding, international Phase 2 study with once monthly subcutaneous VRS-317 in adult growth hormone deficiency (Principal Investigator: Yuen)
Epilepsy
A multicenter, randomized, double-blind, parallel group, placebo-controlled trial of two fixed doses of ZX008 (fenfuramine hydrochloride) oral solution as an adjunctive therapy in children and young adults with Dravet syndrome (Principal Investigator: Sotero)
Compassionate Use of Striptentol in Dravet Syndrome (Principal Investigator: Sotero)
Gwinn Allen Brain Tumor Collection: Human brain tissue collection and preservation for cortical neuronal cell type classification (Principal Investigator: Gwinn)
Masial Temporal Lobe Scherosis: Pathological-Radiological (SRO) in the treatment of patients with presumed Masial Temporal Lobe Scherosis (Principal Investigator: Sotero)
Nicotine Use in Patients with Epilepsy (Principal Investigator: Doherty)
PACES Collaborative Study: Prevention Research Network’s Managing Epilepsy Well Network PACES Replication, Extension and Dissemination (Principal Investigator: Taylor)
RNS Long-Term Treatment: Responsive neurostimulator system long-term treatment clinical investigation (Principal Investigator: Gwinn)
Tissue Bank: Tissue procurement and repository protocol for future cerebrovascular studies (Principal Investigator: Gwinn)
Movement Disorders
CD FLEX: An open-label, non-inferiority study evaluating the efficacy and safety of two injection schedules of Xenoport® [nicobutanumtoxinA] [short flex vs. long flex] in subjects with cervical dystonia with < 10 weeks of benefit from onobutanumtoxinA treatment (Principal Investigator: Witt)
www.swedish.org/SNI
Stephen J. Monteith, M.D., in the control room of the focused ultrasound suite.

ET-03: A prospective, randomized, double-blinded, sham-stimulation controlled, non-significant risk, pivotal study to assess the safety and effectiveness of the Cala ONE device to aid in the symptomatic relief of hand tremors in adult essential tremor subjects (Principal Investigator: Gwinn)

Focused Ultrasound for ET: A continued access study to evaluate the effectiveness and safety of ExAblate transcranial MRgFUS thalamotomy treatment of medication refractory essential tremor subjects (Principal Investigator: Gwinn)

Focused Ultrasound for ET: Pivotal Study of MRgFUS thalamotomy for essential tremor (Principal Investigator: Gwinn)

NN105 – Huntington’s: An exploratory Phase II study to determine tolerability, safety and activity of a novel vasopressin 1a receptor antagonist (SRX246) in inpatient subjects with Huntington’s disease (Principal Investigator: Chuang)

Parkinson’s: An open-label, phase 3 study examining the long-term safety, tolerability and efficacy of APL-130277 in levodopa responsive patients with Parkinson’s disease complicated by motor fluctuations (“OFF” episodes) (Principal Investigator: Ro)

PD001: A feasibility study to evaluate safety and initial effectiveness of ExAblate transcranial MR-guided focused ultrasound for unilateral thalamotomy in the treatment of medication-refractory tremor dominant idiopathic Parkinson’s disease (Principal Investigator: Gwinn)

Multiple Sclerosis

ACTH Fatigue study: The effect of ACTH (Acthar Gel) on measures of fatigue in patients with relapsing MS (Principal Investigator: Bowen)

ADPR Subaward (Principal Investigator: Bowen)

Alexion NMO 301: A randomized, double-blind, placebo-controlled trial to evaluate the safety and efficacy of eculizumab in patients with relapsing-remitting MS (Principal Investigator: Repovic)

Alexion NMO 302 extension: A Phase III, open-label, extension trial of ECU-NMO-301 to evaluate the safety and efficacy of eculizumab in patients with relapsing-remitting MS (Principal Investigator: Bowen)

Biogen 303: A dose-blind, double-blind, placebo-controlled, parallel-group, dose-ranging study to assess the efficacy, safety, tolerability and pharmacokinetics of BIIB033 in subjects with relapsing forms of MS when used concurrently with avoneq (Principal Investigator: Qian)

Biogen 303: A dose-blind, multicenter, extension study to determine the long-term safety and efficacy of two doses of BG00012 monotherapy in subjects with relapsing-remitting MS (Principal Investigator: Bowen)

Biogen MITIGATE: A multicenter, double-blind, placebo-controlled study of montelukast on gastro-intestinal tolerability in patients with relapsing forms of MS receiving tecfidera delayed release capsules (Principal Investigator: Bowen)

CARE-MS extension: An extension protocol for MS patients who participated in Genzyme-sponsored studies of alemtuzumab.

CFTY720D2006E1: Open-label, single-arm extension study to the double-blind, randomized, multicenter, placebo-controlled, parallel-group study comparing the efficacy and safety of 0.5 mg FTY720 administered orally once daily versus placebo in patients with primary progressive MS (Principal Investigator: Bowen)

CIRCLES: Collaborative International Research in Clinical and Longitudinal Experience for Neuroumyelitis Optica Studies (Principal Investigator: Repovic)

CONCERTO: A multinational, multicenter, randomized, double-blind, parallel-group, placebo-controlled study followed by an active treatment period, to evaluate the efficacy, safety and tolerability of two doses of oral administration of laquinimod (0.6 mg/day or 1.2 mg/day) in subjects with relapsing-remitting MS (Principal Investigator: Qian)

FTY Gilenya Long-term: A single arm, open-label, multicenter study evaluating the long-term safety, tolerability and efficacy of 0.5 mg fingolimod (FTY720) administered orally once daily in patients with MS (Principal Investigator: Bowen)

Genentech OL OCR PPMS: An open-label, multicenter, expanded access program for ocrelizumab in patients with primary progressive MS (Principal Investigator: Bowen)

HEORMS Retrospective Study (Principal Investigator: Repovic)

Ibudlast: A randomized, double-blind, placebo-controlled study to evaluate the safety, tolerability and activity of ibudlast (MN-166) in subjects with progressive MS (Principal Investigator: Repovic)

LAND Life after MS Diagnosis: A biospsychosocial assessment of symptom trajectory (Principal Investigator: Qian)

Lemtrada OBS14379: A prospective observational cohort study in adult patients with relapsing MS to assess patient safety during and after Lemtrada® (alemtuzumab) infusions of the first treatment course (Principal Investigator: Repovic)

MPF mapping: Quantitative imaging of white and gray matter demyelination in MS using macromolecular proton fraction mapping (Principal Investigator: Bowen)

MS CHORDS: An open-label study to evaluate the effectiveness and safety of ocrelizumab in patients with relapsing remitting multiple sclerosis who have had a suboptimal response to an adequate course of disease-modifying treatment (Principal Investigator: Repovic)

MS Exacerbations: PT in acute motor MS exacerbations (Principal Investigator: Mayadav)

MS Imaging: Cross-sectional analysis of DTI and clinical parameters in MS (Principal Investigator: McCullough)

MS Transplant: The effect of allogeneic hematopoietic cell transplantation on the activity and progression of MS (Principal Investigator: Bowen)

NeuroNEXT: Clinical research sites for the Network of Excellence in Neurosciences Clinical Trials (Principal Investigator: Bowen)

OMB PPMS: A randomized, double-blind, double-dummy, parallel-group study comparing the efficacy and safety of ofatumumab versus teriflunomide in patients with relapsing MS (Principal Investigator: Repovic)

OPERA: A randomized, double-blind, double-dummy, parallel-group study to evaluate the efficacy and safety of ocrelizumab in comparison to interferon beta-1a (Rebif®) in patients with relapsing MS (Principal Investigator: Bowen)

Opexa 2012-00 SPMS: A Phase 2 double-blind, placebo-controlled multicenter study to evaluate the efficacy and safety of Tovaxin® in subjects with secondary progressive MS (Principal Investigator: Bowen)

Oratorio (Ocrelizumab in PPMS): A Phase III, multicenter, randomized, parallel-group, double-blind, placebo controlled study to evaluate the efficacy and safety of ocrelizumab in adults with primary progressive MS (Principal Investigator: Bowen)

Passage FTY2403: Long-term, prospective, multinational, parallel-cohort study monitoring safety in patients with MS newly started on fingolimod once daily or treated with another approved disease-modifying therapy (Principal Investigator: Bowen)

Quantitative imaging MS spine sub study subaward (Principal Investigator: Bowen)

REALIZE: A retrospective, multicenter, observational study to assess the effect of Teefidera® delayed-release capsules on lymphocyte subsets in subjects with relapsing forms of MS

REVEAL: A multicenter, randomized, open-label study to assess the impact of natalizumab versus fingolimod on central nervous system tissue damage and recovery in active relapsing-remitting MS subjects (Principal Investigator: Qian)
Cyberdyne’s Hybrid Assistive Limb® (HAL®), which is being used in a clinical trial at SNI.

Neuro-ophthalmology
NAION: A phase 2/3, randomized, double-masked, sham-controlled trial of QPI-1007 delivered by single or multi-dose intravitreal injection(s) to subjects with acute nonarteritic anterior ischemic optic neuropathy (Principal Investigator: Hamilton)

Neurosurgery
Barril Study — Aneurysm: Prospective, multicenter, single-arm study of the Reverse Medical Barril™ vascular reconstruction device for adjunctive treatment to embolic coils for wide-neck, intracranial, bifurcating/branching aneurysms of middle cerebral and basilar arteries (Principal Investigator: Montemeth)

Enterprise HDE: Enterprise Vascular Reconstruction Device and Delivery System (Principal Investigator: Montemeth)

LVIS HDE: MicroVention Low-profile Visualized Intraluminal Support (LVIS®) or LVIS Jr. Humanitarian Use Device (Principal Investigator: Montemeth)

NANO Effectiveness and Safety of Small Aneurysm Colling Trial (Principal Investigator: Montemeth)

Neuroform™ Microdelivery Stent system HDE: Boston Scientific Target Neuroform™ Microdelivery Stent System (Principal Investigator: Eskridge)

RELIEF: Prospective, multicenter, global registry to collect complete characteristics of real-world clinical outcomes for Boston Scientific commercially approved neurostimulation systems for pain in routine clinical practice when used according to the applicable directions for use (Principal Investigator: Gwinn/Deaville)

Transspher: Prospective multicenter cohort study comparing extent of tumor resection between microscopically transsphenoidal surgery and fully endoscopic transsphenoidal surgery for non-functioning pituitary adenomas (Principal Investigator: Deleahaw)

Voyager: A feasibility study of the Nativis Voyager™ system in patients with recurrent GBM (Principal Investigator: Cobbs)

Wingspan™ Stent: Wingspan™ Stent System with Gateway™ PTA Balloon Catheter (Principal Investigator: Eskridge)

Psychiatry
RECLAIM — HDE: Bilateral stimulation of the anterior limb of the internal capsule, AIC, as an adjunct to medications and as an alternative to anterior capsulotomy for treatment of chronic, severe treatment-resistant OCD in adult patients who have failed at least three selective serotonin re-uptake inhibitors (Principal Investigator: Melman)

Spine
BoneBac®: Spinal fusion with local BoneBac® autograft; preliminary clinical results and cost analysis (Principal Investigator: Page)

Coffex Spine Device: A 2 and 5 year comparative evaluation of clinical outcomes in the treatment of degenerative spinal stenosis with concomitant low back pain by decompression with and without additional stabilization using the Coffex Interlimanar Technology for FDA Real Conditions of Use study (Principal Investigator: Oskouian)

DuraSeal™ Exact Spine Sealant System Post-Approval Study Protocol (Principal Investigator: Oskouian)

HAL® exoskeleton: Use of an exoskeleton in neuromuscular- locomotion-impaired patients in rehabilitation therapy to improve function and societal contributions (Principal Investigator: Chapman)

I-Spondi: An assessment of outcomes of surgical treatment of isthmic spondylolisthesis (Principal Investigator: Chapman)

Lateral Spine Interbody Fusion: Long-term results and complications (Principal Investigator: Page)

Neurologically controlled intrinsic neuromuscular feedback therapy in the treatment of incomplete spinal cord disease: A pilot study using the HAL® system (Principal Investigator: Chapman)

Osteocel — Retrospective Chart Review: Osteocel bone grafting results in spinal fusions: Long-term review of outcomes and complications (Principal Investigator: Page)

RISCIS: A multicenter, randomized, placebo-controlled, double-blind, trial of efficacy and safety of niluzole in acute spinal cord injury (Principal Investigator: Chapman)

SNI Frailty Index Study: A prospective evaluation of the influence of patient frailty and their eventual disposition (Principal Investigator: Chapman)

Spinall Interbody Fusion Spinal Interbody Fusion: Long-term results and complications (Principal Investigator: Page)

Stand-Alone Cage — Retrospective Chart Review: Stand-alone cervical fusion cage systems: Long-term results and complications (Principal Investigator: Page)

Stand-Alone Cage versus Conventional ACDF (Principal Investigator: Oskouian)

Stand-Alone Cervical Fusion Cage Systems: Long-term results and complications (Principal Investigator: Page)

Structured Spine Care: Prospective review of Structured Spine Care Program for surgical and non-surgical spine patients (Principal Investigator: Hanscom)

Unplanned Reoperation after Intradural Spinal Tumor Resection (Principal Investigator: Oskouian)

Stroke
BIP Study: Randomized, double-blind, evaluation in secondary stroke prevention comparing the efficacy and safety of the oral thrombin inhibitor dabigatran etexilate (110 mg or 150 mg, oral bid) versus acetylsalicylic acid (100 mg oral qd) in patients with embolic stroke of undetermined source (RESPECT Study) (Principal Investigator: Smith)

The Flow Redirectional Endovascular Device Stent System Trial (FRED Trial) (Principal Investigator: McDougall)

Imaging Collaterals in Acute Stroke (iCAS) study to determine if non-contrast arterial spin label MR imaging can help characterize collateral Pipeline in patients presenting with acute large vessel arterial stroke and whether it can identify which patients who are ineligible for intravenous tissue plasminogen activator (t-PA) therapy or have failed t-PA therapy are most likely to benefit from an endovascular clot removal procedure; and a direct comparison with current state-of-the-art for clinical perfusion imaging, bolus contrast dynamic susceptibility contrast. (Principal Investigator: Keogh)

PRISMS: A Phase IIIb, double-blind, multicenter study to evaluate the efficacy and safety of alteplase in patients with mild stroke, (Principal Investigator: Stayman)

Retrospective chart review study in Telemedicine — Is it a safe and effective method for performing acute medical hospital admissions? (Principal Investigator: Guide)

SOCRATES: A randomized, double-blind, multinational study to prevent major vascular events with ticagrelor compared to aspirin (ASA) in patients with acute ischaemic stroke or TIA (Principal Investigator: Monen)

STRATIS: Systematic Evaluation of Patients Treated with Neurothrombectomy Devices for Acute Ischemic Stroke Registry (Principal Investigator: Monteith)

Translational Brain Tumor
GBM Biomarkers: Glioblastoma Biomarker Database (Principal Investigator: Cobbs)

NIH TGCA: The Cancer Genome Atlas (Principal Investigator: Cobbs)

The Ivy Glioblastoma Atlas Project: A multi-site initiative to create a web-based resource for glioblastoma research (Principal Investigator: Cobbs)

R01 SMC Prime: The role of cidofovir and structural analogs as adjuvant therapy for GBM (Principal Investigator: Cobbs)

R01 CPMP Transfer Grant: Cytomegalovirus gene expression and strain variability in glioma pathogenesis (Principal Investigator: Cobbs)

Other
DBS for Dystonia (Principal Investigators: Nora/Gwinn)

DBS for OCD (Principal Investigators: Nora/Gwinn)

IVAC: A single-blind, randomized, controlled trial to determine the effect of intravenous acetaminophen administered at induction and emergence from craniotomy (Principal Investigator: Lam)

PTSD-ADNI Study: Effects of traumatic brain injury and post-traumatic stress disorder on Alzheimer’s disease (AD) in veterans using ADNI (DoD-ADNI) (Principal Investigator: Keogh)

Tissue Bank — PAW (Principal Investigator: Repovic)
Education

Highly respected institutes, such as the Swedish Neuroscience Institute (SNI) share a common characteristic — they accept responsibility to advance the practice of medicine through knowledge sharing. This exchange of expertise drives innovation, improves the delivery of care and contributes to achieving exceptional clinical outcomes. SNI offers continuing medication education (CME) courses and neuroscience grand rounds for primary-care physicians and specialists, and also provides advanced training through five fellowship programs.

A close partnership with the Seattle Science Foundation (SSF), a non-profit education and research organization located adjacent to SNI, enhances these educational opportunities. As a clinical education resource for SNI, SSF is unmatched. Its professional staff helps SNI develop and administer didactic courses, hands-on practical labs, clinical trial investigator meetings and allied health-care training. A 21-station Bio Skills Lab is outfitted with operating room tables and lighting, which makes it an ideal venue for hands-on workshops for surgical and endoscopic specialties. These sessions can be viewed remotely and are recorded for future viewing. Demand for in-person attendance is often over-subscribed; however, teleconferencing and distance learning
capabilities, access to an online video archive, and SSF’s ability to facilitate live, interactive feeds from SNI’s operating suites to outside facilities, give SNI’s worldwide audience easy access to this quality knowledge sharing.

Demand is also high for SNI’s fellowship training. More than 100 applications were received in 2015 for SNI’s five fellowships, which include:

**Cerebrovascular Surgery/Endovascular.** SNI offers neurosurgeons one- and two-year fellowships in cerebrovascular microsurgery and/or neuro-endovascular treatment. The fellowships provide experience in the diagnosis and management of a wide range of cerebrovascular disorders, and in extracranial carotid and vertebral artery disorders.

**Epilepsy and Functional.** As one of the busiest centers for epilepsy and functional disorders in the country, SNI is a prime location for advanced training. The fellowship teaches complete work-ups and evaluation for epilepsy surgery, including grid and strip monitoring, resection techniques and vagal nerve stimulation, and also provides functional neurosurgery training.

**Complex and Minimally Invasive Spine.** This is a unique fellowship that combines orthopedic and neurosurgical spine training. As a high-volume tertiary spine center, SNI offers fellows experience in trauma, tumors, infection, degenerative conditions and complex adult spinal deformity, as well as exposure to all types of osteotomies.

**General Neurosurgery.** Through one- and two-year fellowships, fellows receive additional hands-on training in general and advanced tertiary-care neurosurgery. This training includes the diagnosis and management of a wide variety of neurosurgical conditions using traditional and endovascular surgical procedures, as well as radiosurgery.

**Skull Base and Neurotology.** Fellows receive training in association with the Swedish Hearing and Skull Base Surgery Center, the Seattle Pituitary Center and The Ben and Catherine Ivy Center for Advanced Brain Tumor Treatment. The two one-year fellowships include hands-on training using the latest techniques and technologies to diagnose, treat and manage patients with skull base tumors or neurotology disorders. Skull base fellows have access to an anatomical laboratory where they can practice procedures before performing live surgeries.

Teleconferencing capabilities give SNI a worldwide audience for its professional courses.
Philanthropic gifts from the community help the Swedish Neuroscience Institute (SNI) broaden the advanced, progressive treatment it provides for a wide range of brain, spine and central nervous system conditions. In 2015, the community’s support of Swedish was greater than ever before, with nearly $2.5 million donated specifically to benefit SNI.

For example, philanthropy helped open the Multiple Sclerosis Center at Swedish in 2012, the only one of its kind in the Pacific Northwest. Gifts to the center continue to help fund specialized services, education and programs found only at Swedish. Looking forward, the Swedish Medical Center Foundation is working with the center and members of the community to create an endowment that would permanently fund several supportive care services, including a social worker, vocational counselor, program development coordinator, adventure guide and a neuropsychologist. An endowment will ensure these non-clinical services are available in perpetuity to enrich patients’ lives. (See page 6 for more information about the MS Center’s programs.)

Community support is also making it possible to build a paralysis research program. The Swedish Spinal Cord Research Platform will create a 3-D human spinal cord atlas and develop a registry and tissue bank that will spur research in paralysis associated with stroke, spinal cord injury and neurological diseases, such as MS and amyotrophic lateral sclerosis (ALS or Lou Gehrig’s disease). It will also build a clinical trials platform to evaluate new technologies, such as Cybathlon’s Hybrid Assistive Limb (HAL®) suit. (See page 21 for more information about the HAL® research.)

A gift from the estate of Susan McGregor, who died of glioblastoma multiforme, is helping Charles Cobbs, M.D., the Gregory Foltz, M.D., endowed director of The Ben & Catherine Ivy Center for Advanced Brain Tumor Treatment at SNI, establish a partnership among The Ivy Center, Institute for Systems Biology and Fred Hutch (a cancer research center in Seattle). The purpose of the research is to leverage new technologies to identify proteins that all brain tumors share, so eventually they can produce a vaccine that would target those specific proteins, thus killing the proteins and the tumor. (See page 15 for more information about The Ivy Center.)

Gifts like these help SNI’s staff provide their patients comprehensive care and support, while also pursuing research breakthroughs that may change the way patients with neurologic disorders are cared for in the future.
Deep Brain Stimulation


Multiple Sclerosis


Epilepsy


Movement Disorders


Neurology


Neuro-Oncology


Neuro-Oncology


Neuromuscular


Neurosurgery


Neurology, Hearing and Skull Base Surgery


Swedish Neuroscience Institute Providers (As of October 2016)

Adult Hydrocephalus
Eric Gierke, M.D.
Ryder Gwinn, M.D.
Anne Mai, M.D.
Stephen Monteith, M.D.
Lawrence Murphy, M.D.
Akshal Patel, M.D.
Susie Ro, M.D.
Ruth Thiex, M.D.
Jennifer Witt, M.D.

Audiology
Elizabeth Elkins, AuD, CCC-A
Alyson Mellish, AuD, CCC-A
Alexandra Parbery-Clark, Ph.D., AuD, CCC-A
Stacey Watson, AuD, CCC-A

Balance
Elizabeth Elkins, AuD, CCC-A
Myra Emami, P.T.
Mary Goodman, P.T.
Judith White, M.D., Ph.D.

Brain Tumor
The Ben & Catherine Ivy Center for Advanced Brain Tumor Treatment
Tara Benkers, M.D.
Robyn Callahan, MSW, LCSW
Charles Cobbs, M.D.
Sheldon Goldberg, M.D.
Jerome Graber, M.D.
Marc Mayberg, M.D.
Michelle Smith, PA-C
Sarah Wade, PA-C

Cerebrovascular
Margaret Dancan, PA-C
Johnny Delashaw, M.D.
Leisa Garrett, PA-C
Cheri Geist, PA-C
Puneet Gupta, PA-C
Dustin Hayward, M.D.
Martin Holland, M.D.
Amanveer Kalia, ARNP
Yince Loh, M.D.
Amitoz Manhas, M.D.
Cameron G. McDougall, M.D.
Stephen Monteith, M.D.
Joanne Osetsky, ARNP
Akshal Patel, M.D.
Norman Rokosz, M.D.
Ruth Thiex, M.D.
Ryan Urbonas, M.D.

Deep Brain Stimulation
Rosalind Chuang, M.D.
Kristin Crosley, ARNP
Briccio Guillermino, PA-C
Ryder Gwinn, M.D.
Peter Nora, M.D.
Samira Pardakhim, ARNP
Susie Ro, M.D.
Martha Short, PA-C
Jordan Steed, PA-C
Jennifer Witt, M.D.

Epilepsy
Lisa Caylor, M.D.
Quinn Crosta, ARNP
Michael Doherty, M.D.
Ryder Gwinn, M.D.
Alan Haltiner, Ph.D.
Kitti Kaiboriboon, M.D.
Jehuda Sepkuty, M.D.
Edneia Simon, M.D.
Marcio Sotero de Menezes, M.D.
Nicole Warner, ARNP

General Neurology
Alex Cooper, M.D.
Todd Czartoski, M.D.
Meghana Doreswamy, M.D., MBBS
Brian Draker, M.D.
Suzanna Eller, M.A., LMHC
Michael Elliot, M.D.
Eric Gierke, M.D.
Ali Aamer Habib, M.D.
Kate Kennedy, ARNP
Lee-Loung Liou, M.D.
Dongmei Liu, M.D.
Anne Mai, M.D.
Joyce Mauk, M.D.
Ellen Modell, M.D.
Lawrence Murphy, M.D.
Brian Nago, M.D.
Hal Rappaport, M.D.
Mary Reif, M.D.
Jack Stigler, D.O.
Carolyn Taylor, M.D.
Anna Wong, M.D.
Benduan Yang, M.D., MSC
Dennis Zhou, M.D.

Inpatient Neurology and Stroke
James Bartscher, M.D.
William Berg, M.D.
Derek Clark, M.D.
Todd Czartoski, M.D.
Thomas Deuel, M.D.
Keri Drury, PA-C
Tatyana Erdmann, PA-C
Holly Hensley, M.D.
Kory Herrick, M.D.
Emily Ho, M.D.
James Jordan, M.D.
Stanley Kong, PA-C
Tom W. Kushner, D.O.
Liou Lee-Loung, M.D.
Ravi Menon, M.D.
Kariss Peterson, ARNP
Lovelace Ralls, ARNP
Nirav Shah, M.D.
Tarvinder Singh, M.D.
Shela Smith, M.D.
Aaron Stayman, M.D.
Ruth Thomson, M.D.

Movement Disorder
Rosalind Chuang, M.D.
Suzanna Eller, M.A., LMHC
Briccio Guillermino, PA-C
Ryder Gwinn, M.D.
Peter Nora, M.D.
Susie Ro, M.D.
Jordan Steed, PA-C
Jennifer Witt, M.D.

Aaron N. Stayman, M.D.
Multiple Sclerosis
James Bowen, M.D.
Lina Fine, M.D., M.Phil.
Simon Gale, OTR/L
Kimberly Kobata, P.T., NCS
Angeli Mayadev, M.D.
Peiqing Qian, M.D.
Pavle Repovic, M.D., Ph.D.
Barbara Severson, ARNP
Michelle Toshima, Ph.D.
Alan Wittenberg, R.C.

Neuro-Critical Care
James Bartscher, M.D.
Steven Deem, M.D.
Arthur Lam, M.D.

Neurologic Restoration
Kristen Crosley, ARNP
Ryder Gwinn, M.D.
Arthur Lam, M.D.
Jordan Steed, PA-C

Neuromuscular
Suzanna Eller, M.A., LMHC
Michael Elliott, M.D.
Eric Gierke, M.D.
Ali Aamer Habib, M.D.
Lee-Loung Liou, M.D.

Neuro-Ophthalmology
Marybeth Grazko, M.D.
Steven Hamilton, M.D.
Bonnie Keung, M.D.
Eugene May, M.D.

Neuro-Psychiatry
Joshua Bess, M.D.
Tuesday Burns, M.D.
Suzanne Kerns, M.D.
Kenneth Melman, M.D.

Neurosurgery
Pamela Betz, PA-C
Robyn Callahan, MSW, LCSW
Kristina Campbell, ARNP
Jens Chapman, M.D.
Charles Cobbs, M.D.
Cara Cook, ARNP
Margaret Dancan, PA-C
Glen David, M.D.
Johnny Delashaw, M.D.
Todd Ensign, PA-C
Leisa Garrett, PA-C
Victoria Gasparayan, ARNP
Cheri Geist, PA-C
Briccio Guillermo, PA-C
Puneet Gupta, PA-C
Ryder Gwinn, M.D.
David Hanscom, M.D.
Robert Hart, M.D.
Dustin Hayward, M.D.
Martin Holland, M.D.
Shiveindra Jayamohan, M.D.
Amanveer Kaila, ARNP
Katherine Kamm, PA-C
Linda Lai, PA-C
Zachary Litvack, M.D.
Amitoz Manhas, M.D.
Marc Mayberg, M.D.
Cameron G. McDougall, M.D.
Charene McElroy, ARNP
Stephen Montieh, M.D.
Tanya Nguyen, ARNP
Peter Nora, M.D.
Joanne Osetsyk, ARNP
Rod Osksouian, M.D.
Jeni Page, ARNP
Akshal Patel, M.D.
Andrea Pero, PA-C
Norman Rokosz, M.D.
James Saadi, M.D.
Jordan Steed, PA-C
Timothy Steege, M.D.
Anna Sturm, PA-C
Ruth Thiex, M.D.
Ryan Urbonas, M.D.
Sara Wade, PA-C
Sanford Wright, M.D.

Pediatric Neurology
Anthony Boulcin, M.D.
Quinn Crosta, M.D.
Ryder Gwinn, M.D.
Nancy Hunter, R.D., C.D., CSP
Edna Simon, M.D.
Marcio Sotero de Menezes, M.D.
Timothy Steege, M.D.
Brien Vloek, M.D.

Physiatry
Abraham Abu, PA-C
Glen David, M.D.
Eva Young, M.D.

Pituitary
Johnny Delashaw, M.D.
Bart Keogh, M.D., PhD
Zachary Litvack, M.D.
Christopher Loiselle, M.D.
Marc Mayberg, M.D.
Robert Meier, M.D.
Jennifer Mercado, ARNP
Kelley Moloney, ARNP
Steven Rostad, M.D.
Sandra Vermeulen, M.D.
Kevin Yuen, M.D.

Radiology
Pedro Vieco, M.D.
David Westman, M.D.

Radiosurgery
Daniel Landis, M.D.
Brian Lee, M.D., Ph.D.
Christopher Loiselle, M.D.
Vivek Mehta, M.D.
Robert Meier, M.D.
Sandra Vermeulen, M.D.

Spine
Jens Chapman, M.D.
Charles Cobbs, M.D.
Cara Cook, ARNP
Margaret Dancan, PA-C
Glen David, M.D.

Stroke
Stanley Kong, PA-C
Tom W. Kushner, D.O.
Sheila Smith, M.D.

TeleStroke
James Bartscher, M.D.
Derek Clark, M.D.
Todd Czartoski, M.D.
Thomas Deuel, M.D.
Holly Hensley, M.D.
Kory Herrick, M.D.
Emily Ho, M.D.
Lee-Loung Liou, M.D.
Ravi Menon, M.D.
Nirav Shah, M.D.
Tarvinder Singh, M.D.
Sheila Smith, M.D.
Aaron Stayman, M.D.
Ruth Thomson, M.D.
SNI in the Community

The clinical and administrative staff of the Swedish Neuroscience Institute (SNI) works tirelessly to ensure patients receive the highest quality of care. At the same time, SNI supports communities and organizations across the state by providing care at outreach clinics, and through educational opportunities and special events that help raise awareness and funding for various conditions that affect the nervous system or spine. The following events are an example of the many outreach programs SNI has sponsored or supported throughout the years.

Multiple Sclerosis

Art Show: Six years ago the Swedish MS Center hosted its first art show, giving individuals in the Pacific Northwest touched by MS an opportunity to express themselves. Since then, the show has become an eagerly awaited annual event. The show accepts every piece of artwork, regardless of the level of ability of the artist, and professionally displays the pieces for public viewing. More than 100 pieces of art were submitted for this year’s show, and about 200 patients and hundreds of guests attended the event. The show, which encourages individuals to thrive apart from their disease, helps raise community awareness about MS, while offering a venue for artists to display their creative works, meet others in the community and sell their art, if desired.

MS Roadshows: Medical professionals from the Swedish MS Center take pride in sharing their expertise with communities outside the Seattle metro area. Bellingham, Bremerton, Tacoma, Port Angeles, Yakima, Everett, Centralia, Wenatchee and Woodinville are a few of the communities in Washington that have hosted a four-hour weekend seminar about diagnosing and treating MS, and the latest MS research.

MS Walk: Every year for the past eight years, the Swedish MS Center has participated in the annual MS Walk at the University of Washington. Swedish’s 150-member team raised more than $15,000 at the most recent walk to support MS research.

Epilepsy

Supporting EFNW: SNI participates in the Epilepsy Foundation Northwest’s (EFNW) run/walk, now in its 13th year, to help increase public awareness and understanding of epilepsy, and to raise money for the organization’s programs and services. Swedish Neuroscience Epilepsy raised $3,600 at the recent event.

TSC Community Walk: SNI both sponsored and participated in the local Tuberous Sclerosis Complex (TSC) community walk.

Education: Swedish Epilepsy, The LAM (lymphangioleiomyomatosis) Foundation and the Tuberous Sclerosis Alliance partnered to host a regional educational conference at Swedish Cherry Hill. The conference shared updates on LAM and TSC research, and explored ways to improve quality of life for those living with these medical conditions.

Brain Cancer

For nine years, patients, families and friends have come together to support cancer patients and survivors at the Seattle Brain Cancer Walk. The fundraising event benefits brain cancer research and patient care at The Ben & Catherine Ivy Center for Advanced Brain Tumor Treatment at SNI. To date we have raised more than $398,000 through the walk.

Amyotrophic Lateral Sclerosis (ALS)

SNI recognized the Microsoft Enable Team for its efforts to create technologies that help restore capabilities to individuals living with disabilities. Ann Eichmeyer (far left), former care coordinator, ALS Evergreen Chapter, and Dr. Michael Elliott (far right), associate chief of neurology and medical director of neuromuscular medicine at SNI, presented the Spirit of Lou Gerhig Award to Microsoft’s Ann Paradiso and Jamie Rifley (middle left and right). This event is just one example of the strong relationship SNI has with industry leaders in the Greater Puget Sound Area.

SNI in the Community

The clinical and administrative staff of the Swedish Neuroscience Institute (SNI) works tirelessly to ensure patients receive the highest quality of care. At the same time, SNI supports communities and organizations across the state by providing care at outreach clinics, and through educational opportunities and special events that help raise awareness and funding for various conditions that affect the nervous system or spine. The following events are an example of the many outreach programs SNI has sponsored or supported throughout the years.

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Clinical Programs and Services

Ballard
- Neurology
- Stroke Program

Bellevue
- Neurology
- Neuro-Ophthalmology

Cherry Hill (Seattle)
- Acute Rehabilitation Unit
- Balance Center
- Center for Hearing and Skull Base Surgery
- Cerebrovascular Center
- Deep Brain Stimulation
- Epilepsy Program
- Focused Ultrasound
- Movement Disorders
- Multiple Sclerosis Center
- Neurologic Restoration
- Neurology
- Neuromuscular Program
- Neuro-Ophthalmology
- Neuropsychiatry
- Neurosurgery
- Physiatry
- Pituitary Center
- Radiosurgery
- Skull Base Tumor Program
- Sleep Medicine Program
- Spine Specialists at SNI
- Stroke Program

Edmonds
- TeleStroke Program
- The Ben and Catherine Ivy Center for Advanced Brain Tumor Treatment

Edmonds
- Neurology
- Neurosurgery
- Pediatric Neuroscience Program
- Stroke Program

Everett
- Cerebrovascular Center
- Movement Disorders
- Neurology
- Neurosurgery
- Skull Base Tumors
- Sleep Health
- Spine Center
- Stroke Center

First Hill (Seattle)
- Center for Hearing and Skull Base Surgery
- Neurology: Swedish Center for Comprehensive Care
- Neurology: The Polyclinic
- Pediatric Neuroscience Program
- Pituitary Program
- Stroke Program

Issaquah
- Adult Hydrocephalus Program
- Neurologic Restoration
- Neurology

Longview
- Neurosurgery

Mill Creek
- Center for Hearing and Skull Base Surgery
- Stroke Program

Northgate (Seattle)
- Neurology: The Polyclinic

Redmond
- Neuromuscular Program
- Neurosurgery
- Stroke Program

Sequim
- Neurosurgery

Seattle – North
- Sleep Medicine Program

West Seattle
- Neurosurgery

Anchorage, AK
- Neurosurgery
- Spine

TeleStroke Sites

Island Hospital, Anacortes
Jefferson Healthcare, Port Townsend
Kadlec Regional Medical Center, Richland
Lake Chelan Community Hospital, Chelan
Olympic Medical Center, Port Angeles
Providence Regional Medical Center, Everett

Skagit Valley Hospital, Mount Vernon
Swedish Ballard, Seattle
Swedish Cherry Hill, Seattle
Swedish Edmonds
Swedish First Hill, Seattle
Swedish Issaquah

Swedish Mill Creek
Swedish Redmond
Walla Walla Adventist Hospital, Walla Walla
Whidbey General Hospital, Coupeville

Program locations are current as of October 2016 and are subject to change.