The UCLA Department of Neurology is robust and strategically positioned to lead this complex area of medicine into the future. How, though, does one measure an academic department? UCLA Neurology is large and deep, with 135 full-time faculty members and 54 voluntary faculty members. Since the early 1990s, the department’s research activity has been in the top 10 in neurology departmental National Institutes of Health funding. Research output from the department places it in the top five in the field in terms of publication numbers, citations, and specific citation metrics. On the clinical side, UCLA Neurology provides inpatient services at state-of-the-art Ronald Reagan UCLA Medical Center. The UCLA Neuro Intensive Care Unit is a large 26-bed unit that houses a 3 Tesla magnetic resonance imaging (MRI) unit and combination positron emission tomography–computed tomography scanners. Stroke, general neurology, and epilepsy services occupy spacious floors which, like the hospital in general, have the openness and natural light that was part of the original design by I.M Pei. Together with the neighboring outpatient Neurology Clinic, there is a strong focus on quality medical care, which has earned UCLA Health’s hospitals the ranking of No. 1 in the West and No. 5 in the country by U.S. News & World Report.

UCLA Neurology extends beyond the Westwood campus to include Olive View–UCLA Medical Center and the VA Greater Los Angeles Healthcare System’s West Los Angeles Medical Center and VA Sepulveda Ambulatory Care Center. This network provides exceptional clinical care to one of the most ethnically, economically, and socially diverse patient populations in the country. This network also offers research and educational opportunities for UCLA physicians and scientists. UCLA Neurology education has a matching focus in size and quality. It has recently extended its medical student clerkship. There are more than 125 Neurology trainees as graduate students, postdoctoral fellows, and clinical fellows, a highly ranked residency program, and unique educational channels, such as the UCLA Neurology Resident NINDS R25 research program that funds a dedicated clinical or basic science research track in the residency.

A Unique Collaborative Environment

UCLA Neurology is part of the larger, collaborative neuroscience environment of UCLA Clinical Neurosciences that fosters movement across departments and disciplines. The Departments of Neurology, Psychiatry, and Neurosurgery have faculty with joint appointments, joint research projects, and publications that reflect the interdisciplinary nature of neuroscience research. For example, autism investigations and new treatments in brain cancer or brain repair require faculty who move through various areas, such as genetics, clinical trials, and viral gene delivery. These faculty members bring to the table the resources and energy of each discipline and the support of all neuroscience-related departments.

The David Geffen School of Medicine at UCLA has identified six research priorities, including neuroscience, to facilitate synergetic interactions, common grants, and faculty recruitment and retention. The Neuroscience Theme is a multidisciplinary structure that integrates basic neuroscience investigations across departments, including neurobiology, physiology, and biological chemistry. Faculty in the Department of Neurology are part of the Neuroscience Theme and work closely with theme leaders in cooperative research studies that span basic to translational to clinical science. Clinical studies in the Department of Neurology are further strengthened with database, statistical, and infrastructure support from the UCLA Clinical and Translational Science Institute. These interactions within UCLA Neuroscience expand the depth and breadth of the Department of Neurology and add intellectual diversity and vitality to its research programs.

Parkinson’s Disease: Innovation, Collaboration, Transformation

What if UCLA scientists could enhance the brain’s ability to fight the slow degeneration that occurs in Parkinson’s disease? Parkinson’s disease is a progressive degeneration of brain systems that control movement. Patients experience a slowing of their ability to start movements, tremor or shaking at rest, and an increase in falls. What many people don’t know is that Parkinson’s disease actually affects many different functions and leads to increased rates of depression and dementia. Neurology physicians at UCLA work long hours to care for patients with Parkinson’s and to treat their symptoms. Some patients appear to be more resilient in the face of the attack of the disease. What if the mechanisms behind this resilience could be identified and stimulated to help patients fight the disorder? Drs. Jeff Bronstein and Beate Ritz are doing such a study. They are using advanced DNA sequencing to identify genes that are associated with this slowdown in brain damage and disease progression. This study is unique in that it is a collaboration between a neurologist and an epidemiologist to develop methods of determining environmental exposures that appear to not only increase one’s risk of getting Parkinson’s disease, but also may help determine the rate of progression. The goal is to study how these genes and environmental...
factors act on a molecular level, so that new drugs can be developed that will slow or halt the progression of cell death. By studying brain resilience in patients, UCLA Neurology has a goal to stop brain degeneration. Ten years ago, patients were treated with drugs that helped mitigate slow movement, but did nothing to stop the disease. UCLA’s goal is to develop therapies that stop disease progression and have them available within 10 years from now.

Brain cancer is a devastating disease— even more so because it can occur at younger ages than cancer in the rest of the body and because it has been resistant to traditional cancer therapies. Many people have experienced the suffering and loss of a family member, loved one or friend to brain cancer. UCLA provides comprehensive brain cancer care and deploys leading-edge therapies for this disease, including a range of clinical trials. An important goal in brain cancer is to develop tailored therapy for the genetics of each person’s tumor. Research to discover new therapies that are more effective against brain cancer indicates that each patient’s brain cancer has different DNA mutations that dramatically affect its cancer. For example, some of these gene mutations enable the cancer to grow more quickly, evade chemotherapy, and extend throughout the brain. These mutations also make the cancer dependent on certain molecules. UCLA neurology researchers are working to identify specific mutations in brain cancer genes by sequencing the brain cancer genome, which will enable them to tailor therapies for each patient’s condition and more effectively treat the cancer. One such mutated gene is IDH1, which is particularly common in brain cancer in younger adults. IDH1 mutations produce high levels of a molecule that appears to initiate activity wherein normal brain cells develop into cancer cells. Interestingly, this molecule may also serve as an indicator for the tumor, allowing an MRI to detect it at earlier stages. Drs. Albert Lai and Timothy Cloughesy, along with a team of researchers at UCLA, are studying patient brain cancers, preclinical models of brain cancer in the lab, and novel drugs in clinical trials to determine how IDH1 mutations allow cancer cells to grow and how these mutations combine with other gene mutations in the cancer to provide for a “cancer escape” from chemotherapy. Research into IDH1 and other brain cancer gene mutations will identify unique vulnerabilities in the tumor.

Friedrich Nietzsche is not popularly associated with ironic humor. People do slow down with age, and this can be a source of witty commentary. Most people worry about the increased incidence of dementia in aging, because dementia sharply increases with age: by 85 almost one-third of the population will have dementia. Neurologists now recognize that dementia is not just Alzheimer’s disease, but instead is often a combination of factors. One component of mixed dementia is an accumulation of small strokes in the parts of the brain that connect different areas. This part of the brain is called the “white matter.” Stroke in the brain’s white matter increases with age, occurs with increased frequency in Alzheimer’s disease, and accelerates it. UCLA Neurology’s Dr. S. Thomas Carmichael has determined that white matter stroke turns on a process of brain repair in its early stages, but then this process stalls. His research team identified a set of molecules that are increased by white matter stroke in the aged brain and prevents recovery. The team then promoted recovery in scientific models with white matter stroke by delivering an experimental therapy that blocks these molecules. This research points the way for a new therapeutic approach for dementia.

Epilepsy Care: The Danger of the Unknown

Epilepsy is a disease of uncertainty. A seizure is instantly disabling, life altering and—particularly when it first presents—unpredictable. Fear of the unknown is the devastating fact of epilepsy. After a brain injury, what is the risk of developing epilepsy? After one seizure, how great is the risk for another seizure? When anti-seizure medication is indicated, how can a physician know which drug will work without risking another seizure? In a patient with a history of seizures, what is the risk that the disease will require greater scrutiny, additional testing, and multiple drugs or surgery? Currently, there is no way to definitively diagnose epilepsy or predict the likelihood of future seizures. UCLA neurologists are developing biomarkers for epilepsy patients that will predict the need for greater intervention, or will indicate that patients are not at high risk for further seizures. One biomarker comes from electrical signals in the brain. Drs. Anatol Bragin and Jerome Engel, Jr., discovered several years ago that brain circuits in epilepsy can form especially fast communications among cells. They are investigating the possibility that detection of high-frequency electrical oscillations may serve to indicate which patients will develop epilepsy after an insult, such as traumatic brain injury, and which patients require more advanced therapies. Classifying seizures this way contributes to better outcomes following surgical treatment for epilepsy when drugs have failed to control the disease. Along with new brain imaging modalities, the UCLA Epilepsy group is developing brain wave recordings of these electrical oscillations as a biomarker in epilepsy so that anxiety and fear of the unknown can be reduced in epilepsy patients.

Do You Know Your Tumor’s Genes?

This is called “mixed dementia,” because the symptoms of forgetfulness and mental slowing may be due to not just the damage from Alzheimer’s or other dementias, but also to small strokes. UCLA Neurology provides diagnosis and care for dementia in its Dementia and Memory Disorders Clinic within the Mary S. Easton Center for Alzheimer’s Disease Research at UCLA. To push for treatments for dementia, researchers at UCLA are identifying the mechanisms of mixed dementia and how to treat it. One component of mixed dementia is an accumulation of small strokes in the parts of the brain that connect different areas. This part of the brain is called the “white matter.” Stroke in the brain’s white matter increases with age, occurs with increased frequency in Alzheimer’s disease, and accelerates it. UCLA Neurology’s Dr. S. Thomas Carmichael has determined that white matter stroke turns on a process of brain repair in its early stages, but then this process stalls. His research team identified a set of molecules that are increased by white matter stroke in the aged brain and prevents recovery. The team then promoted recovery in scientific models with white matter stroke by delivering an experimental therapy that blocks these molecules. This research points the way for a new therapeutic approach for dementia.

“The advantage of a bad memory is that one enjoys several times the same good things for the first time.”

—Friedrich Nietzsche