



COURTESY OF NORMAN PRINCE NEUROSCIENCES INSTITUTE

The cover image is an artist's semitransparent rendering of the brain looking from the back. It shows features of the vascular system on the surface, the cerebral cortex on the left, deep structures of the cerebral hemisphere on the right, and brain stem in the lower center.

The Norman Prince Neurosciences Institute: Linking Research to Clinical Care

JOHN A. ROBSON, PhD; KAREN FURIE, MD; STEVEN RASMUSSEN, MD

Over the past 50 years the expansion and advances in neuroscience have been astonishing. The Society for Neuroscience illustrates this growth. It is the world's largest organization of scientists and physicians devoted to understanding the brain and nervous system. In 1969 it had 500 members. Today it has almost 42,000 and its annual meeting attracts over 30,000 researchers. This tremendous growth in research has led to discoveries that have fundamentally changed our understanding of the nervous system.

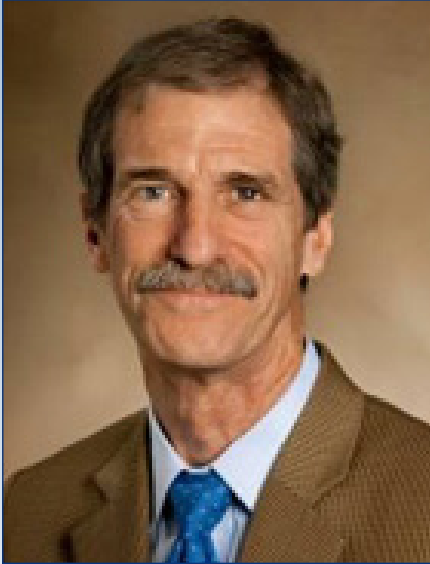
We are gaining an ever-more sophisticated understanding of the functioning of neurons through the development of advanced imaging technologies in combination with genetic manipulations, and the human genome project is providing new insights about diseases and disorders of the nervous system. Advances in brain imaging technologies, such as Positron Emission Tomography (PET) and Magnetic Resonance Imaging (MRI), have revolutionized the ways that we diagnose disorders of the nervous system and they are showing, on a global scale, how information is processed in the brain. At the same time researchers are developing devices, like electrodes for deep brain stimulation and implantable

multi-electrode arrays that take advantage of progress in computational neuroscience and computer science to better diagnose and treat a variety of neurological disorders, ranging from depression to epilepsy to Parkinson's disease and paralysis.

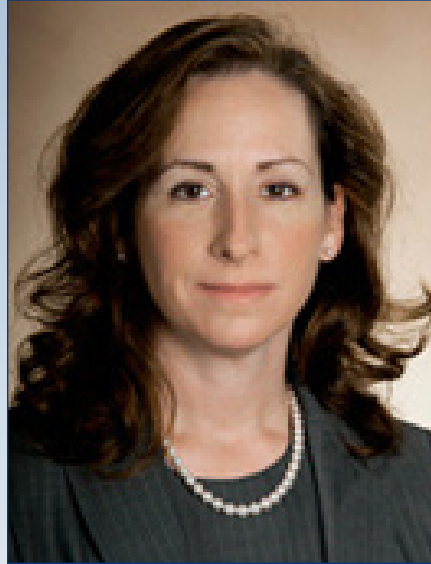
In 2013 the White House announced a new national initiative in neuroscience – BRAIN (Brain Research through Advancing Innovative Neurotechnologies). It is targeted at one of the great mysteries of the brain – how networks of neurons interact to create sensations, movements and thoughts. It will lead to even more breakthroughs in our understanding of how populations of neurons work together normally and how changes in network interplay lead to symptoms associated with neurological and psychiatric disease. These recent and anticipated future advances are creating opportunities for devising new treatments for diseases of the brain and nervous system that are greater than at any time in history.

In Rhode Island

This excitement about brain science is having a profound impact in Rhode Island. In the past few years the Alpert



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PHOTOS: BROWN UNIVERSITY

Medical School at Brown University, in partnership with its affiliated hospitals, has been moving toward the creation of a coordinated academic medical center in Providence. One goal of such a center is to create links between research scientists and clinicians to encourage disease-targeted research and to create a pipeline that will facilitate the conversion of research findings into benefits for patients. In this area neuroscience is leading the way.

In December 2009 descendants of Frederick Henry Prince, a New England entrepreneur who made his fortune during the Gilded Age, around the turn of the 20th century, approached Dr. Timothy Babineau, President of Rhode Island Hospital, about making a gift from the Frederick Henry Prince 1932 Trust. Over the next several months that idea crystallized into a \$15-million donation, the largest in the history of Rhode Island Hospital, from Elizabeth J.M. Prince and her children, Diana Oehrli, Guillaume de Ramel and Regis de Ramel, to endow the Norman Prince Neurosciences Institute (NPNI), named after the son of Henry Frederick Prince, who died from a head injury suffered in a plane crash during World War I.

Although the gift was made to Rhode Island Hospital, the Institute was expected to develop as a collaborative venture with Brown University and other hospitals affiliated with the Alpert Medical School, including Bradley Hospital, Butler Hospital, Women and Infants Hospital, The Miriam Hospital and the Providence VA Medical Center. In that respect, the timing could not have been better. The chairs of the clinical neuroscience departments of neurology, neurosurgery and psychiatry were vacant, creating an opportunity to recruit new leadership with a shared vision for building interdisciplinary programs. In addition, Brown University was planning a major expansion of brain science on its campus through its own neuroscience institute, the Brown

Institute for Brain Science (BIBS). The fit was obvious and these initiatives have coalesced into a broad-based, interdisciplinary and inter-institutional effort.

Launching the Norman Prince Neurosciences Institute

In 2011 NPNI began to develop a vision for growth. A steering committee was created that included the leaders in neurology, neurosurgery, psychiatry and basic neuroscience at Rhode Island Hospital, Brown and its other affiliated hospitals. Dr. G. Rees Cosgrove was recruited from Boston in 2010 to serve as chair of neurosurgery and take a major leadership role in the NPNI, which he did until resigning in 2014. Dr. Cosgrove did his neurosurgical training at the Montreal Neurological Institute, a self-contained, highly integrated clinical and research institute at McGill University that, in several respects, serves as a model for NPNI. In 2011 he was joined by Dr. John Robson as executive director. He is a neuroscientist who also worked at the Montreal Neurological Institute as associate director from 1997–2007. In 2012 Dr. Karen Furie, a Brown graduate and stroke specialist at Harvard University and the Massachusetts General Hospital, was recruited to be the chair of neurology and Dr. Steven Rasmussen accepted the chair of psychiatry and human behavior. Dr. Rasmussen has been on the Brown faculty for almost 30 years and is a leading expert on the treatment of obsessive-compulsive disorder. Both Drs. Furie and Rasmussen also serve as co-clinical directors of NPNI.

Building on Excellence: Brown Institute for Brain Science

Brown University is well known for its strengths in neuroscience research. It was one of the first universities in the United States to establish a Department of Neuroscience and, as a group, its neuroscientists have been very successful building excellence and attracting research funds.

However, Brown's neuroscientists are not confined to one department; they are found across the campus. Consequently the Brown Institute for Brain Science (BIBS) was established as an umbrella organization to advocate for all "brain scientists" and to facilitate interdisciplinary research. This institute now lists more than 100 faculty members from 15 different departments. Represented disciplines range from applied math, engineering and computer science, to cell and molecular biology and physiology, to cognitive neuroscience and brain imaging. Similarly, the clinical neurosciences are distributed across several departments, including neurology, neurosurgery, pathology, psychiatry and radiology, and they are found in many different hospitals affiliated with the Alpert Medical School. Like BIBS, NPNI strives to unite their efforts and create new opportunities for growth and collaboration.

From the onset there has been a major emphasis on collaboration between NPNI and BIBS. The two organizations have worked closely together to create joint programs intended to benefit all of brain science across the campuses of Brown and its affiliated hospitals. These efforts have included funding for collaborative research projects, a symposium, workshops and seminar speakers. BIBS and NPNI also partnered with the Rhode Island Medical Society for its highly successful "200th Anniversary Lecture Series."

Efforts are also underway to find ways to collaborate with scientists at the University of Rhode Island, which started an interdisciplinary neuroscience graduate program in 2012. That program and others related to neuroscience at URI are sure to grow in size and prominence in the coming years due to the recent creation of the Ryan Institute for Neuroscience.

These are exciting times for neuroscience in Rhode Island.

There is a real opportunity to make Providence a nationally recognized center of excellence in this area. In some areas we are already there but further investment will be needed. The clinicians and scientists are eager and many of the parts are in place.

This issue of the *Rhode Island Medical Journal* contains articles by members of NPNI. They provide examples of programs being developed that focus on important clinical issues. It is not a comprehensive review of all programs that fall under the NPNI umbrella. However, these articles describe programs that illustrate the approach that we are developing. They focus on autism, stroke, traumatic brain injury and emerging uses of technology to treat a variety of neurological and psychiatric disorders. Each of these efforts involves teams that are collaborative, interdisciplinary and inter-institutional.

Authors

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