

(above)
The OHSU Brain Institute offers hope and healing for patients of every age.

OHSU Brain Institute

A statement of strength

Every day at Oregon Health & Science University 1,000 brain experts are engaged in breakthrough research, integrated clinical care, rigorous professional training and essential public outreach. Together they comprise one of the largest and most productive communities of brain scientists and clinicians in the nation. It is not just the scope of their activities, however, but the essential ways in which they connect – like the intricate connections of the brain’s own neural network – that make possible their power and potential. Together they are hastening the pace of research, improving life for patients, and advancing the quest for cures.

Connection is everything

The brain is the most powerful, most complex organic machine in existence, a biocomputer laced with nearly one trillion nerve cells, each interacting in a series of elaborate steps that allow us to experience and interact with the world. When the brain’s intricate processes are disrupted, devastating illness can result.

Today more than 50 million Americans suffer from nearly 1,000 known neurological and psychiatric illnesses – disorders that cause more hospitalizations and disabilities than any other class of disease and exact staggering financial, emotional and societal costs.

There is good news, however. Over the last two decades:

- Revolutionary new tools and technologies have dramatically expanded our knowledge of the brain.
- New therapies have significantly improved patient lives and offered patients new hope.
- Leading academic health centers such as OHSU and major research funders such as the National Institutes of Health are together strongly focused on translational research, the process by which laboratory breakthroughs reach patients.
- OHSU’s community of brain experts has launched the OHSU Brain Institute to leverage exceptional strengths and build vital connections.

Key points of distinction:

- Largest community of brain experts in the West
- National neurosciences ranking: top 1%
- Number of diseases treated/ studied: 36
- Number of principal investigators: 220
- Number of brain specialists: 1,000
- Number of Howard Hughes Medical Institute investigators: 3

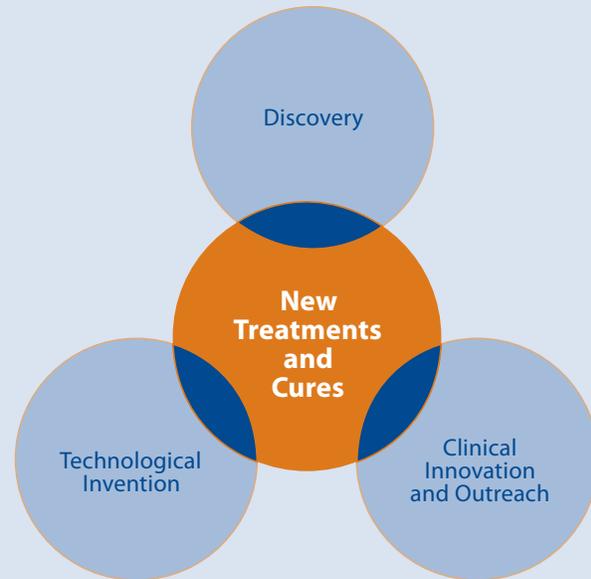
Given these developments, some experts believe that the next ten years will bring stunning advances – even cures – and powerful new therapies that can transform many common neurological diseases into manageable conditions.

But the road ahead is challenging. In the neurosciences, advances will never track neatly along a singular or defined path. Brain science and the clinical neurosciences are simply too complex and multifaceted for easy solutions. The cellular and molecular mechanisms of the brain, its elaborate systems, the mysteries of cognition and the links between mind and body mean that enlightenment will come through the deliberate, rigorous interaction of related activities and disciplines. To succeed, we must court connections.

Experts agree that the biggest breakthroughs will come at the intersection of disciplines and at the interplay between research and clinical activities. That is where dazzling connections inspire new knowledge. Those connections are the hallmark of the OHSU Brain Institute.



The power of connection is hastening the pace of research, improving life for patients, and advancing the quest for cures.



Discovery connections

Connecting basic and translational research

Connecting 33 areas of research focus

Connecting to the NIH Neurosciences Blueprint

For the past decade, research on the brain and central nervous system has made up nearly half of OHSU's research portfolio, with hundreds of ongoing investigations into the way we prevent, diagnose and treat neurological and psychiatric disorders. OHSU experts collectively – and perpetually – rank in the top one percent nationally for competitive grant support in the neurosciences from the National Institutes of Health.

This remarkable productivity begins with basic science research. Many new therapeutics and diagnostics owe their existence to basic bench science. OHSU is an acknowledged leader in this fundamental type of research – an unassailable point of distinction that, along with premier core imaging and gene sequencing capabilities and other unique resources, truly sets OHSU apart on the national stage.

But beyond basic research strengths, OHSU's achievements and potential for greatness is built on an unrelenting focus on the cycle of connection – the dynamic interplay between the laboratory (where discoveries are made), the bedside (where breakthroughs are put into practice) and the lab again (where clinical data helps shape what's next). At OHSU this translation is enabled by rich multidisciplinary collaboration in which teams of researchers and clinicians from departments, clinics, institutes and programs across the university work together to serve patients, share discoveries and leverage both public and private funding. These critical connections are the hallmark of the OHSU Brain Institute, and a point of strength that has helped nurture the West's most dynamic and productive cluster of brain experts.

Such connections are also emblematic of the broader collaborative trend in neurosciences. The NIH Neurosciences Blueprint has identified three unifying themes (neurological development, degeneration and plasticity) that reflect the full scope of knowledge necessary to understand diseases and functions of the nervous system. These themes recognize that multiple disciplines – from molecular neurobiology to family practice to psychiatry – have become so intertwined that individual, institutional and even international collaboration is the rule, not the exception.

Discovery points of distinction:

- *National NIH ranking: top 1%*
- *World's most powerful imaging capabilities*
- *The nation's largest alcohol research center and only methamphetamine research center*
- *Developed 3 unique MS therapeutics*
- *Discovered 4 of 5 known dopamine receptors which help govern movement, motivation and emotion*
- *Discovered system that keeps neurons firing properly*
- *Discovered brain mechanisms of addiction, balance and mental retardation*
- *Opened door to identifying origins of key neurodegenerative diseases*

Technical innovation connections

Harnessing technology to advance connections

There is little doubt that in the last 20 years of neurological research and practice, technology has changed everything. Incredible advances in imaging, computing, neurotechnology and computational neuroscience are enabling discoveries that were impossible before now. It is now possible, for instance, to understand the complex processes occurring within a single neuron.

The OHSU Brain Institute has access to a number of core technology resources that are unquestionably at the edge of the leading edge: both 7T and 12T magnetic resonance imaging (there are currently only three similar 12Ts in the world); microscopy devices capable of imaging brain function at the level of the individual cell; and a next-generation advanced gene sequencer that can sequence a human genome in minutes, not years.

The connections made possible by these state-of-the-art devices are helping OHSU researchers and physicians better diagnose, treat and study brain illnesses – and they will enable the coming age of personalized medicine that will be the next big revolution in clinical practice.

A key example of OHSU's technical leadership is the Oregon Center for Aging & Technology (ORCATECH), a landmark collaborative between OHSU, industry and community partners to pioneer bold and effective technology solutions that will address cognitive decline and optimize health and quality of life for aging populations. This first-in-the-world endeavor is changing the paradigm for independent living for the aging.

Technical points of distinction:

- *Best-in-the-world MRI and gene sequencer*
- *Pioneered live cell culture and imaging of neurons*
- *Oregon Center for Aging & Technology*
- *Devices that measure mobility*



OHSU Brain Institute

The OHSU Brain Institute was established in 2006 to build on OHSU's tremendous strengths in the neurosciences. OBI provides an institutional framework for efforts to advance the treatment and prevention of nervous system diseases – promoting interdisciplinary research, integrating health care, and furthering public understanding of the brain and its central role in human experience.

Participating hospitals, centers and institutes

- Casey Eye Institute
- Center for Research on Occupational and Environmental Toxicology
- OHSU Hospital
- OHSU Doernbecher Children's Hospital
- Oregon Hearing Research Center
- Oregon National Primate Research Center
- Vollum Institute

School of Medicine departments

- Anesthesiology and Perioperative Medicine
- Behavioral Neuroscience
- Neurological Surgery
- Neurology
- Pediatric Neurology
- Physiology & Pharmacology
- Psychiatry
- Science & Engineering



OHSU brain experts treat and investigate the following brain and nervous system disorders

- ALS
- Alzheimer's disease
- Ataxias, dystonia
- Attention Deficit-Hyperactivity Disorder
- Autism
- Bipolar disorder
- Blindness
- Brain and spinal tumors
- Cerebral Palsy
- Circadian rhythm disorders
- Depression
- Diabetes
- Dyslexia
- Eating disorders
- Epilepsy
- Gene diseases
- Hearing loss – vestibular, Meniere's disease, tinnitus
- Huntington's disease
- Macular degeneration
- Mental retardation
- Multiple Sclerosis
- Muscular dystrophy
- Myasthenia Gravis
- Narcolepsy, sleep apnea, restless leg syndrome
- Neuroendocrine disorders
- Pain disorders – back, migraine, shingles, trigeminal neuralgia
- Panic disorders, OCD, phobias
- Parkinson's disease
- Peripheral neuropathies
- Prion diseases – CJD
- Schizophrenia
- Spina bifida
- Stroke
- Substance dependency, abuse
- Tourette's syndrome
- Traumatic brain injury and spinal cord injury

Clinical and outreach connections

Connecting discovery and clinical practice

Connecting experts with patients and students

Connecting clinical breakthroughs back to the laboratory

Connecting with the community

Neurological disease is significantly influenced by age and locality. With Oregon's oldest per-capita population in the West and its higher-than-average rate of occurrence for several common neurological diseases, Oregonians have a greater-than-normal need for exceptional clinical services related to nervous system disorders.

At OHSU, discovery and clinical care are fundamentally linked in the daily operations of OHSU's comprehensive neurology and neurosurgery clinics and in its six major disease-based patient centers – the Parkinson Center of Oregon, the Oregon Stroke Center, the Layton Aging and Alzheimer's Disease Center, the Multiple Sclerosis Center of Oregon, the ALS Center of Oregon, and the Adult Attention Deficit Disorders Clinic – as well as its numerous pediatric and psychiatric services.

Each year hundreds of experts in these programs and centers help thousands of patients and their families deal with the challenging daily impacts of living with neurological disease. Their treatment is enhanced by the exceptional caliber of clinicians associated with OHSU, by research breakthroughs – many that originated in laboratories steps away from the clinics – and by OHSU's unique core assets such as premier imaging capabilities.

Interdisciplinary clinical practice also fundamentally advances research. The insights of physicians, nurses, patients and other experts help pioneer effective therapies and inspire new laboratory research opportunities. These connections are advancing what is possible and changing lives for the better.

This rich environment also gives students in OHSU's neuroscience graduate programs exceptional educational opportunity and forges connections to the future of discovery and practice.

Finally, public advocacy and outreach are also advancing what's possible by regularly and enthusiastically connecting OHSU experts with the community – to share insights, promote brain health, and advocate for support through a series of activities culminating each year in Brain Awareness Season, a constellation of highly anticipated, award-winning awareness events.

Clinical and outreach points of distinction:

- *Deep brain stimulation for Parkinson's patients*
- *Innovative, minimally invasive surgical therapies for brain tumors*
- *Participation in clinical trials that saves lives*
- *Brain Awareness Season*

To learn about giving opportunities, contact Lori Sweeney, Director of Development for the Neurosciences at 503 494-7455 or sweeneyl@ohsu.edu.

