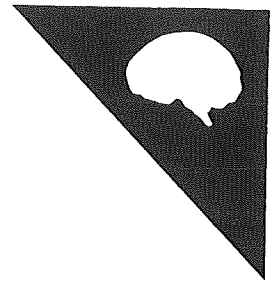


# Answering Your Questions About Brain Research



## **Q: HOW DOES THE BRAIN WORK?**

The brain is a multilayered web of cells: nerve cells (neurons) and vastly more numerous glial cells that stabilize the chemical environment and regulate and protect neurons.

The outermost layer, the cerebral cortex, is a fraction of an inch thick but contains 70 percent of all neurons. This most evolved part of the brain is divided into lobes specialized to regulate sensory experience, language and memory, and our sense of space. The frontal lobe is the most distinctively human region, responsible for judgment, planning and decision making.

Beneath the cortex are areas such as the basal ganglia, which controls movement; the limbic system, central to emotion; and the hippocampus, a keystone of memory.

The primitive brainstem regulates balance, coordination and life-sustaining processes such as breathing and heartbeat.

Throughout the brain, neurons communicate with one another through interlocking circuits. When a neuron is stimulated, it generates a tiny electrical current, which passes down a fiber, or axon. The end of the axon releases neurotransmitters —chemicals that cross a microscopic gap, or synapse — to stimulate other neurons nearby.

The process may be repeated thousands of times to create a circuit of electrical signals that produces movement, emotion, a sensory experience or thought.

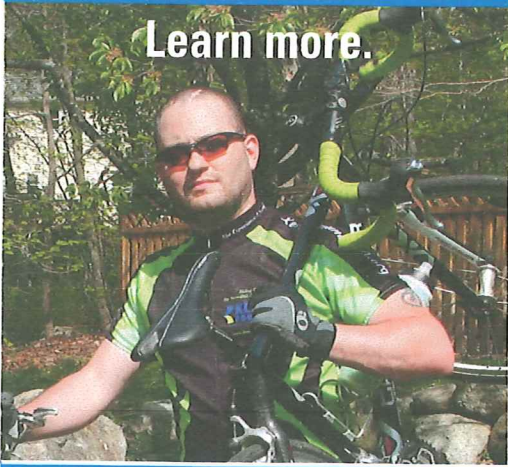
Actually, a neuron typically communicates with many others simultaneously, and will or won't fire depending on the sum of signals it receives. Neuron-to-neuron activity extends widely, linking lobes and levels of the brain. Bundles of axons, "white matter," efficiently carry signals from region to region, like long-distance cables.

In recent years, this connectivity has become a focus of research as scientists explicate how the brain is wired and piece together the intricate orchestration of inner activity that ebbs and flows as we go about our lives — how reading, for example, integrates vision, language, emotion and reasoning centers.

At a projected cost of \$4.5 billion, the BRAIN initiative is pushing this effort to its ultimate goal: Map the whole brain, neuron by neuron, and determine how these connections work in health and disease. The project is designed as a public-private endeavor, with initial funding from the federal government.



Learn more.



Find help.



Help raise awareness.



#NotAloneinBrainInjury  
[www.biausa.org](http://www.biausa.org)

### BRAIN INJURY FACTS AND STATISTICS

- More than 3.5 million children and adults sustain an acquired brain injury (ABI) each year, but the total incidence is unknown.
- An ABI is any injury to the brain that is not hereditary, congenital, degenerative, or induced by birth trauma.
- Typical causes of ABI include:
  - Electric Shock
  - Infectious Disease
  - Lightning Strike
  - Near Drowning
  - Oxygen Deprivation (Hypoxia/Anoxia)
  - Seizure Disorders
  - Stroke
  - Substance Abuse
  - Toxic Exposure
  - Trauma
  - Tumor
- More than 12 million Americans live with the impact of ABI.
  - Traumatic brain injury (TBI) is a subset of ABI and is caused by trauma to the brain from an external force.
  - At least 2.5 million children and adults sustain TBIs in the U.S. each year:
    - 2.2 million are treated in emergency departments for TBI each year.
    - 280,000 are hospitalized for TBI each year.
    - 50,000 die because of TBI each year.
  - The number of people who sustain TBIs and do not seek treatment is unknown.
  - Every 13 seconds, someone in the U.S. sustains a TBI.
  - One of every 60 people in the U.S. lives with a TBI-related disability.
- Every day, 137 people in the U.S. die because of a TBI-related injury.
- There are many causes of TBI:
  - Falls – 40.5%
  - Struck by/against – 15.5%
  - Motor vehicle – 14.3%
  - Assaults – 10.7%
  - Unknown – 19%
- At least 5.3 million Americans live with TBI-related disabilities.
- When someone sustains a brain injury, many people are affected:
  - Survivors and their parents, spouses, siblings, extended families, and friends
  - Healthcare providers, including surgeons, physicians, counselors, rehab therapists, social workers, and personal care attendants
  - Insurance companies that issue auto accident, individual, and group health, disability, life and re-insurance policies
  - Attorneys of all types, including those who handle personal injury, insurance and disability claims, civil rights/discrimination, domestic actions, wills, estates, and trusts
  - Educators at every level, but especially special education teachers and those who prepare America's future healthcare workforce
  - Government agencies that administer health and social programs such as Medicare, Medicaid, State Children's Health Insurance Program (SCHIP), Supplemental Nutritional Assistance Program (SNAP), vocational rehab
  - Employers of all types