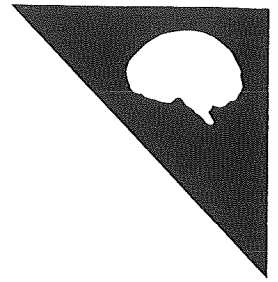


Answering Your Questions About Brain Research



Q: HOW DOES THE BRAIN DEVELOP?

The brain is a lifelong work in progress. Development is most rapid before birth, maintains a furious pace in infancy and continues briskly through childhood and adolescence, but never ceases altogether.

In the third week of gestation, genes switch on to turn some of the embryo's stem cells — “blank slate” cells with the potential to become any kind of tissue — into neurons and glia. These newly formed cells multiply, migrate and connect with one another, guided by chemical signals into the webwork of brain anatomy. By week seven, primitive forms of the cortex, cerebellum and brainstem are apparent.

Birth is only the beginning. The brain adds volume at an initial rate of 1 percent per day, growing by two-thirds in the first three months. To fuel its development, it requires 43 percent of the body's daily energy intake until puberty — which, some experts say, explains why physical growth takes so long in humans, compared with other species.

Neurons aren't added — in fact, we have more at birth than in adulthood — but grow and connect as specialized circuits form. Sensory centers emerge early, while the hippocampus and amygdala, primitive regions important in emotion and memory, aren't fully functional until age 3 — which is why we retain virtually no memories of infancy.

Childhood development is a dynamic brain-world interaction. During “critical” periods when regions regulating senses, emotions and language are amped up to make synapses, they must receive appropriate environmental stimulation to connect properly.

Development in adolescence defines brain circuits more sharply, adding new synapses, pruning unnecessary ones and strengthening those that remain. Sensory, language and emotional centers mature. Axons add an insulating sheath of myelin to transmit messages more efficiently.

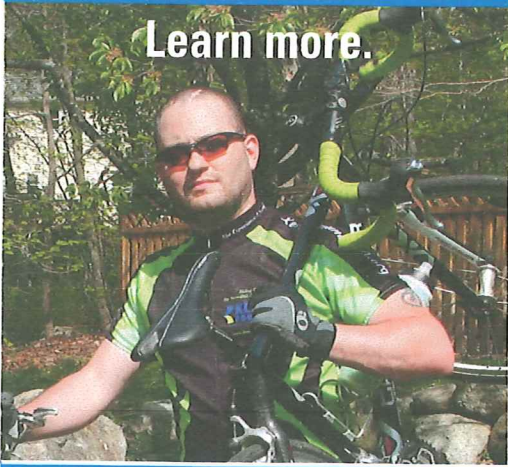
As adolescence ends, the brain still needs fine-tuning, as indicated by frequent risk taking and poor judgment displayed by some in their early 20s. That the prefrontal cortex, seat of planning and decision making, won't mature fully for another decade partly explains this behavior, but connections between brain regions also must strengthen to give the intellect meaningful control over emotional impulse.

WHEN DEVELOPMENT GOES WRONG

Mishaps in this complex process before birth or early in childhood result in neurodevelopmental disorders, such as intellectual disability, autism and attention deficit hyperactivity disorder (ADHD). Some suggest that schizophrenia, which typically appears in late teens, develops in a similar way.

Causes of neurodevelopmental disorders may include genetics, toxic exposure, infection and trauma. Research into these problems may facilitate earlier intervention and improve treatment.

Learn more.



Find help.



Help raise awareness.



#NotAloneinBrainInjury
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