The Adolescent Brain and How to Improve Learning

By Mary Knutson, RN

4-8-11
Adolescent Brain Development

- The frontal lobe (the “executive” area of the brain that controls planning, reasoning, and impulse control) continues developing during adolescence.

- With time, neural networks that help brain cells communicate become larger and work faster in the brains of teenagers.

- The brain’s white matter is not fully formed until age 20 – The frontal lobe is the last area of the brain to be myelinated.
The Frontal Lobe

• During adolescence, the brain undergoes an increased production of gray matter (which is responsible for the generation of nerve impulses to process the brain’s information).

• A process called “pruning” follows, where the connections among unused neurons are eliminated.

• “Pruning” makes the brain more efficient, strengthening the useful connections and getting rid of “clutter”.
Adolescent Behavior

• Why do teens tend to lack impulse control and decision making skills, demonstrate irrational behaviors, recklessness, and have emotional outbursts?
• Teens tend to see their lives as full of ‘drama’ as they process information much differently than adults:
  – Adults usually rely on the frontal lobes, (center of reasoning and language), to respond to situations
  – Adolescents rely more on the amygdala (which controls a wide range of emotions) as they react quickly without considering the consequences of their actions.
  – Teens are more likely to misinterpret and respond emotionally to situations.
  – They may not be able to find the words to express their feelings - They may have difficulty identifying their emotions or the emotions of others.
Adolescent Brain Development

• Teens begin to develop some advanced reasoning abilities during teenage years and can develop stronger synapses with repeated practice and learning.

• When teens “exercise” their brains by learning to control impulses, order their thoughts, and understand abstract concepts, it lays good neural foundations for adulthood.

• During teenage years, it is important to “use it or lose it” (because of the “pruning” that occurs), and to form healthy pathways rather than unhealthy ones.
Teens Seek Stimulation

• The capacity for learning of an adolescent brain is amazing, but they often need guidance with prioritizing and organizing.
• The “cellular excitement” in their brain helps teenagers learn languages and musical instruments much easier than adults.
• Neurochemical changes, puberty, and changes in the way the brain processes rewards and pleasure often lead to risky, thrill-seeking behaviors like experimenting with drinking and drugs.
• Environmental factors or experiencing trauma can and also contribute to high-risk behavior.
Implications of Drugs or Alcohol

• While the brain is still developing, it is more sensitive to drugs

• Brain changes from using drugs are more likely to become “hardwired” in the brain, leading to addictions in adulthood.

• Adolescents are also more vulnerable to the affects of alcohol on memory and learning abilities.

• Growing up in fear and chaos increases their risk of depression, substance abuse, and other harmful behaviors
Helping Teens Learn

- The teenage brain filters out a lot of incoming stimuli, making teaching them more challenging.
- Their brain pays more attention if the information has meaning, and if it causes an emotional response.
- Practice and rehearsal are critical for long term learning.
- Think of the human brain as social - It requires interaction to develop properly.
- Provide more visual information and active learning.
- Encourage teens to get plenty of sleep.
- Give simple instructions, both verbally and in writing.
• Abstract thought processes aren’t developed until age 18-20
• The most effective teaching style for adolescents is to create concrete experiences, involving hearing, seeing, smelling and/or touching.
• Symbolic experiences like reading books and abstract thinking (trying to make generalizations about things) can build from their experiences.
• An adolescent’s brain can hold seven, (plus or minus two), items of information in their working memory.
Effective Learning Strategies

• **Storytelling** – Either real or fictional
• **Reciprocal teaching** - (Think, Pair, Share) or small group discussion
• **Metaphor, Analogy or Simile** - to connect the information to something they are familiar with
• **Visuals/Graphics** - (A picture is worth a thousand words)
• **Hands-on/Simulation** activities
• **Wait Time** – Give them time to process your question before asking for a response

(See handout for reference – The Adolescent Brain – Learning Strategies and Teaching Tips)
Conclusion

• Teens have brain development that affects their thinking, behavior, mood, and ability to learn.
• Effective learning is very possible if teaching is done in an engaging way that connects with their concrete experiences.
• They have an opportunity to develop a faster, sharper and more focused brain as their gray matter and neural connections can be changed.
• With our help, teens can lay foundations for healthier thinking and stronger neural pathways that will be with them throughout their lifetime.
References


• Spinks, S. (2002). Adolescent brains are works in progress.

• http://www.pbs.org/wgbh/pages/frontline/shows/teenbrain/work/adolescent.html


• With contributions by LeeAnn Knutson, a psychology student