

Tobacco Addiction and the Adolescent Brain

One statistic is widely known in this field: the likelihood for a lifetime of tobacco addiction increases when one begins smoking or using tobacco under the age of 18¹. Obviously the brain (and body) is doing magical development during the teen years. It's interesting to consider this tobacco statistic from a biological standpoint.

Brain development learning can be broken down for comprehension, and for sharing with young people involved first-hand. Many people are interested to learn how their bodies work and why things happen the way they do. This topic of brain development among adolescents, and the role addiction has with it, can be fascinating to discuss with your youth.

Do you know at which age the brain matures? On average, it is 25 years! Adolescence is the period between childhood and adulthood. During that period all learning is making memories with the brain. Therefore, engagement (such as involvement with inspiring youth tobacco prevention groups and programs!) excites neurons in the brain to talk to other neurons (via synapses) about the age of brain maturity, and is making memories.

Steps of Development:



1 – BLOSSOMING—abstract thought explodes, along with multiple cognitive interests! Yet, the speed needed for processing in the brain is reduced and can feel “fuzzy.”

This processing slow-down impacts spontaneous decision-making. Sometimes we ask teens, “What were you thinking?!?” Youth need time to process for good decisions. It takes literal time and practice to learn to go from a primitive “feeling brain” to a developed “thinking brain.” Peer pressure, such as a proposition to try tobacco products, lacks the time teens need in that moment to process and think about options and consequences.

2 – PRUNING—the brain will become smaller and more efficient as it matures. Dendrites (a little extension of a neuron) which aren’t used will be reduced and stripped. “Use it or lose it!”

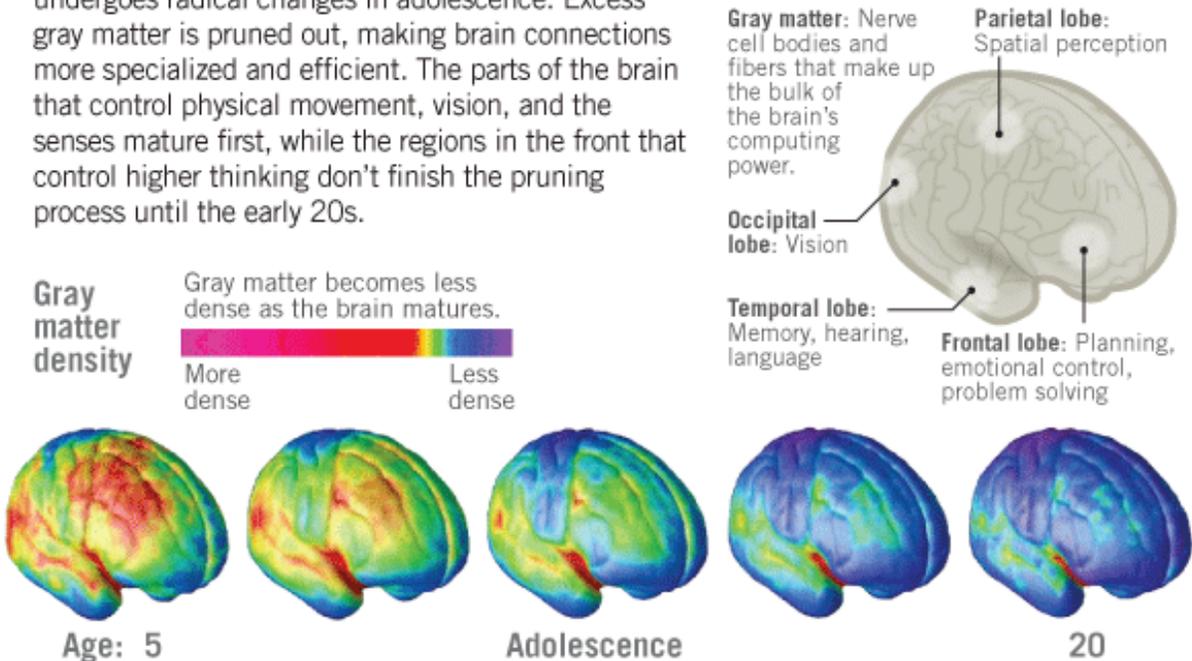
The brain is NEUTRAL. As pruning occurs “risky decisions” will be carried into the adult brain just the same as “positive decisions,” based on what the youth is experiencing. Should tobacco, with the addictive influence of nicotine, be introduced to a brain that is blossoming and pruning, that behavior and usage will get carried into the adult brain and be harder to break.

3 – MYELINATION—this is the physical reinforcement or “insulating” of often-used learning connections. “The neurons that fire together, stay together.” Once myelination of nerve fibers is completed, it is difficult to undo, which includes changing behaviors around cessation, instituting healthy eating, etc.

Neurons that repeatedly connect to transfer the same information (such as repeated behaviors of smoking) will become heavily insulated and safe from pruning. Consistency is key as teens’ brains myelinate. We want young people to reinforce and repeat positive actions such as learning life skills, community involvement, constructive decision making and healthy habits!

Growing a Grown-up Brain

Scientists have long thought that the human brain was formed in early childhood. But by scanning children's brains with an MRI year after year, they discovered that the brain undergoes radical changes in adolescence. Excess gray matter is pruned out, making brain connections more specialized and efficient. The parts of the brain that control physical movement, vision, and the senses mature first, while the regions in the front that control higher thinking don't finish the pruning process until the early 20s.



Source: "Dynamic mapping of human cortical development during childhood through early adulthood," Nitin Gogtay et al., *Proceedings of the National Academy of Sciences*, May 25, 2004; California Institute of Technology

Let's help youth with their blossoming, pruning and myelination through positive, repetitive behaviors. Think of all that goes into learning a musical instrument and the complexities involved. The same process can be said for the teen who works to obtain tobacco products: learning to sneak using them, finding hook-ups to products and acquiring money for purchase. Again, the brain is neutral for whichever activities occur.

It's been said that what brains do and think about when they are 12-20 years old may matter more than what they do and think about at any other time.² That age range likely crosses over with your local tobacco data of youth initiation.

It's helpful to learn the processes of brain development as it relates to the importance of preventing addiction. It's helpful to share this information with your youth so they understand how their brain is working during this critical period.

Encourage your youth to make the best brain by the end of adolescence—all the way to age 25!

Citations and Resources:

¹See, e.g., Khuder, SA, et al., "Age at Smoking Onset and its Effect on Smoking Cessation," *Addictive Behavior* 24(5):673-7, September/October 1999; D'Avanzo, B, et al., "Age at Starting Smoking and Number of Cigarettes Smoked," *Annals of Epidemiology* 4(6):455-59, November 1994; Chen, J & Millar, WJ, "Age of Smoking Initiation: Implications for Quitting," *Health Reports* 9(4):39-46, Spring 1998; Everett, SA, et al., "Initiation of Cigarette Smoking and Subsequent Smoking Behavior Among U.S. High School Students," *Preventive Medicine* 29(5):327-33, November 1999; Breslau, N & Peterson, EL, "Smoking cessation in young adults: Age at initiation of cigarette smoking and other suspected influences," *American Journal of Public Health* 86(2):214-20, February 1996.

²Frank J. Kros, MSW, JB, President, The Upside Down Organization

"Fighting Invisible Tigers" by Earl Hipp

"Why Do They Act That Way?" by David Walsh, PhD