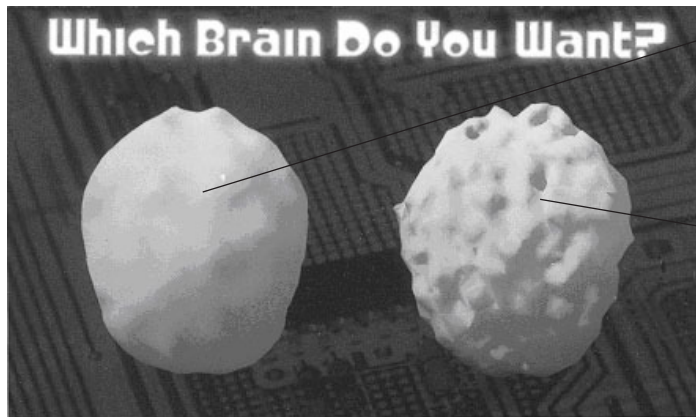


## Brain Change

**“The brain goes through dynamic changes during adolescence (ages 12 to 21) and alcohol can seriously damage long- and short-term growth processes.”**

American Medical Association Fact Sheet, 2003)

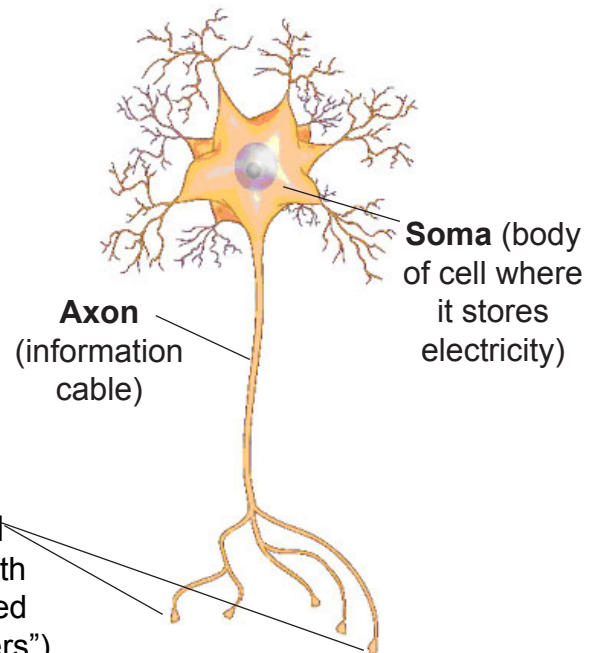
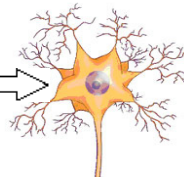


Scans courtesy of Dr. Daniel Amen <http://amenclinic.com>

**SPECT images show activity levels in the brain of a healthy non-drinker (left)...**  
**...and that of a sober 21-year old with a 4-year history of heavy alcohol use (right).**

The “holes” indicate areas of significantly reduced brain activity.

Your brain has about 150 billion neurons that look like this.  
 (Does it look like a tree?)

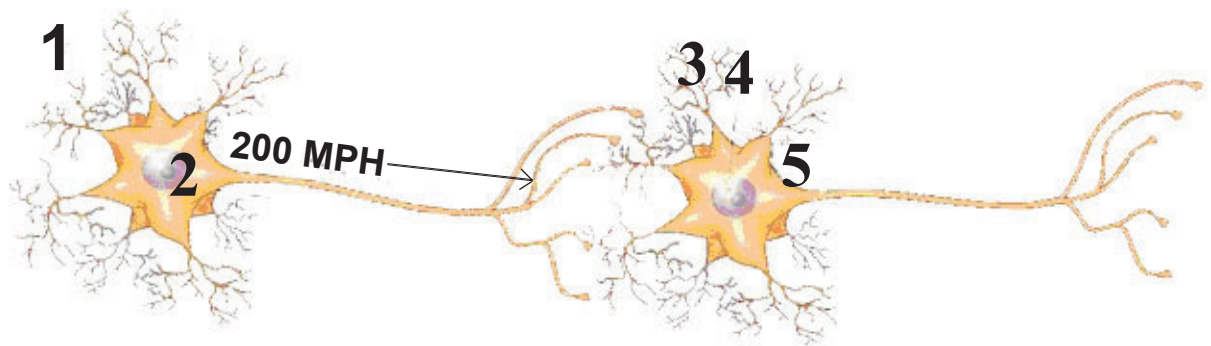


**Axon Terminal**  
 (sacks filled with chemicals called “neurotransmitters”)

**PD**

## How Brains Communicate

1. The **dendrites** receive a message from the body and send it to the soma
2. The **soma** sends electrical impulses down the **axon** to the axon terminals.
3. The **axon terminals** give out a chemical message (neurotransmitter).
4. Dendrite **receptors** pick up the message and forward it to the soma.
5. A neural connection is made.

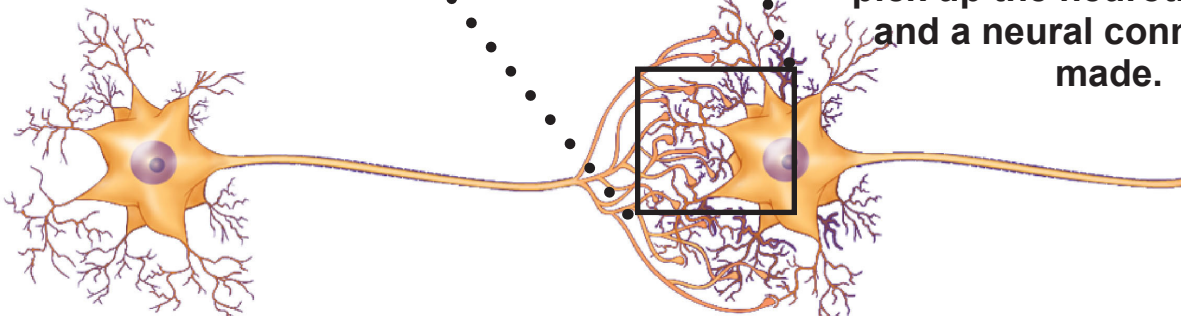


## Neurons Don't Touch—But They Connect!

There is a tiny gap called a **synapse** between the dendrites of one neuron and axon terminals of another.

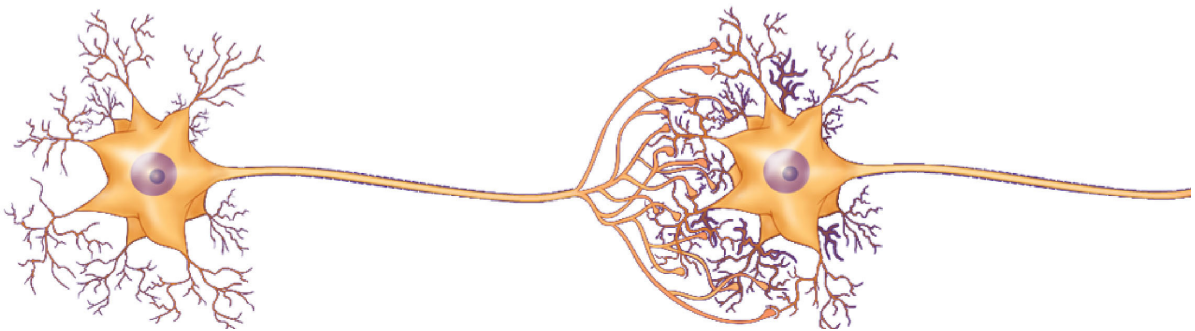
Chemicals called **neurotransmitters** flow across the synapse.

The receptors on the dendrites pick up the neurotransmitter, and a neural connection is made.



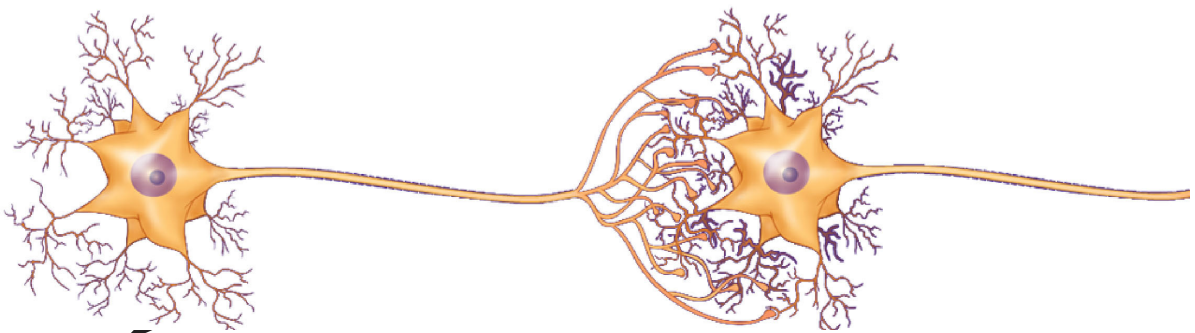
## Stronger Neural Connections

- If a thought or action is repeated often, the neuron sends more neurotransmitter...
- The dendrites make more receptors to receive it...
- The neural connection then becomes stronger – until it becomes a dominant pathway.

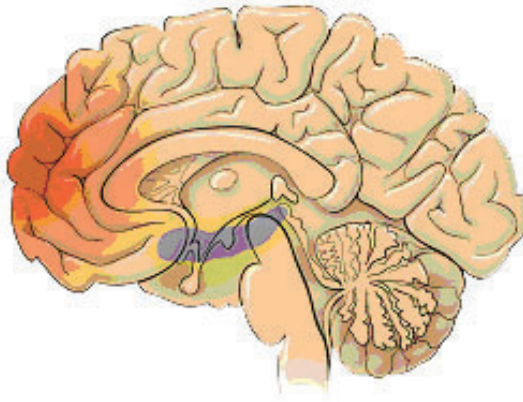


## Myelin Sheath = Brain Insulation

- Part of the neuron then becomes coated with a fatty, waxy coating called the myelin sheath.
- This whole process is called “wiring” the brain.
- The more neural wiring we have, the smarter and more capable we are.



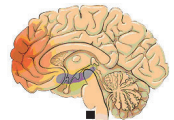
# Teens Choose How Their Brains Are Wired



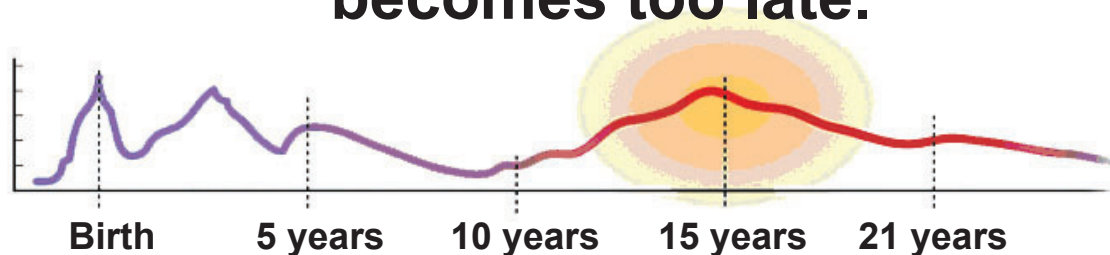
**“Teens, through their choices and actions, have the power to direct the development of their own brains.”**

- Dr. Jay Giedd, Chief of Brain Imaging at the National Institutes of Health

## Peaks of Brain Plasticity



**During peaks of plasticity the brain must make the key neural connections to wire us to become responsible, thoughtful, capable adults, or it becomes too late.**

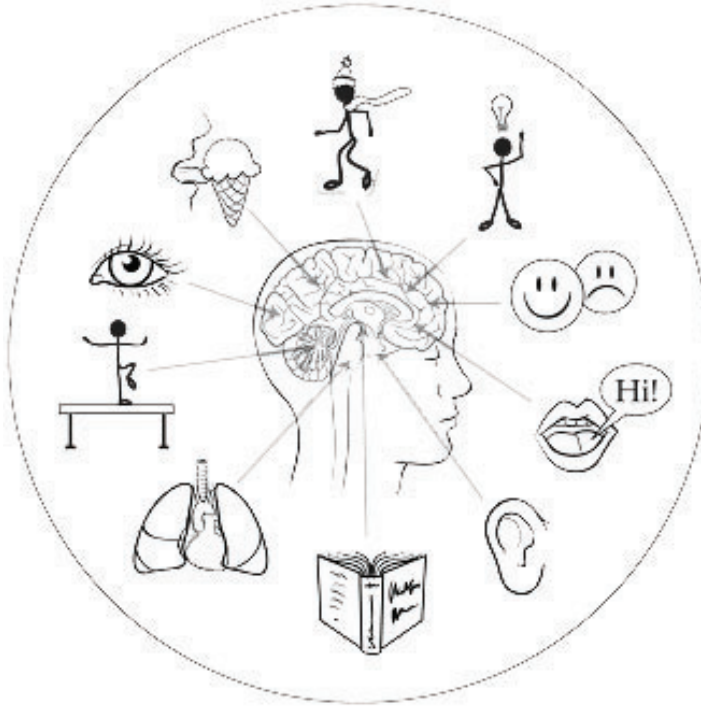


Drinking alcohol during times of plasticity can seriously damage brain wiring!



# BRAIN AREAS

Our brain is divided into specialized areas.



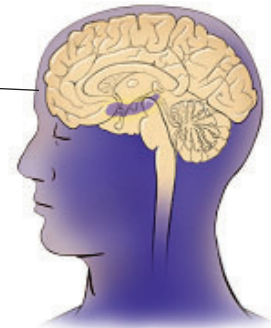
Each area has its own unique “**neuron communications network**” that governs and controls different parts of the body.

## ➤ Two Brain Areas MUST Be Wired During the Teen Years:

The **prefrontal cortex** is the boss or director of the brain.

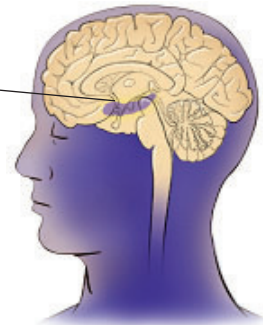
It governs good judgment, complex thinking, decision making, planning and impulse control.

The majority of prefrontal brain wiring takes place by age 16, and it continues to develop until about age 20.



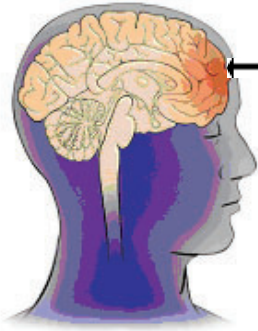
The **hippocampus** is part of the learning and memory area.

Adolescence (ages 12-21) is a key time of learning that wires the hippocampus for future successful learning.



# Alcohol Damages the Adolescent Brain

Alcohol damages key brain areas that need to be wired between the ages of 12 to 21!



The prefrontal cortex (frontal lobe) governs good judgment, decision making, planning and impulse control.

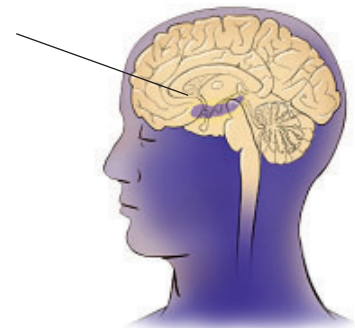
“The prefrontal area (behind the forehead) undergoes the most change during adolescence. Researchers found that adolescent drinking could cause severe changes in this area... which plays an important role in forming adult personality and behavior... **Damage from alcohol at this time can be long-term and irreversible.**”

(American Medical Association Fact Sheet, 2003)

“The hippocampus handles many types of memory and learning and suffers from the worst alcohol-related brain damage in teens. Those who had been drinking more and for longer had a significantly smaller hippocampus (10 percent)... **Frequent drinkers may never be able to catch up in adulthood, since alcohol inhibits systems crucial for storing new information.**”

(American Medical Association Fact Sheet, 2003)

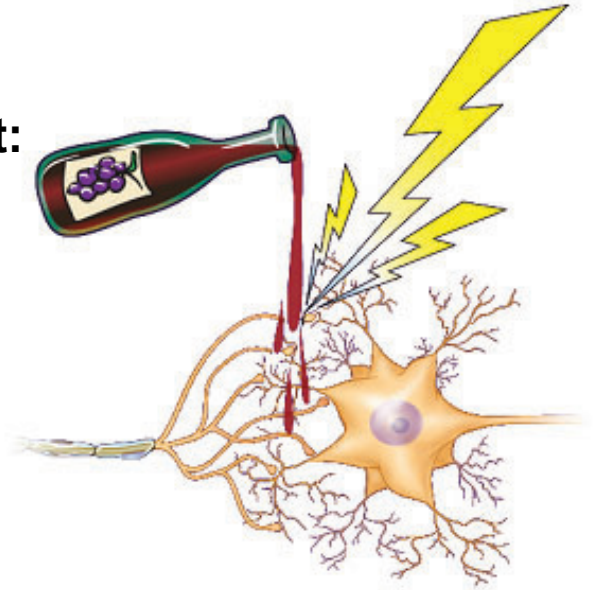
The hippocampus governs learning/memory.



# Alcohol Damages Teen Brain Wiring!

Ø Alcohol pretends to be a neurotransmitter. It acts like a computer virus that:

- Slows or shuts down brain activity.
- Deletes neural messages.
- Damages neural connections.
- Stops brain wiring that a teen needs to become a responsible, thoughtful adult.



After viewing all the latest alcohol brain damage research, the American Medical Association came up with this new slogan:

**Drinking underage is a D.U.M.B. decision!**

**(Drinking Underage Maims the Brain!)**

Decide NOW.

What will you do to keep your brain smarts?

**PD**

# How Alcohol Damages a Teen's Developing Brain, Part 1

PREVENTION DIMENSIONS

PD

