



Cannabis – what do we need to know?

Worldwide use of cannabis



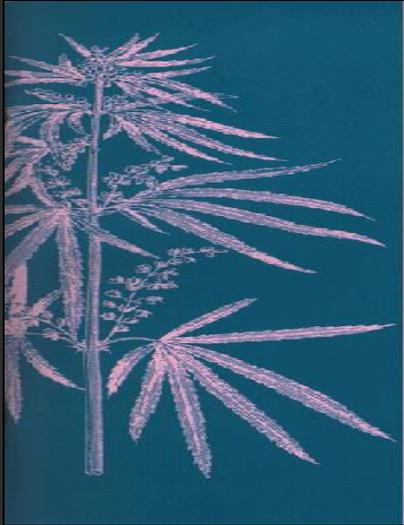
- Cannabis is by far the most widely cultivated, trafficked and abused illicit drug in the World
- Half of all drug seizures worldwide are cannabis seizures

(United Nations report, 2012)

**So what is so different about
this plant?**



Cannabis plant



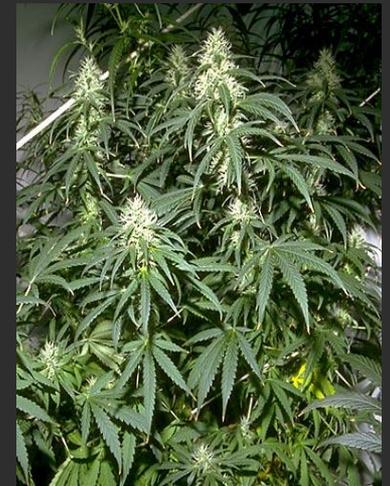
- *Cannabis sativa*: Grows in many regions of the world.
- 5 –11 leaflets with serrated margins.
- A sticky resin covers the flowering tops and upper leaves
- This resin contains the active agents of the plant

Cannabis plant

A complex plant with over 60 compounds and 400 chemicals. There are four major compounds:

- Delta-9-tetrahydrocannabinol (THC) 
- Cannabidiol (CBD)
- delta-8-tetrahydrocannabinol 
- Cannabinol 

 = Has psychotogenic effect



Cannabidiol (CBD)

- CBD does not give you a ‘high’
- CBD significantly reduces anxiety in men and animals
- It has been shown to be a highly effective anti-epileptic
- CBD has a profile similar to “atypical” anti-psychotics

What about the strength of street cannabis? How important is that?



What Does Cannabis Look Like?

- Cannabis is usually found in 3 distinct states.



SKUNK



HASH



WEED

HIGH



LOW

Cost – Quality – Demand – Strength.

Rising strength of street cannabis

- Skunk has squeezed out other types of cannabis
- “Traditional” herbal cannabis now accounts for only 5 per cent
- The amount of THC in skunk has doubled in the last 10 years
- Most street cannabis is now home-grown
- Electrical lighting power yields more flowers, hence leading to higher production



(Potter, et al 2008 and 2012)

Skunk..



- In the 1980s THC concentrations in cannabis was around 4%
- In 2012, averaged 14.5%
- Some current strains contain as much as 30% THC
- Skunk has very little CBD

Skunk in London

- In London, using 'skunk-like' cannabis has been shown to **triple** the risk of psychosis
- The risk increased with the frequency of use and the strength of the variety of cannabis used (Di Forti et al, 2015)



Synthetic cannabinoids

- Also known as “Spice” “K2”, “legal highs”
- More serious and negative effects, ranging from extreme anxiety, paranoia, psychosis to fatality
- 40% of users are adolescents
- Mostly males
- Mostly experienced cannabis users

- From 26 May 2016, it will be illegal to **supply or sell** New Psychoactive Substances (NPS) also called “legal highs” and you could face up to **seven years** in prison.
- The new law will include any substance intended for human consumption that is capable of producing a **psychoactive effect** (excluding alcohol, tobacco, nicotine, caffeine and medical products.)

Cannabis and Psychosis - Existing evidence



- Epidemiological
- Neurobiological
- Genetic studies

Review of clinical studies;

Moore et al, 2007



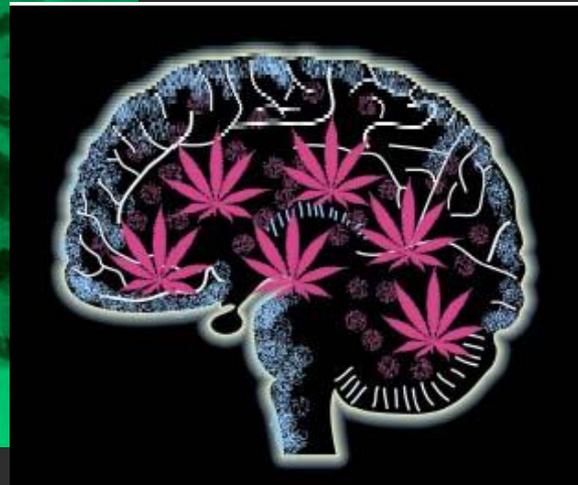
- Looked at clinical trials and investigations into the effects of cannabis use on the mind
- Cannabis use significantly increases the risk of development of a psychotic illness depending on how often it is taken.

cannabis use and earlier onset of psychosis; Large et al, 2011



- Looked at 83 different studies
- Showed that the younger someone is when they start, the higher the risk of mental illness.

So, what happens when cannabis is taken? Where in the body does it go?

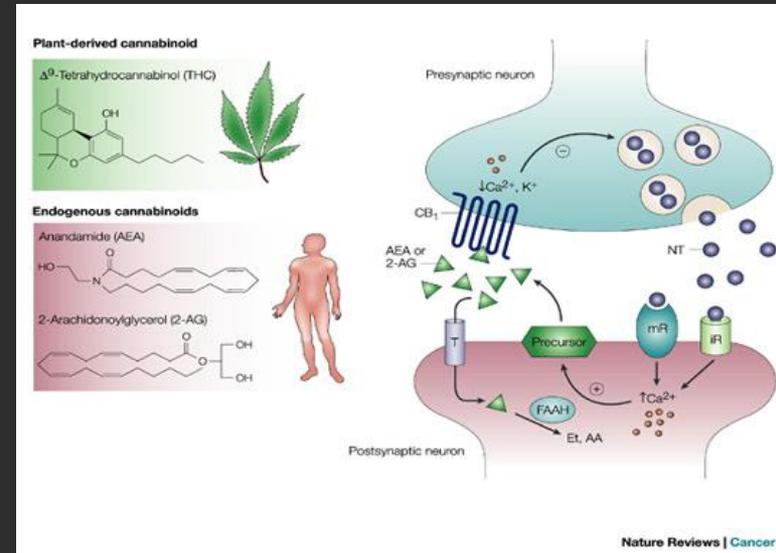


Video - <https://youtu.be/FsJzCdFlpyQ>

Endocannabinoid system

One of the most widely distributed neurotransmitter systems:

- Brain
- Peripheral tissues
(most internal organs;
Heart, liver, kidneys, etc)



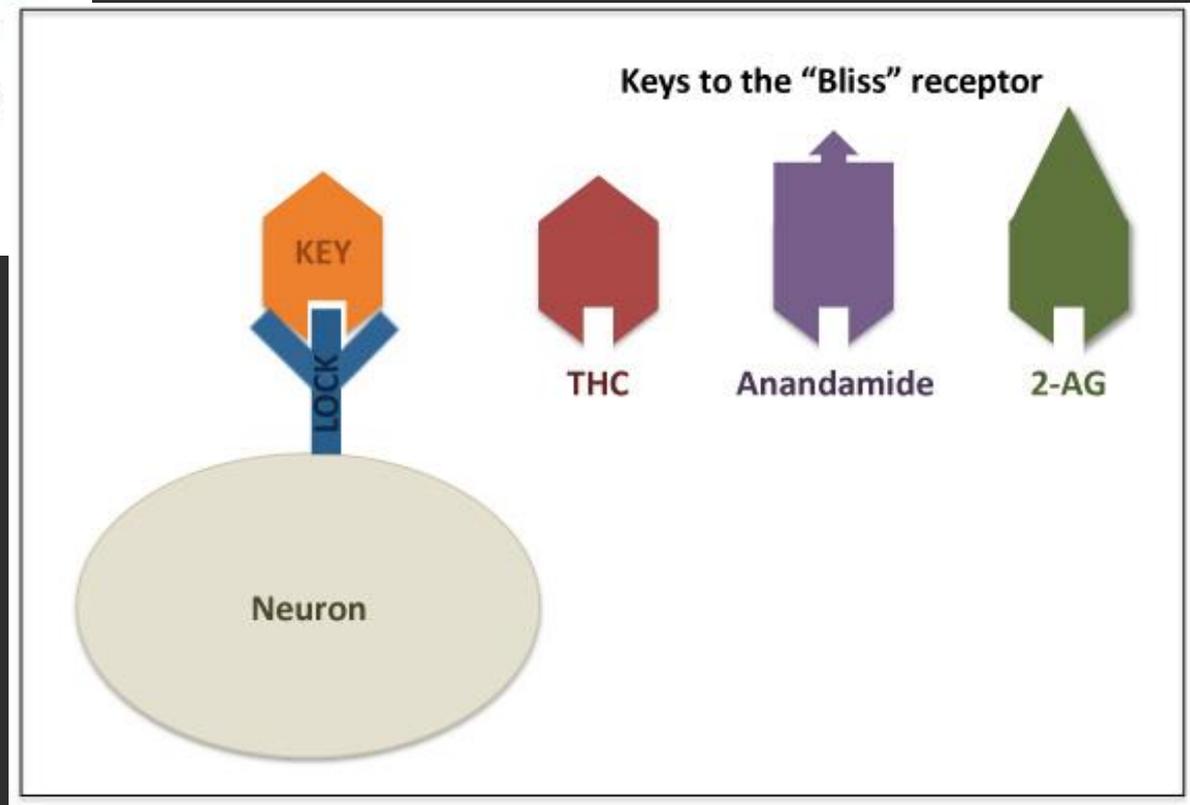
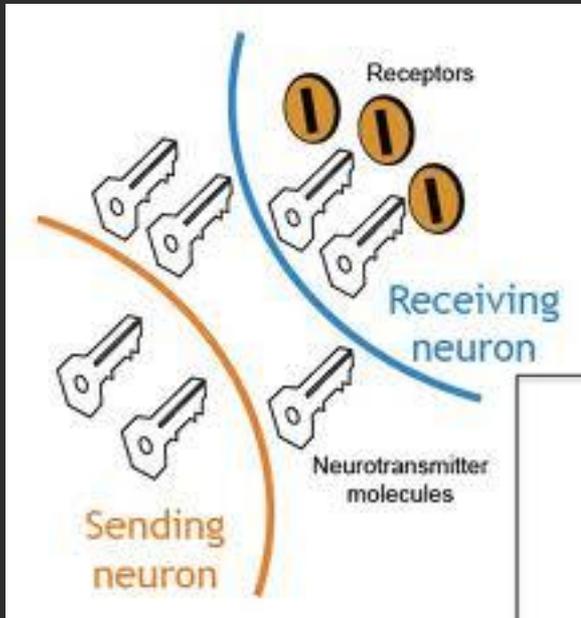
Endocannabinoid System Functions

- The neuron's “**volume control**” system: dials down neuron activity when too strong
- Regulates levels of neurotransmitters that affect pleasure, mood, pain, appetite, motivation, memory (e.g., dopamine, glutamate, endorphins, serotonin, GABA)

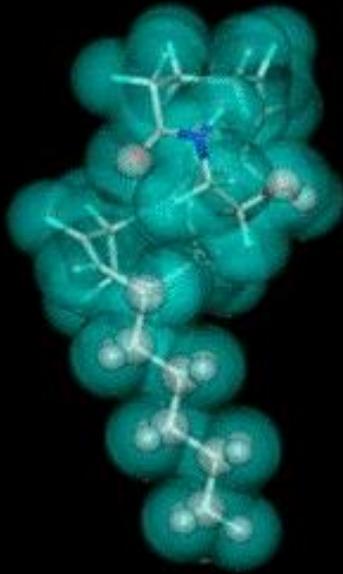


Receptors = Locks
Neurotransmitter = Keys

- Multiple keys can activate the same lock

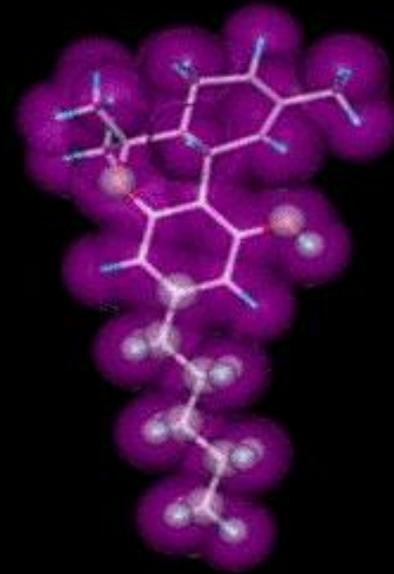


Brain's Chemical



Anandamide

Drug



THC

With Anadamide:

With Marijuana:

Dopamine release

Dopamine release



THC vs. Anandamide

- Both dial down neuron activity to change neurotransmitter release
- THC has a **MUCH STRONGER, LONGER** effect than anandamide on brain cells
- THC interferes with cell function and growth



But not everyone who uses cannabis, even regularly, develop a psychotic illness. So, who is vulnerable?

Vulnerable groups

Research has shown that certain factors determine those who are at risk of developing a psychotic illness:

- Those carrying certain psychosis susceptibility genes
 - Predisposition to psychosis
 - Family history of psychotic illness

So, what is so special about the teenager brain?



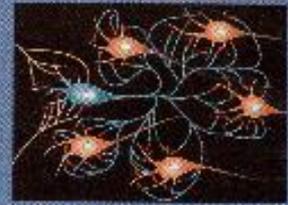
What We Now Know

- Adolescence is a critical period in brain development.
- The brain is still developing until approximately age 24 or 25

INSIDE THE ADOLESCENT BRAIN

The brain undergoes two major developmental spurts, one in the womb and the second from childhood through the teen years, when the organ matures by fits and starts in a sequence that moves from the back of the brain to the front.

Nerve Proliferation ...



By age 25, for girls and 25% for boys, the neurons in the front of the brain have formed thousands of new connections. Two-thirds of these neurons are still in the process of being pruned.

Corpus Callosum

Thought is accomplished by sending messages through the brain's bundle of nerves that connects the left and right hemispheres of the brain. But in adolescence, the nerve fibers thicken and proliferate, forming an extra and more efficient bridge.

Prefrontal Cortex

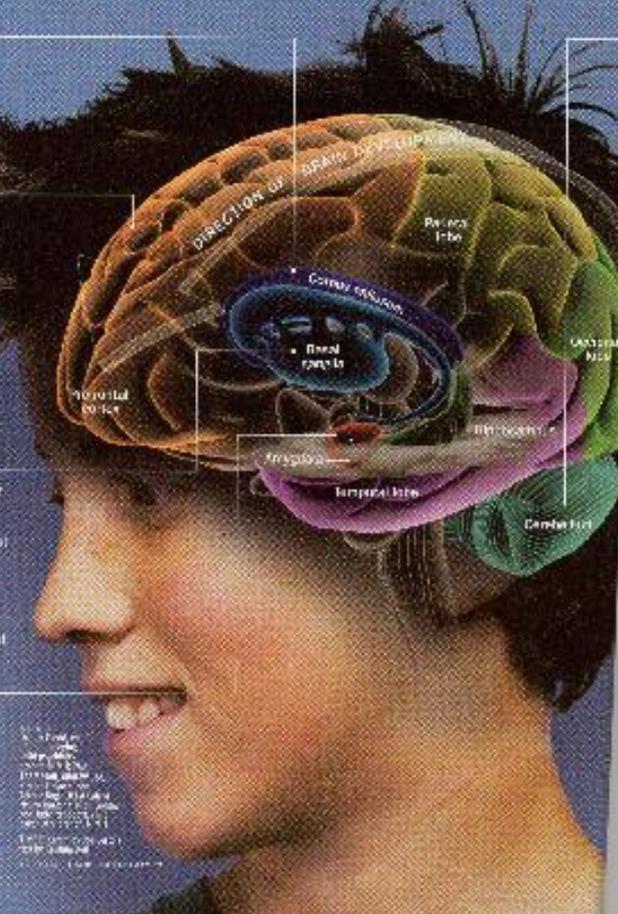
The CEO of the brain, also called the seat of higher thought, is the last part of the brain to mature—when you're about 25 years old. In youth, it's still being built, so behind the scenes, the prefrontal cortex is growing during its prime years, and then continues to build connections and pruned during adolescence.

Basal Ganglia

Larger in females than in males, this part of the brain acts like a supervisor to the prefrontal cortex by holding it in check. It coordinates the brain's response to and processing of sensory information. It's also the seat of the brain's reward system, which sends out dopamine and other neurotransmitters. This system is still being built, so it's still in the process of exposing its circuitry to the world and adjusting it to growing.

Amygdala

The smaller emotional center of the brain, known for such primal feelings as fear and rage, is processing incoming information, then acting to help you respond to the situation. And because more of the reduced prefrontal cortex is part of the brain that is maturing in teens, they may react more strongly to these feelings than adults.



Critical Period



Is a “**window**” in brain development when a part of the brain:

- develops rapidly
- is **highly sensitive** to being shaped by environmental experiences

Brain cells (Neurons)



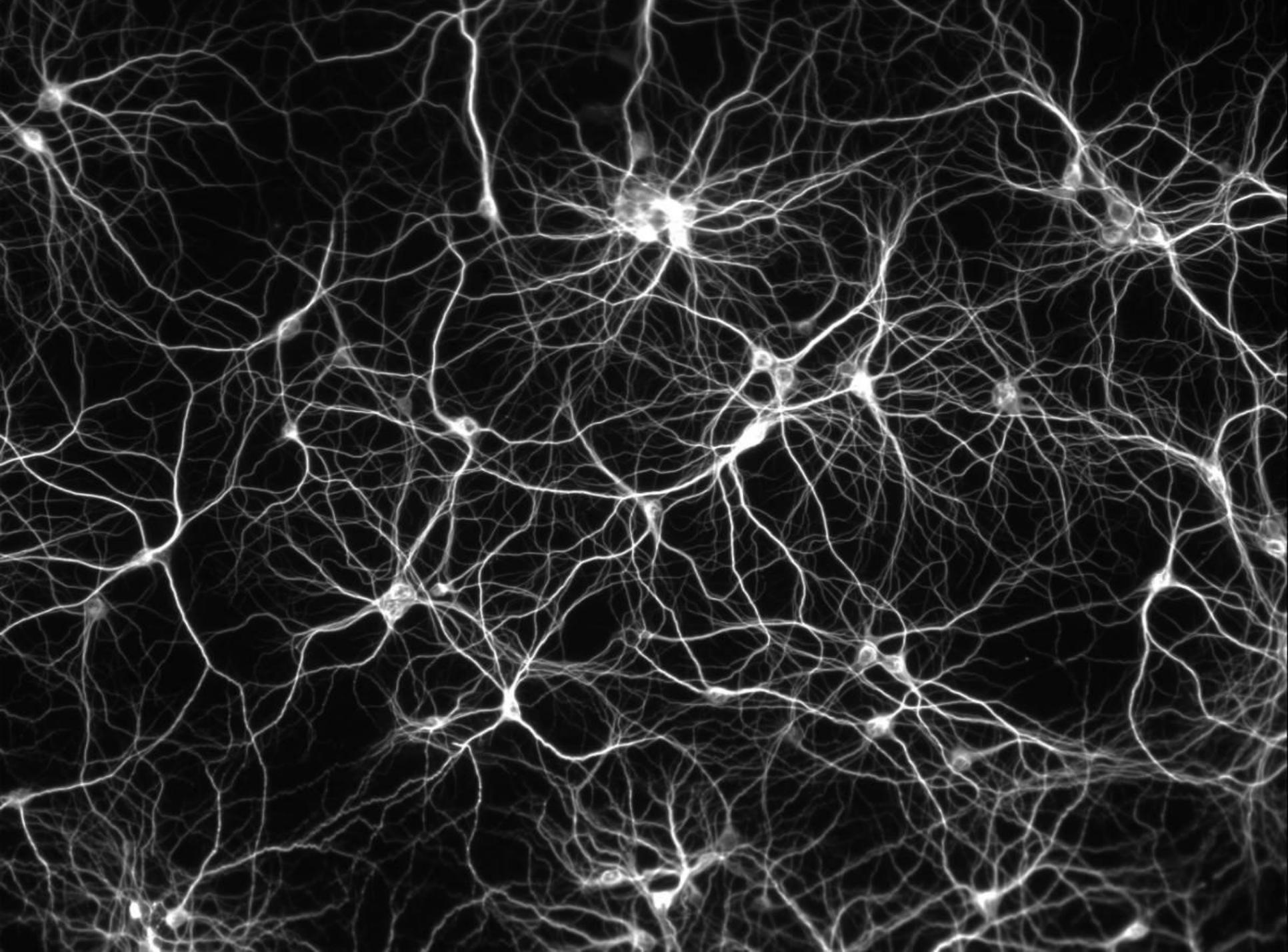
Construction Ahead



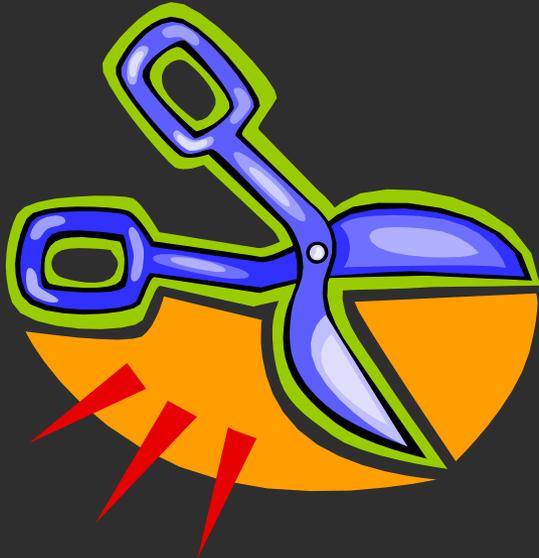
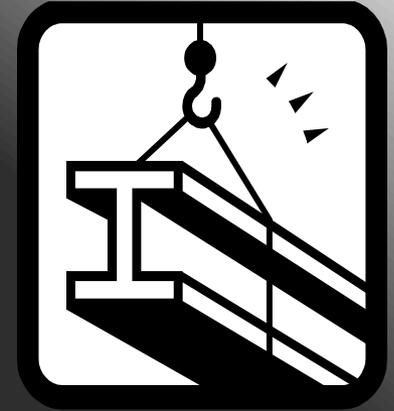
BLOSSOMING:

Until about ages 10-12, the brain undergoes rapid growth, including:

- Neuron numbers increasing
- Neurons getting bushier
- Neuron connections increasing



Construction Ahead

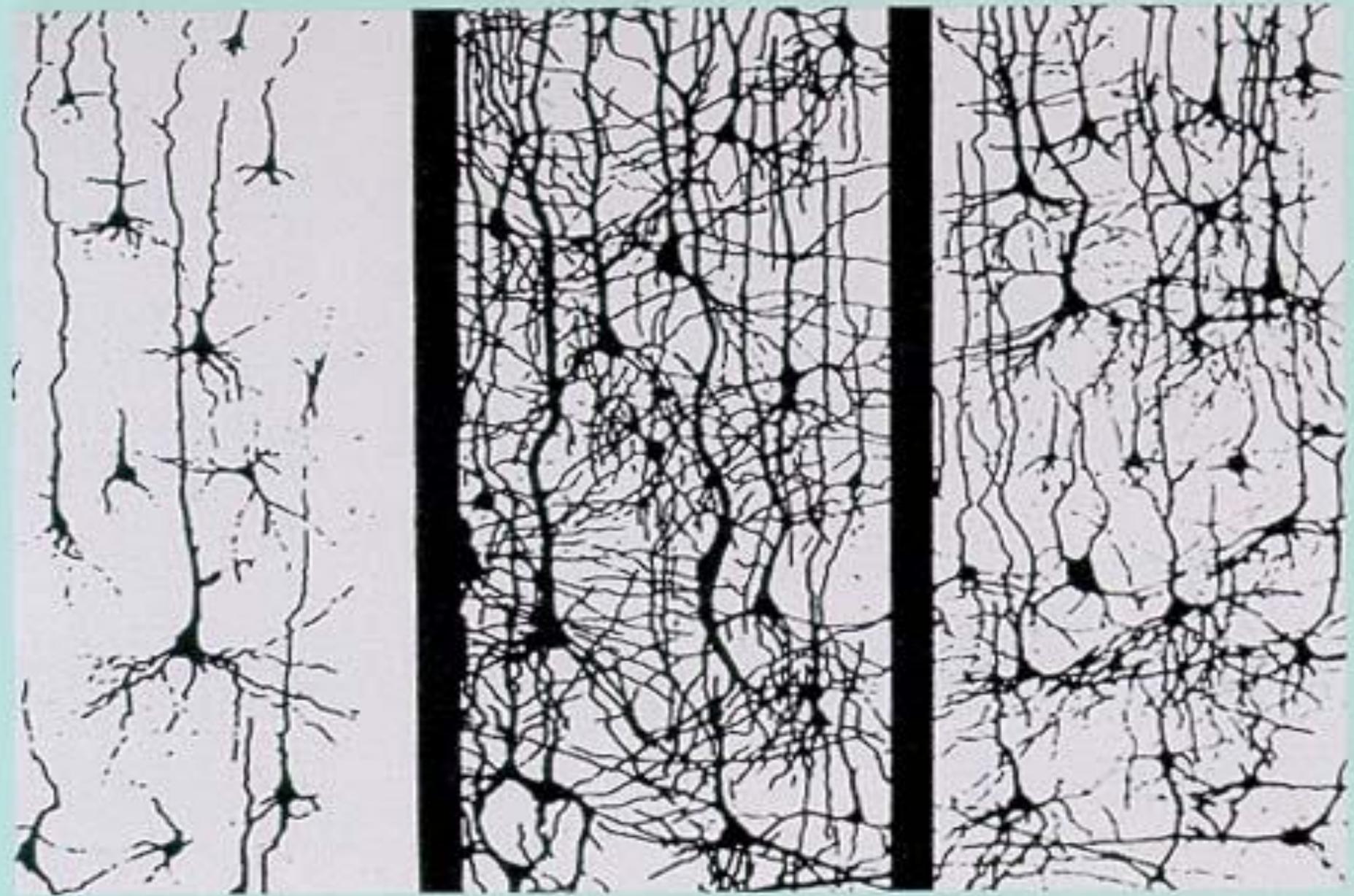


Around age 12, neuronal growth starts to undergo pruning, following the principle of “use it or lose it.”

At Birth

6 Years Old

14 Years Old

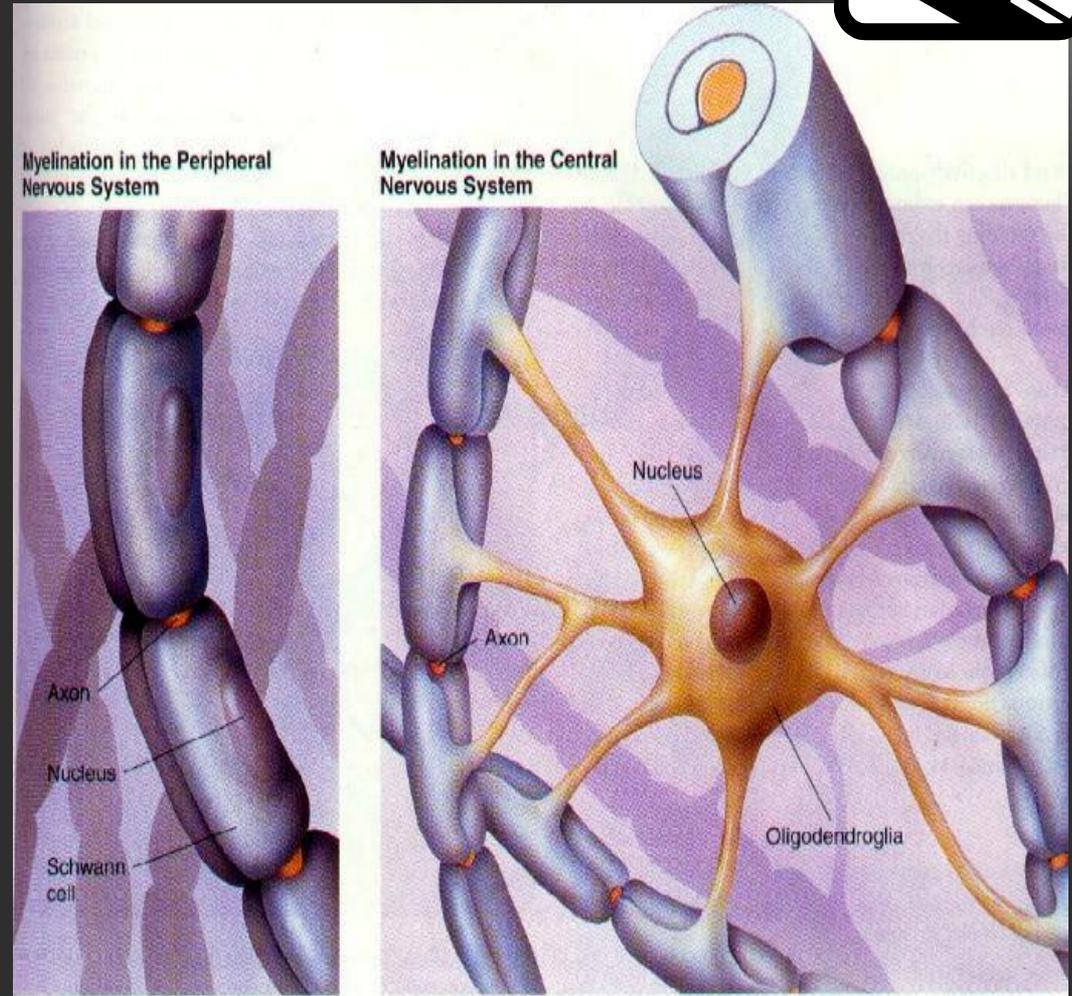


Construction Ahead



Along with pruning, myelin starts to cover axons and then thicken.

The myelin sheaths help action potential travel 100 times faster.



Construction Ahead



Result of Pruning and Myelination:
Fewer but faster
connections
in the brain.



Key Points



1. Adolescence is an important “window” of **opportunity** and **sensitivity** for the brain, particularly for developing brain connectivity.
2. How the brain is used during adolescence, and what it is exposed to, **will have life-long effects.**

Key Points



3. Due to the stage of brain development in adolescence, **teens are more susceptible** to the addictive effects of substance use.

Some facts about cannabis

- Cannabis can be addictive, if used regularly
- If used regularly in teens, it can lead to a drop of IQ by an average of 8 points in mid-adulthood permanently or a three per cent drop in GCSE scores compared with their non-using peers
- But those who use cannabis ≥ 50 times do not differ from non-users on either IQ or educational performance (Mokrysz et al, 2016)
- It can lead to mental health problems in those who carry risk factors (psychosis, depression, anxiety, panic disorder)

Strong evidence on the following factors for increased risk of developing a psychotic illness

- Using at a younger age
- Using regularly
- THC interferes with synaptic plasticity
- Those with familial risk have higher sensitivity
- THC/CBD critical
- Early life events

Video - <https://youtu.be/FvszaF4vcNY>

So, in summary..

Is cannabis bad for mental health?

Yes, if you;

- Are young (When the brain is still developing it is most vulnerable to cannabis' deleterious effects)
- Smoke regularly
- Smoke strong cannabis
 - Skunk dominates the market
- Have a family history of severe mental disorder
- Have predisposition to develop a psychotic illness
- Carry some susceptibility genes



Thank you!