

Cocaine originates from the *Erythroxylon coca* plant found in the Andes Mountain located in South America



*Erythroxylon coca*

## Cocaine: Getting In

Snorting

↓  
Crosses  
mucosal lining  
of the nose

↓  
Enters the  
capillaries of the  
nasal  
passageway

Injecting

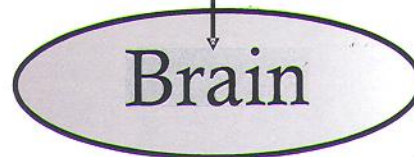
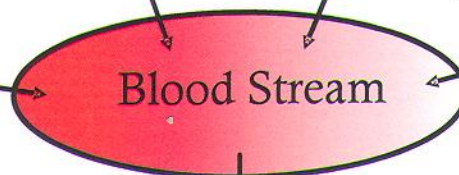
Smoking

↓  
Enters  
pulmonary  
capillaries

Ingesting

↓  
Pass  
through  
the  
stomach

↓  
Enters the  
capillaries of the  
duodenum

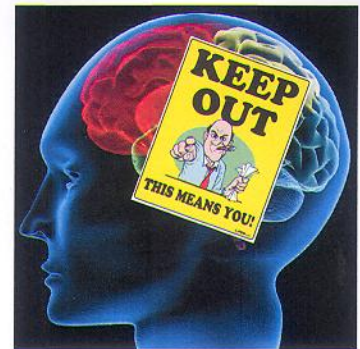


## Blood-Brain Barrier:

**\*\*Drugs must get to their receptors to act\*\***

Cocaine receptors are in the brain

~however, the brain (and spinal cord) have a protective measure called the **Blood-Brain-Barrier** (BBB)



### FUNCTION OF BBB:

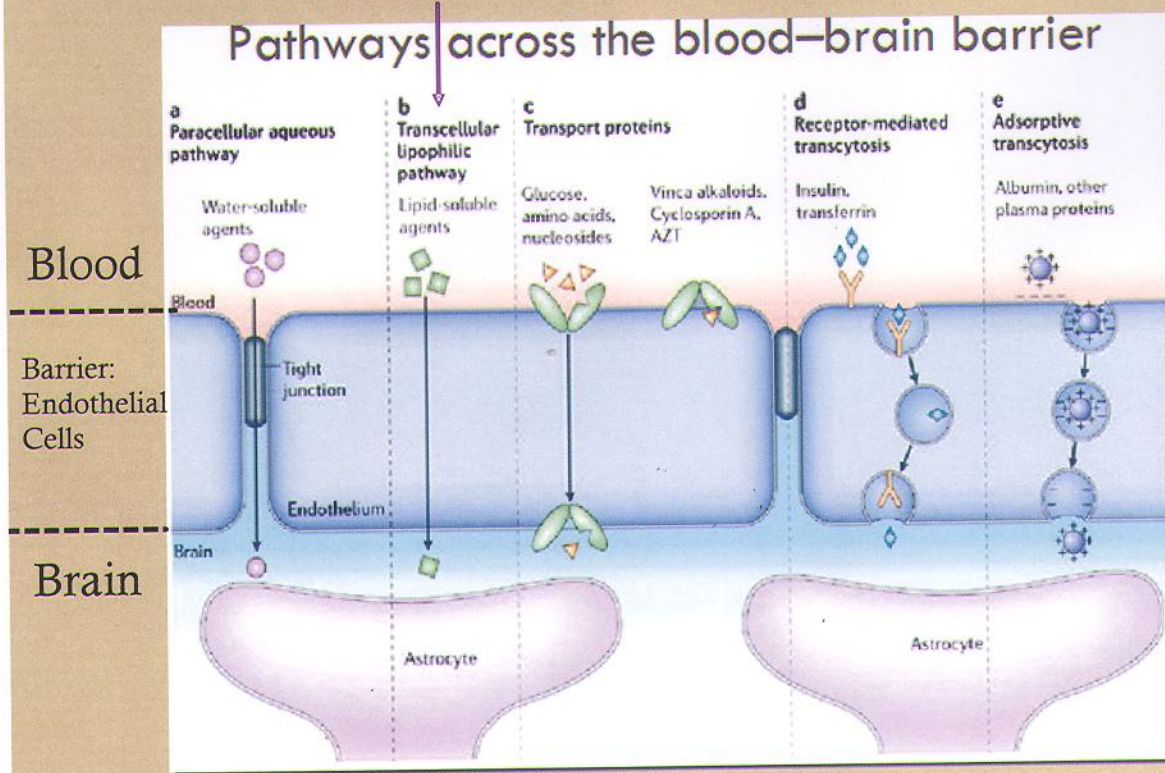
- 1.) Protects the brain from foreign objects in the blood that may harm the brain
- 2.) Protects the brain from hormones and neurotransmitters in the rest of the body
- 3.) Maintains homeostasis in the brain

So how does cocaine get to the receptors.....???



~Cocaine, and other psychoactive drugs, can enter the central nervous system because they are fat (lipid) soluble.

Cocaine Molecule



## Neurotransmitter: Dopamine

Parts of  
Brain  
Influenced  
by  
Dopamine



- \*Midbrain
- \*Ventral tegmental area
- \*Cerebral cortex
- \*Hypothalamus

Functions  
Affected by  
Dopamine



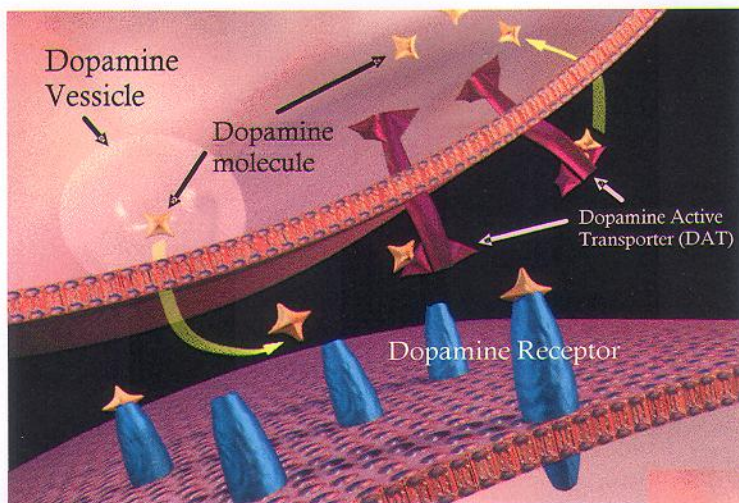
- \*Pleasure and Reward
- \*Movement
- \*Attention
- \*Memory

Drugs that affect  
dopamine



- \*Cocaine
- \*Methamphetamine
- \*Amphetamine

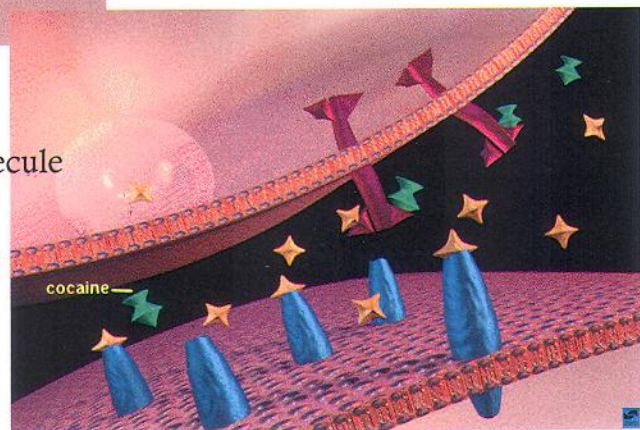


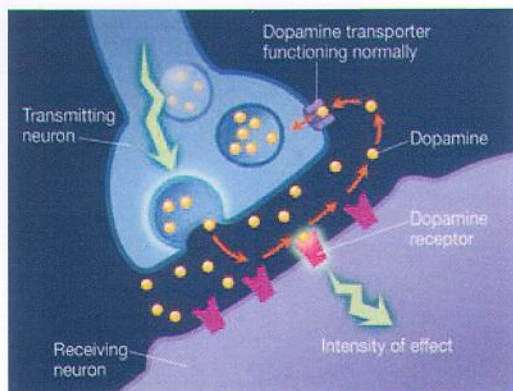


### Cocaine's Influence at the Dopamine Receptor

The cocaine molecule binds to the DAT, reducing the uptake of the dopamine molecule from the synapse.

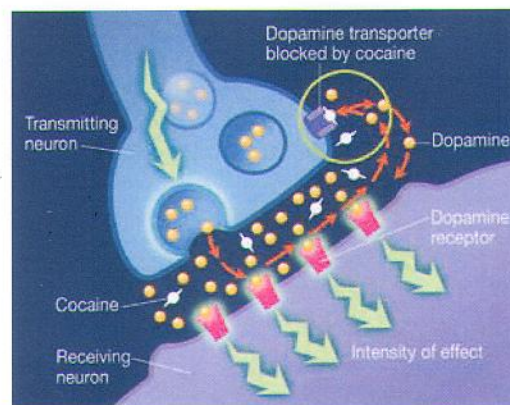
As a result, there is excess dopamine. This stimulates the action potential in the post-synaptic neuron.





Normal Dopamine Function

Cocaine Impaired Function





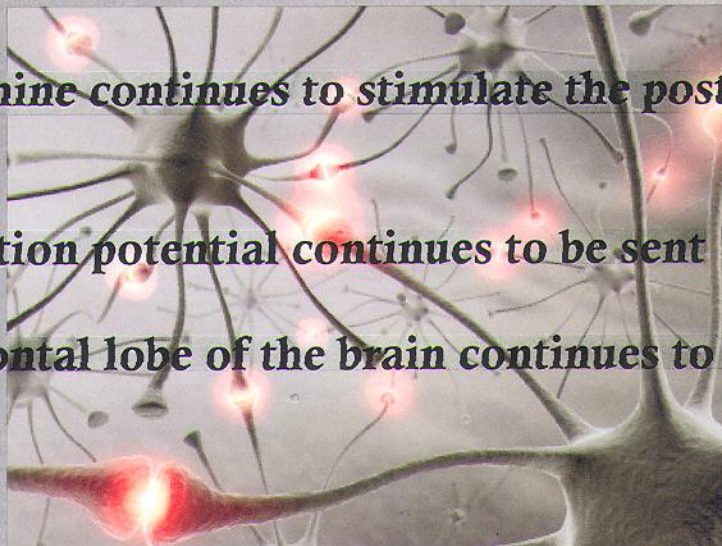
## **When Dopamine Uptake Receptors are Blocked by Cocaine**

~Dopamine continues to stimulate the post-synaptic cell.

~The action potential continues to be sent

~The frontal lobe of the brain continues to be stimulated

~A sense of energy, alertness, talkativeness, and euphoria result



## Half-life of Cocaine

The rush of euphoric feelings of cocaine last ~45 minutes

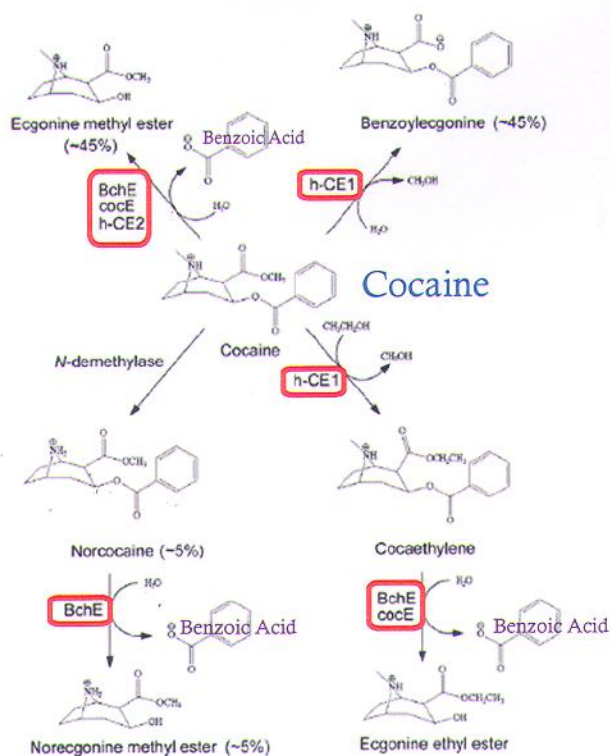
Non-psychoactive metabolites are formed by enzymes

### Enzymes that metabolize cocaine

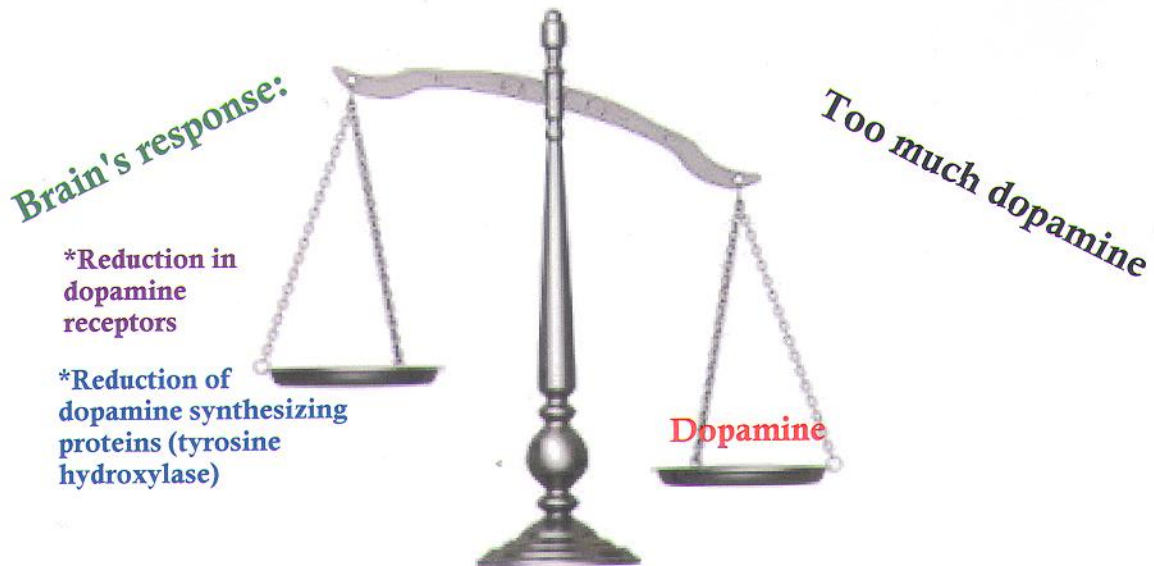
BchE: Butyrylcholinesterase (plasma)

h-CE1: Human liver carboxylesterase-2

cocE: Rhodococcus cocaine esterase

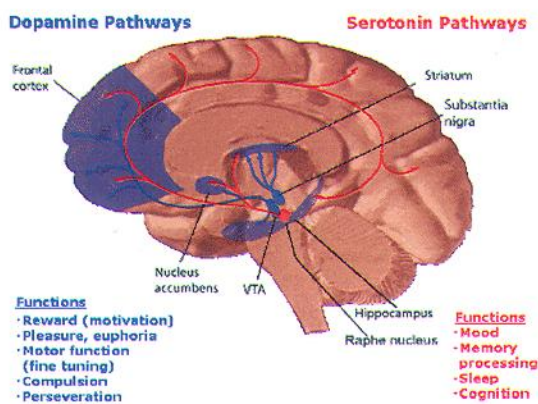


Too much dopamine....homeostasis is upset in the brain



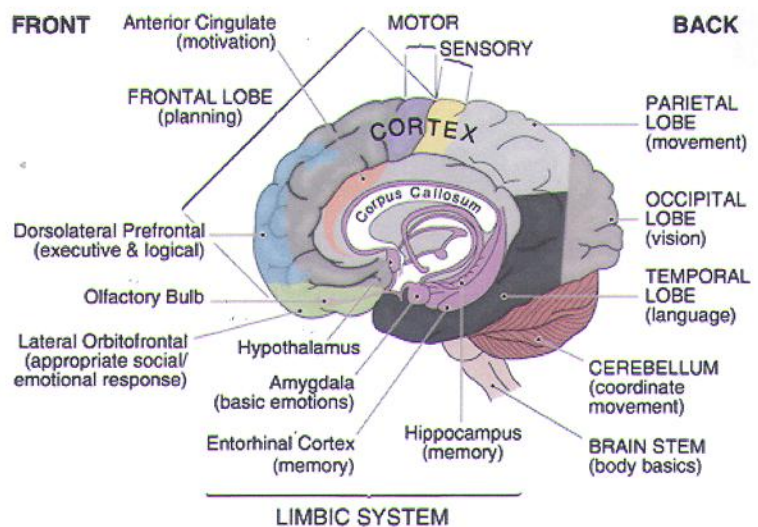
Less dopamine production → Depression → Desire to use cocaine increases → Addiction

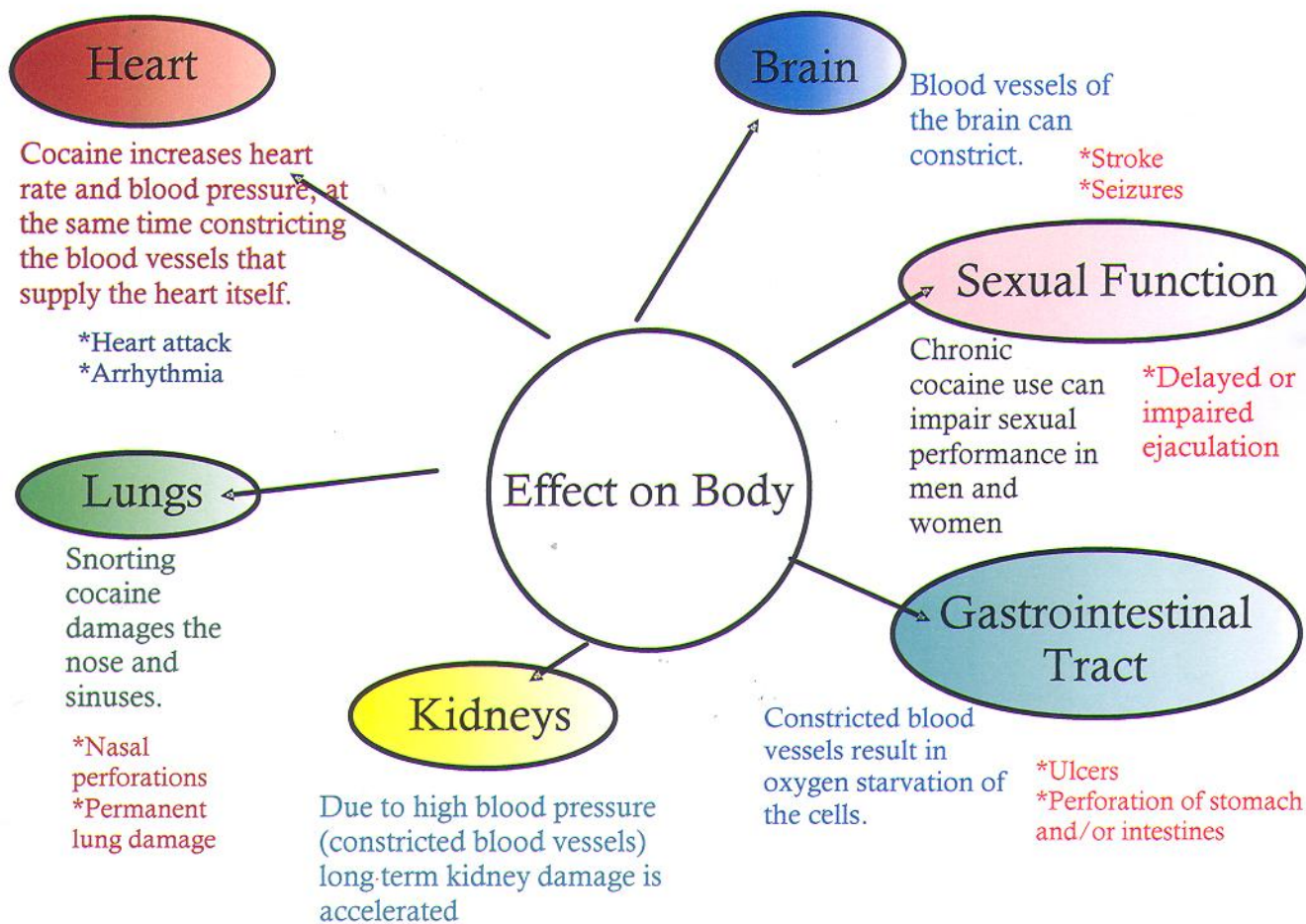




Studies have shown that the frontal cortex of the brain is not fully developed until age 25.

How could this fact pose a problem for a person who begins using cocaine prior to this age???





Can the brain bounce back?

Yes! However, it can take the brain months to years to create new receptors.

So why does insurance companies only pay for a rehabilitation center for 28 days?  
Is this fair?



