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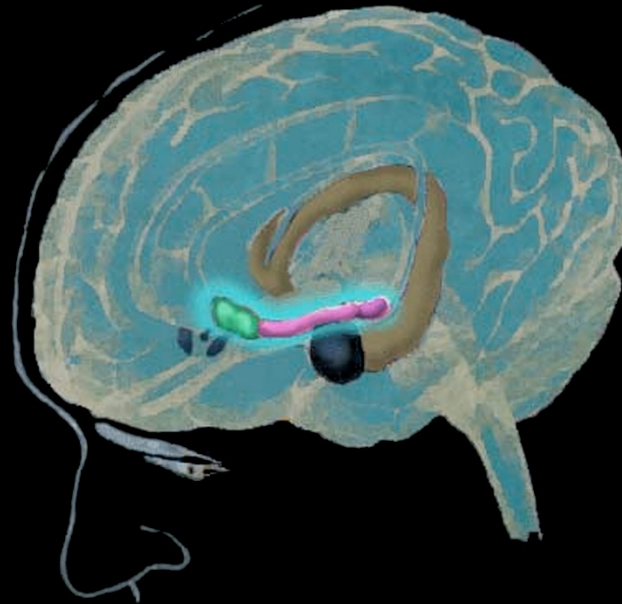
Hot Science - Cool Talk # 16

***Exploring Myths About
Addiction***

**Dr. Carlton Erickson
November 16, 2016**

Produced by and for *Hot Science - Cool Talks* by the Environmental Science Institute. We request that the use of these materials include an acknowledgement of the presenter and *Hot Science - Cool Talks* by the Environmental Science Institute at UT Austin. We hope you find these materials educational and enjoyable.

EXPLORING MYTHS ABOUT ADDICTION



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**Director, Addiction Science Research and Education Center
College of Pharmacy, U.T.**



We have problems....

Here are some myths:

- Club drugs and marijuana are not addicting.
- Prozac and other antidepressant drugs are addicting.
- Everyone who uses cocaine or heroin is addicted.
- It takes a history of heavy smoking to produce addiction to nicotine.
- Anyone who drinks too much, too often, is an alcoholic.

Movie about Alcoholism

[Click here to view animation](#)



Movie about Addiction

[Click here to view animation](#)

TWO CRITICAL DEFINITIONS*

Abuse

Dependence

* Based on the Diagnostic and Statistical Manual-IV (DSM-IV)



ABUSE

- **Intentional Overuse** in cases of celebration, anxiety, despair, self-medication, or ignorance. Tends to decline with adverse consequences. (“a problem to solve”)
- **Not a minor problem** - produces a major socioeconomic impact in the nation



DEPENDENCE

- Impaired Control over drug use, probably caused by a dysfunction of the medial forebrain bundle, “pleasure pathway”


(“a disease to conquer”)

**Addiction is impaired control
over use of the drug!**

Dependence = Addiction

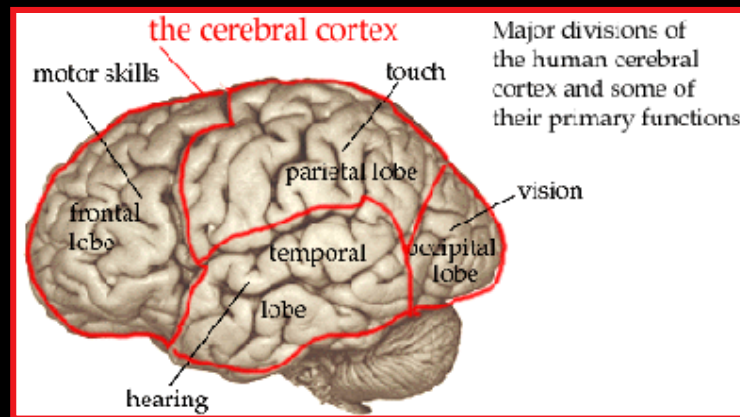


Alcohol Dependence = Alcoholism

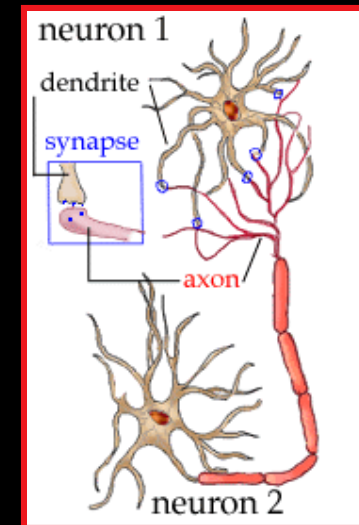
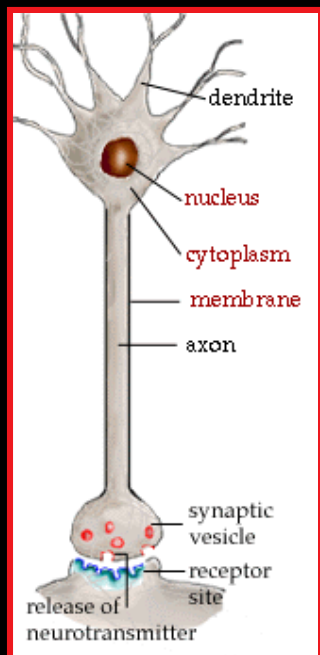


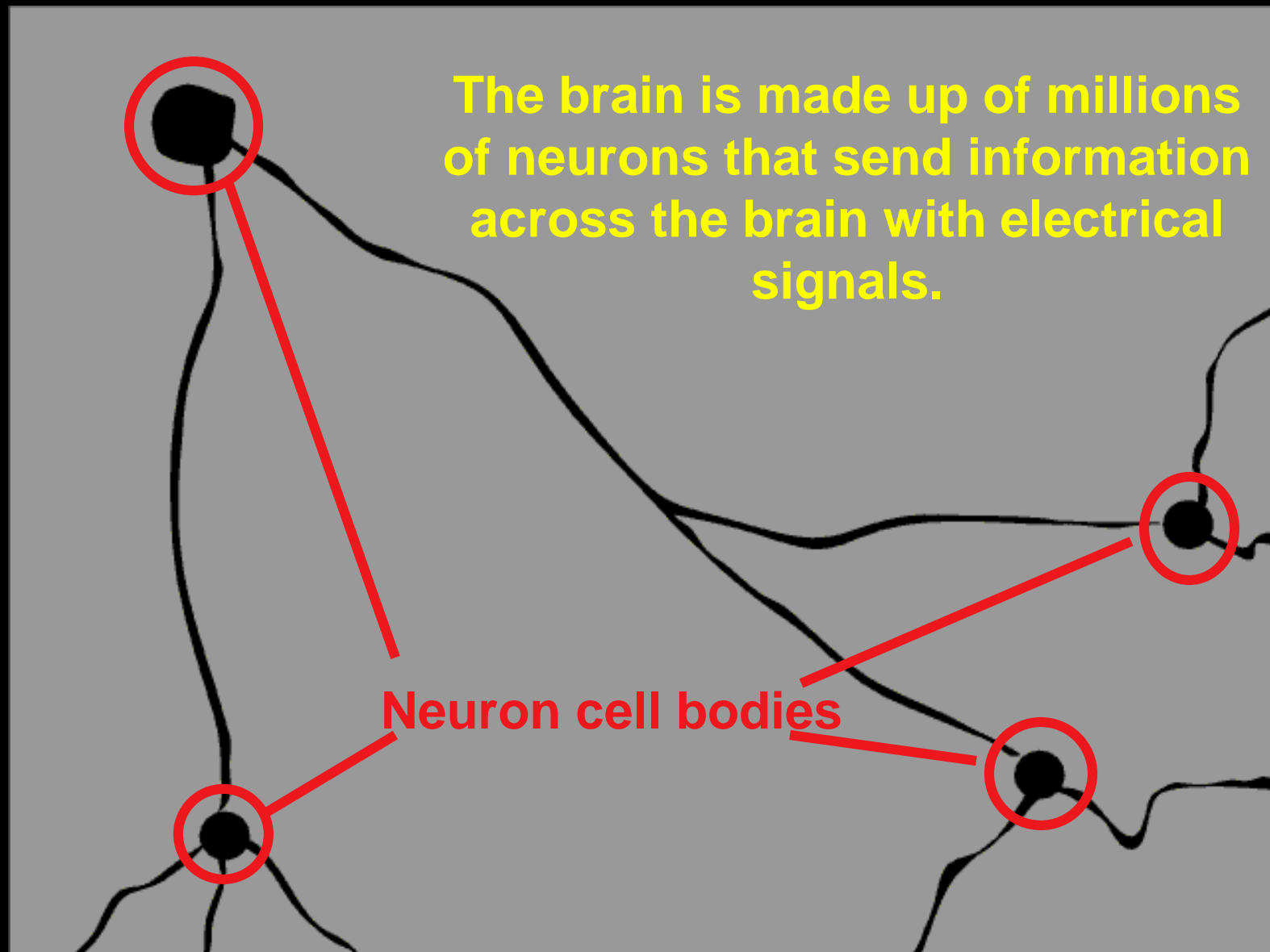
**Determining whether
someone is an alcoholic or
drug addict is a
professional decision.**

**You should not
make that decision.**



A NINE MINUTE COURSE IN NEUROBIOLOGY

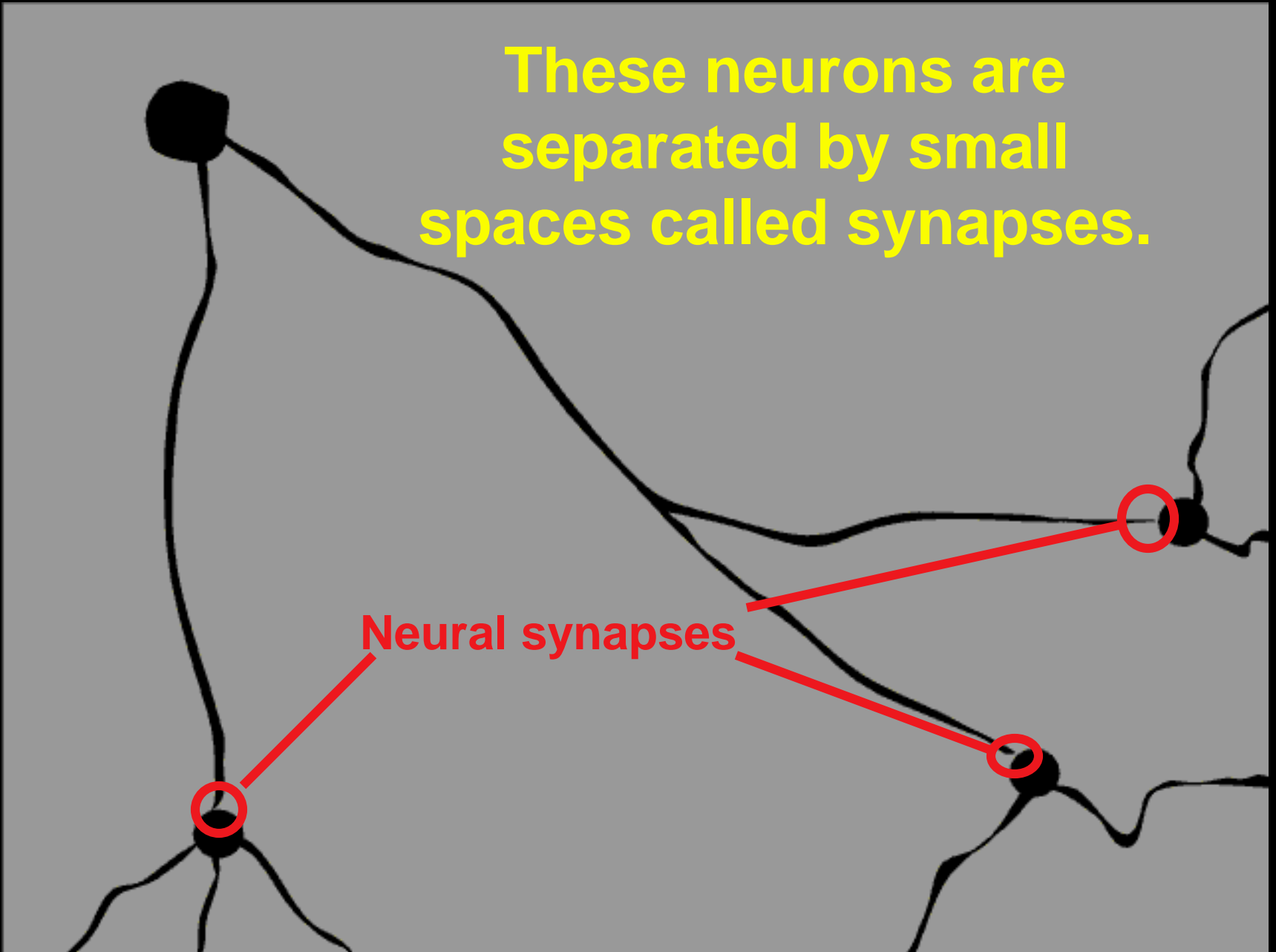




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These neurons are
separated by small
spaces called synapses.

Neural synapses

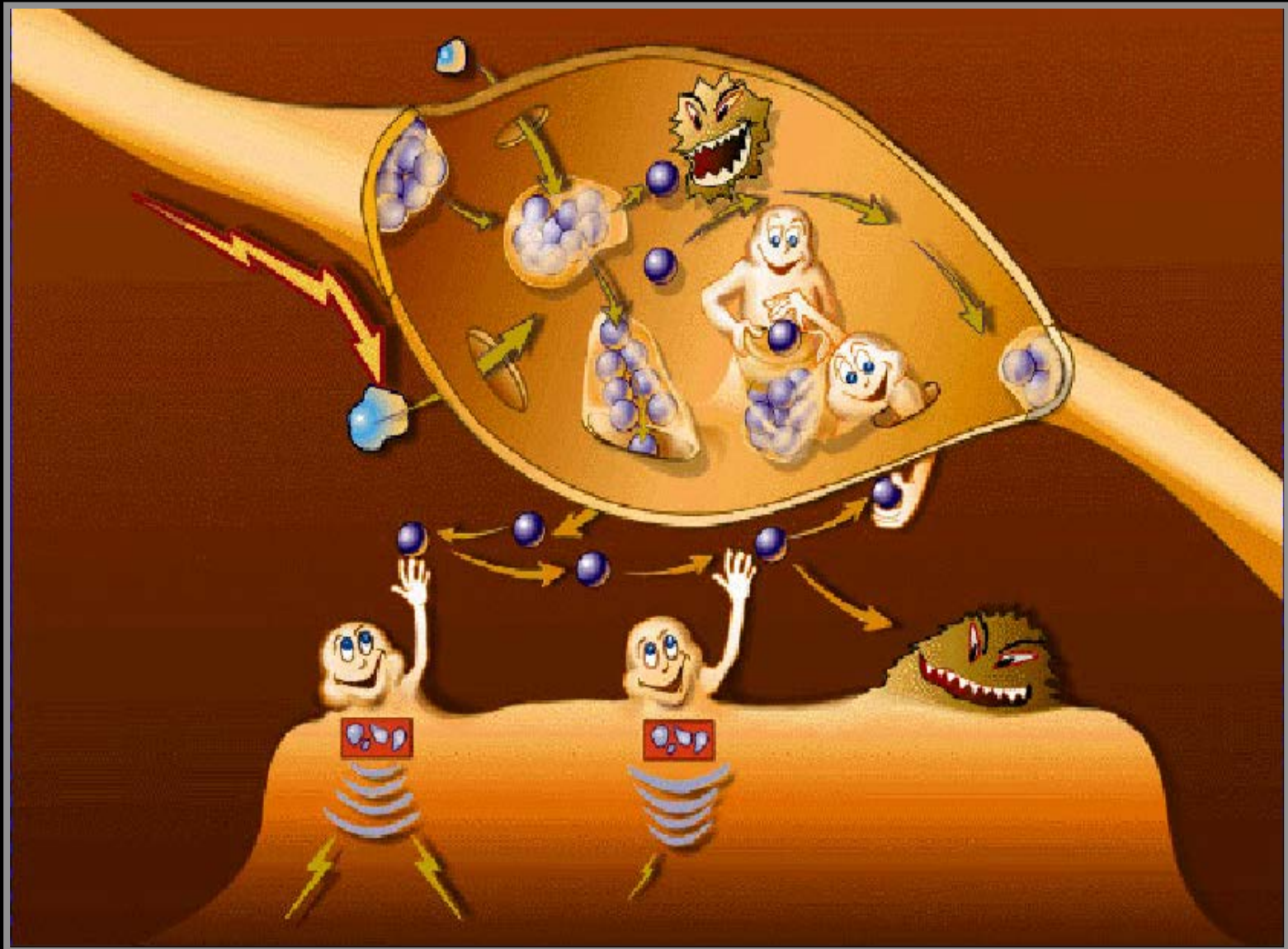




Neurons communicate across synapses by chemical signals called neurotransmitters.

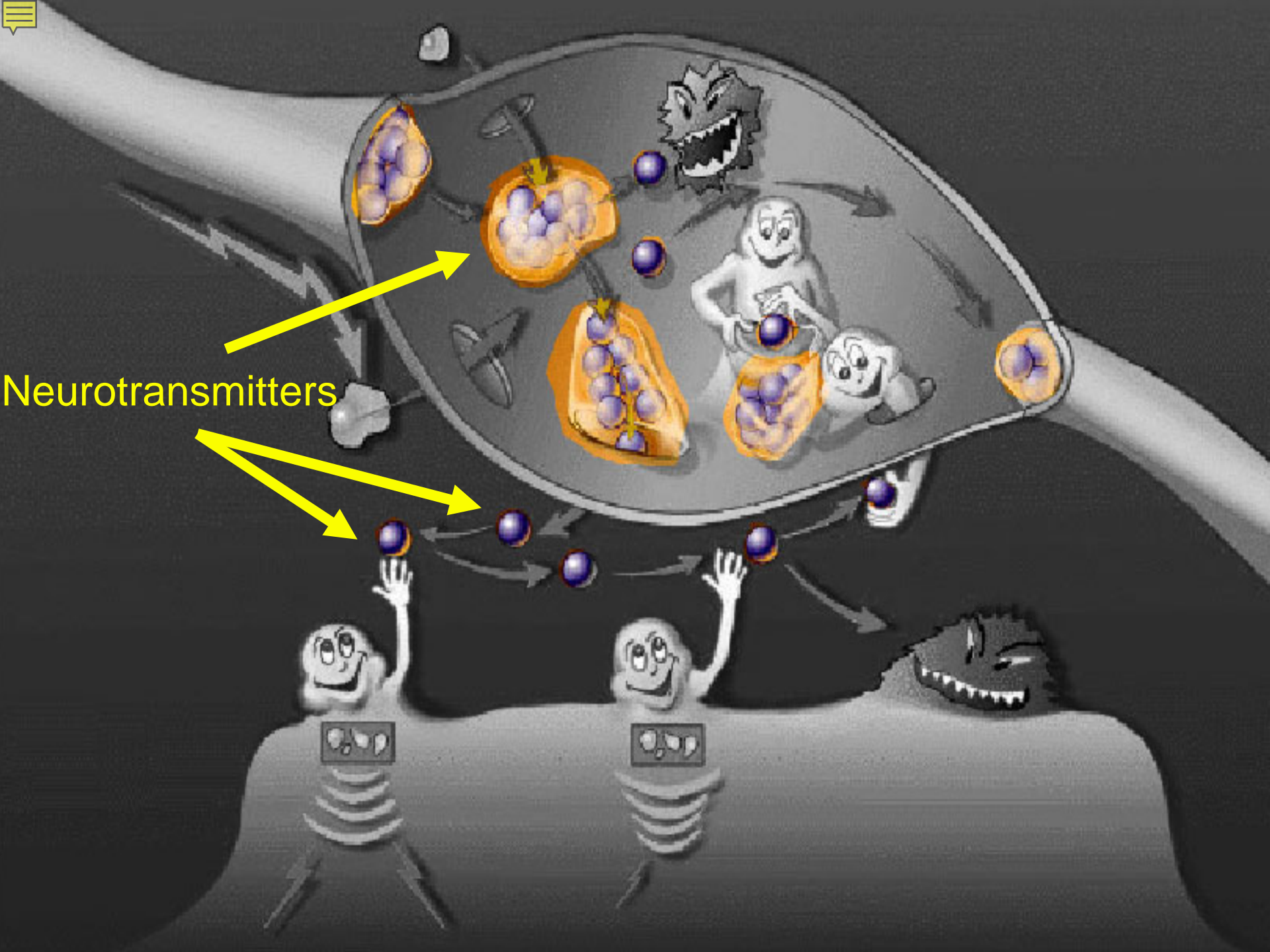
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A Detailed Look at a Neural Synapse



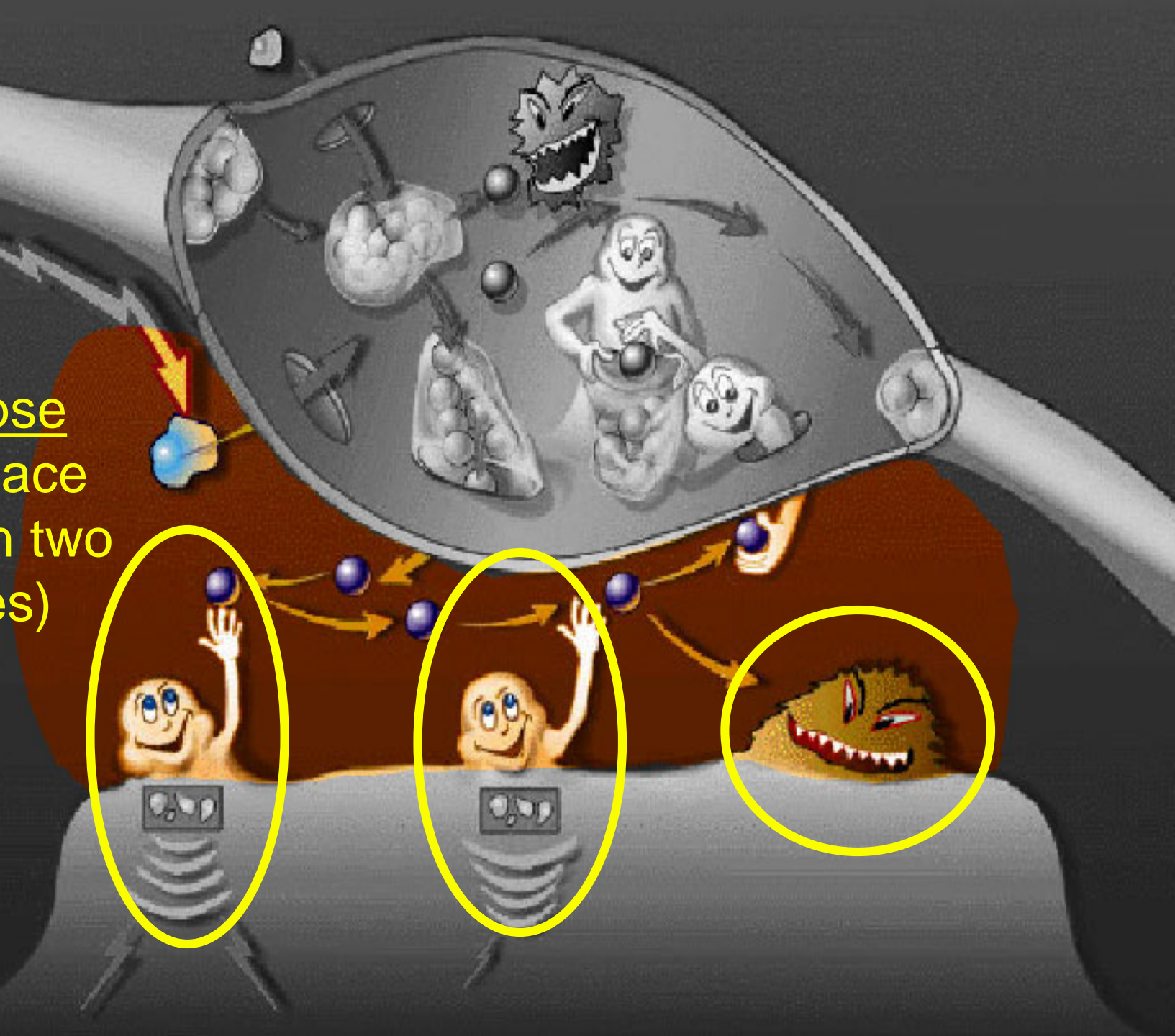


Neurotransmitters



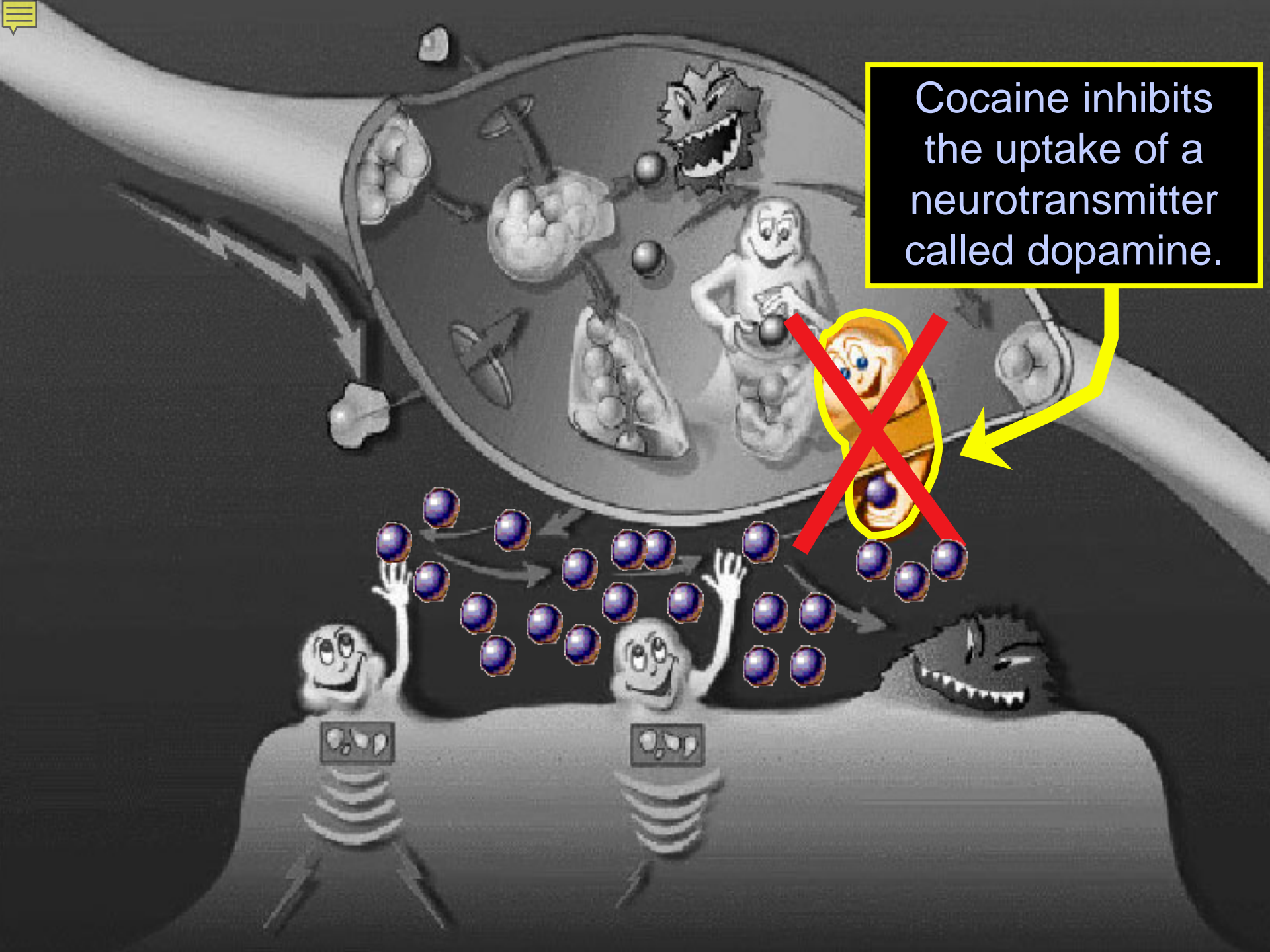



Synapse
(the space
between two
nerves)





Cocaine inhibits the uptake of a neurotransmitter called dopamine.

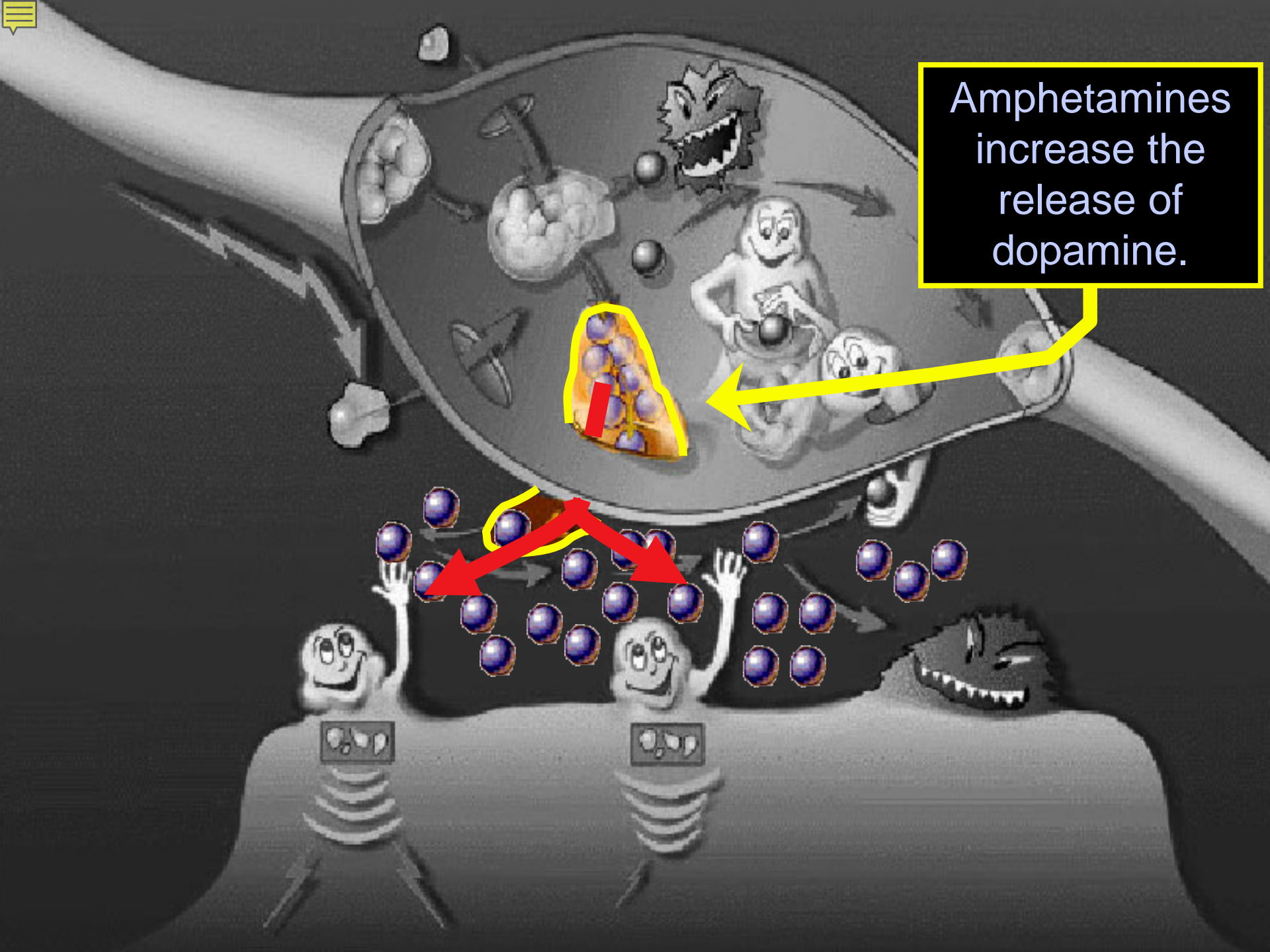


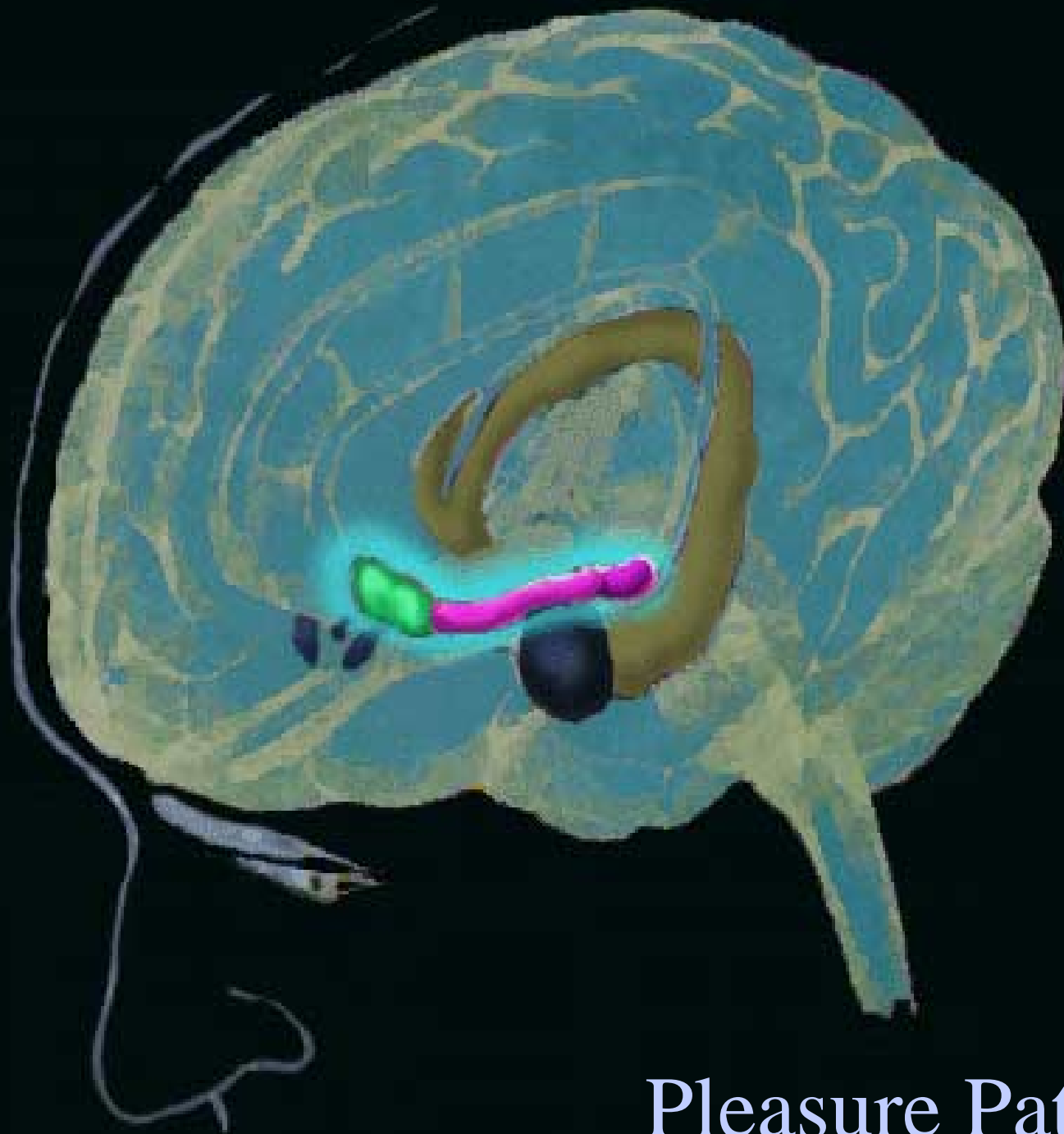


When neurotransmitter is not taken out of the synapse, it causes more stimulation than it normally would.

[Click here to view animation](#)

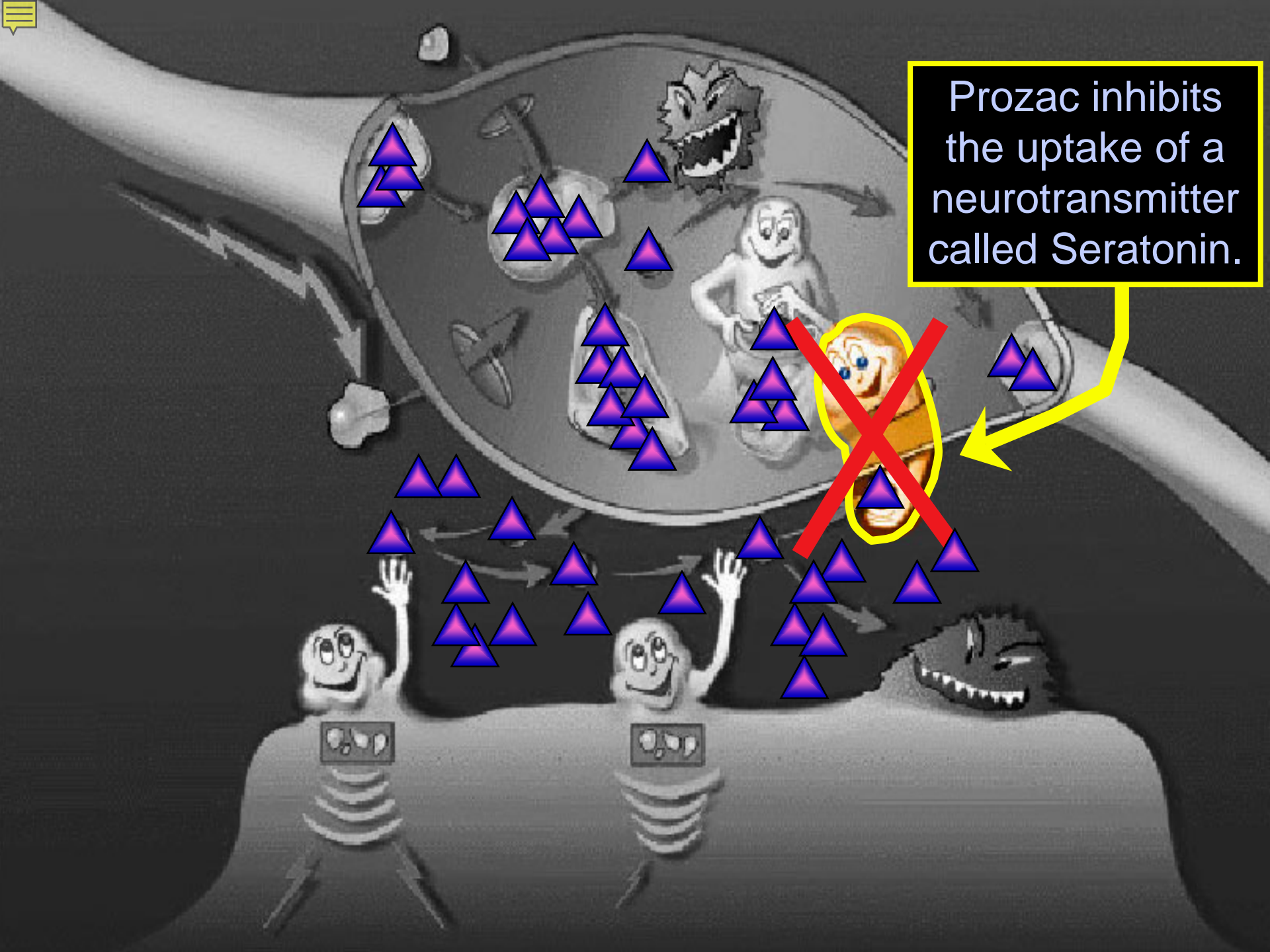
Amphetamines
increase the
release of
dopamine.





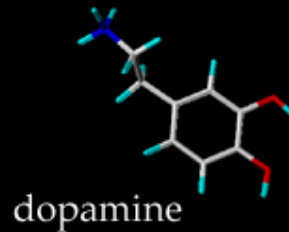
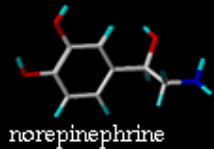
Pleasure Pathway

Prozac inhibits the uptake of a neurotransmitter called Serotonin.



SOME PEOPLE MAY BE PRE-DISPOSED TO ADDICTION

Certain people may have a functional deficiency in one or more neurotransmitters that occur in the pleasure pathway.



NEUROTRANSMITTERS OF “ADDICTION”

- Dopamine (DA)
- Serotonin (SER)
- Endorphins (END)
- Gamma-aminobutyric acid (GABA)
- Glutamate (GLU)
- Acetylcholine (ACh)



ADDICTION IS A BRAIN CHEMISTRY DISEASE!

1. **Addicting drugs** “match” a transmitter system that is not normal.
2. **Abstinence** is the first step in the total treatment process, in order to access the “wreckage of the past”.
3. Some people require a chemical to overcome the non-normal transmitter system. Evidence for is found in cases of methadone maintenance.



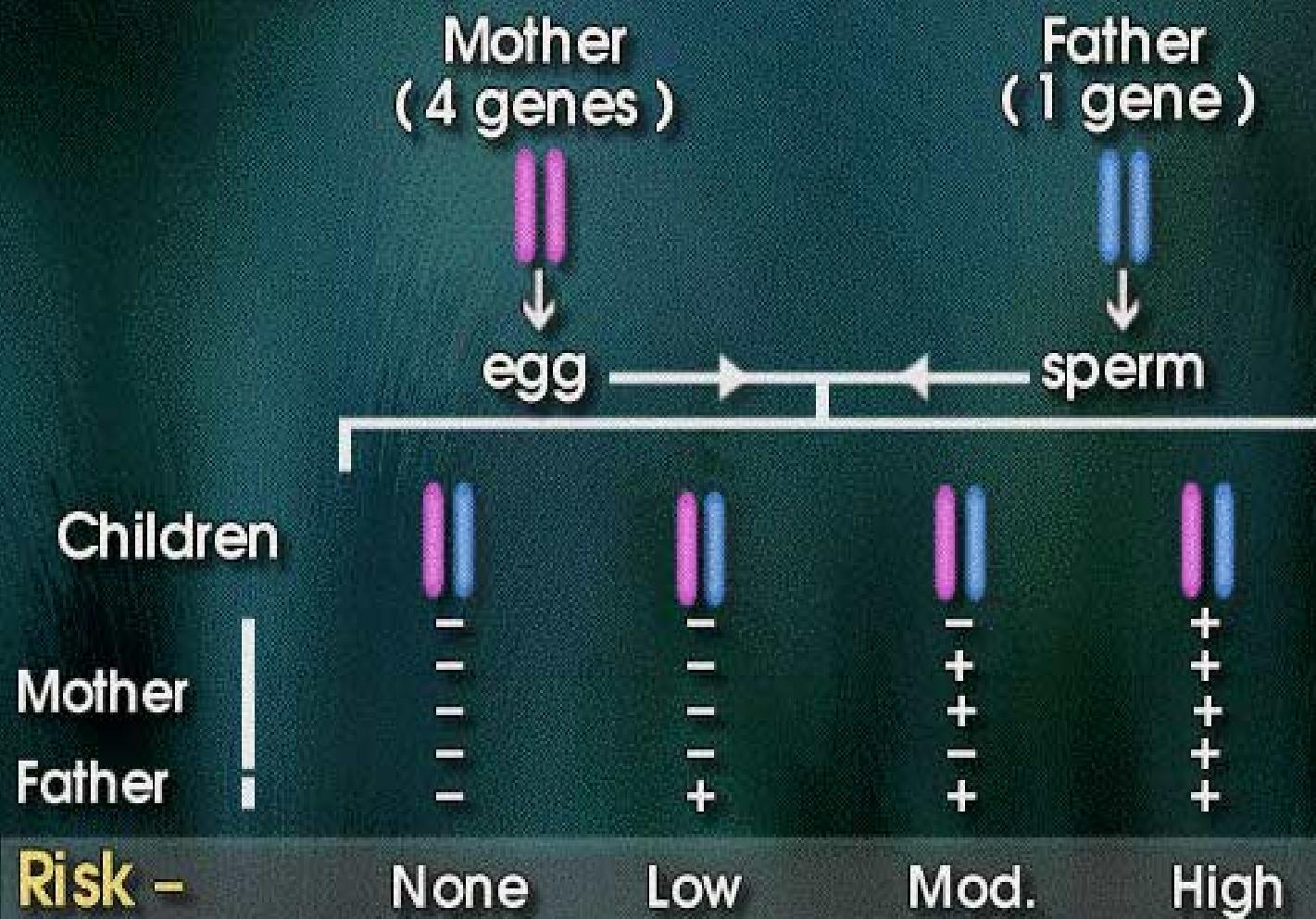
GENETICS OF ALCOHOLISM

- What is passed from parent to child?
- “The tendency to become alcoholic is inherited.”

Research on the Genetics of Alchoholism

- family, twin, and adoption studies
- the search for the genes

Genetic Risk of Alcoholism (Speculated)



SCIENTIFIC RATIONALE BASED UPON GENETICS

abnormal genes  abnormal proteins

transmitter synthesizing enzymes

transmitter breakdown enzymes

Receptors



neurotransmitter dysfunction in the pleasure pathway



impaired control



Medial Forebrain Bundle DEPENDENCE MODEL

- This is **not** a will power or poor judgment disease.
- **Impaired control** is caused by brain chemistry malfunction.
- Addicts **need** to drug to feel normal.
- Ultimate treatment must **normalize** neurotransmitter function in the proper brain area.



REDUCING DRUG ABUSE

- **make drugs harder to get** (alcohol: age, taxes, supply)
- **coerce or punish abusers**
- **educate** to prevent first use
- **increase adverse consequences**




REDUCING DRUG DEPENDENCE

- **intervention** for those in denial
- inpatient-outpatient-aftercare
- **12 steps** (abstinence)
- **relapse prevention** therapy
- new **medications** to reduce craving (now) and fix abnormal genes (in the future)



PHARMACOTHERAPIES FOR CHEMICAL DEPENDENCY

- **alcohol** - naltrexone, acamprosate, ondansetron
- **nicotine** - patches, gum, bupropion (Zyban), new vaccine
- **heroin** - methadone, buprenorphine
- **cocaine** - many alleged (GVG?), new vaccine

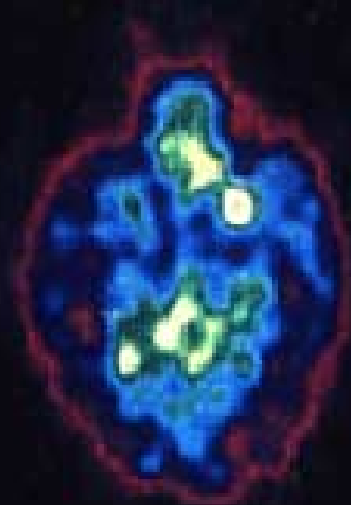


**SCIENCE PROPOSES
THAT
BEHAVIORAL
THERAPIES CHANGE
BRAIN CHEMISTRY!**

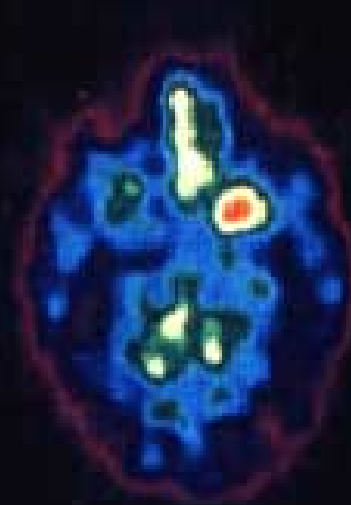
Amygdala



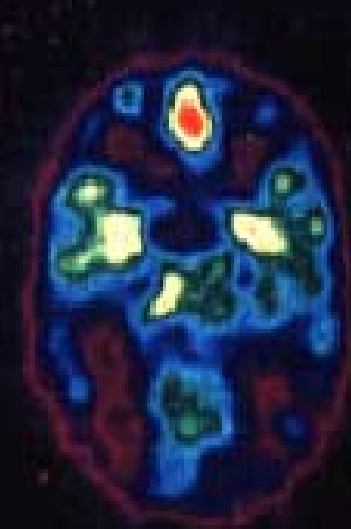
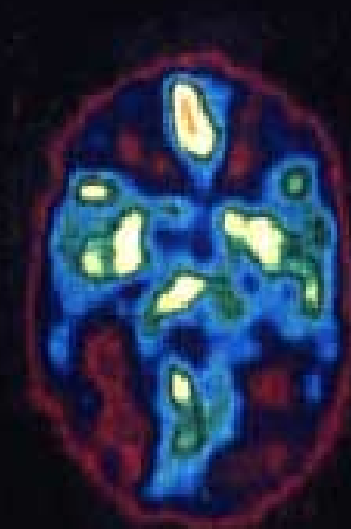
Nature Video



Cocaine Video



Anterior Cingulate





The Real Situation

- **we wrongly tend** to think all drug problems have a single solution
- **we want** to blame people for their affliction, while not seeking real causes (ask: why do they **do** that?)
- **we hate** what we fear or **become angry** at people who act badly
- **stigma, prejudice, and misunderstanding** are enormous
- **addiction science** is teaching us to become more tolerant



Acknowledgements

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Dr. Carlton K. Erickson



Carlton Erickson is interested in addiction science education, performed through the dissemination of new research findings on drug addiction in lay language. Primarily through lectures and slide presentations to treatment professionals (alcohol and other drug abuse counselors, social workers, mental health counselors, etc.) and the “reachable public” (criminal justice workers, physicians, nurses, pharmacists, dentists, clergy, and family members), education is packaged in an easily-understandable form so that new information can be transferred quickly to those who can use it. He is also interested in teaching other researchers to communicate their research results more effectively, and to motivate them to also talk to nonscientific groups. Finally, the evaluation of such information transfer is critical to its long-term effectiveness in altering public opinion about addictions as diseases. Therefore he is interested in learning behavioral change methods and theory, attitudinal theory, and how to influence public opinion regarding drug use, abuse, and dependence in our society.