Street Drug Pharmacology 2021

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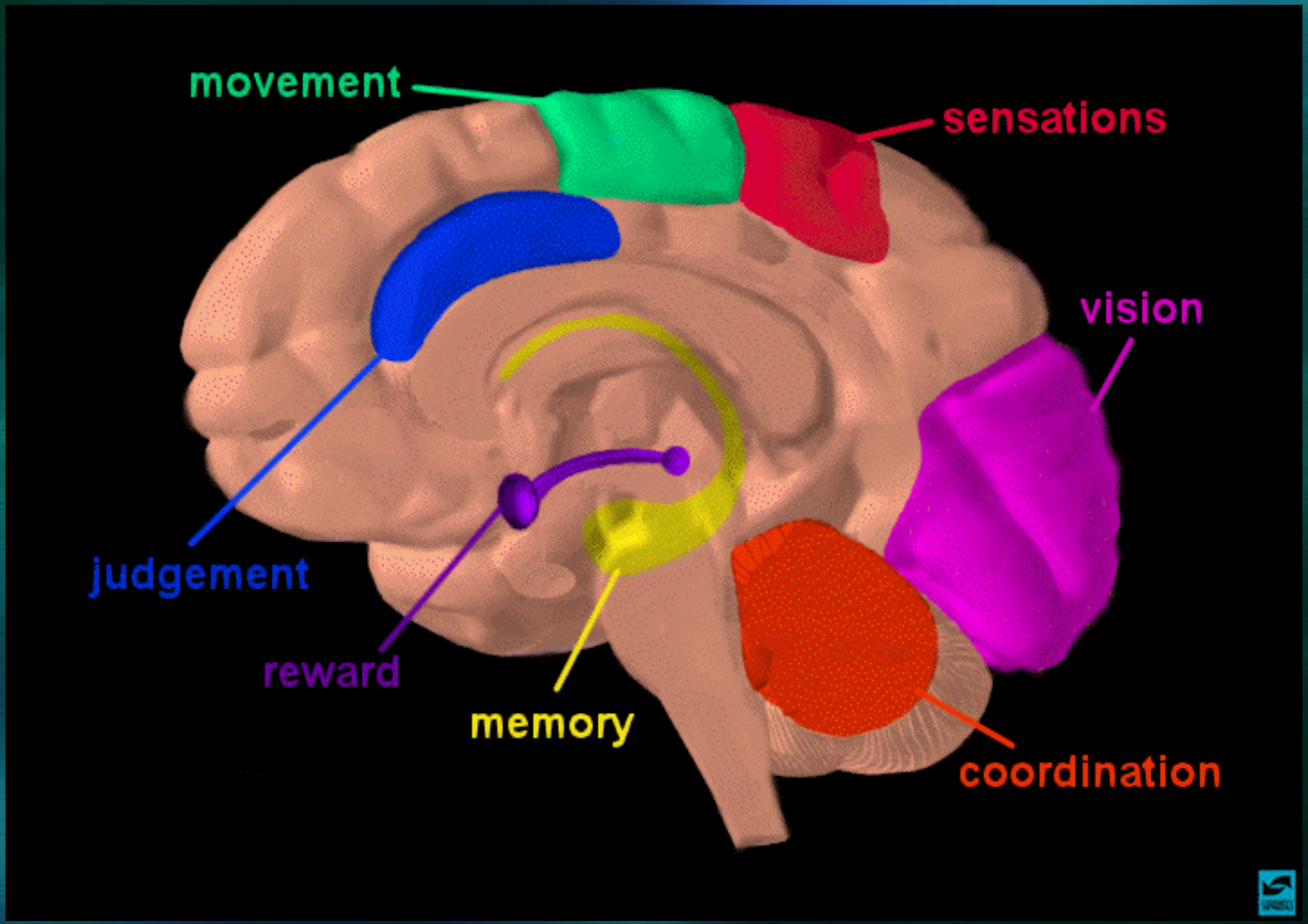
Emerging Drugs of Abuse discussion group

ADDICTION POTENTIAL

- Ability to stimulate the brain's reward circuits
- Ability to meet a individualized neurochemical need
- Physical dependency potential
- Intensity of withdrawal symptoms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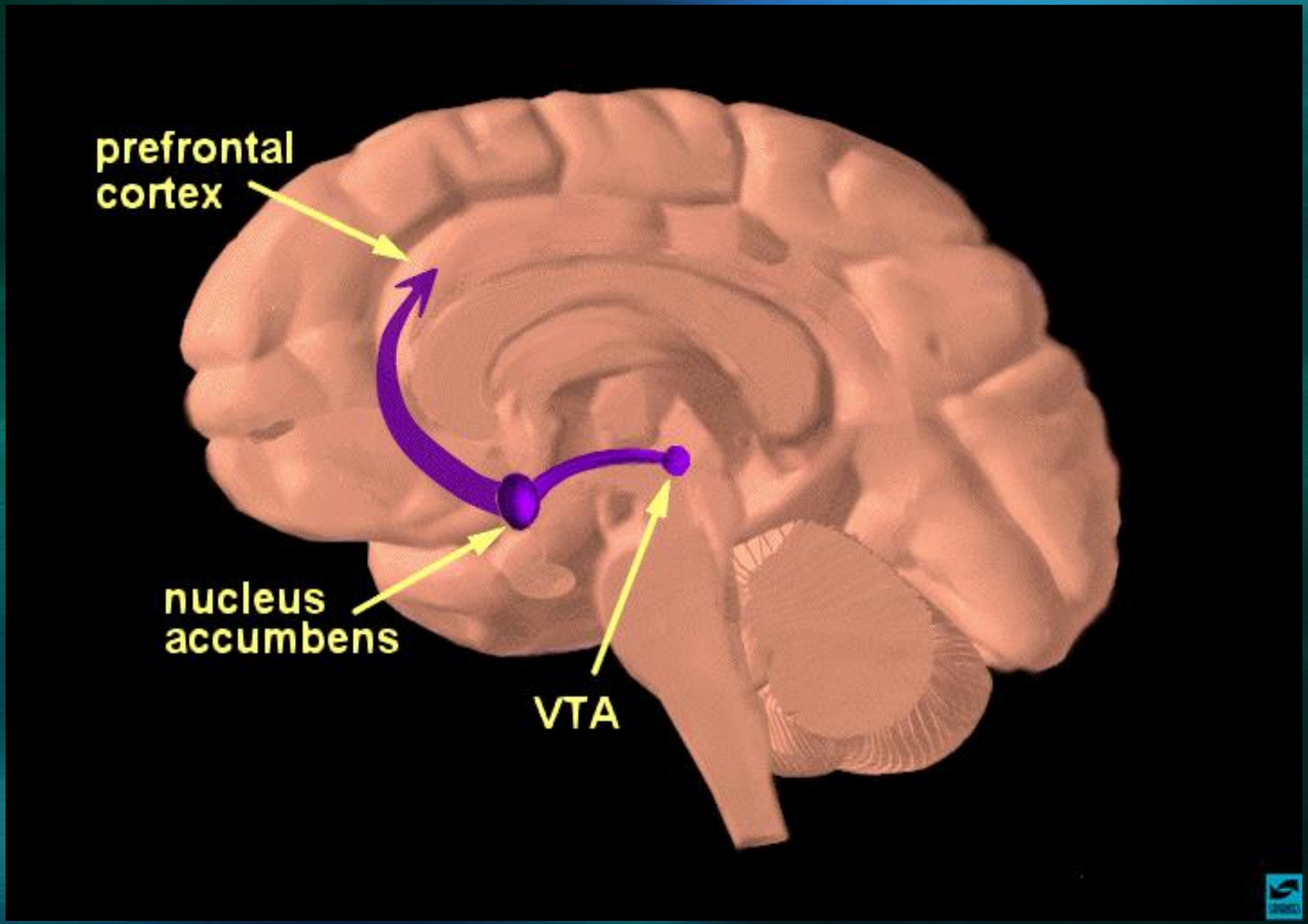
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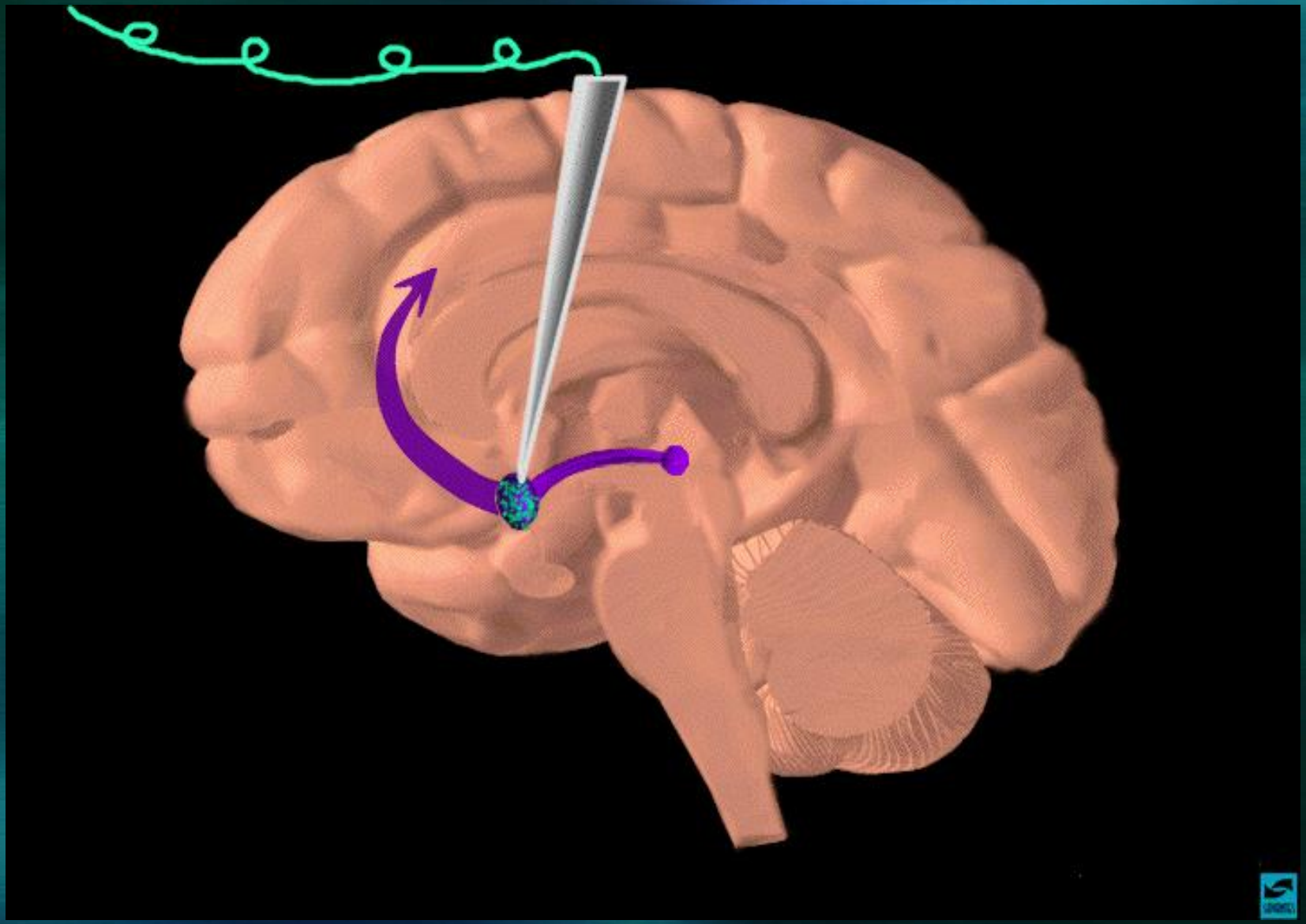
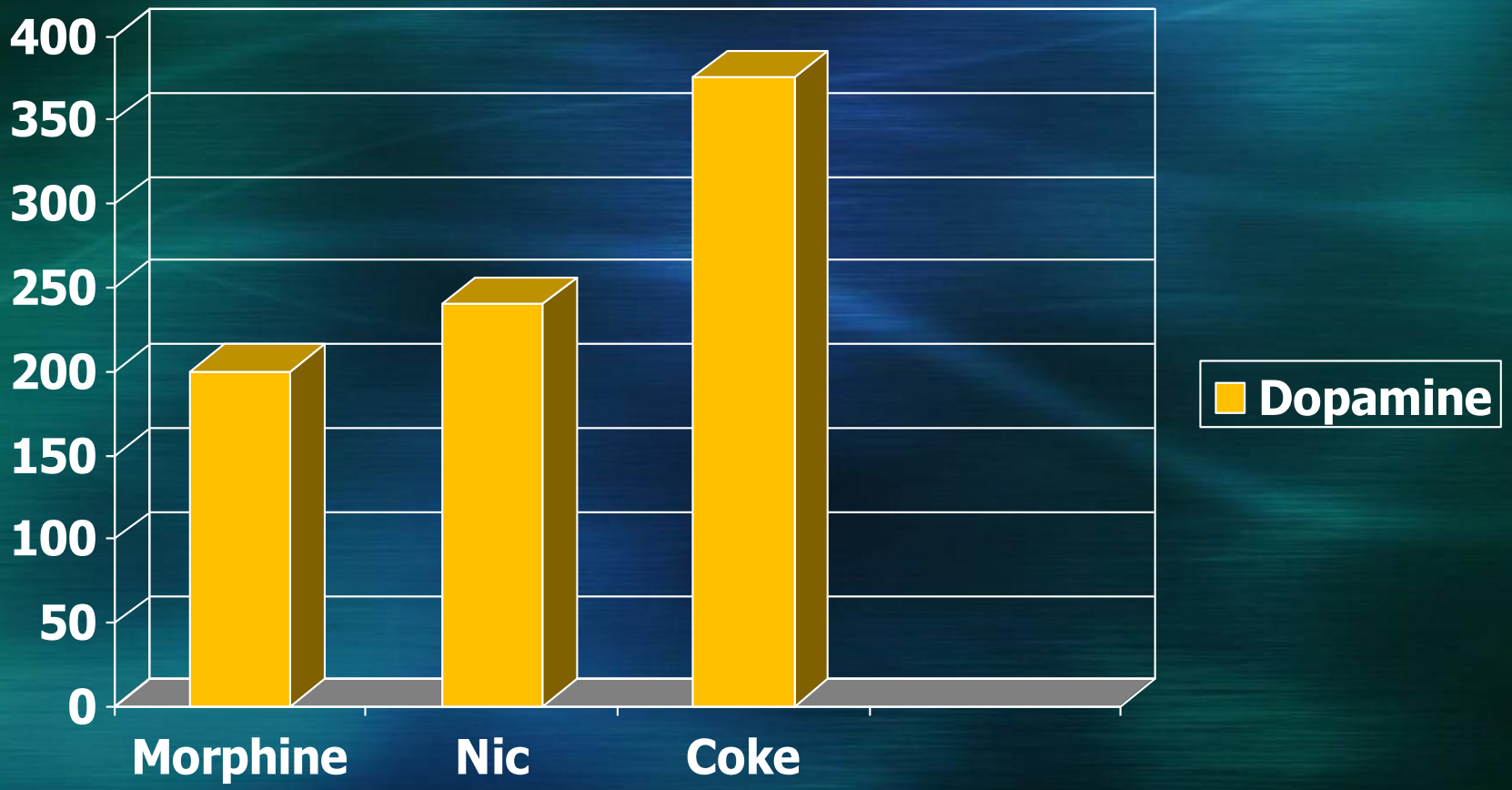
VTA



Neurotransmitters

- Serotonin (5-HT)
- Norepinephrine (NE)
- Dopamine (DA)
- Acetylcholine (Ach)
- Glutamate (GLU)
- Gamma amino butyric acid (GABA)
- N-methyl-D-aspartate (NMDA)

Dopamine Levels in the Shell of the Nucleus Accumbens (% of baseline)



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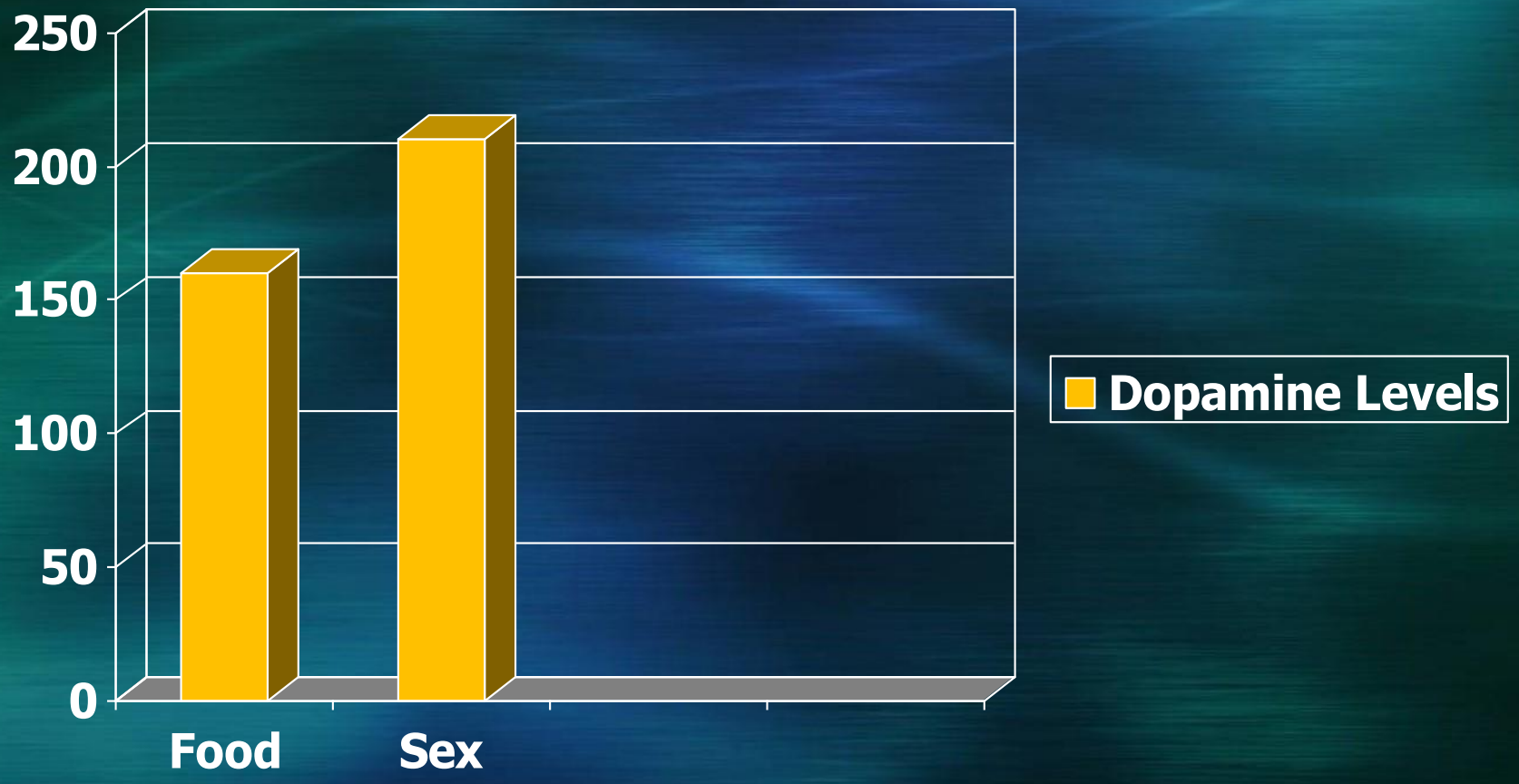

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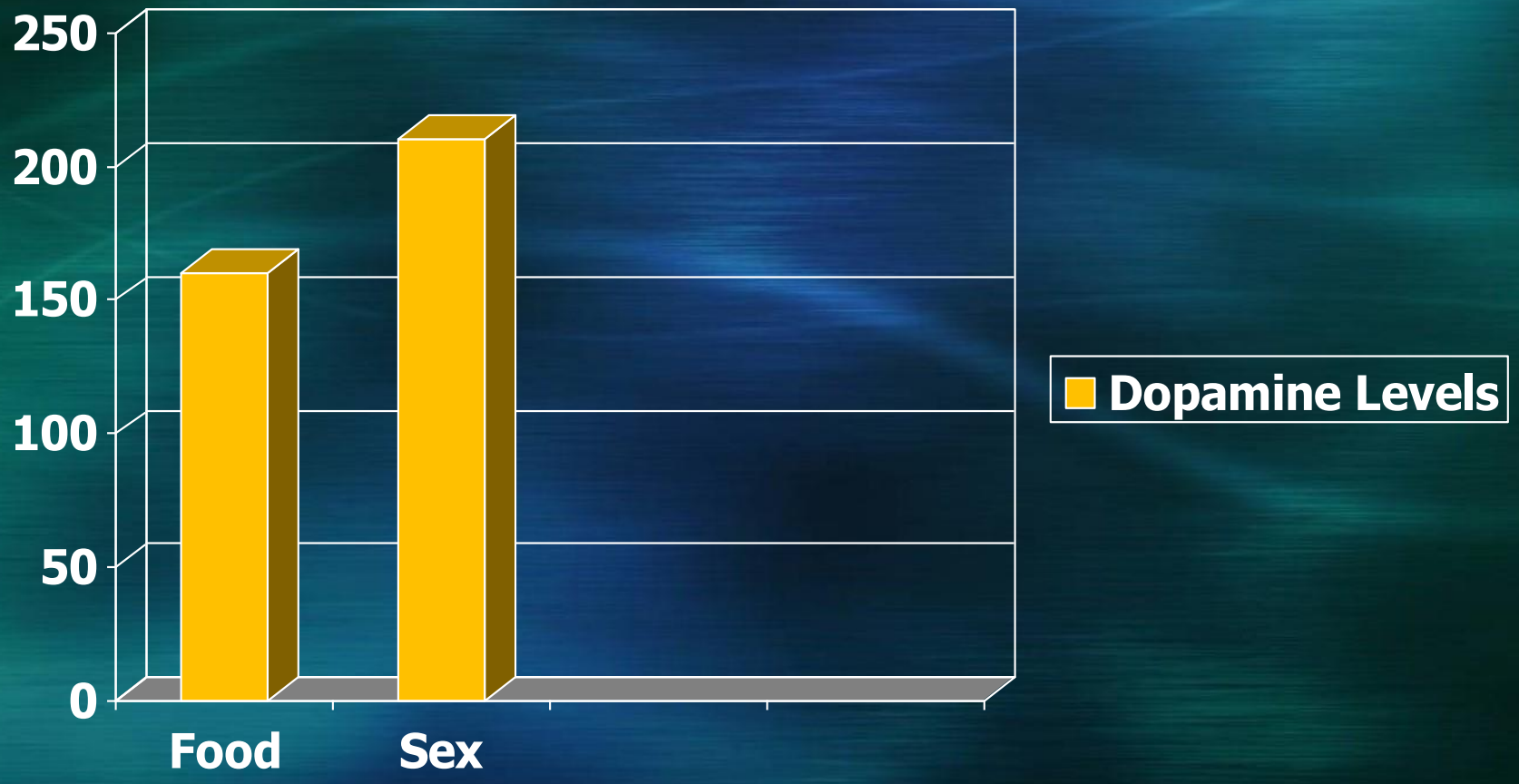

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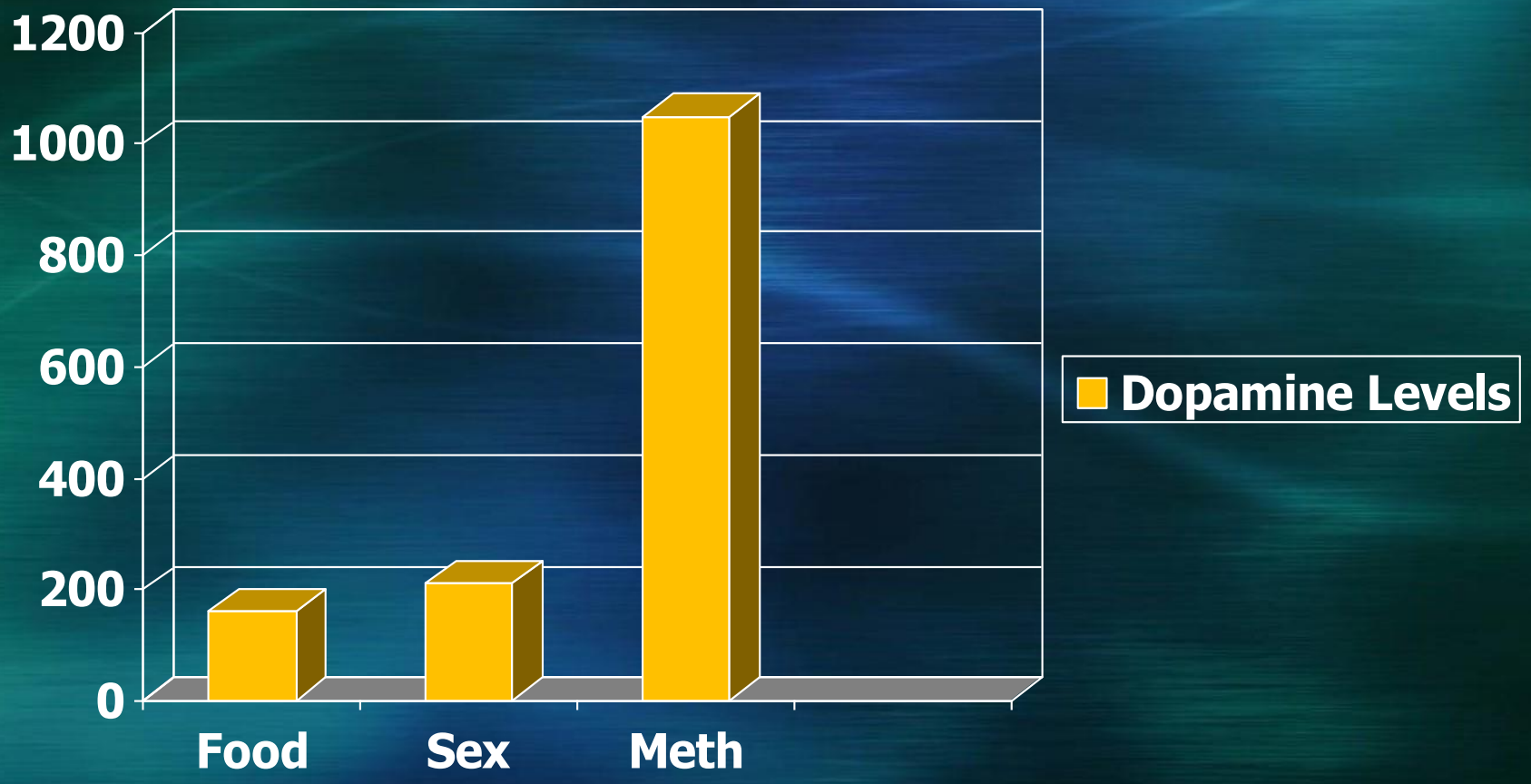
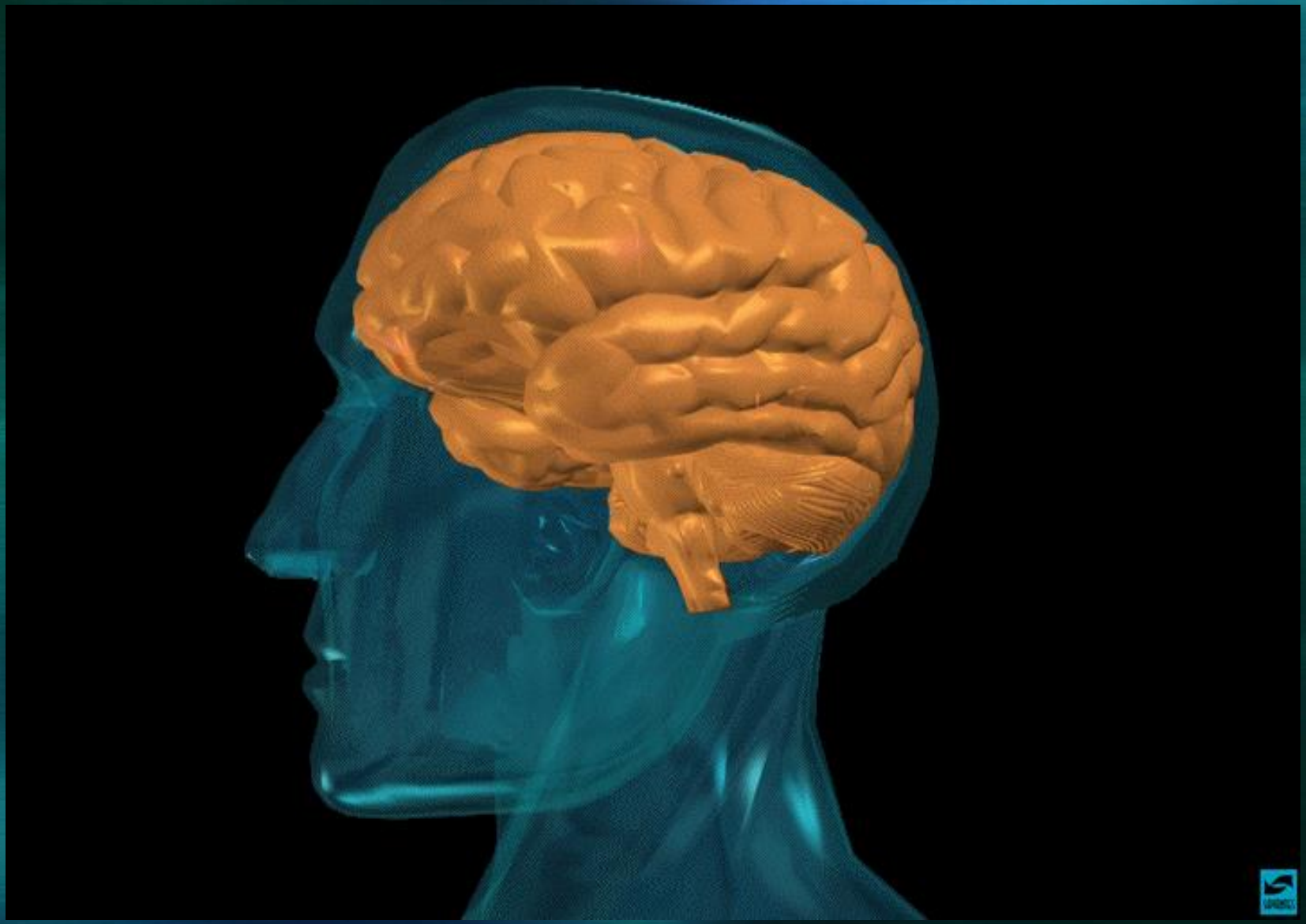
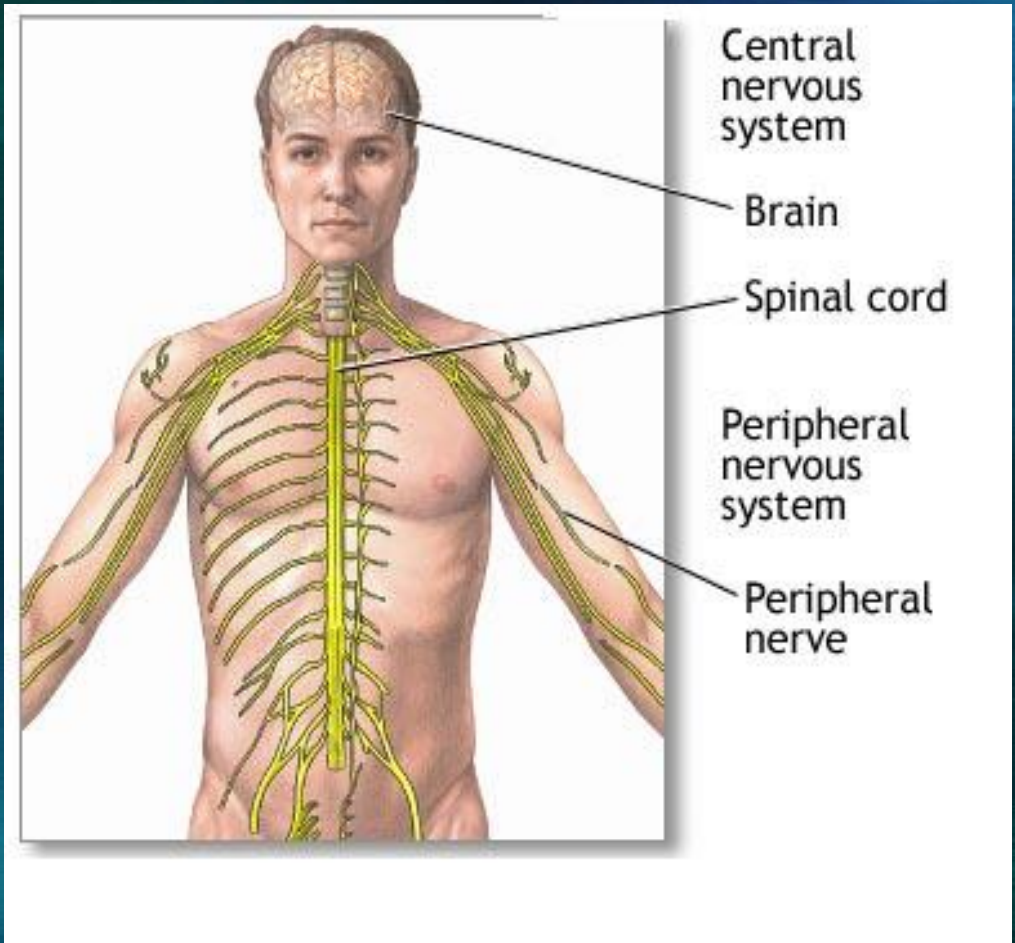
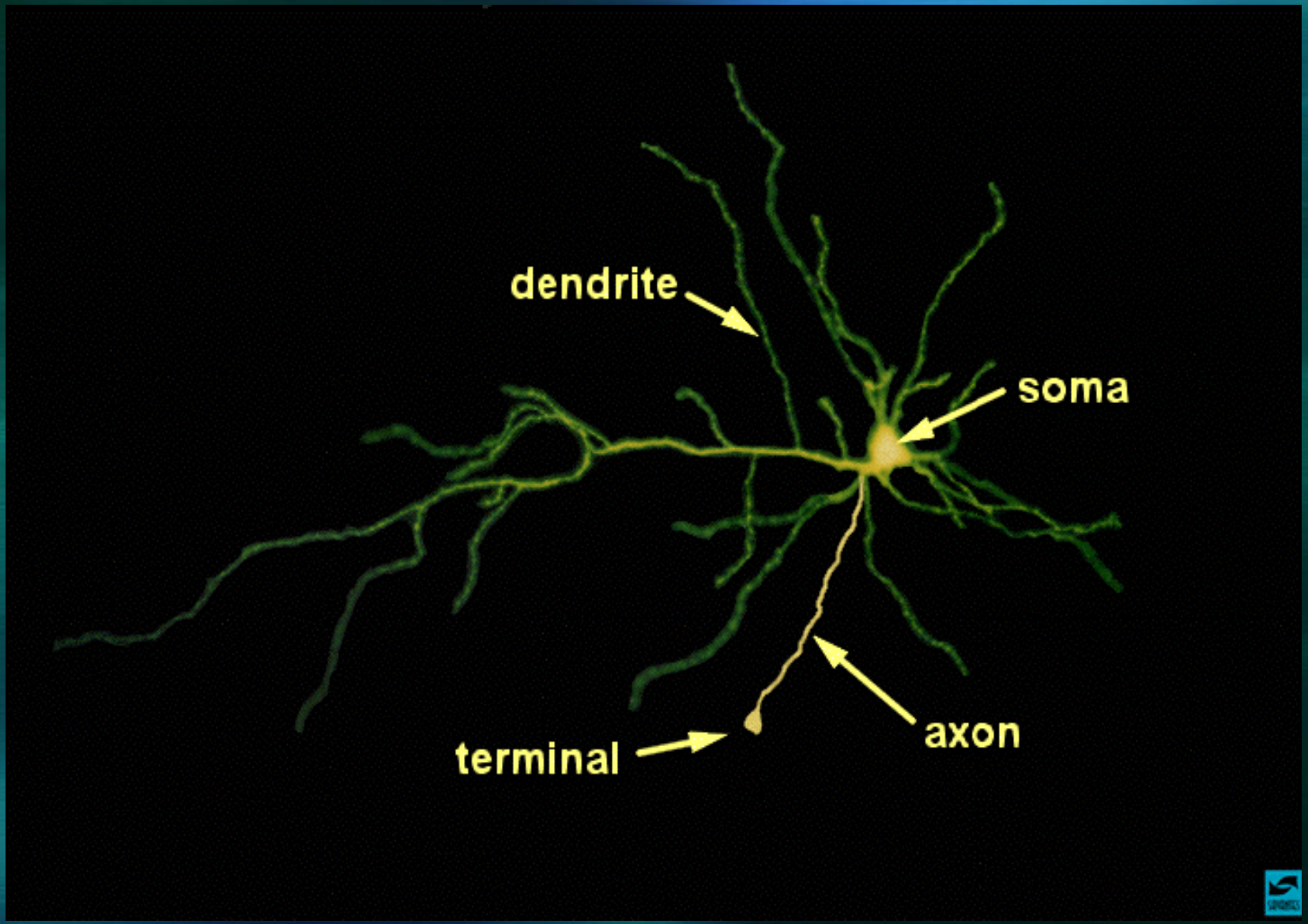




Peripheral Nervous System

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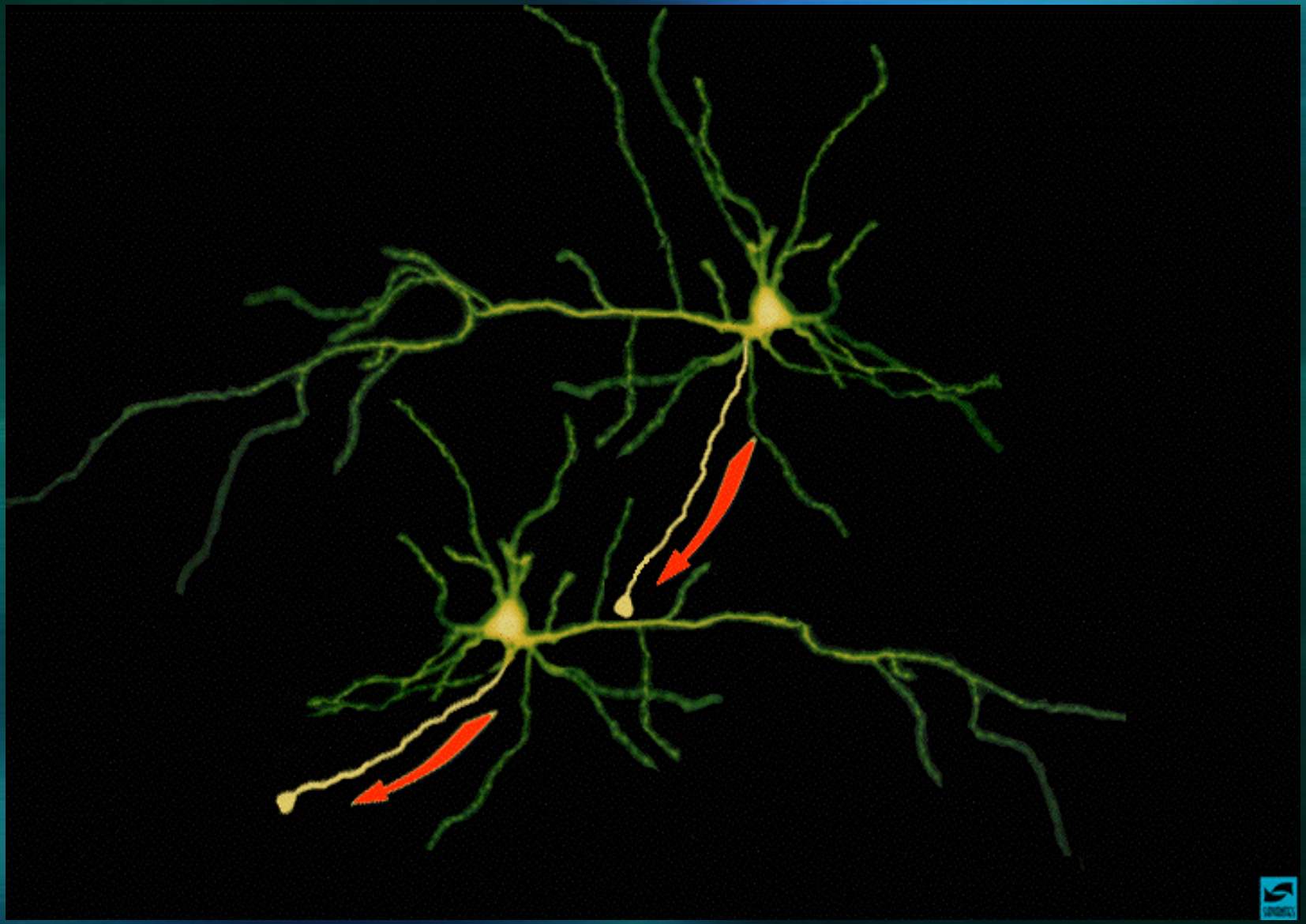
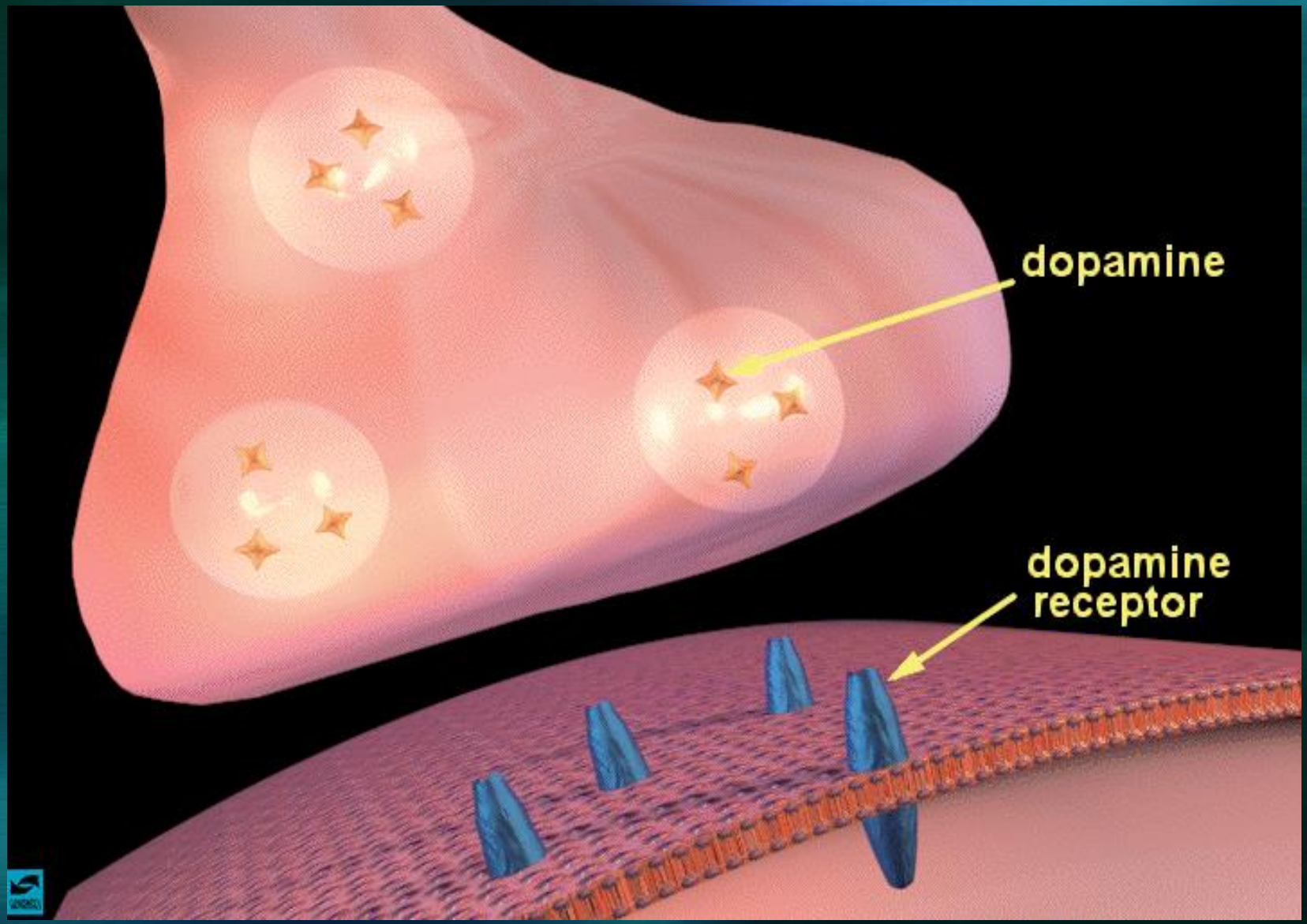
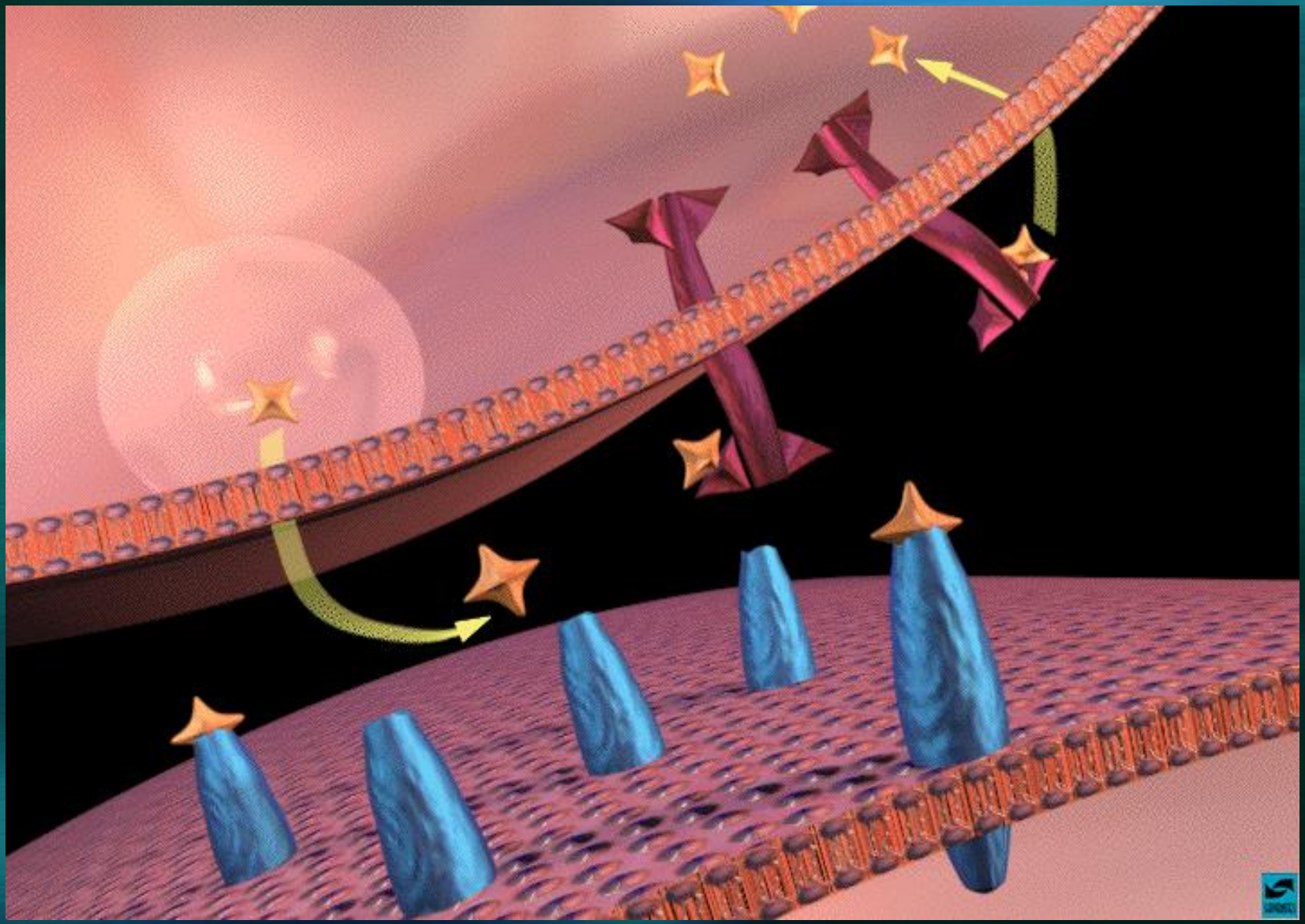
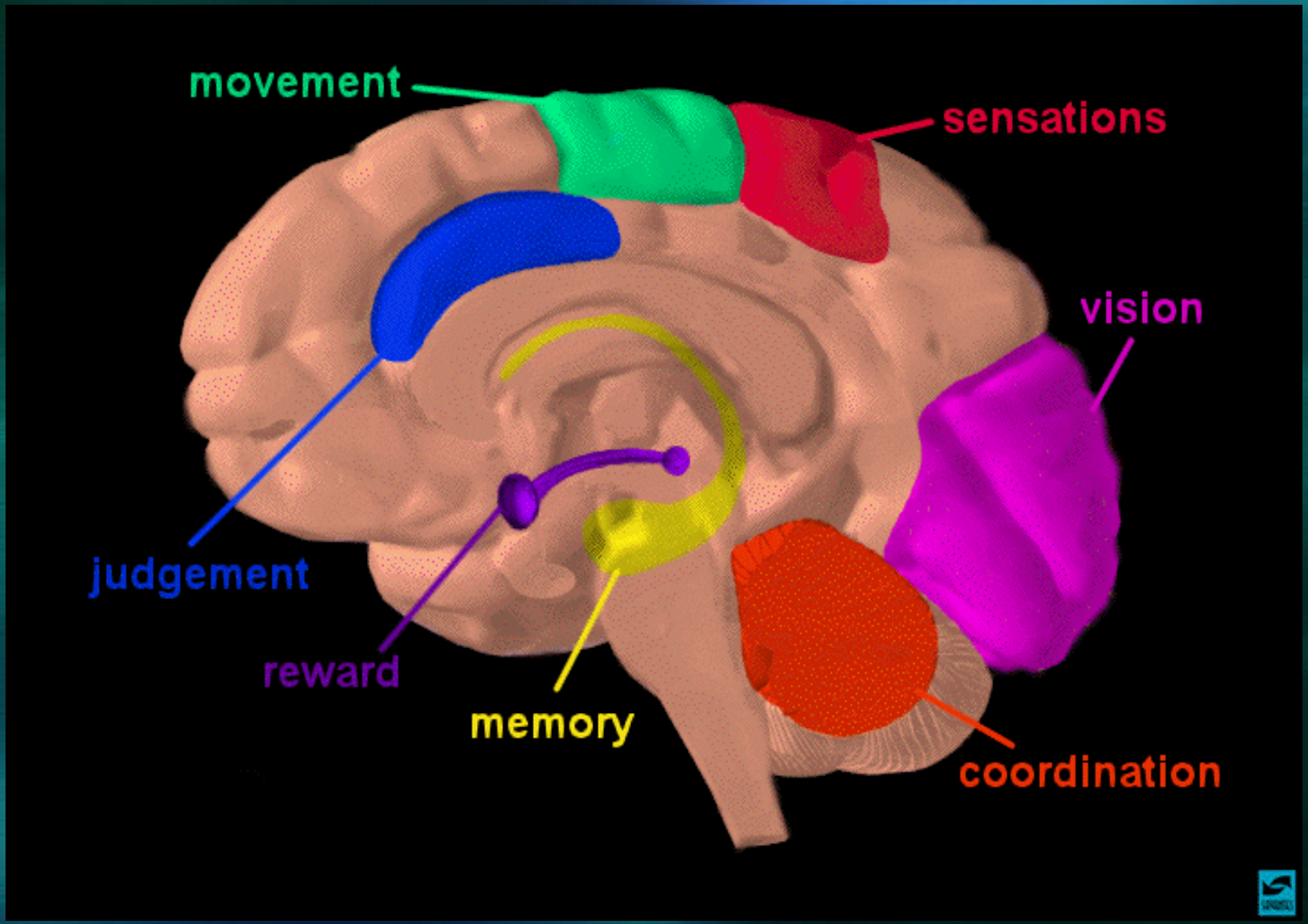
axon




dopamine
dopamine receptor

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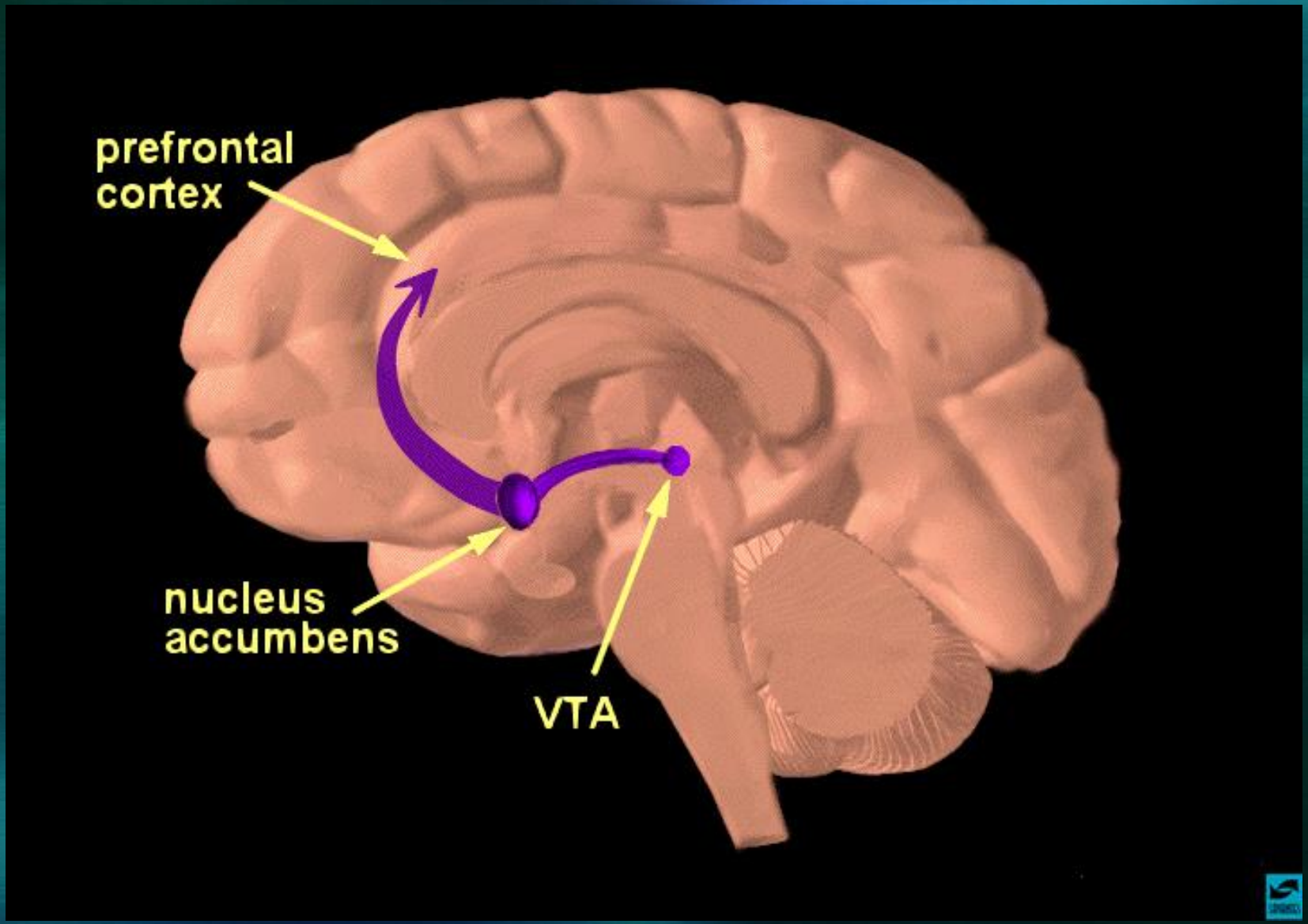
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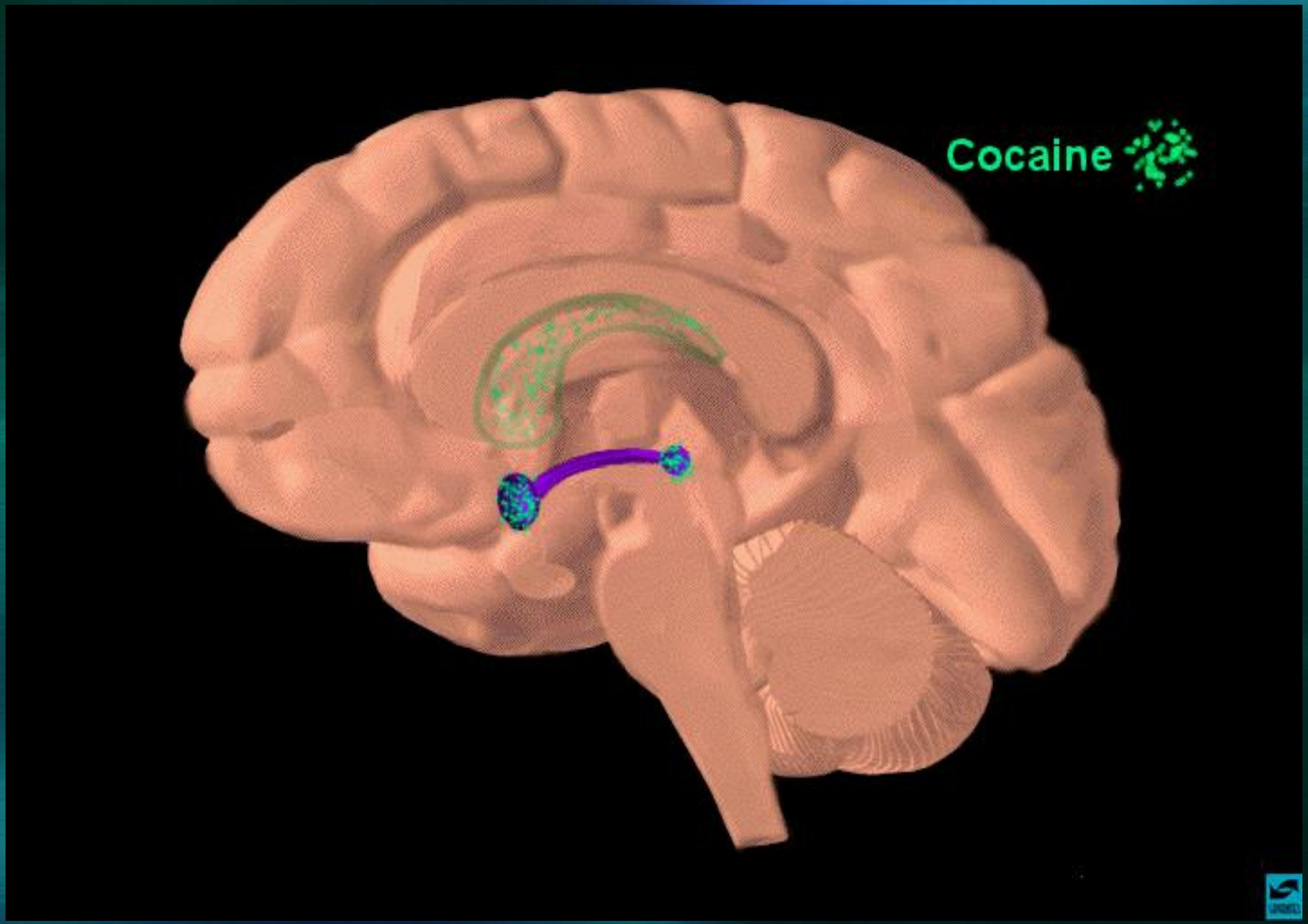
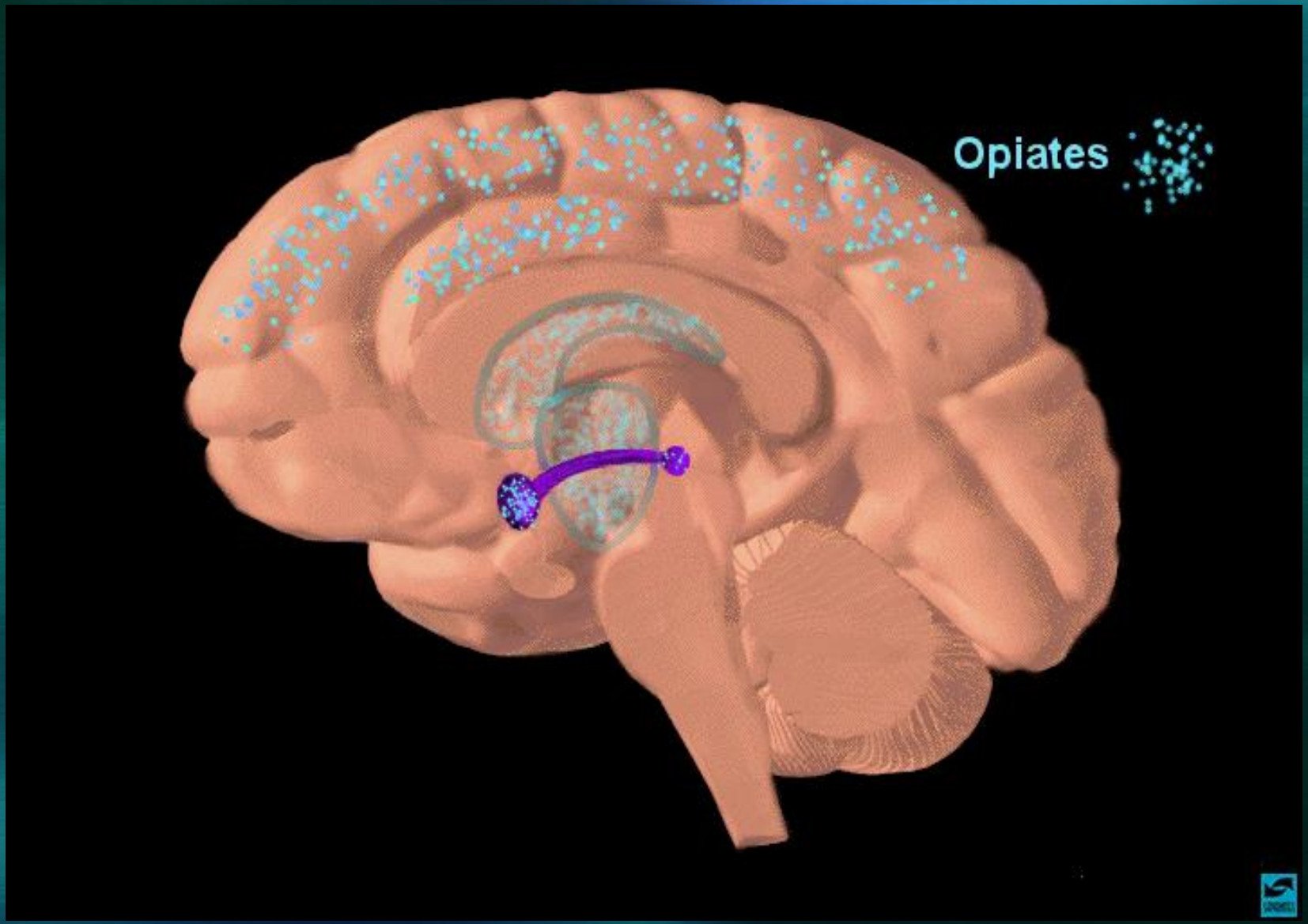
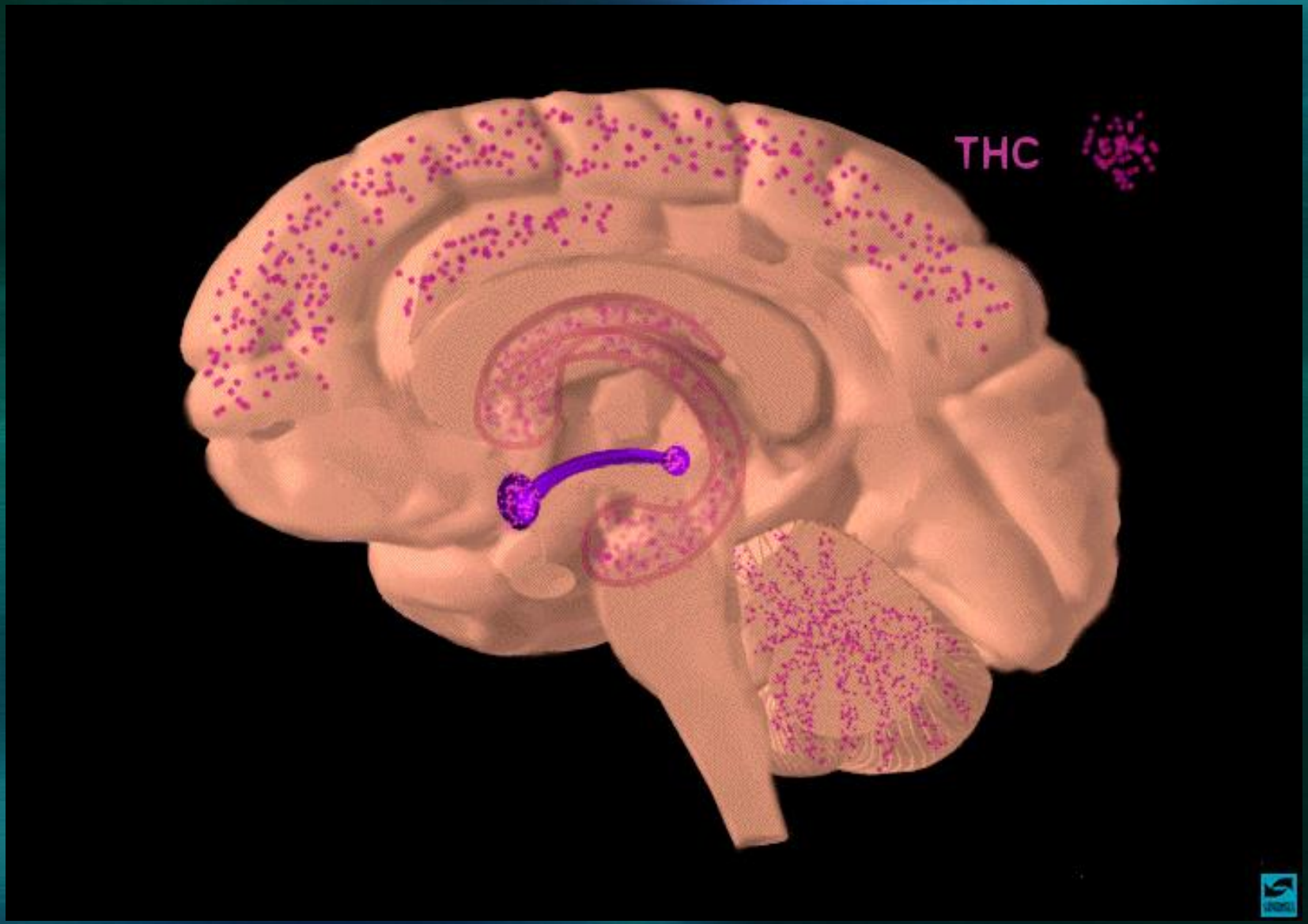

Cocaine


Opiates


THC

NEUROTRANSMITTERS

- Naturally-occurring brain chemicals
- Many psychoactive drugs resemble neurotransmitters:

NEUROTRANSMITTERS

DRUG	NEUROTRANSMITTER
LSD	Serotonin
Methamphetamine	Norepinephrine
heroin	Endorphins

NEUROTRANSMITTERS

DRUG	NEUROTRANSMITTER
THC	Anandamide
PCP	Receptor site identified but not associated neurotransmitter

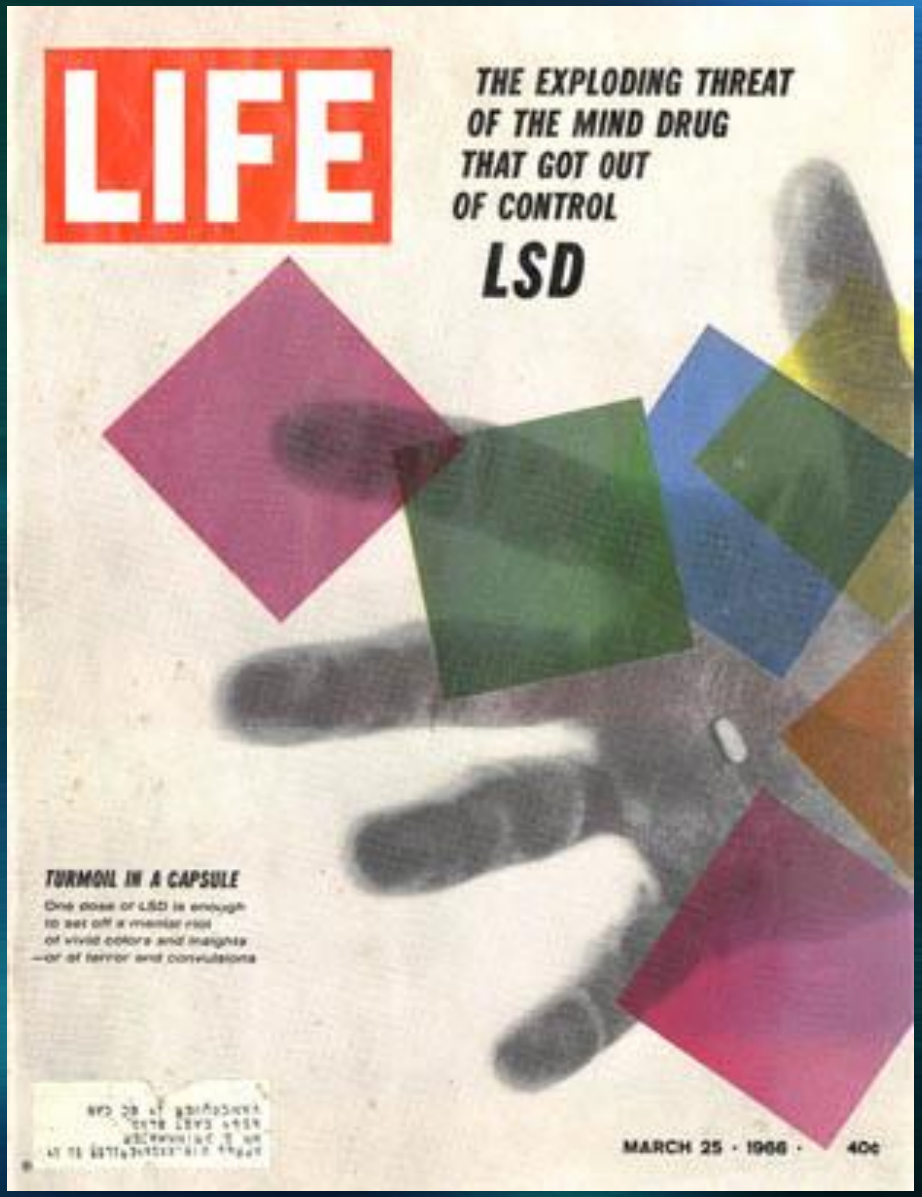
TOXICITY

- Ability to produce physical damage to the human body
- Long-range = months, years
- Short-range = days, weeks
- Physical vs behavioral

PSYCHIATRIC IMPAIRMENT

- Ability of drug to produce negative changes in thinking, learning, perception, mood or behavior
- Acute vs chronic

March 25, 1966



Important “basics”

- What is the drug’s addiction potential?
- Does the drug produce tolerance?
- What are typical physical dependence withdrawal symptoms?
- What is the drug’s potential for producing immediate and long-term physical toxicity?
- Does the drug produce psychiatric impairment? Short-term? Chronic?

Stimulants

- Cocaine
- Amphetamine (Adderall)
- Lisdexamfetamine (Vyvanse)
- Methamphetamine
- Methylphenidate (Ritalin/Concerta)

Stimulants: Basics

- High addiction potential
- Tolerance develops
- Withdrawal symptoms minimal
- Moderate to high potential for immediate physical toxicity
- Moderate potential for long-term toxicity
- Moderate to high potential for acute psychiatric impairment
- Low to moderate potential for chronic psychiatric impairment

CNS Stimulants (Cocaine)

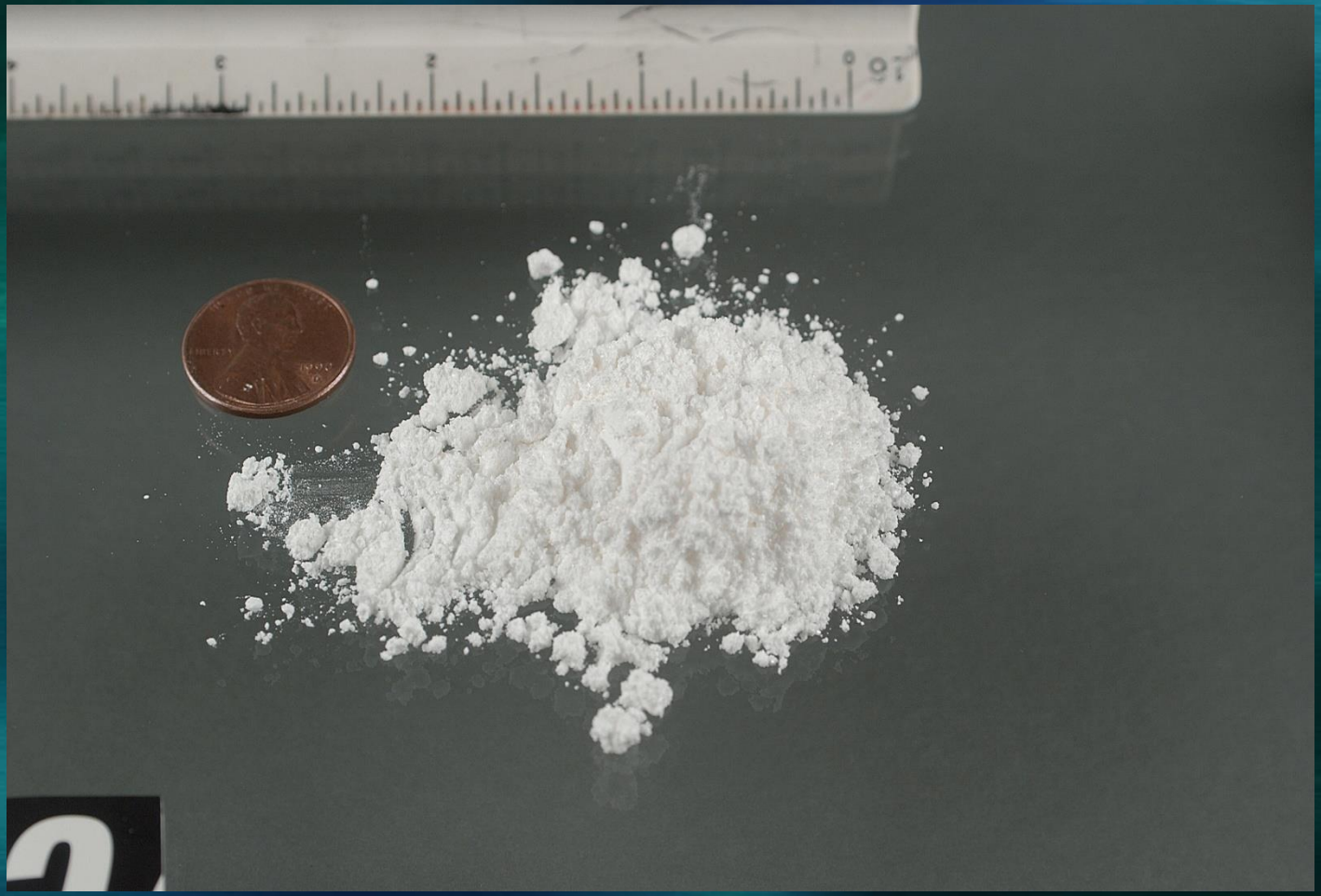
- Local anesthesia
- coca (Erythoxlum Coca)
- cocaine hydrochloride (hcl) ("coke", "toot", "nose/nose candy", "blow", "freeze", "snow", "girl", "white lady", "la mujer blanca")
- alkaloidal cocaine ("free base", "crack", "rock/ready rock", "basuco")

ERYTHROXYLOM COCA FLOWER

COCA FARMER

MAKING COCAINE

Cocaine Hcl



COCAINE PARAPHERNALIA

Crack (Alkaloidal cocaine)

VIALS OF CRACK

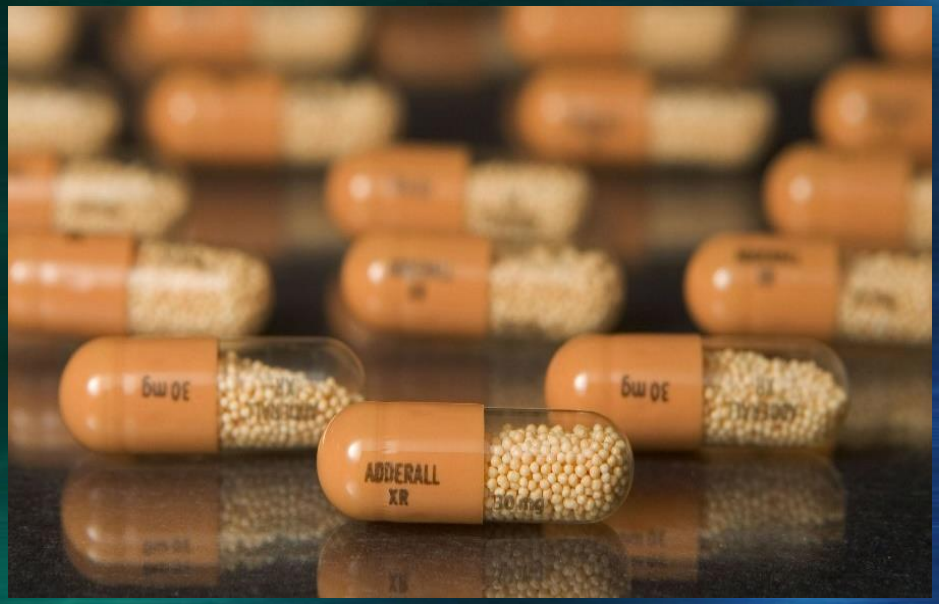
Crack Packaged for Sale

Cocaine Vs. Amphetamine

- Cocaine:
  - Short-acting drug, with a duration of 5-60 minutes.
  - Cocaine can be snorted, injected or smoked, but it is relatively ineffective when swallowed.
  - Tolerance to cocaine can develop and then disappear in a matter of hours.
  - When snorted tends to do much more severe damage to the nasal area.
  - Produces *local anesthesia*

Stimulants

- Cocaine
- Amphetamine (Adderall/dl-amphetamine/d-amphetamine)
- Lisdexamfetamine (Vyvanse)
- Methamphetamine
- Methylphenidate (Ritalin/Concerta)


ADDERALL
XR
30 mg
30 mg
30 mg


50 mg
50 mg
50 mg
50 mg
50 mg

Adderall/Other ADD Medications

- By senior year, nearly two-thirds of college students are offered Adderall or other “study drugs”, and nearly one-third have accepted
- *Journal of Clinical Psychiatry*: 67% increase 2006 to 2011 in ER visits by adults ages 18-25
- From 2016 to 2019, methamphetamine deaths increased from 1.8 to 10.1/100,000 among men and 0.8 to 4.5/100,000 in women (26-54 yo)
- 2021: Amphetamines #1 cause of calls to poison control centers concerning psychoactive drugs

Stimulants

- Amphetamine (Adderall/dl-amphetamine + d-amphetamine)
- Lisdexamfetamine (Vyvanse)
- Methamphetamine
- Methylphenidate (Ritalin/Concerta)
- Cocaine

Methamphetamine toxicity

- Studies show damage to serotonin neurons
- Thinking, learning and memory problems
- Users learn better through graphic visuals rather than reading/writing

Stimulant Intoxication

- Dependent on individual factors
- Euphoria, elation, self-confidence
- Grandiosity
- Hypersexuality/increase in libido
- Relief from depression
- Crashing
  - Depression
  - Boredom
  - Anhedonia
  - Craving

Stimulant “Crash”

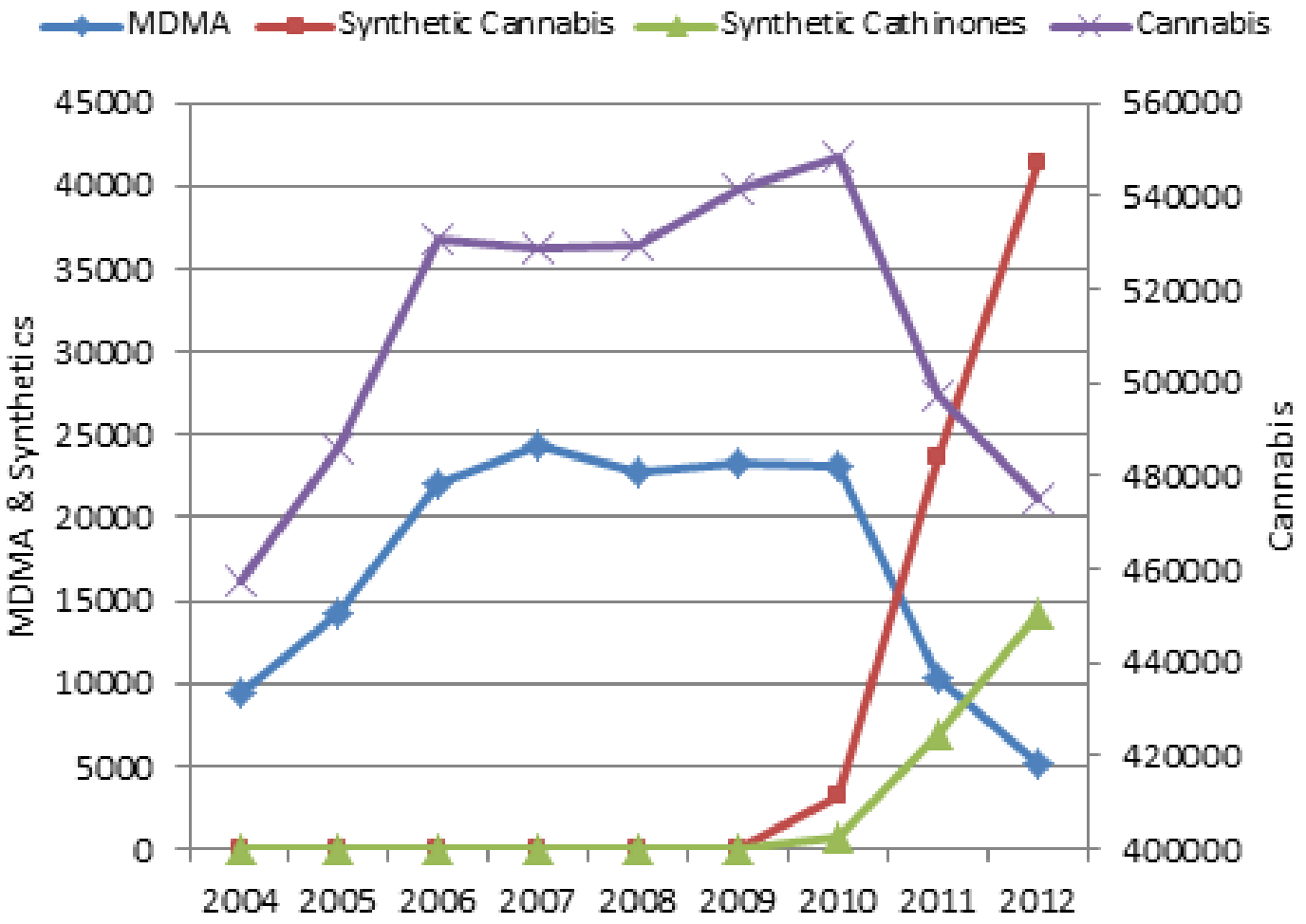
- Crashing
  - Depression
  - Boredom
  - Anhedonia
  - Craving

Stimulant Psychosis

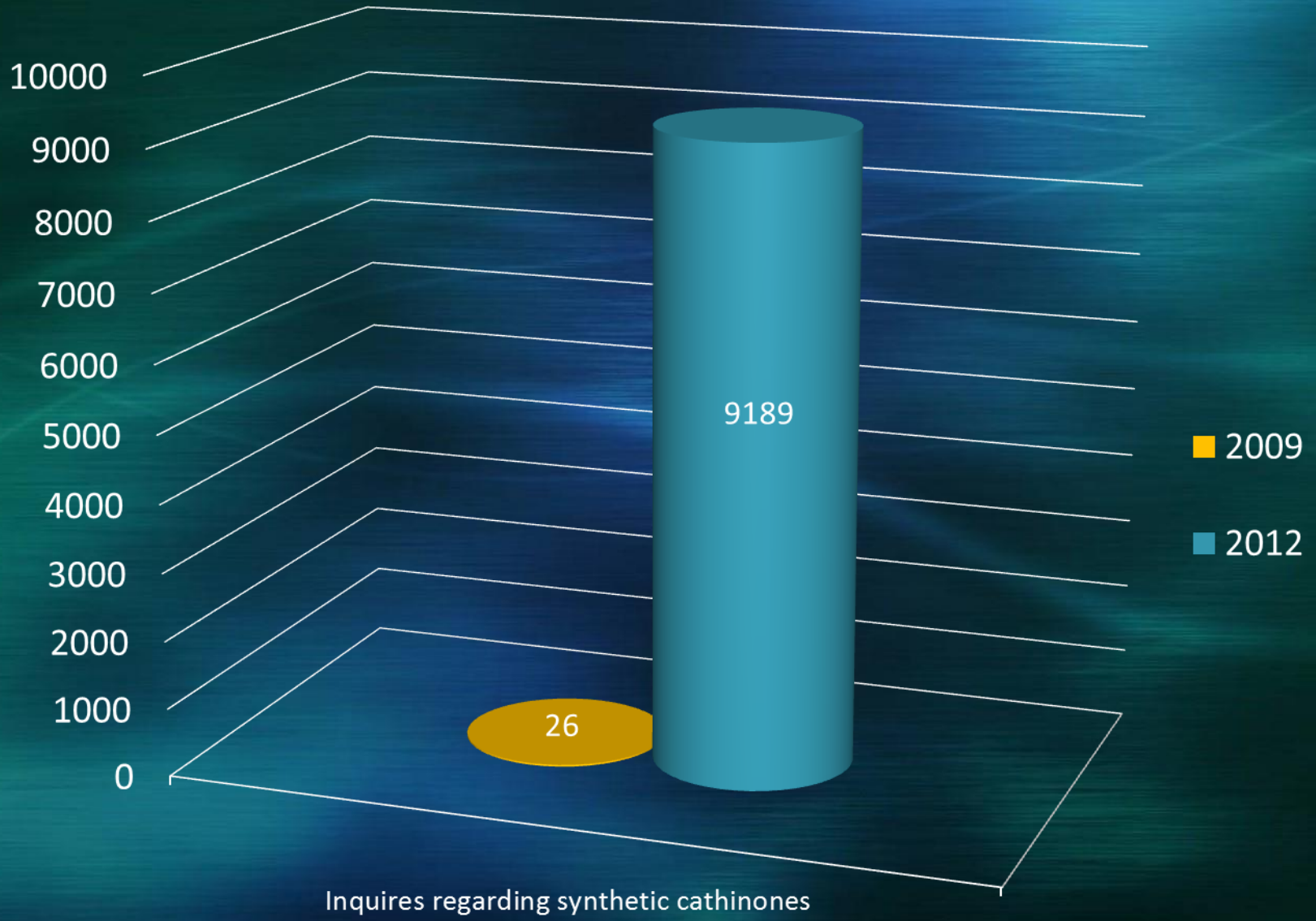
- High dose/long run
- Paranoia
- Visual, auditory and tactile hallucinations
- “Being watched”
- Shadow people
- Resolves within 24 hours/differential diagnosis
- Once one episode occurs, future episodes more likely
- Sleep deprivation

Stimulants:
Synthetic Cathinones

Changes in Number of Items Examined in DEA NFLIS:2004-2012



Inquires to NFLIS Concerning Synthetic Cathinones



Khat

- Native to tropical East Africa and the Arabian Peninsula
- Fresh leaves/tops chewed or consumed as tea
- Stimulation and euphoria
- Part of social culture in many countries (coffee, tea, coca or khat?)


EGYPT
SAUDI ARABIA
OMAN
CHAD
ERITREA
YEMEN
SUDAN
DJIBOUTI
ETHIOPIA
CENTRAL
AFRICAN
REPUBLIC
SOMALIA
UGANDA
DEM. REP.
OF THE CONGO
KENYA
RWANDA
BURUNDI
TANZANIA
INDIAN OCEAN

Khat cultivation in Yemen

Women in Somalia Selling Khat/Quat

Khat

- Native to tropical East Africa and the Arabian Peninsula
- Fresh leaves/tops chewed or consumed as tea
- Stimulation and euphoria
- Part of social culture in many countries (coffee, tea, coca or khat?)

Khat

- Coca--------Cocaine
- Khat---------Cathinone (Schedule I)
- Cathinone: Structure similar to amphetamines

BATH SALTS*

* Contain schedule I substances as of October 2011

HUFF POST ADDICTION & RECOVERY

Bath Salts: The 'Cannibal' From Miami's Alleged Dangerous Drug Of Choice

Posted: 05/30/2012 10:58 am Updated: 05/31/2012 10:39 am

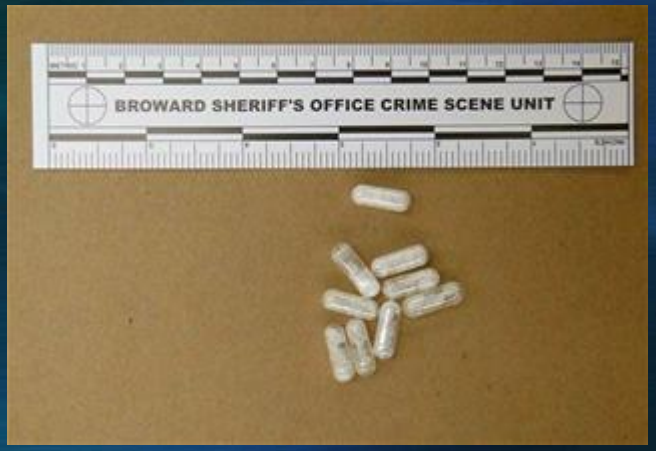
Rudy Eugene, 31, the so-called “Miami Cannibal who was fatally shot as he chewed on another man's face in a gruesome attack over the weekend, is suspected to have been high on a drug known as "bath salts."

Miami cannibal case: NO bath salts or other street drugs found in his system, only marijuana

The Miami-Dade County Medical Examiner's released the toxicology results Tuesday on 31-year-old Rudy Eugene. Lab results found marijuana in his system, but not any other street drugs, alcohol or prescription drugs.

newser
READ LESS KNOW MORE

How Flakka Can Turn Man to Cannibal



No evidence exist that the person had taken “flakka”/alpha-PVP

“Bath Salts”

- Energizing Aromatherapy
- Down2Earth White Horse
- Kamikaze
- Ivory Wave
- Purple Wave
- Red Dove
- Blue Silk
- Vanilla Sky
- White Blizzard
- *Fake Cocaine*

“White Blizzard”

Possible Substances in "Bath Salts"

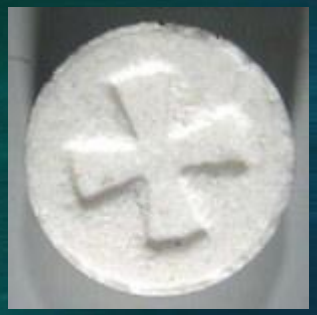
- **All related to cathinone/methcathinone**
  - **4 – Methylmethcathinone (Mephedrone, M-Cat, Meow, 4-MMC)**
  - **3,4 – Methylenedioxymethcathinone (Methylone, MDMC)**
  - **3,4 – Methylenedioxypyrovalerone (MDPV)**
  - **Alpha-PVP**
  - Pentedrone
  - Butylone
  - Pentylone

Possible Substances in "Bath Salts"

- **All related to cathinone/methcathinone**
  - **Ethylone**
  - Buphedrone
  - 4-MEC
  - 3,4-DMMC
  - Isopentadrone
  - Pyrovalerone
  - Alpha-PVP
  - Ephedrone

Mephedrone

M-CAT



4-Methylmethcathinone & **Caffeine**:

MDMA, caffeine & 4-Methylmethcathinone

4-Methylmethcathinone & **Caffeine**

4-Methylmethcathinone & **Methylone**

Mephedrone

- (4-methylmethcathinone /(4-MMC) or 4-methylephedrone)
- Do not confuse with methadone or methylone
- Onset:
  - Oral: 15–45 minutes
  - Insufflation (nasal/“snorting”): 10 minutes
  - i.v. injection (rare): 30 seconds
- Duration:
  - Oral/Nasal: 2-3 hours
  - Intravenous: 30 minutes

UNODC
United Nations Office on Drugs and Crime

VOLUME 15
M.arch

GLOBAL SMART UPDATE

Special Segment
Injecting use of synthetic drugs

2016

Mephedrone

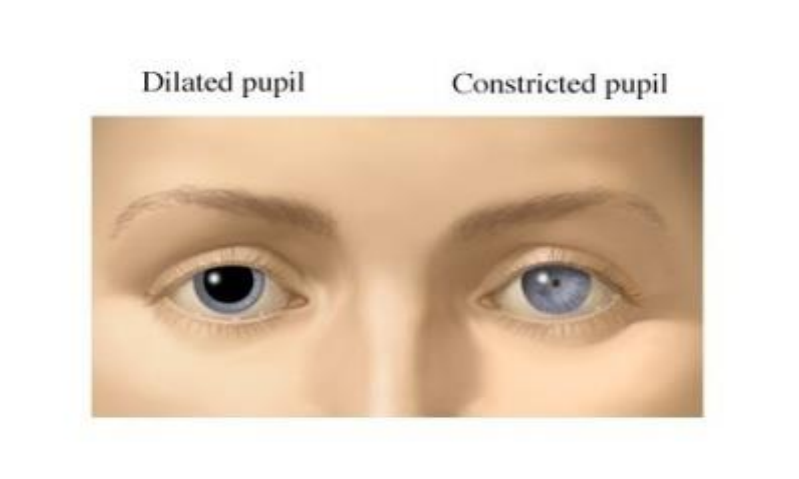
- Controlled under federal analog act
- No formal published studies effects on humans
- A few animals studies that could be applied to humans

Mephedrone

- Intended Effects: (Similar to MDMA/"ecstasy", amphetamines and/or cocaine)
  - Euphoria
  - Stimulation
  - Enhanced music appreciation
  - Decreased hostility/heightened empathy
  - Improved mental function
  - Mild sexual stimulation

Mephedrone

- Unintended (Side) Effects:
  - Dilated pupils
  - Poor concentration
  - Bruxism (teeth grinding)
  - Problems focusing visually
  - Poor short-term memory
  - Hallucinations
  - Delusions

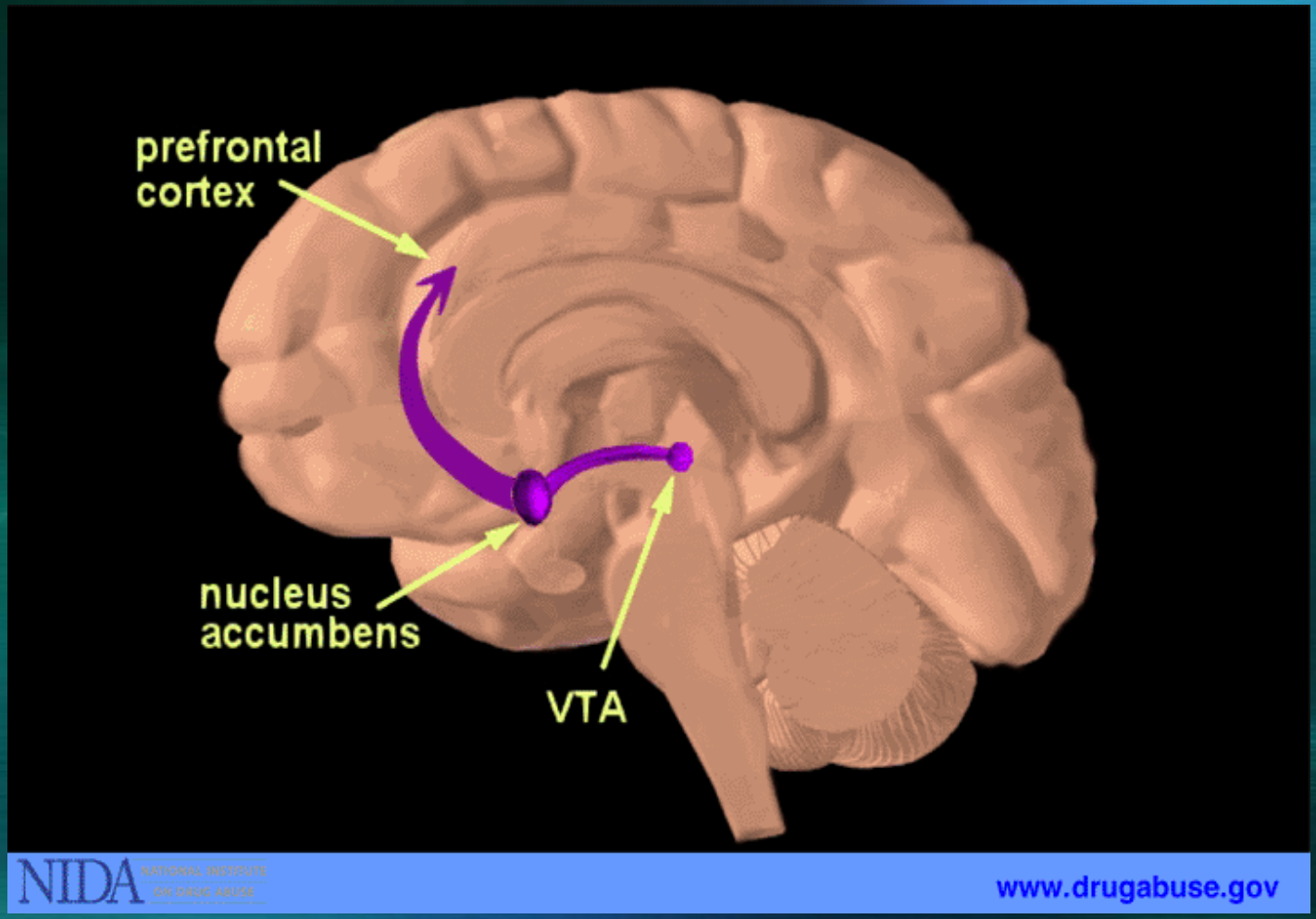


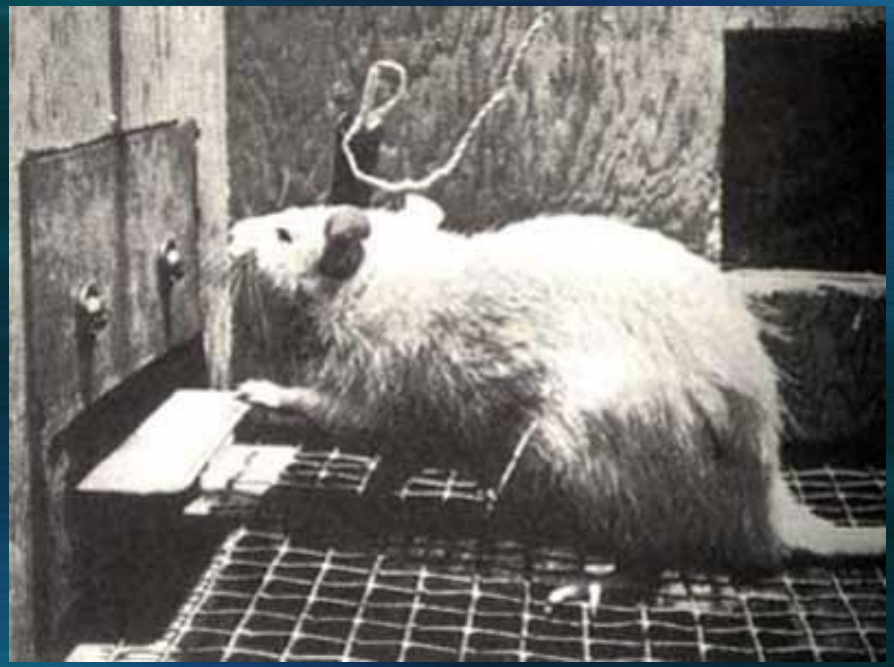
Mephedrone Research

- UK Study:
  - Users w/ previous cocaine experience:
    - Better quality and longer lasting high
    - Less addictive
- Malanga, et. al. (2012)

Mephedrone: Addiction Potential

- Dr. C.J. Malanga at University of North Carolina
- Effect of mephedrone and cocaine on intracranial self-stimulation (ICSS)


prefrontal cortex
nucleus accumbens
VTA
NIDA
NATIONAL INSTITUTE ON DRUG ABUSE
www.drugabuse.gov



Mephedrone and Intracranial Self-Stimulation

- Animals allowed to self-administer mephedrone decrease their ICSS
- Like cocaine, mephedrone makes ICSS less desirable
- Consistent with user self-reports

MDPV

MDPV Addiction Potential

- August 2013 journal *Neuropharmacology*
- Animal self-administration
- Found to be more rewarding than methamphetamine

Methylone

Methylone

- One of the most common synthetic cathinones
- Similar to MDMA/"ecstasy"
- Was an ingredient (along with MDMA) in one of two "Molly" overdoses at the Zoo Music Festival in New York over the 2013 Labor Day weekend
- Has appeared in "Molly" samples in other parts of the country

Hallucinogens/Psychedelics

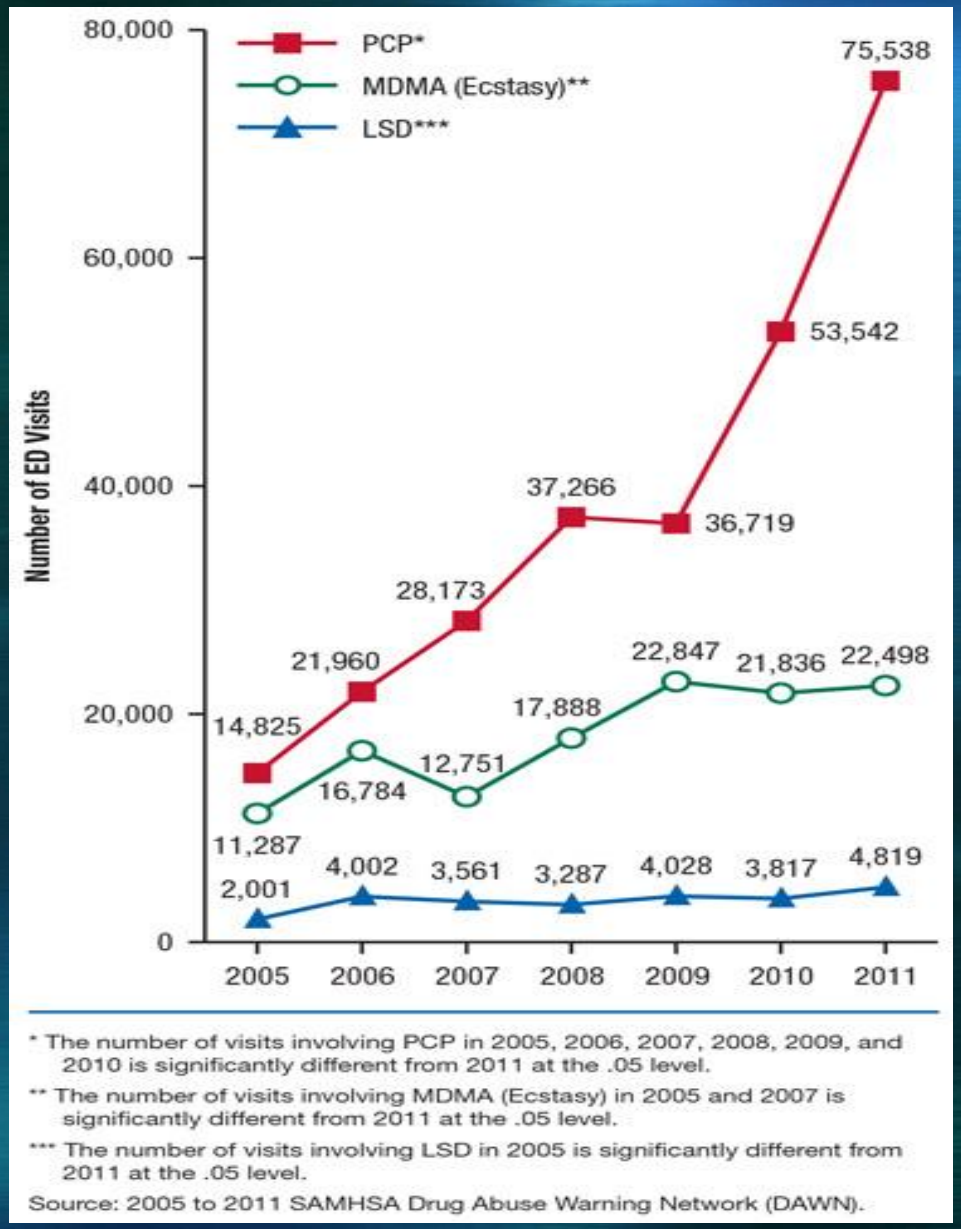
Psychedelics/hallucinogens: Basics

- Addiction potential low
- Tolerance develops rapidly
- Withdrawal symptoms absent or extremely minimal
- Low potential for immediate or long-term physical toxicity
- Moderate potential for acute psychiatric impairment
- Low potential for chronic psychiatric impairment

Hallucinogens/Psychedelics

- LSD
- Psilocybin
- Relatively safe

- NBOMe series-Not so much



+410%

ED visits involving PCP, LSD and MDMA: 2005-2011

Hallucinogens

- Lower risk
  - LSD
  - Psilocybin
  - Peyote/mescaline
- Higher risk
  - Anticholinergics
  - NBOMe compounds

Hallucinogens (Lower risk)

- Addiction potential low
- Tolerance develops rapidly
- Short- and long-term physical toxicity potential low
- Psychiatric impairment low to moderate
- Neurochemical mechanism of action:
  - Stimulation of serotonin subreceptors (5HT2A)
  - Increase in glutamate

LSD Vs Psilocybin

- Psilocybin rarer
- Psilocybin duration shorter than LSD (4-6 hours Vs 8-12)

Hallucinogens (Lower risk)

- Effects (desired):
  - Hallucinations
  - Perceptual distortions
  - “Morphing”
  - Synesthesia
  - Altered body image
  - Altered experience of time and space
  - Consciousness expansion
  - Mystical experiences

Hallucinogens (Lower risk)

- Effects (side)
  - Slight increase in body temperature
  - Nausea (rare)
  - Blurred vision (rare)
  - Slightly increased/decreased blood pressure
  - Slight elevation of pulse
  - Dilated pupils

Hallucinogens (Lower risk)

- Effects (Undesired)
  - Panic
  - Fear of insanity
  - Paranoia
  - Frightening hallucinations
  - Depersonalization
  - Derealization

Low risk hallucinogens: Therapeutic Uses

- Terminal cancer patients