Street Drug Pharmacology 2021

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Emerging Drugs of Abuse discussion group

ESSENTIAL ISSUES IN UNDERSTANDING STREET DRUG PHARMACOLOGY

- Psychoactivity
- Addiction
- Tolerance
- Toxicity
- Psychiatric Impairment
- Set and setting
- Substance misrepresentation/misidentification

Psychoactivity = ability to affect mood, thinking, perception and/or behavior

CONTROLLED SUBSTANCES

- Schedules I-V
- Schedule I: High potential for abuse, tendency to produce dependence, no accepted medical use in US
- Schedules II-V: Potential for abuse, tendency to produce dependency, does have accepted medical application

SCHEDULE I SUBSTANCES

- LSD
- Heroin
- Cannabis
- PCP

SCHEDULE II SUBSTANCES

- Morphine
- Cocaine
- Short-acting barbiturates
- Amphetamines

DRUG NAMES

- Chemical (7-chloro-1,3-dyhydro-1-methyl-5-phenyl-2H-1,4-benzodiazepin-2-one
- Generic: diazepam
- Brand : Valium
- Street: No common street names for Valium

Potency, purity & misrepresentation of street drugs

- **potency** = strength, compared to some other drug of a similar type.
- **purity** = the major determinant of potency.
  - The more pure the drug, the more potent.
  - Street drugs are seldom pure, but are commonly misrepresented in one of three ways

DRUG MISREPRESENTATION

- **adulteration:** (to adulterate = to "step on"/"hit"/"dance on" "cut" a drug).
- **Substitution/misrepresentation-1:** None of the alleged drug is present, but another drug/drugs is/are.
- **substitution/misrepresentation -2:** None of the alleged drug is present, and neither is any other drug or active substance.

The Problem with Pill Identifications:

New York City May 2000 Amphetamine

Chicago May 2000 MDMA

Portland Oct 2000 MDMA

Tucson AZ July 2000 PMA

TIME FACTORS

- Onset of action: How quickly does the drug produced it's effect?
- Duration of action: How long does the drug's effect last?
- Residual effects: After-effects, extended drug reaction, flashbacks

METHOD OF ADMINISTRATION

- Ingestion (oral): slower onset/longer duration
- Insufflation (sniffing/snorting): faster onset/shorter duration
- Intravenous (I.V.) Injection: faster onset (seconds)/shortest duration
- Smoking: fastest onset/shortest duration

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Abscesses Associated with I.V. Injection

THE “RUSH” OR “FLASH”

A highly pleasurable sensation produced by the instantaneous effect of i. v. injection or smoking*

* If entire dose administered at once

METABOLISM AND EXCRETION

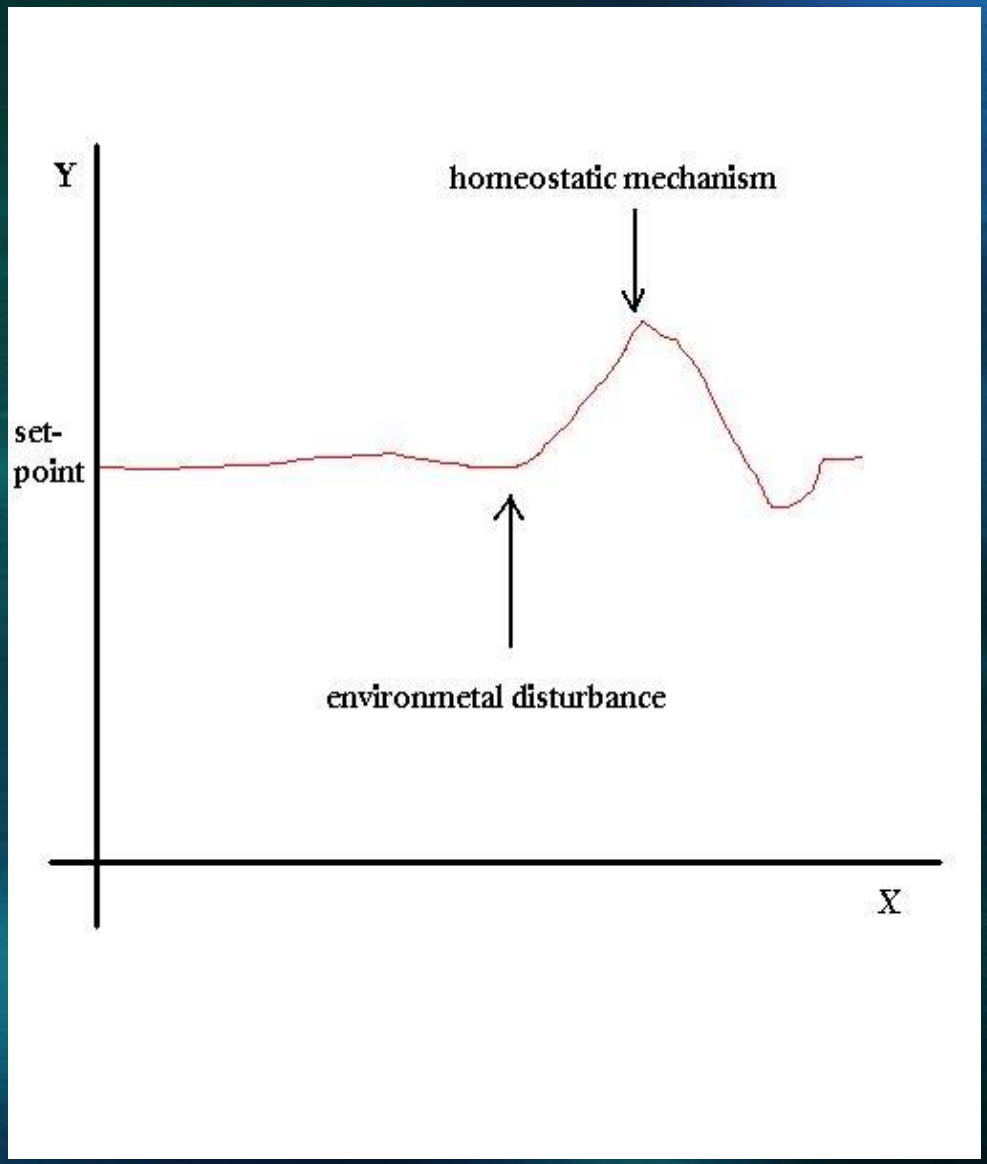
- The break-down of a drug into simpler substances
- The removal of the drug from the body

TOLERANCE

Homeostasis

The human body's natural tendency to move toward a state of equilibrium or constancy

SET POINT RESPONSE TO DRUG USE



TOLERANCE

- Need to increase the dose of a drug in order to obtain the desired effect
- Decreased effect of drug after repeated administration
- Dependent on prior dosage level
- Develops in hours (cocaine), days (LSD), or weeks

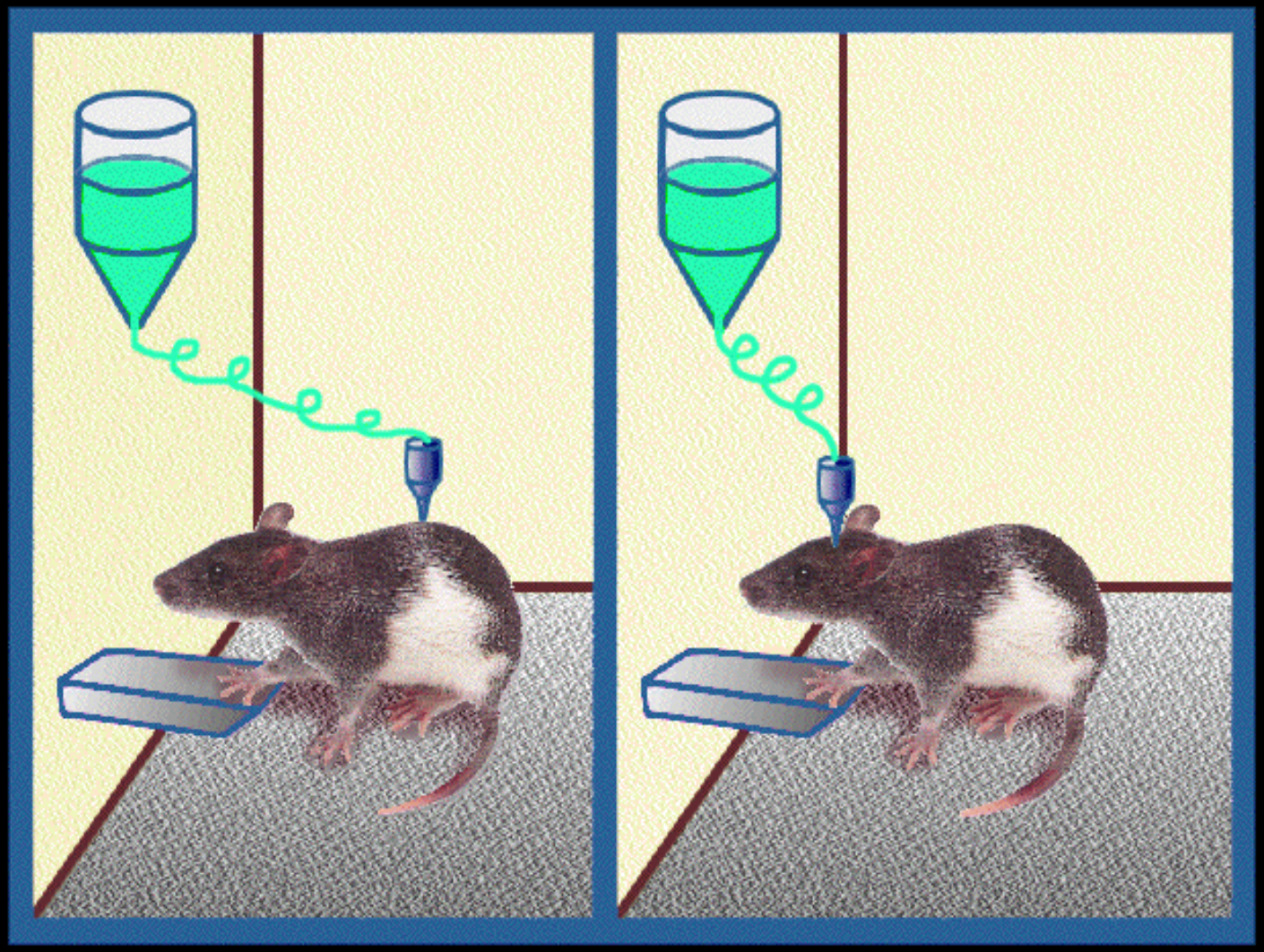
ADDICTION POTENTIAL

- What percentage of first-time users will enjoy the effect of the drug enough that they will seek it out again?
- If an individual uses the drug on a regular basis, how likely is it that s/he will become dependent on the substance?

ADDICTION POTENTIAL

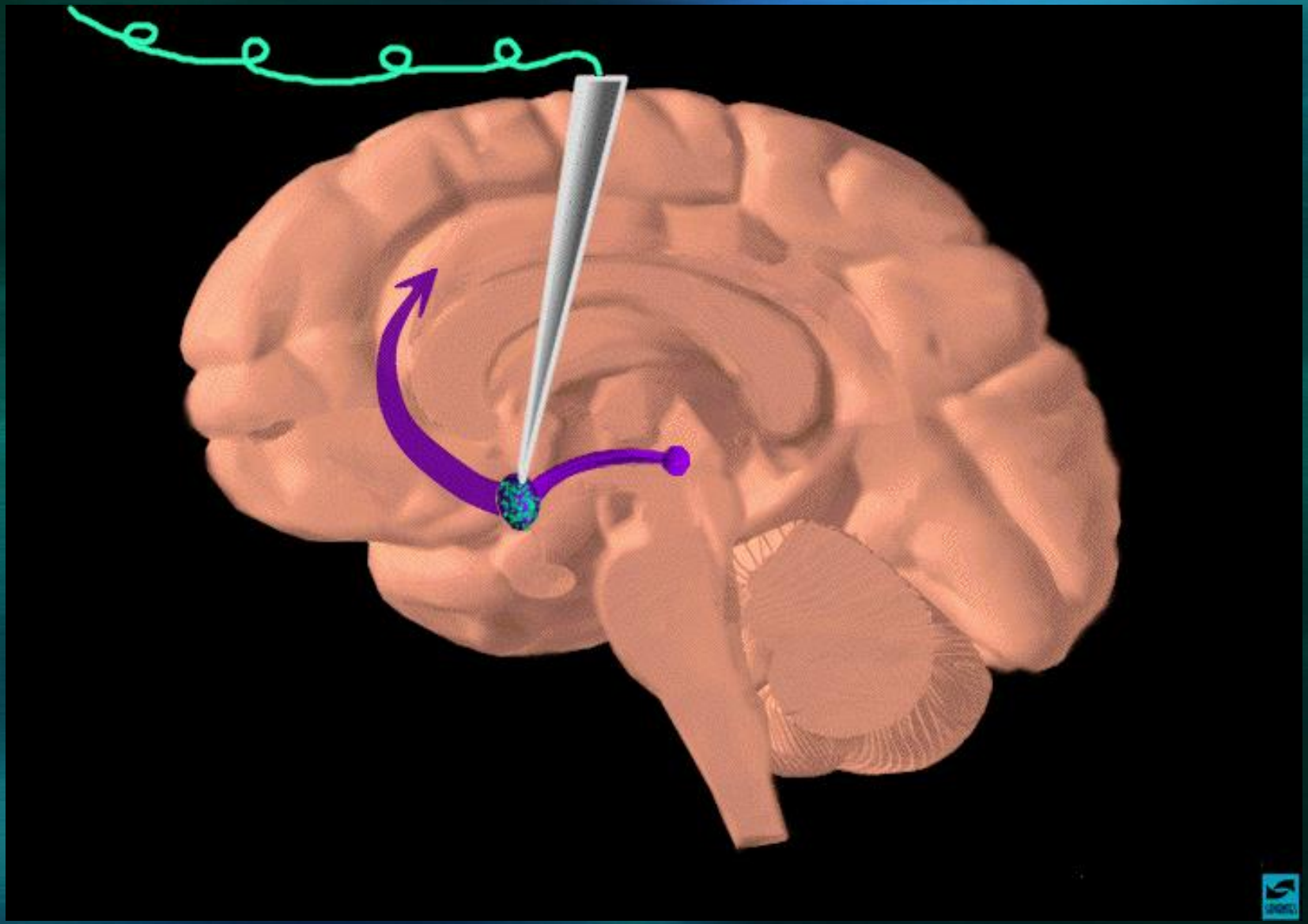
- After being introduced to the drug, do sub-human animals (e.g., monkeys, rats, mice) seek out opportunities to self-administer the substance? Do they do so to the exclusion of eating, consuming water and engaging in reproductive behavior?

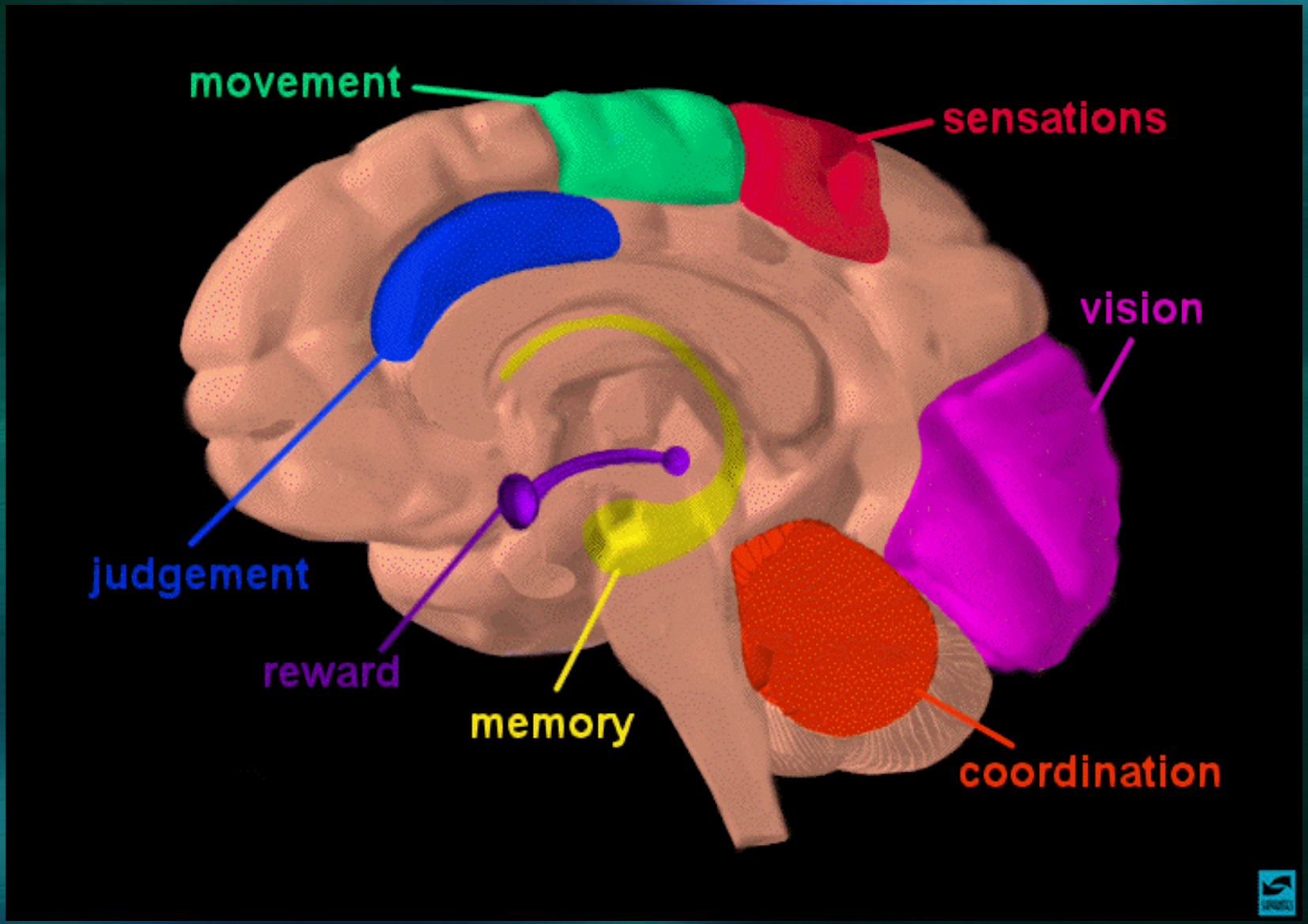
ADDICTION POTENTIAL CAN BE PREDICTED IN PART BY OBSERVING ANIMAL SELF-ADMINISTRATION

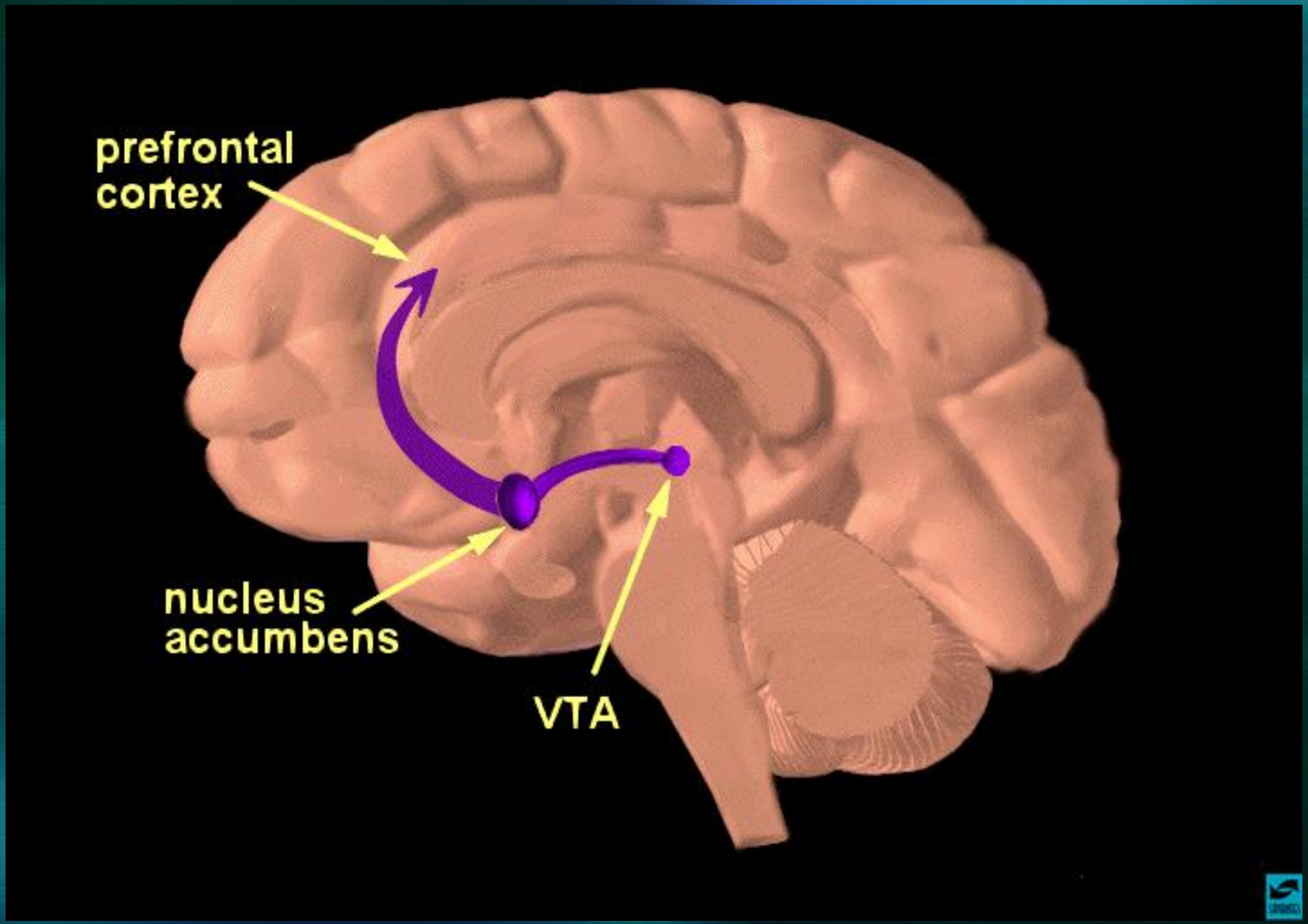


ADDICTION POTENTIAL

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




movement
sensations
vision
judgement
reward
memory
coordination


prefrontal
cortex
nucleus
accumbens
VTA

ADDICTION POTENTIAL

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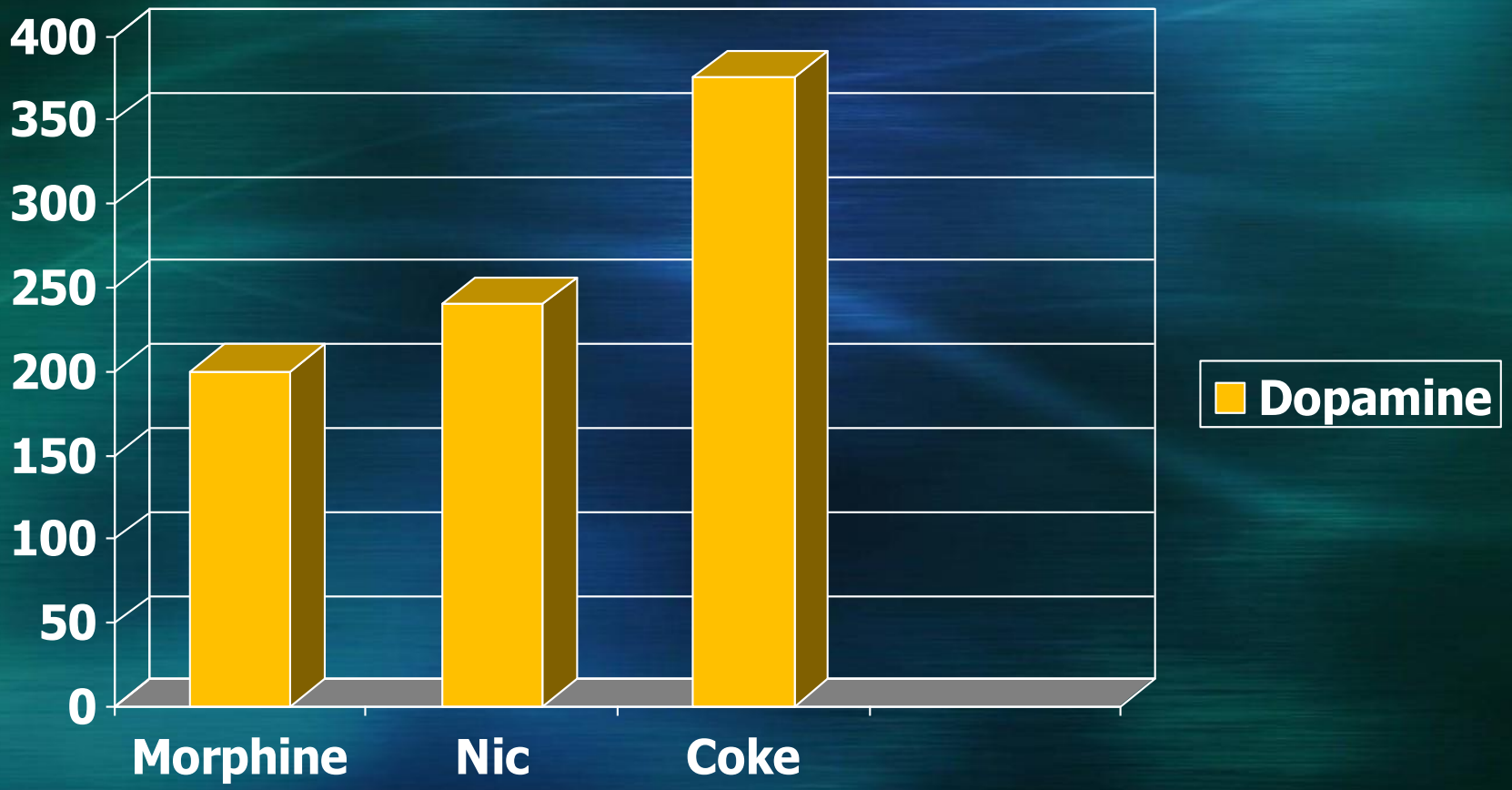
Neurotransmitters

- 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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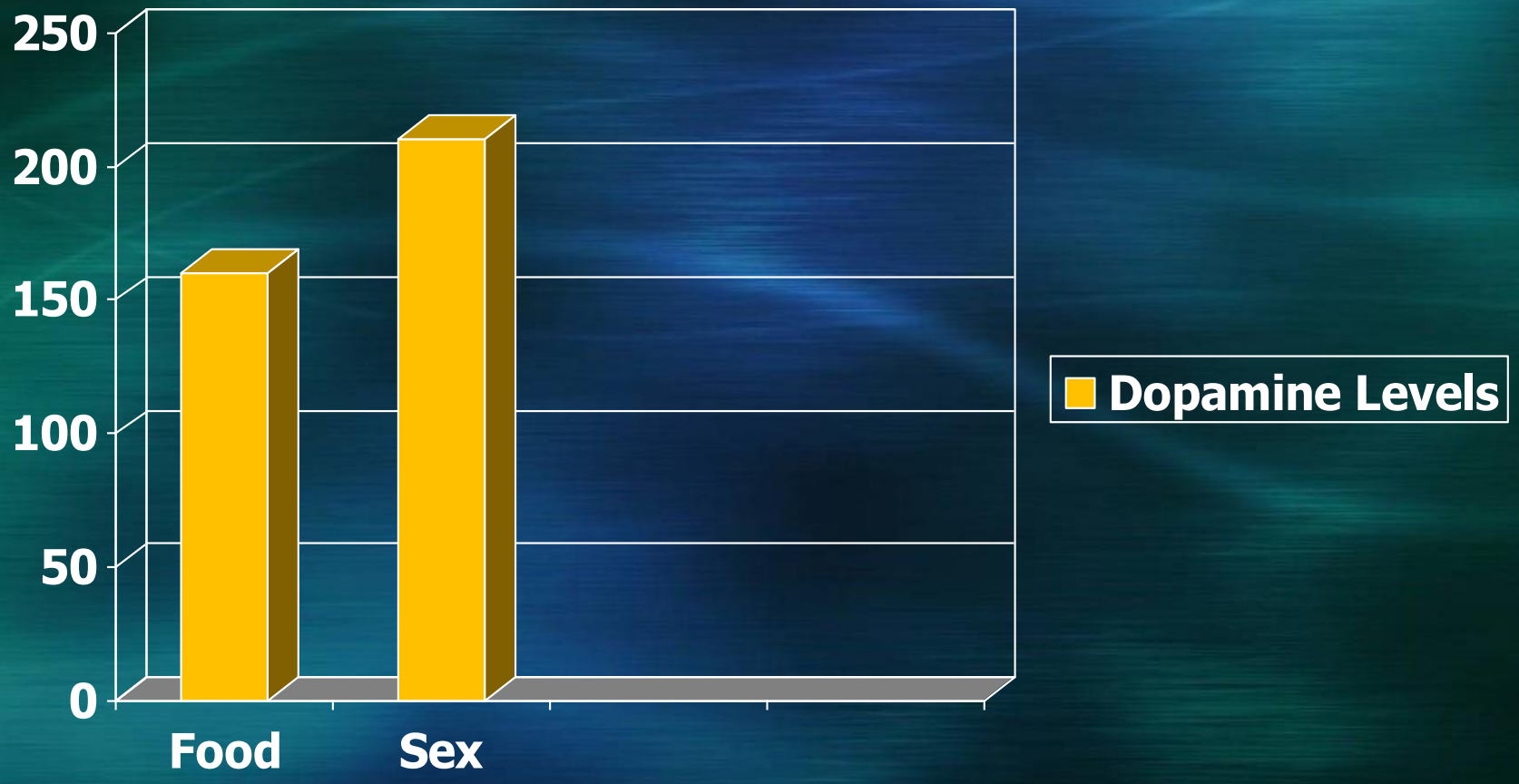

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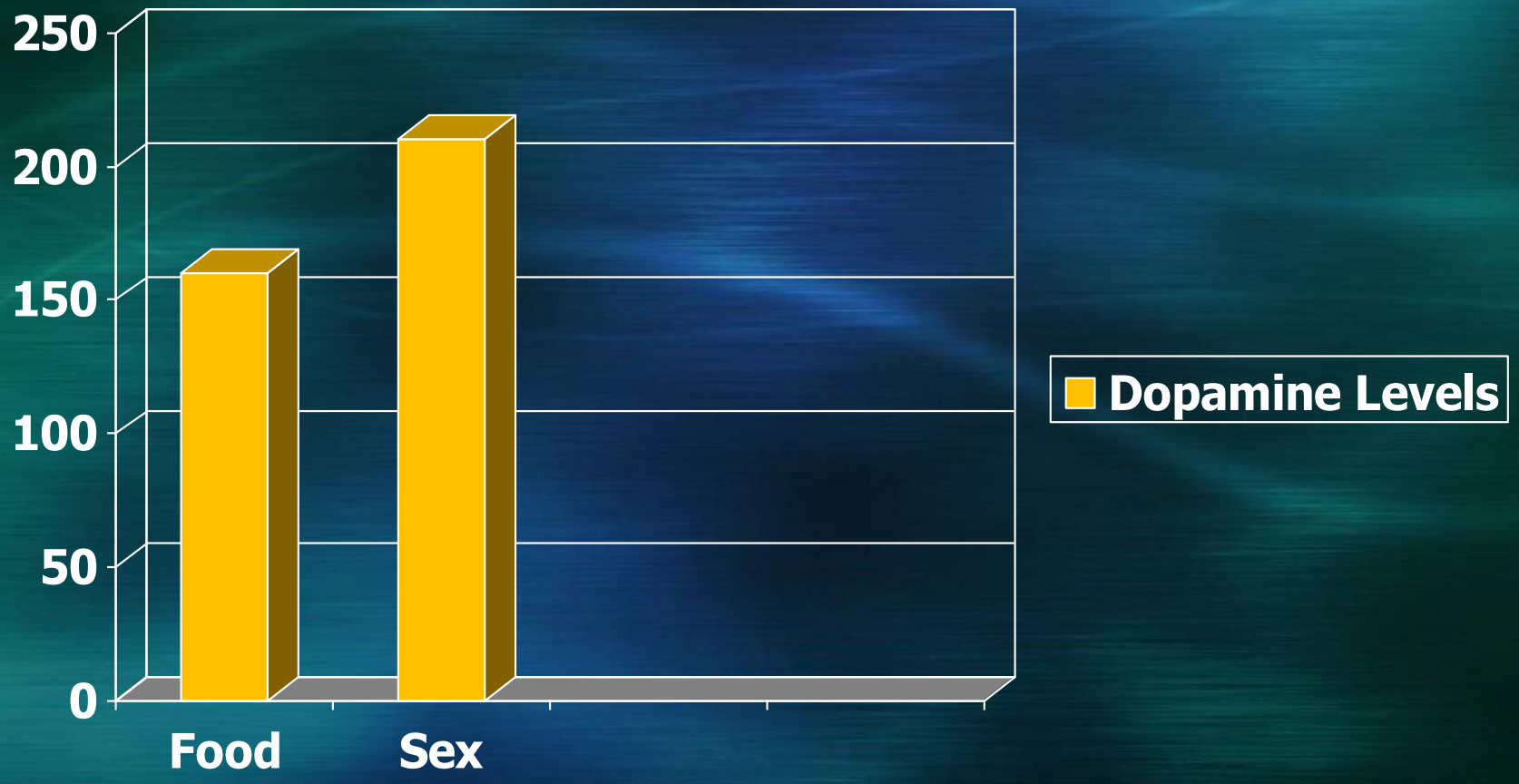

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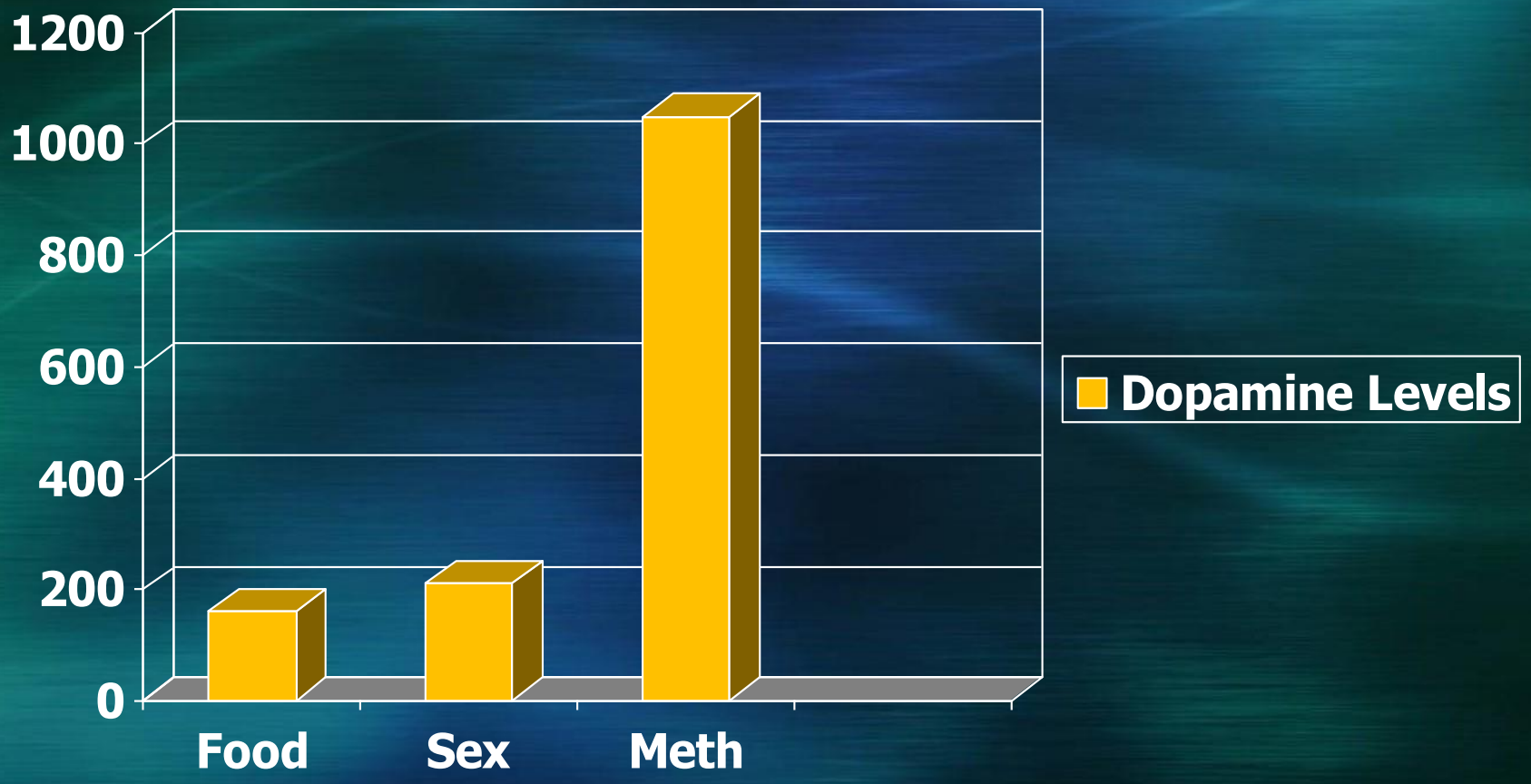
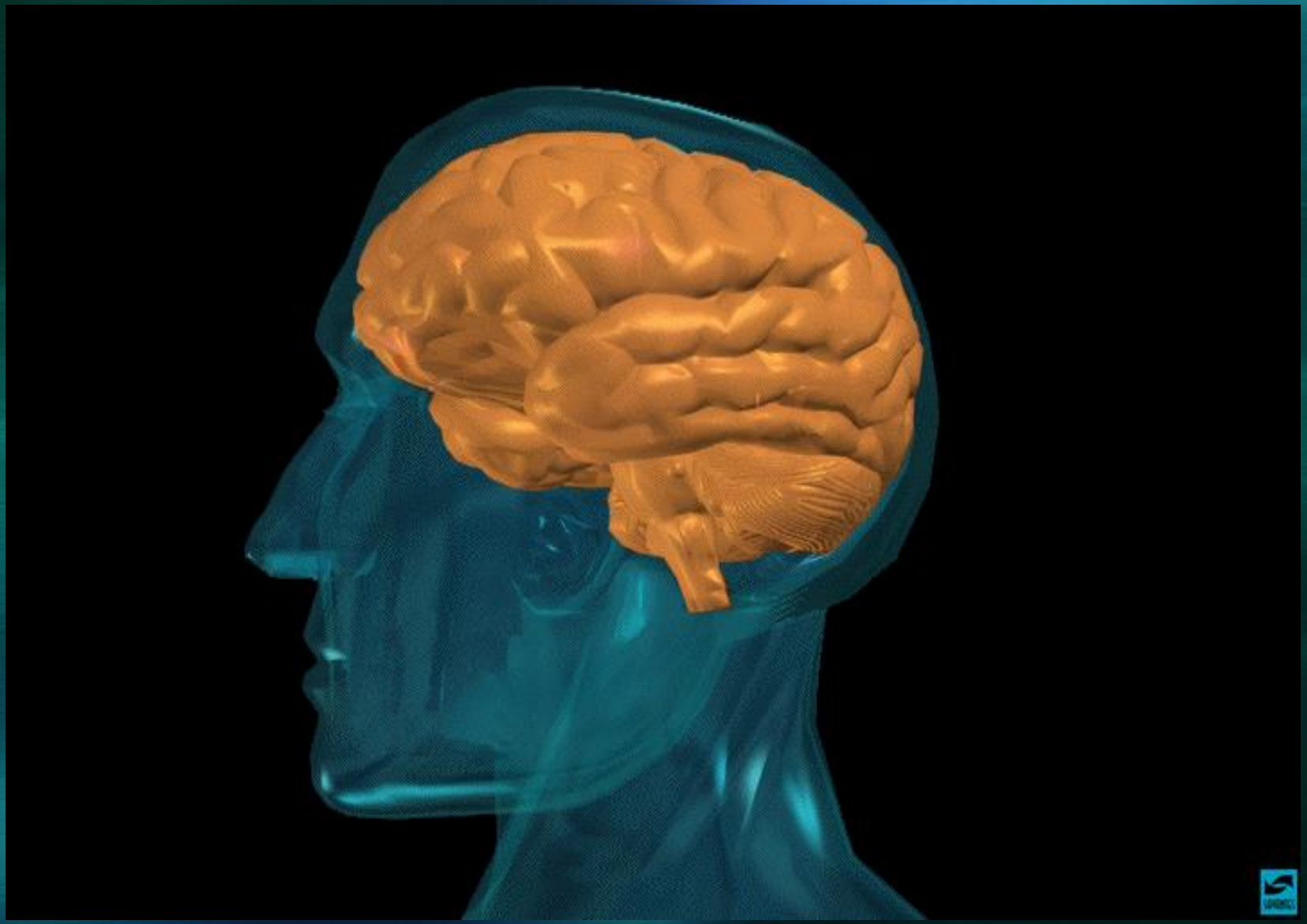
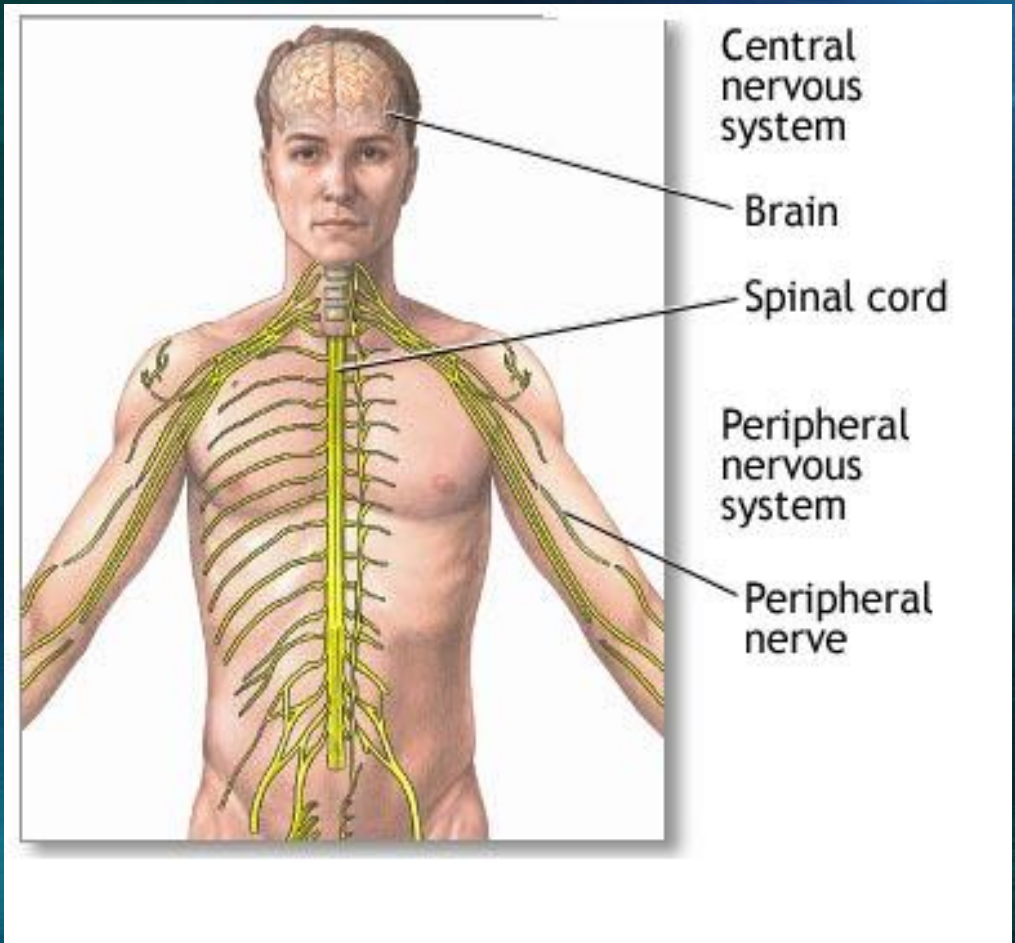
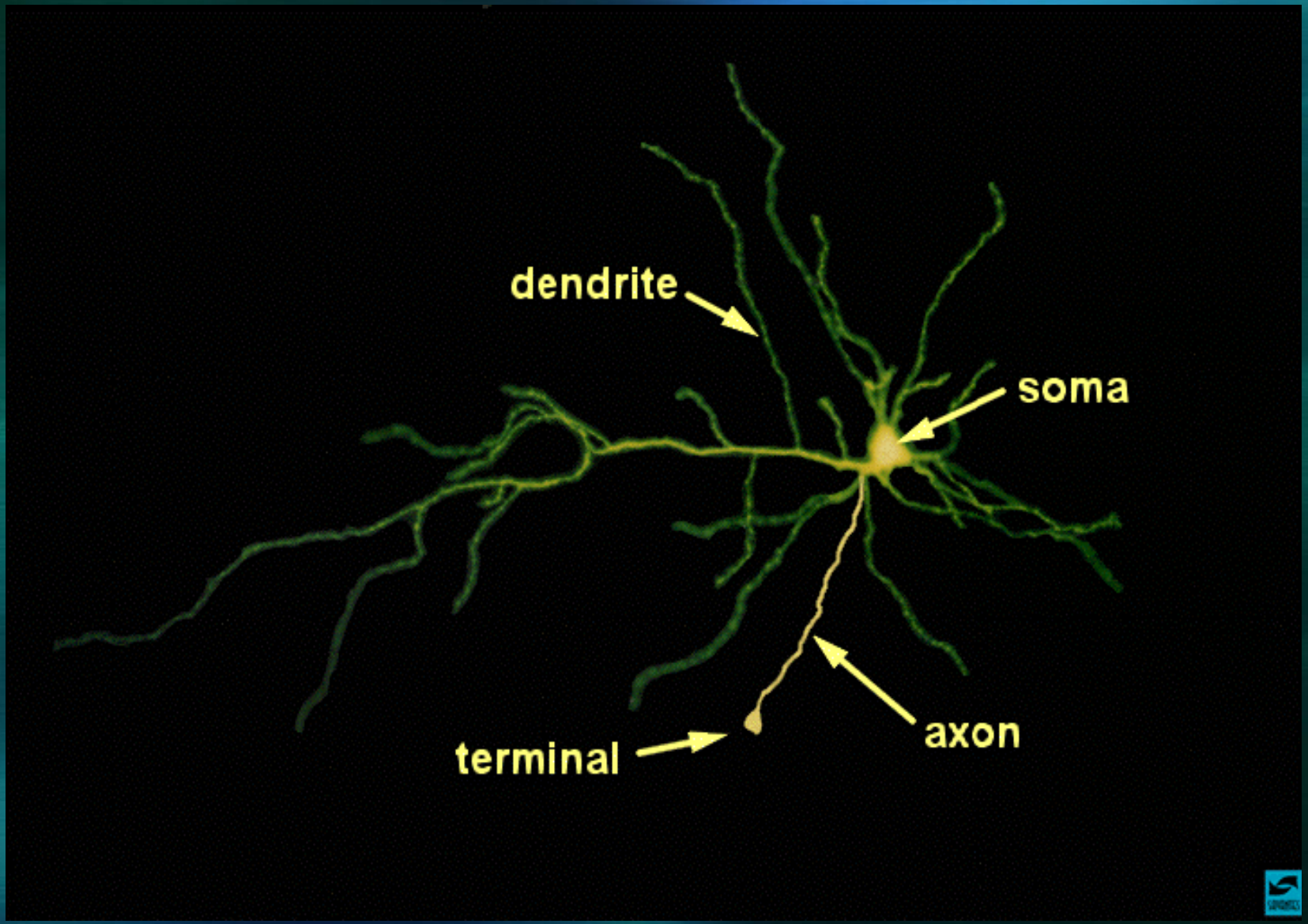
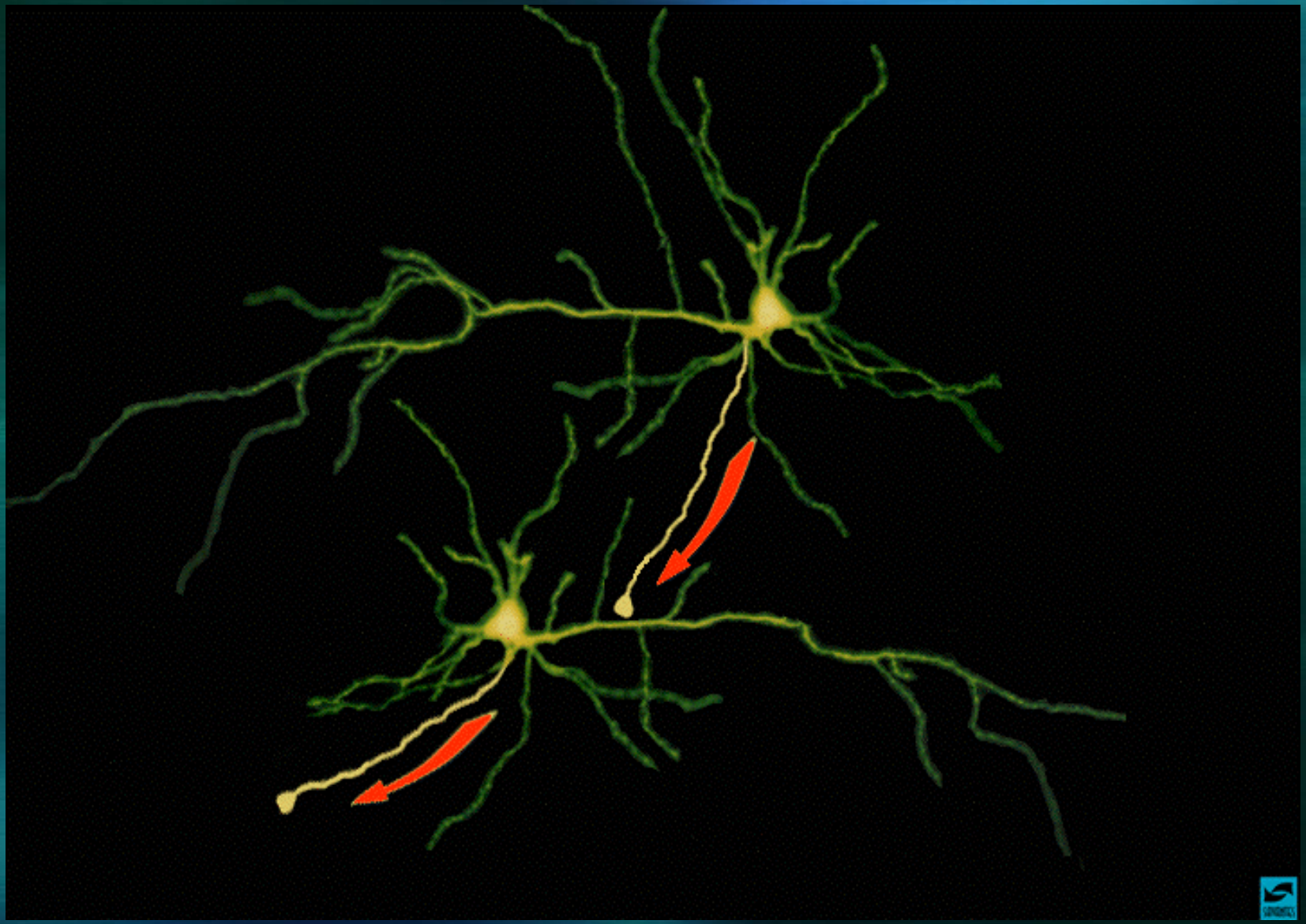


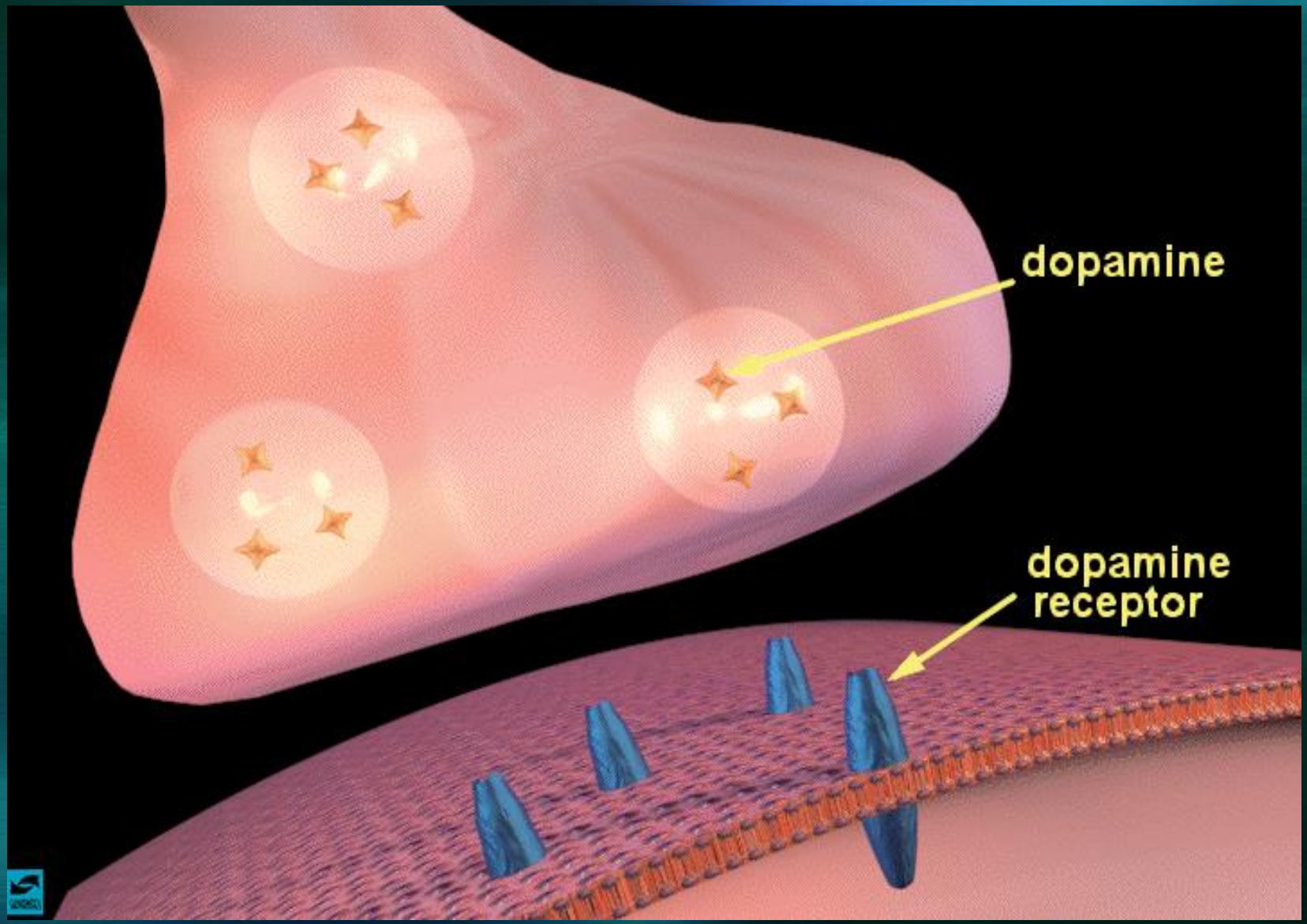


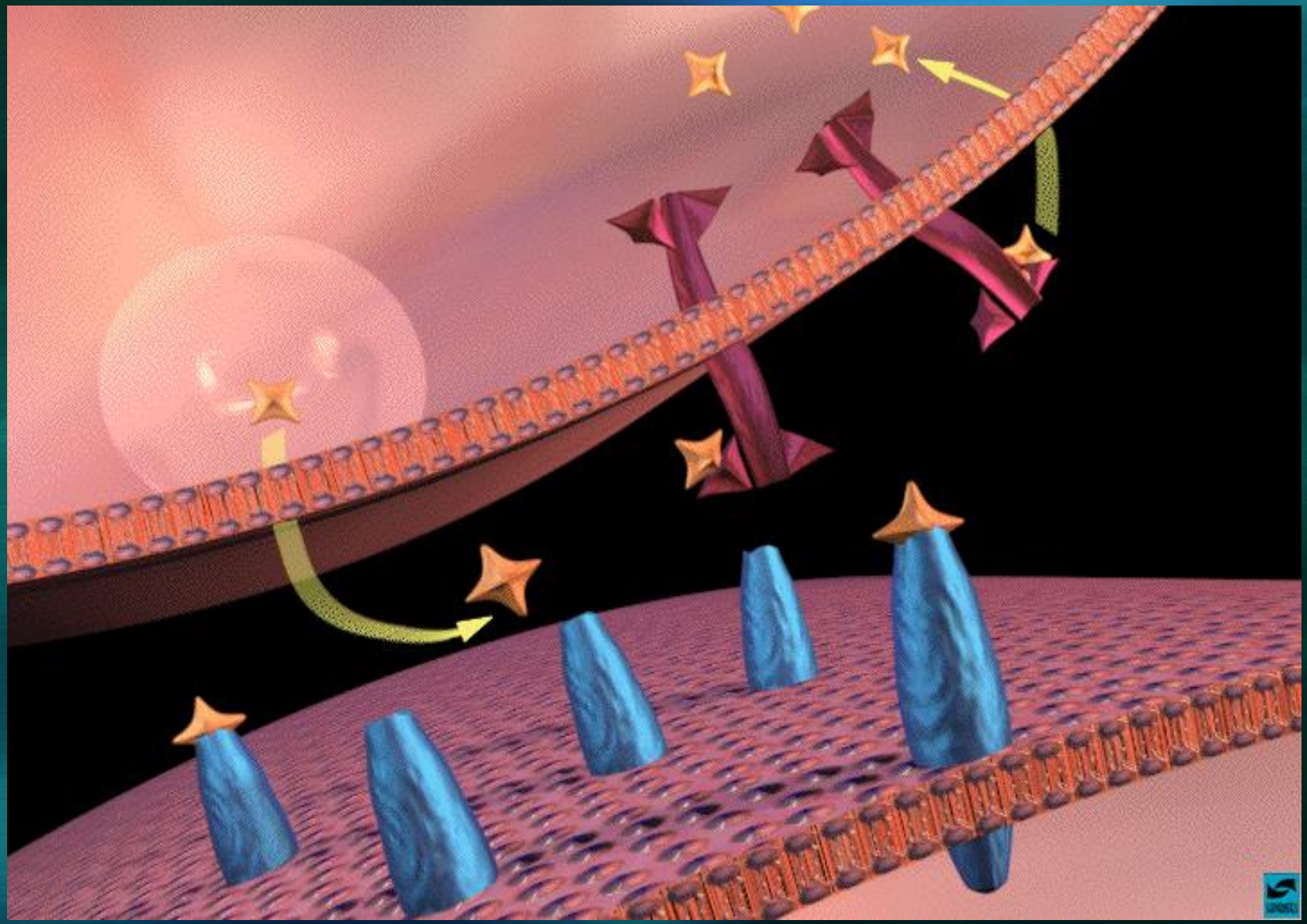
Peripheral Nervous System

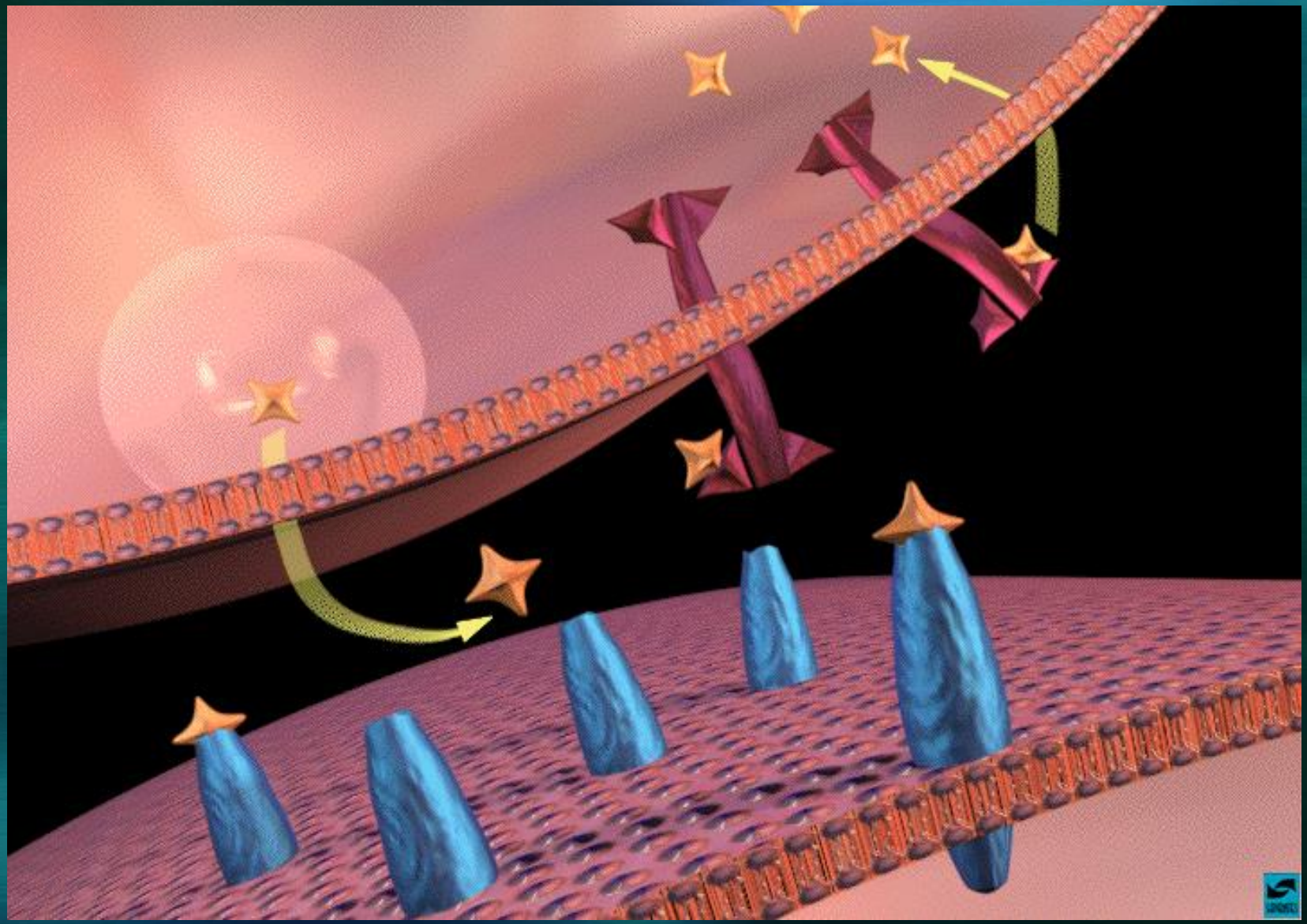


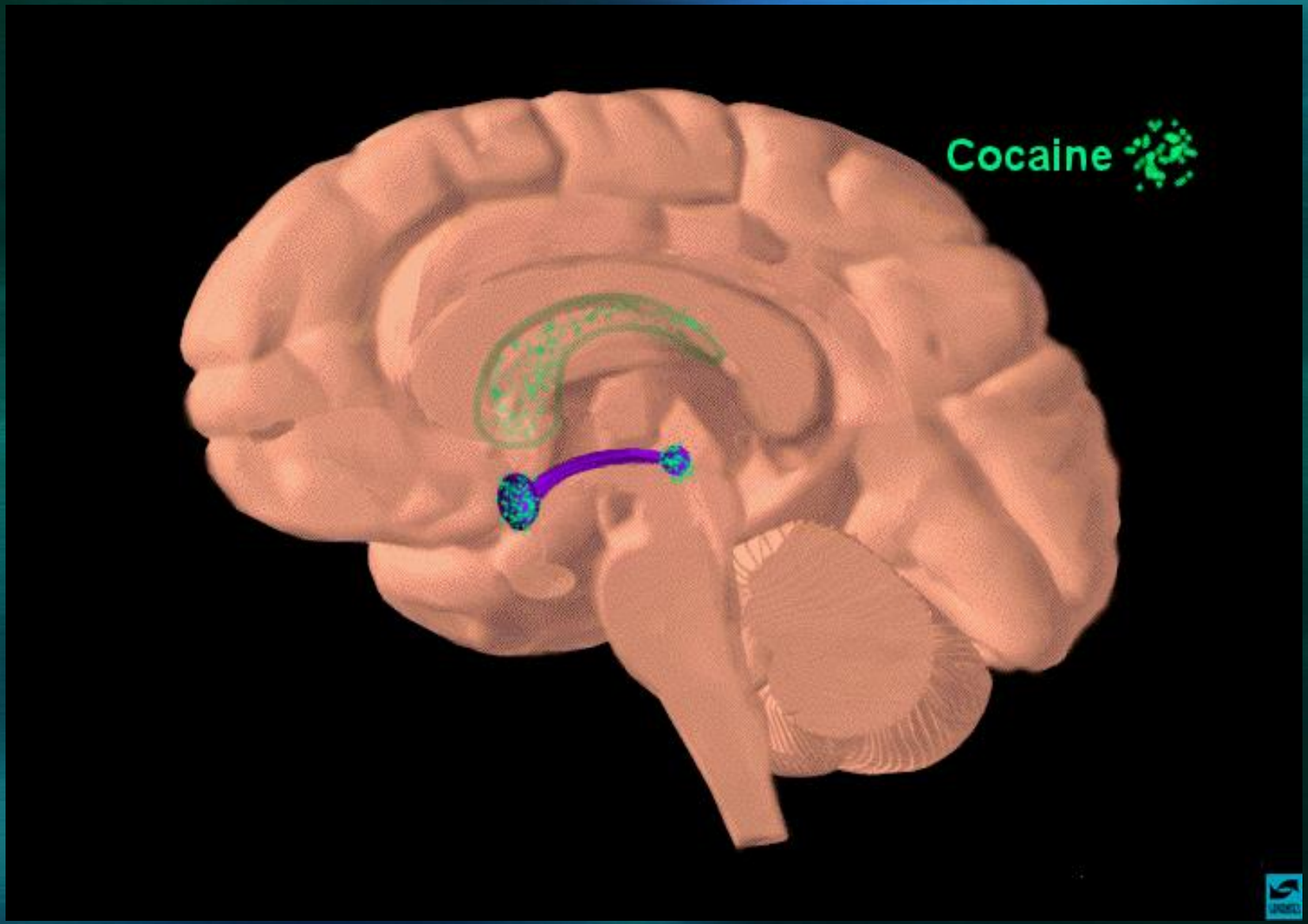

dendrite
soma
terminal
axon

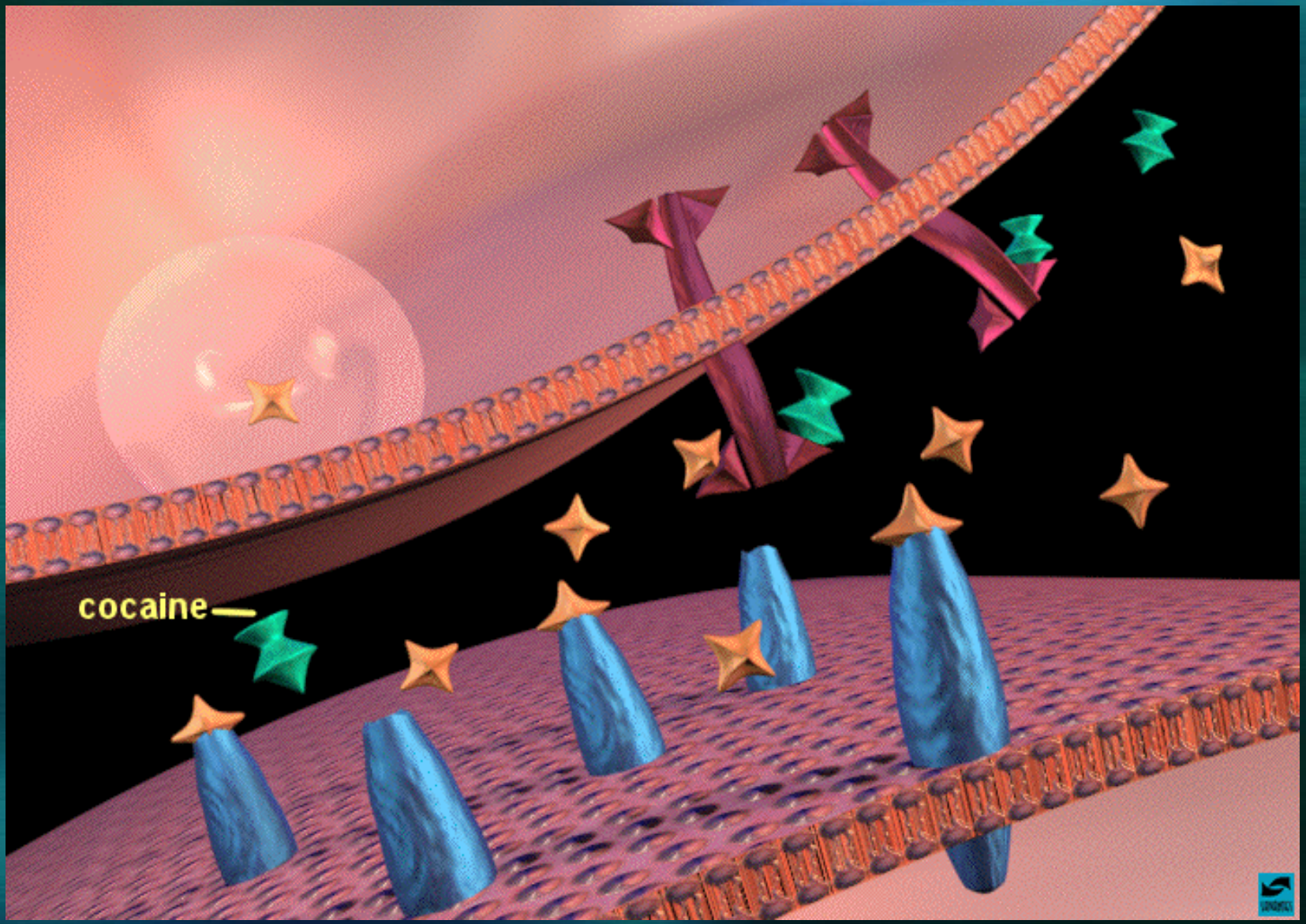


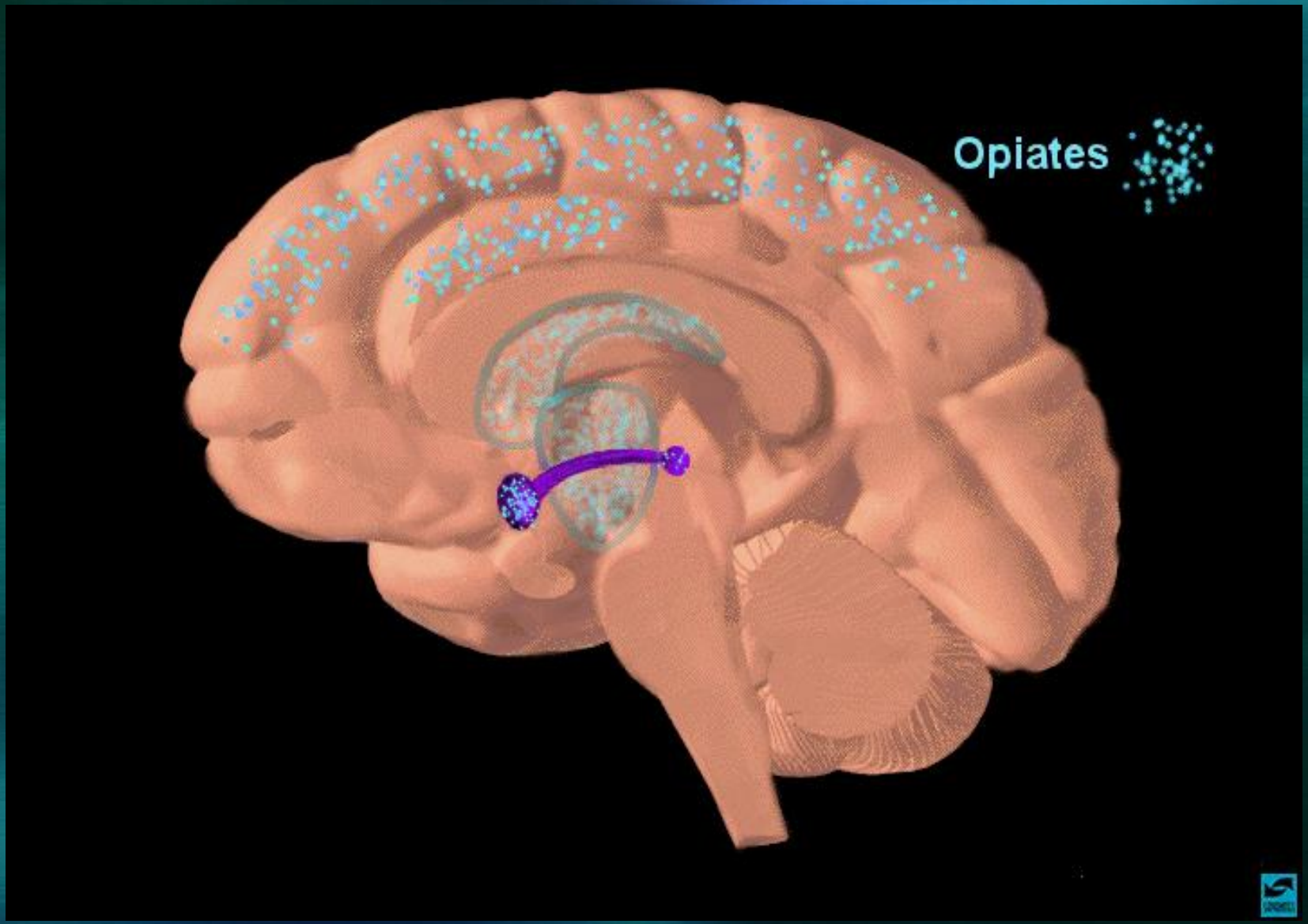

dopamine
dopamine receptor

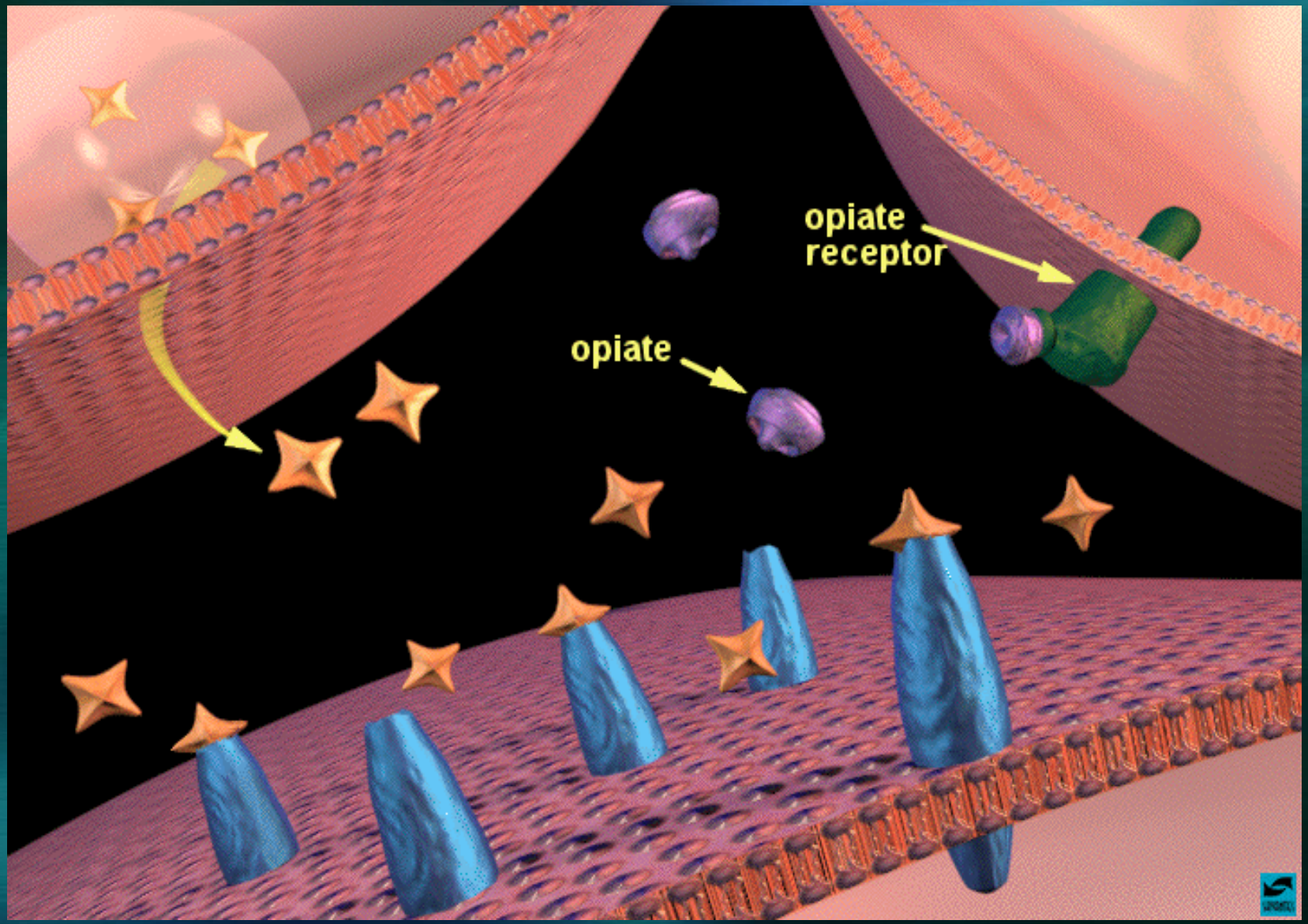


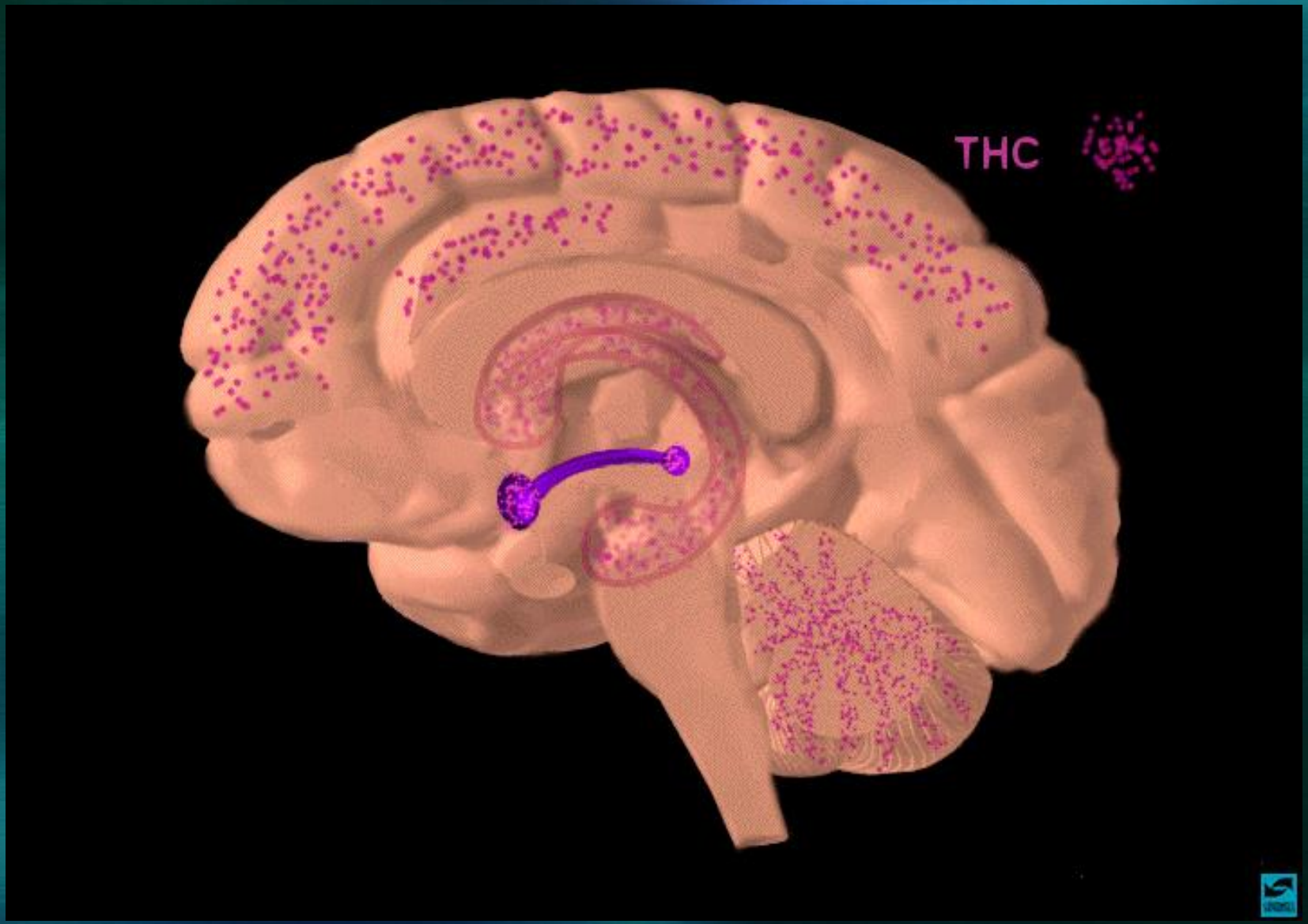


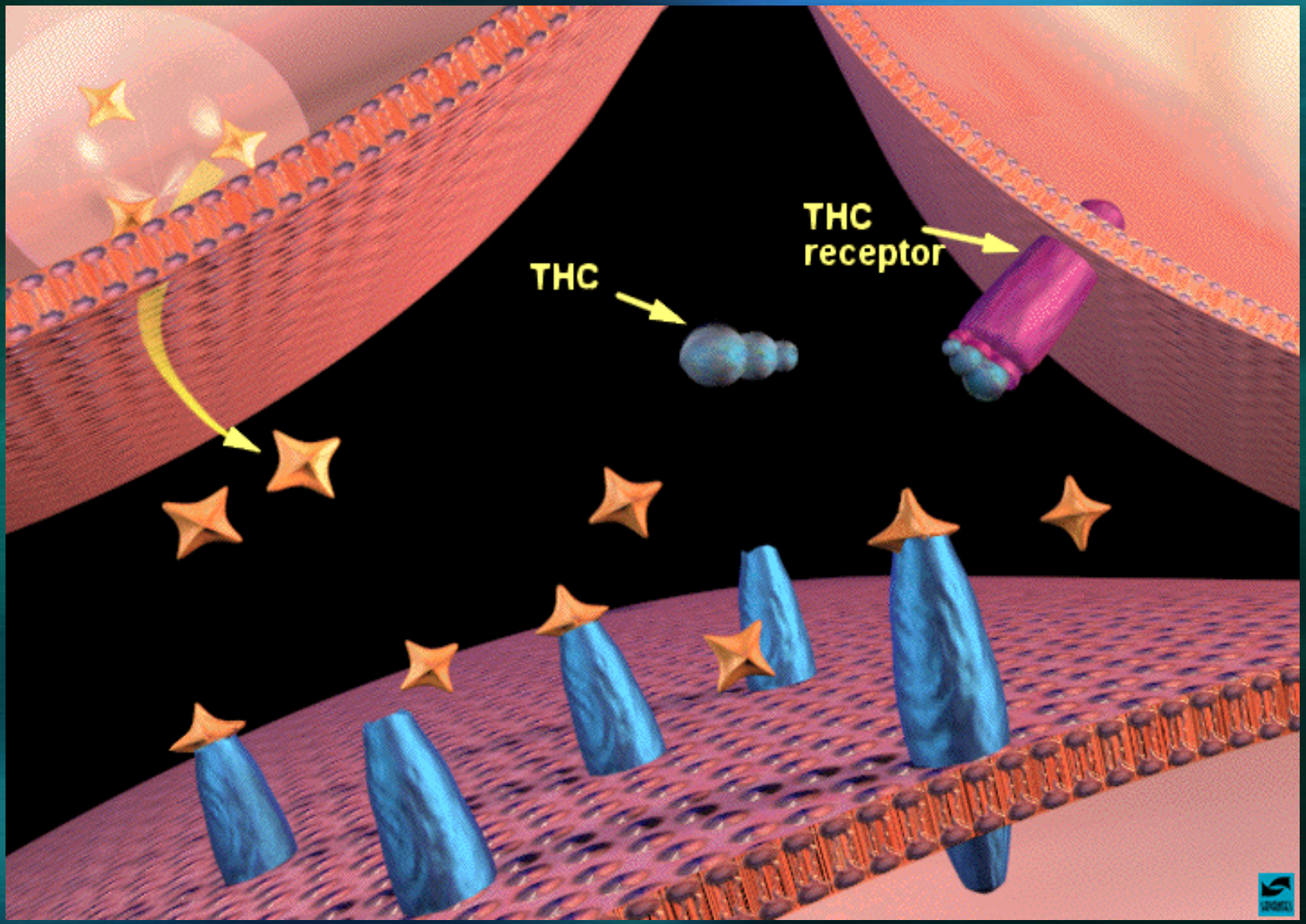

Cocaine


cocaine


Opiates


opiate
receptor
opiate


THC


THC
THC
receptor

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

TOXICITY

- Physical
- Behavioral
- Acute Vs Long-Term

PSYCHIATRIC IMPAIRMENT

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

PSYCHIATRIC IMPAIRMENT

- Short-term
- Long-term
- Affective Disorders
- Thought Disorders

“Krokodil”:

A Media Rumor Runs Wild

A lesson in how to divert attention from real problems

Krokodil patient in Russia

Krokodil: A Timeline

- 2010: News reports from Russia
- November 2012: “Krokodil” implicated in overdose death in Oklahoma. Autopsy showed only morphine
- Oklahoma Bureau of Narcotics: Accounts of “Krokodil” in the media “should be taken with a grain of salt.”
- September 23, 2013: 2 patients in Arizona diagnosed with krokodil-related medical conditions. No laboratory evidence of desomorphine found
- Early October, 2013: 2 cases reported in Utah. Still no laboratory evidence of desomorphine exists anywhere in US

- October 14, 2013: Krokodil reported in Joliet, Illinois. The media frenzy begins

Intravenous Drug User in Great Britain (Picture used in a report on Krokodil broadcast by ABC affiliate WLS-TV in Chicago)


НИЖНИЙ НОВГОРОД

Krokodil: A Timeline

- Reports greeted with skepticism by Linkedin.com “Emerging Drugs of Abuse” discussion group
- Media continues to report stories despite lack of analytical findings
- US DEA makes finding krokodil top priority for 200 agents in five states. Only heroin found.

October 27, 2013: A Voice of Rationality

Chicago Tribune

Suspected krokodil a false alarm

Negative tests lead to further skepticism

October 27, 2013|By Andy Grimm, Chicago Tribune reporter

(Anthony Souffle, Chicago Tribune)

The hunt for krokodil continues as tests conducted in recent days on a suspected sample of the so-called flesh-eating drug came back negative, federal officials said.

An announcement two weeks ago by a Joliet doctor who said he treated three patients who showed the telltale rotting flesh associated with the toxic, home-brewed opiate — made from mixing codeine tablets with solvents like gasoline or acids — has sparked media coverage. A week later, a Crystal Lake hospital reported treating a krokodil user, and reports have cropped up across the country.

But whether the U.S. faces a horrifying new drug or merely an urban legend is hard to say, and confirmation of cases may not come for months or years, if ever.

Jack Riley, special agent in charge of the Drug Enforcement Administration's Chicago office, said doctors and victims in the Chicago area have been interviewed by law enforcement.

In a sweep modeled after the agency's successful search for the source of deadly fentanyl-tainted heroin some six years ago, 200 DEA agents across five states have made finding krokodil a top priority, Riley said.

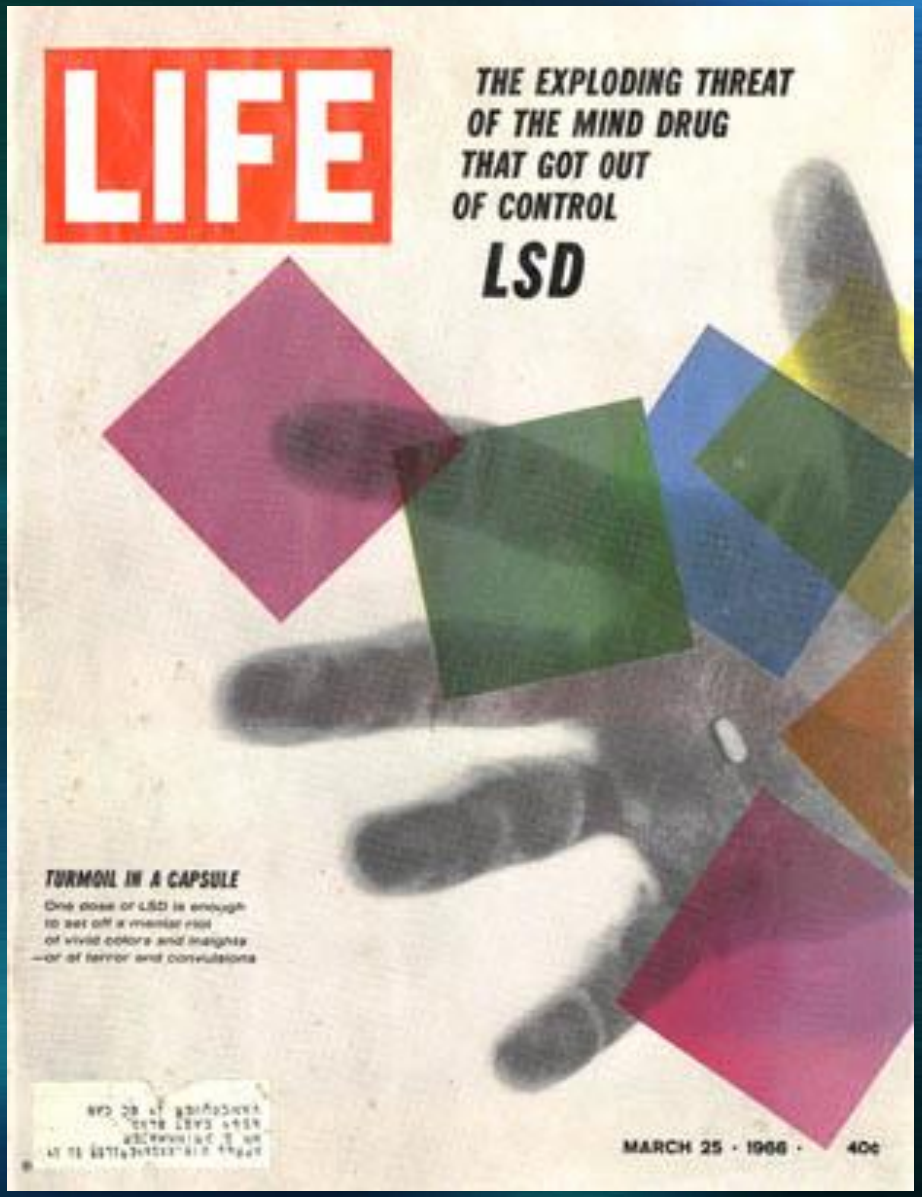
"We have run quite a few buys in the city and suburbs," Riley said "What the lab tells us is it's just heroin."

Some experts in law enforcement and public health say it's unlikely the drug will be widely used beyond the remote areas of Russia and eastern Europe where it became popular a decade ago.

Krokodil is a myth. So what?

- “Krokodil” symptoms probably caused by bacterial infection such as necroticizing faciititis ("flesh-eating disease“)
  - Transmitted by dirty hypodermic needles
  - Drug users could have been told free sterile syringes available legally at needle exchanges
- Waste of time and resources
- Loss of credibility
- What is something real shows up. Like….

March 25, 1966



Sources of Information

- “Monitoring the Future” Survey (MTF)
- National Survey on Drug Use and Health (NSDUH)
- Drug Abuse Warning Network (DAWN)
- U.S. Drug Enforcement Agency (DEA) *National Forensic Laboratory Information System* (NFLIS)
- Peer-viewed scientific and medical journals
- ASAM *Principles of Addiction Medicine*
- Contributions from the “Emerging Drugs of Abuse” discussion group
- Clinical observation
- User reports

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?

Inhalants

- High risk: Volatile solvents
  - Toluene
  - Xylene
  - Trichlorethylene
  - Gasoline
- Lower risk
  - Nitrous oxide (“laughing gas”)
  - Amyl/butyl nitrite

Inhalants

- High risk: Volatile solvents
  - Onset immediate/duration short (minutes)
  - Addiction potential low
  - Tolerance develops
  - Short- and long-term toxicity potential moderate to high
  - Behavioral toxicity potential moderate to high
  - Acute and chronic psychiatric/cognitive impairment potential moderate to high

Inhalants: Higher Risk

- Physical toxicity
  - Overdose (death, hypoxia)
  - Neurotoxicity
  - Inflammation of the lungs
  - Liver and kidney damage
  - Cancer (Benzene and vinyl chloride)
  - “Fetal solvent syndrome”

Inhalants

- Lower risk:
  - Onset immediate/duration short (minutes)
  - Addiction potential low
  - Tolerance develops
  - Short- and long-term toxicity potential low to moderate
  - Behavioral toxicity potential low to moderate
  - Acute and chronic psychiatric impairment potential low