INTRODUCTION TO PSYCHOLOGY
Psychology 101

East-West University/Fall 2022

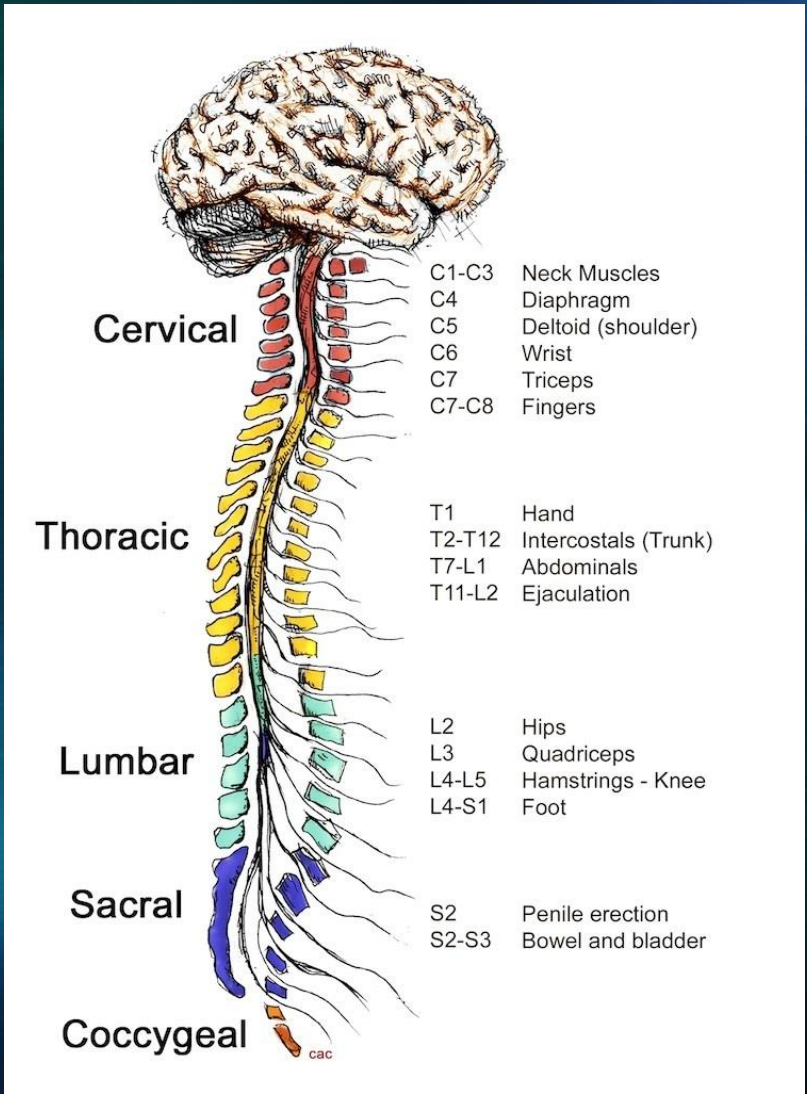
THE BRAIN AND BEHAVIOR

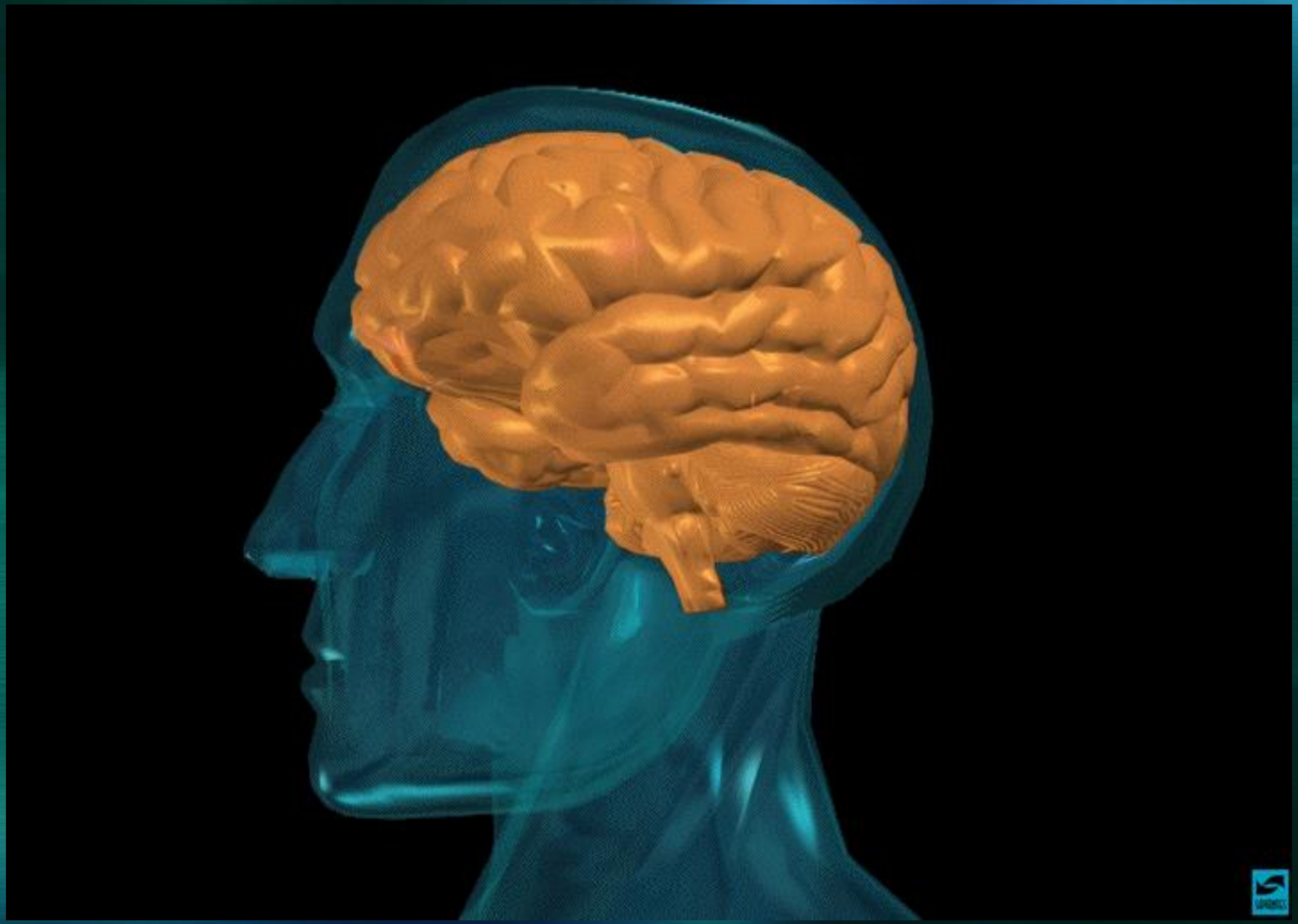
Psychoneurology

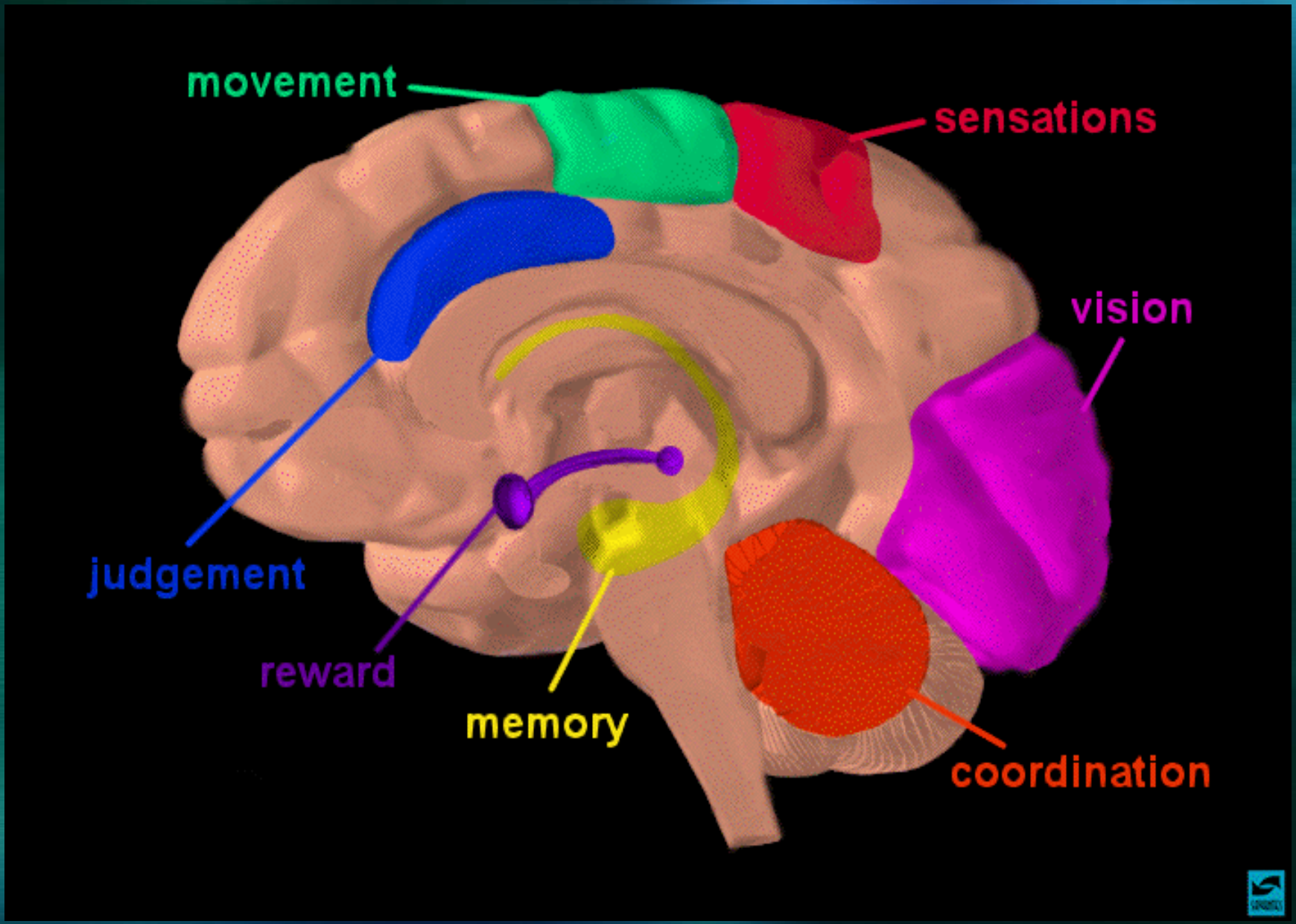
The human nervous system

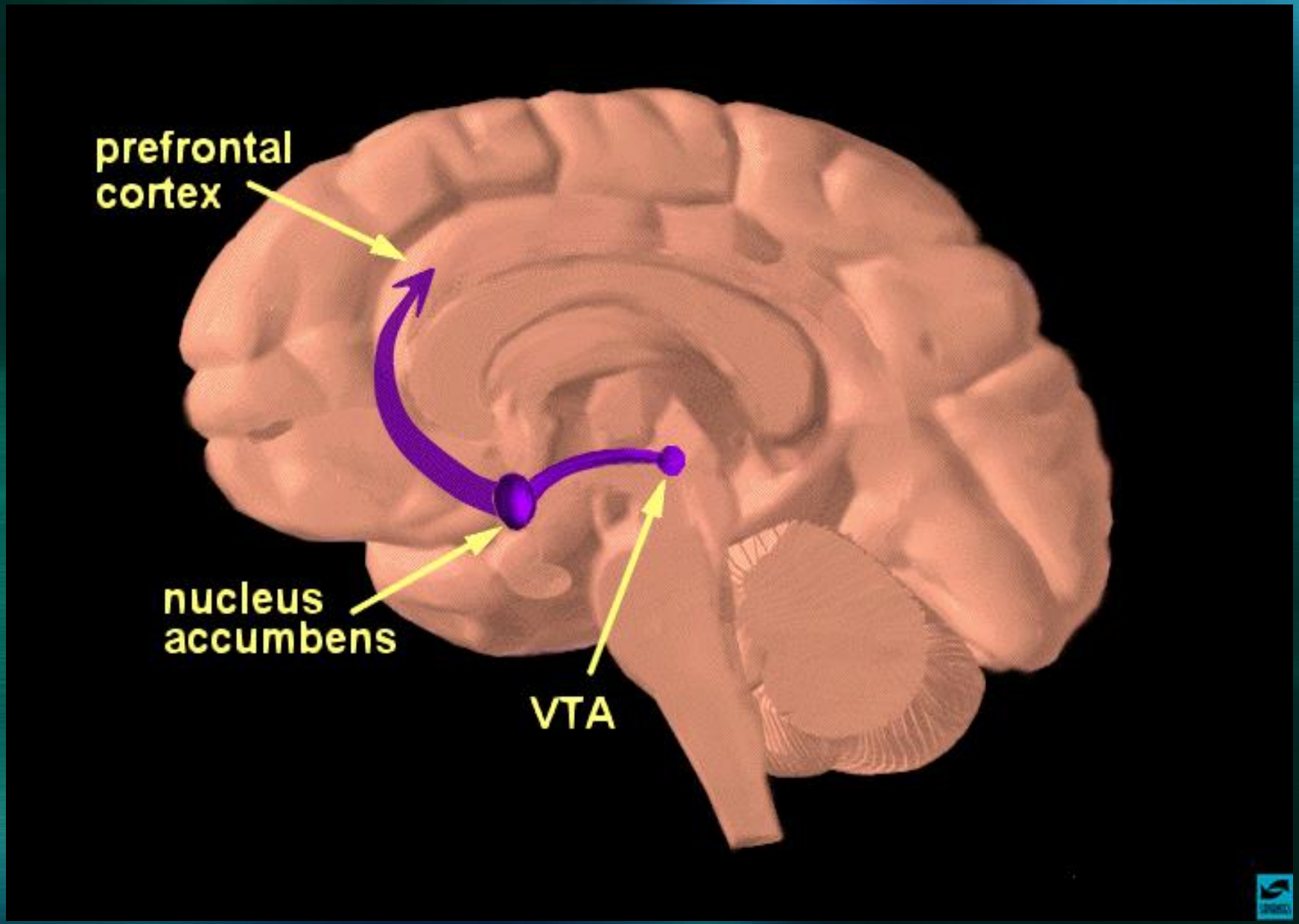
- Billions of brain cells (neurons)
- Complexity
- Integration
- Plasticity
- Neurotransmission (electrochemical)
- Synapse
- Afferent nerves (to the brain)
- Efferent nerves (from the brain)
- Neural networks

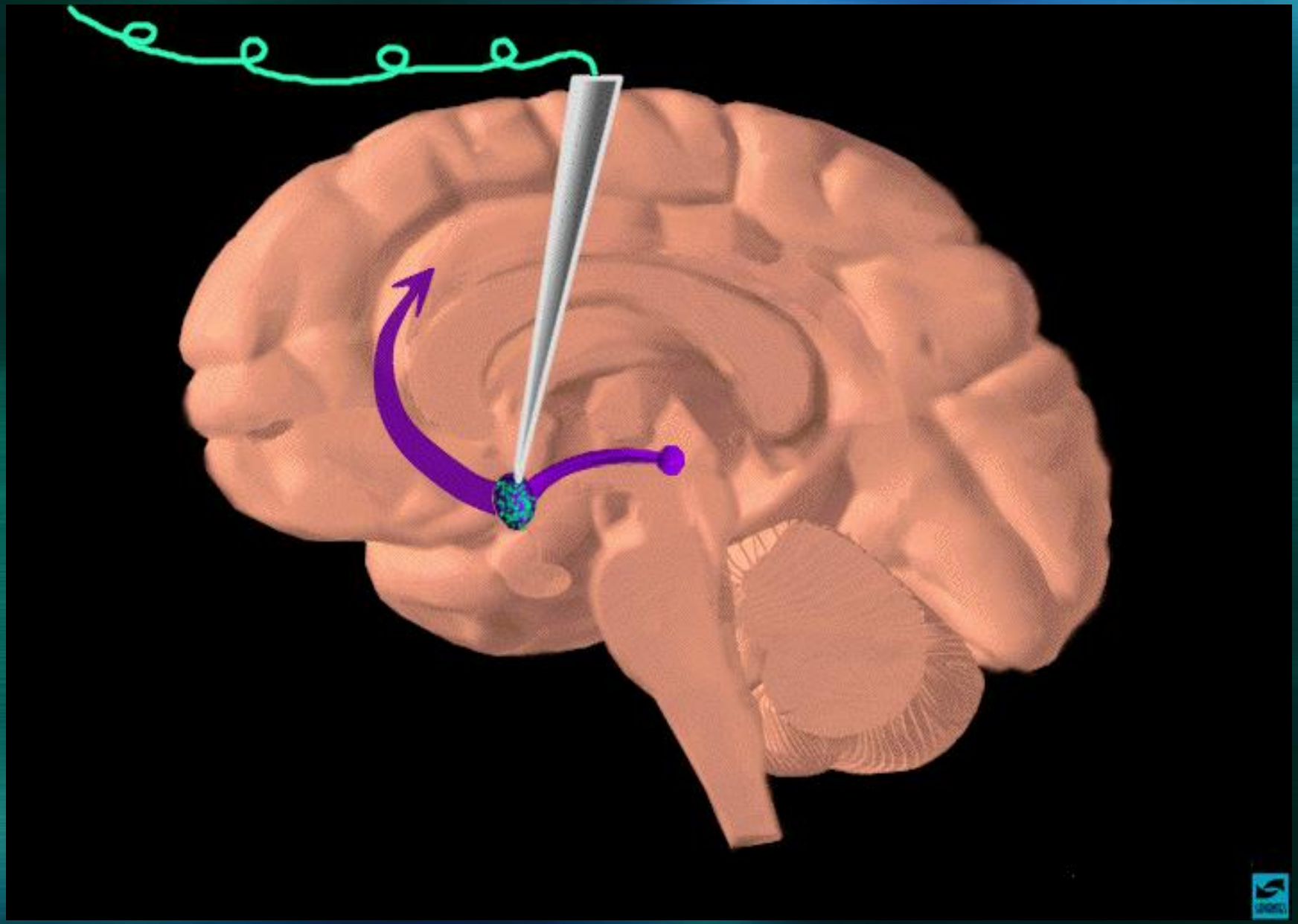
Central nervous system (CNS)






movement
sensations
vision
judgement
reward
memory
coordination


prefrontal cortex
nucleus accumbens
VTA



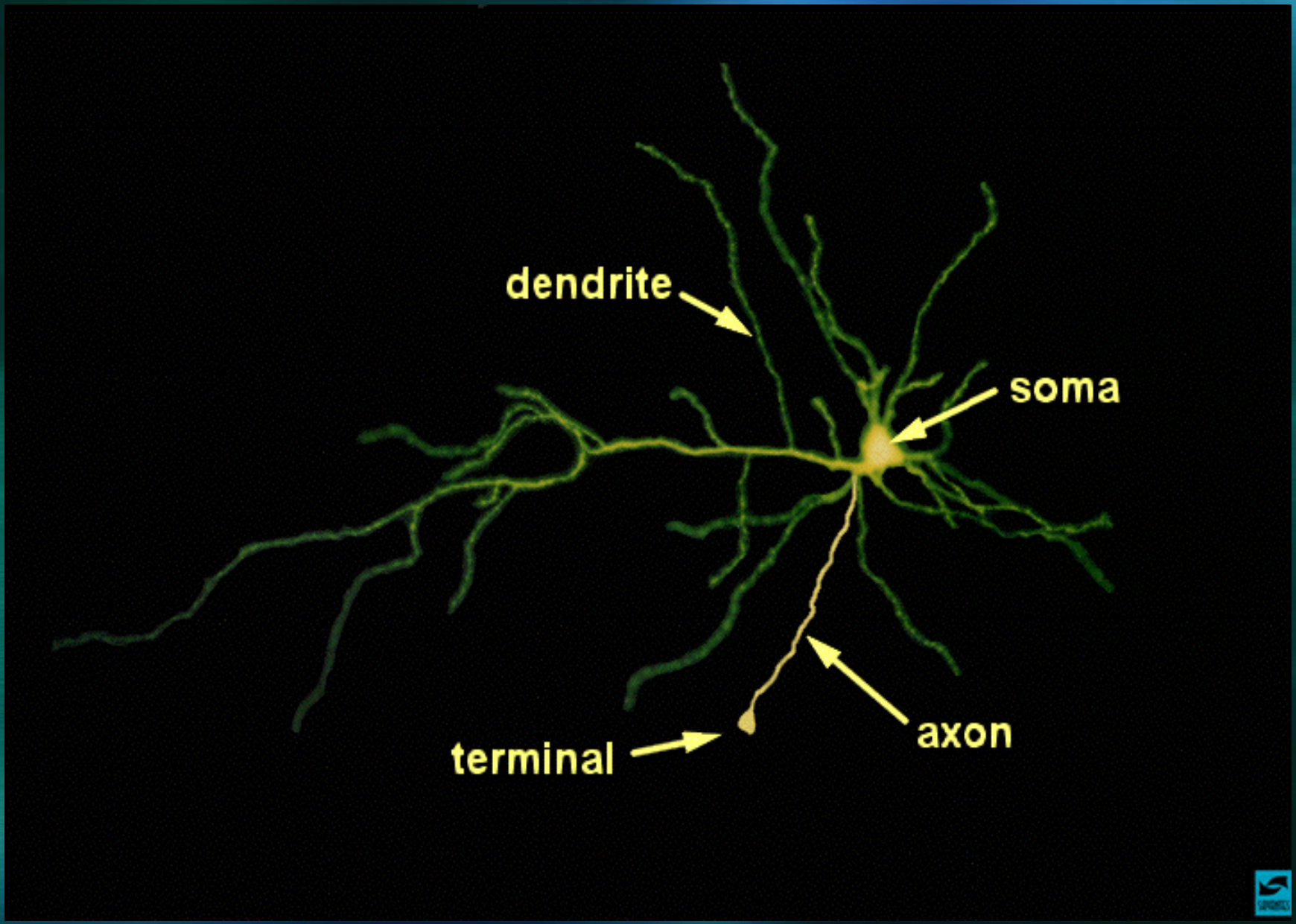
PNS

- Somatic
  - Sensory nerves
  - Motor nerves
- Autonomic
  - Takes messages to and from internal organs
  - Monitors vital functions
  - Sympathetic NS
  - Parasympathetic NS
  - “Fight or flight”

Sympathetic and Parasympathetic Nervous System

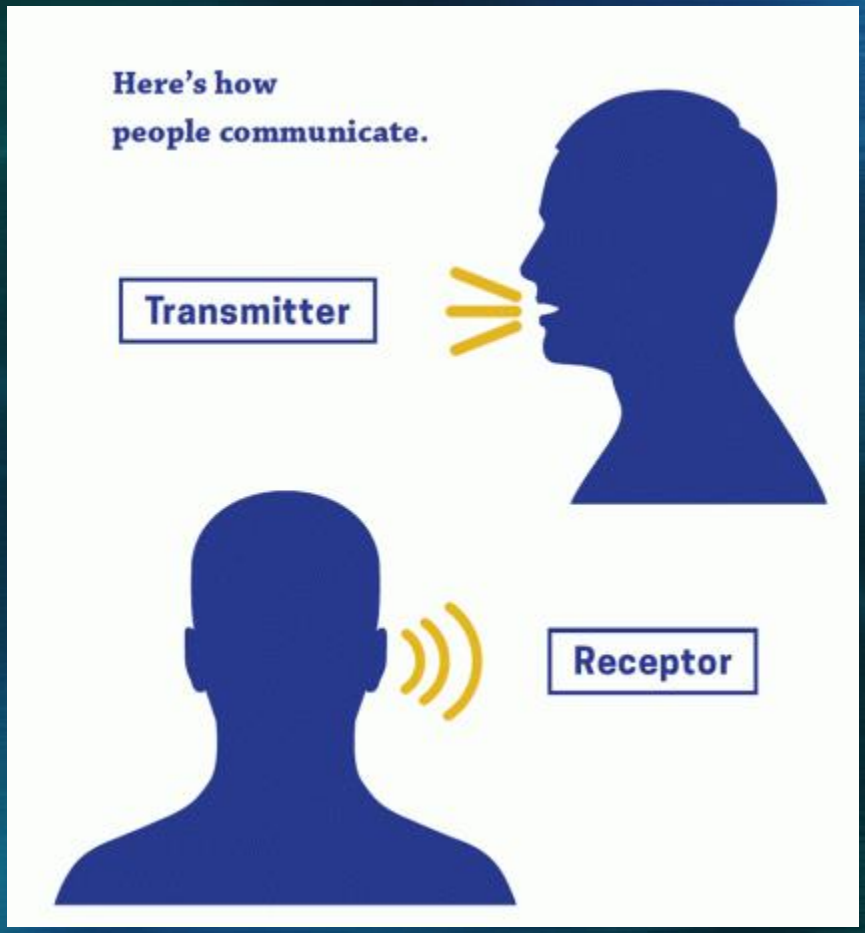
- Sympathetic:
  - Release of adrenaline and stress hormone
  - Increases pulse, breathing, blood pressure, blood flow to brain
  - Dilates pupils
  - Decreases digestive activity
- Parasympathetic
  - Opposite effects

Neurons


dendrite
soma
terminal
axon

The neural impulse

- Resting potential
- Action potential
- All or nothing principle
- Synapse


Here's how
people communicate.
Transmitter
Receptor

NEUROTRANSMITTERS

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

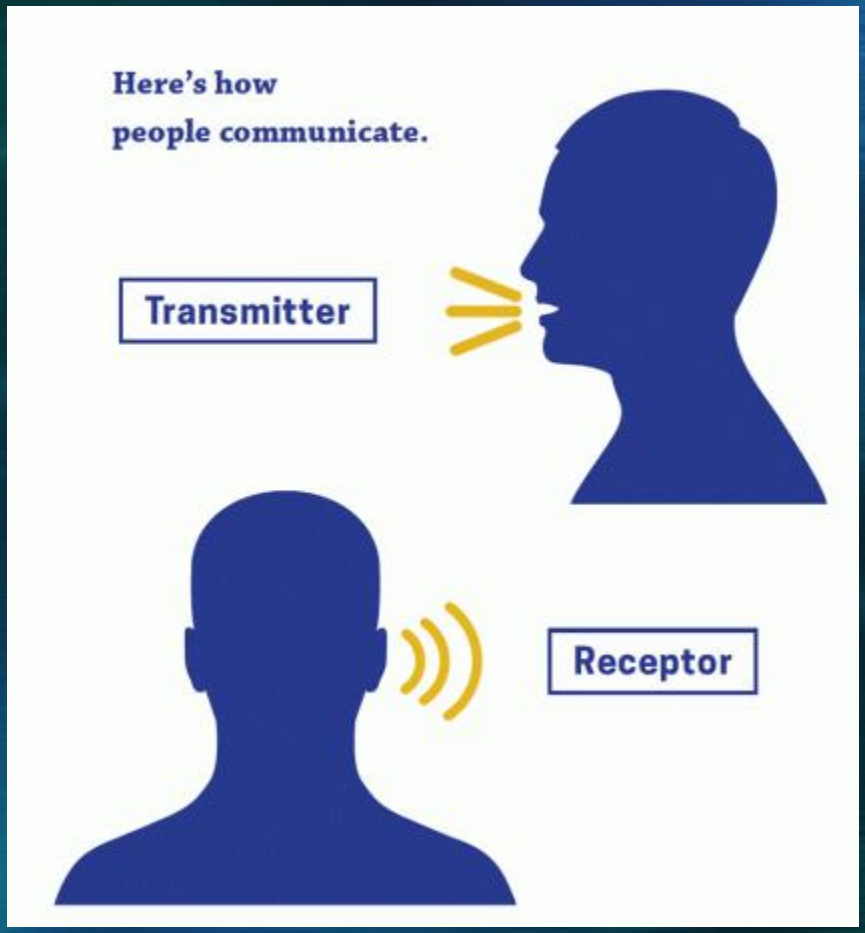
Neurotransmitters

- Acetylcholine (Ach)
- GABA
- Norepinephrine
- Dopamine
- Serotonin
- Endorphins
- Oxytocin

NEUROTRANSMITTERS

DRUG	NEUROTRANSMITTER
LSD	Serotonin
Methamphetamine	Norepinephrine
heroin	Endorphins
THC	Anandamide

Receptor sites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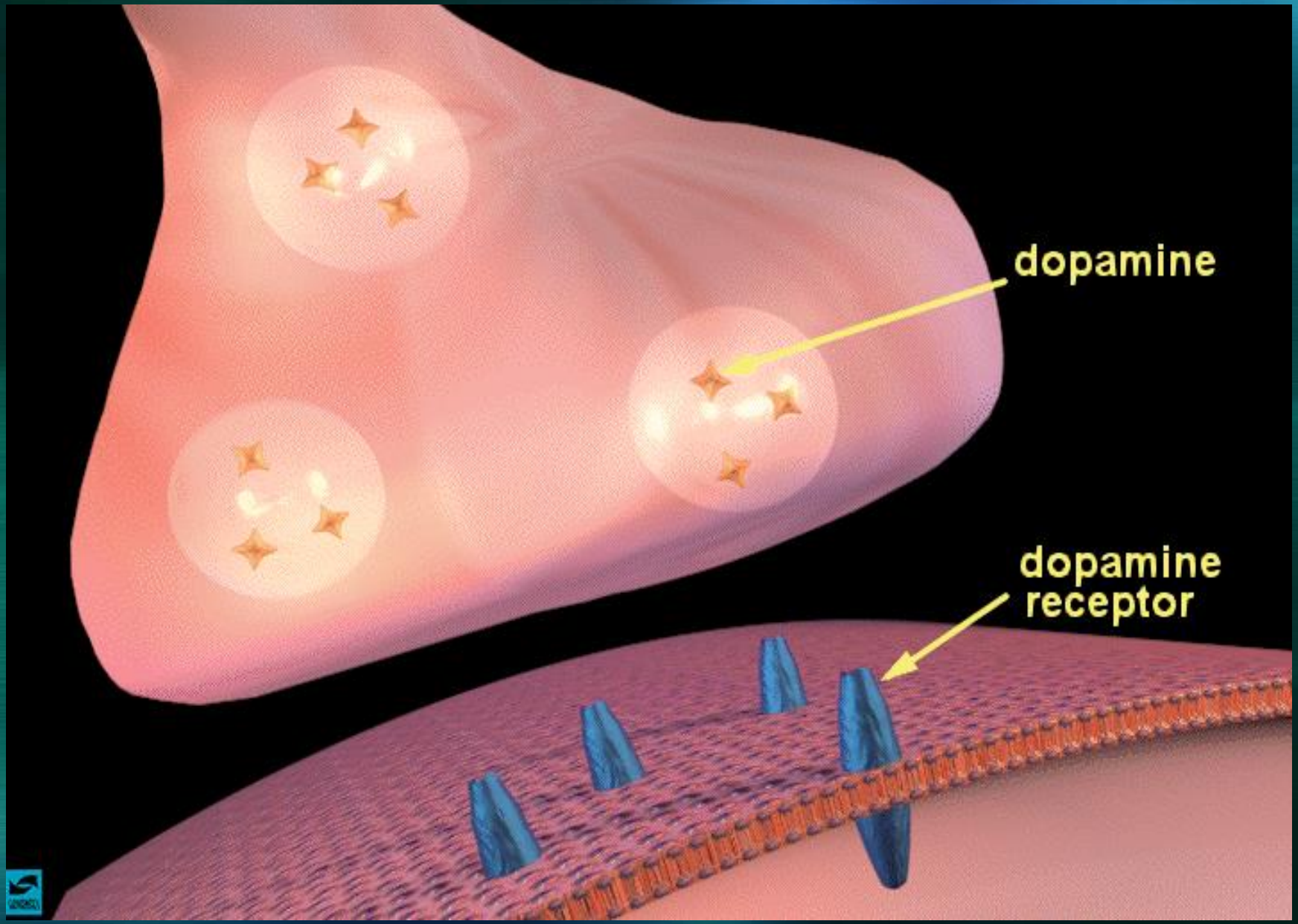
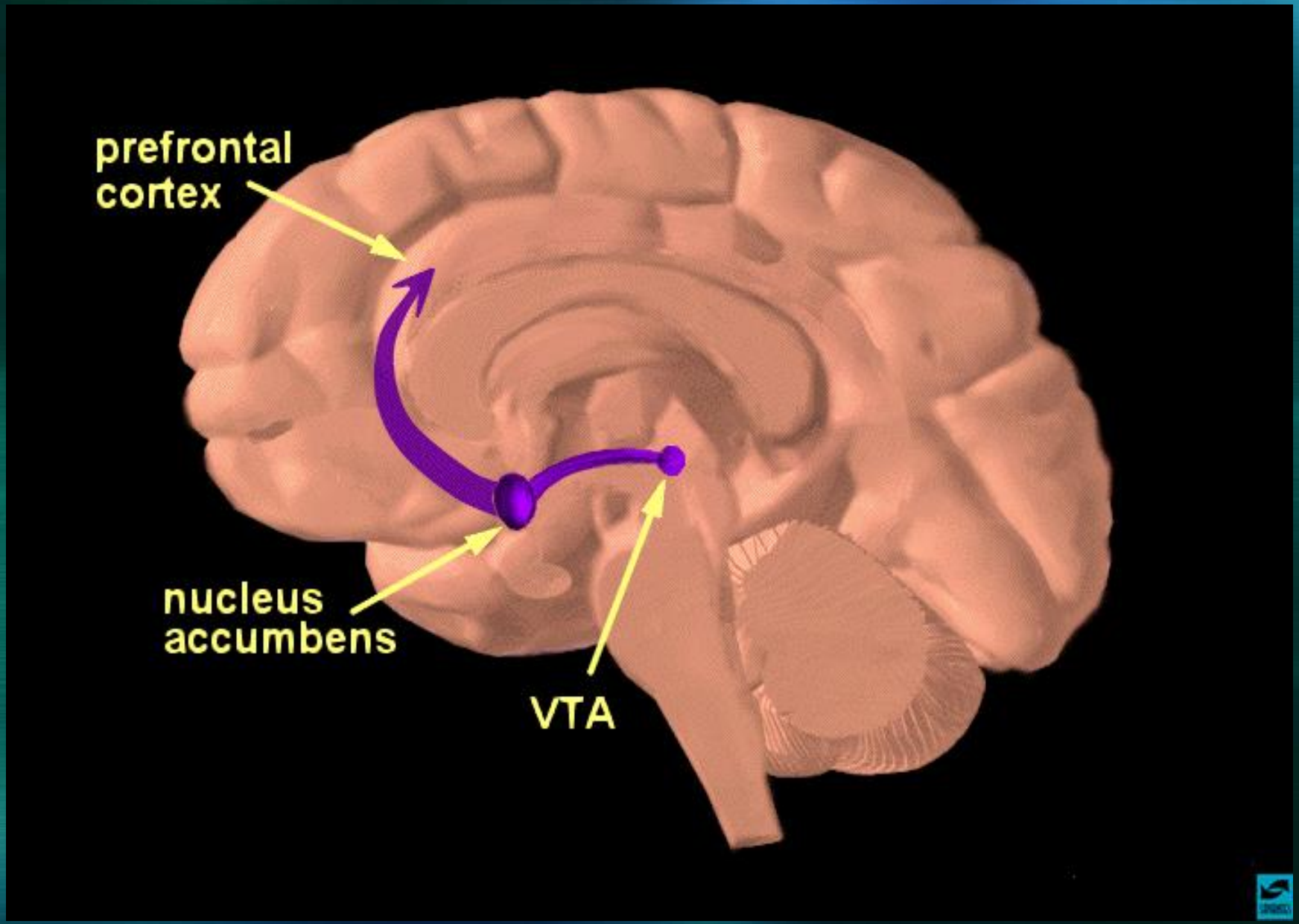

dopamine
dopamine receptor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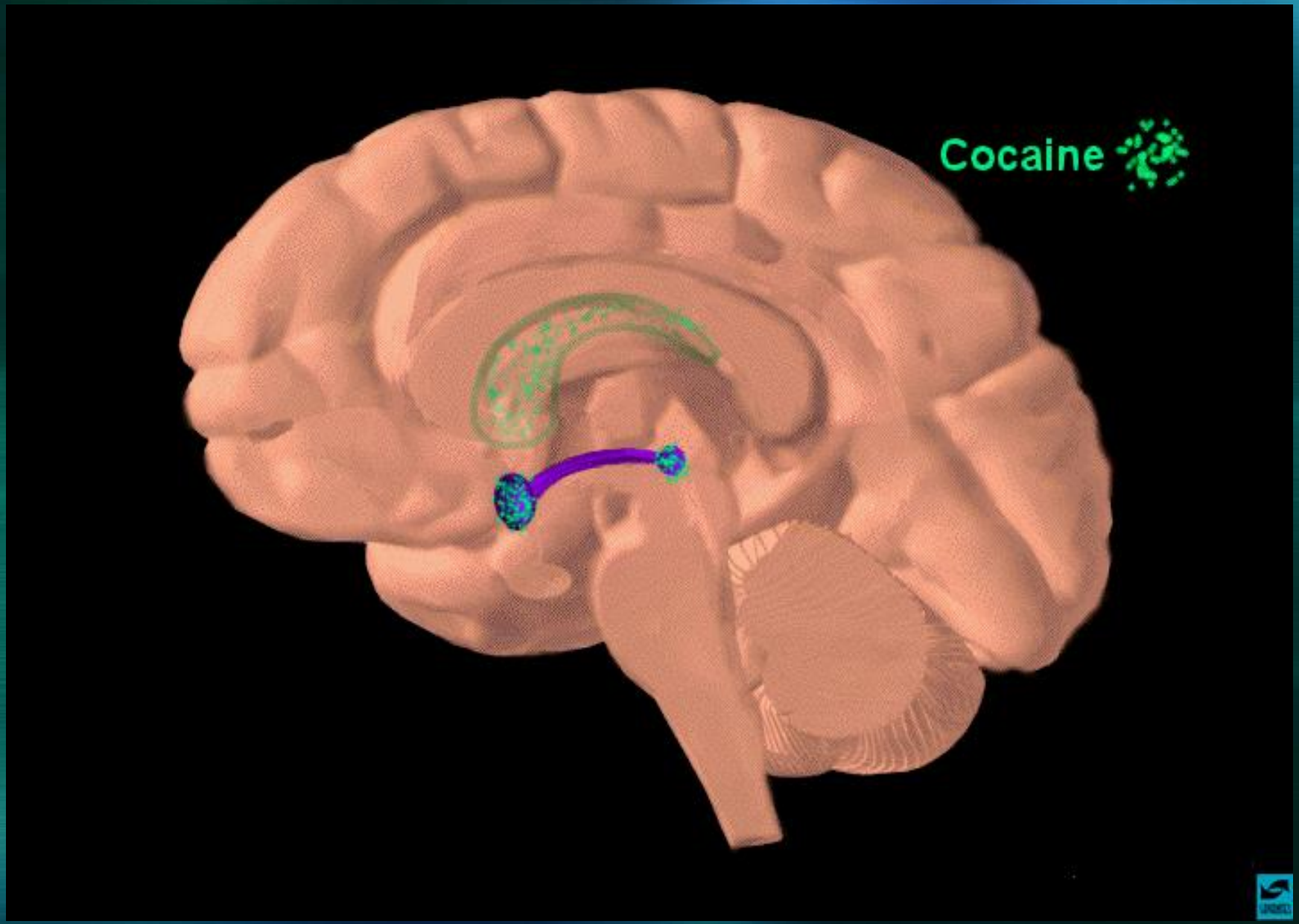
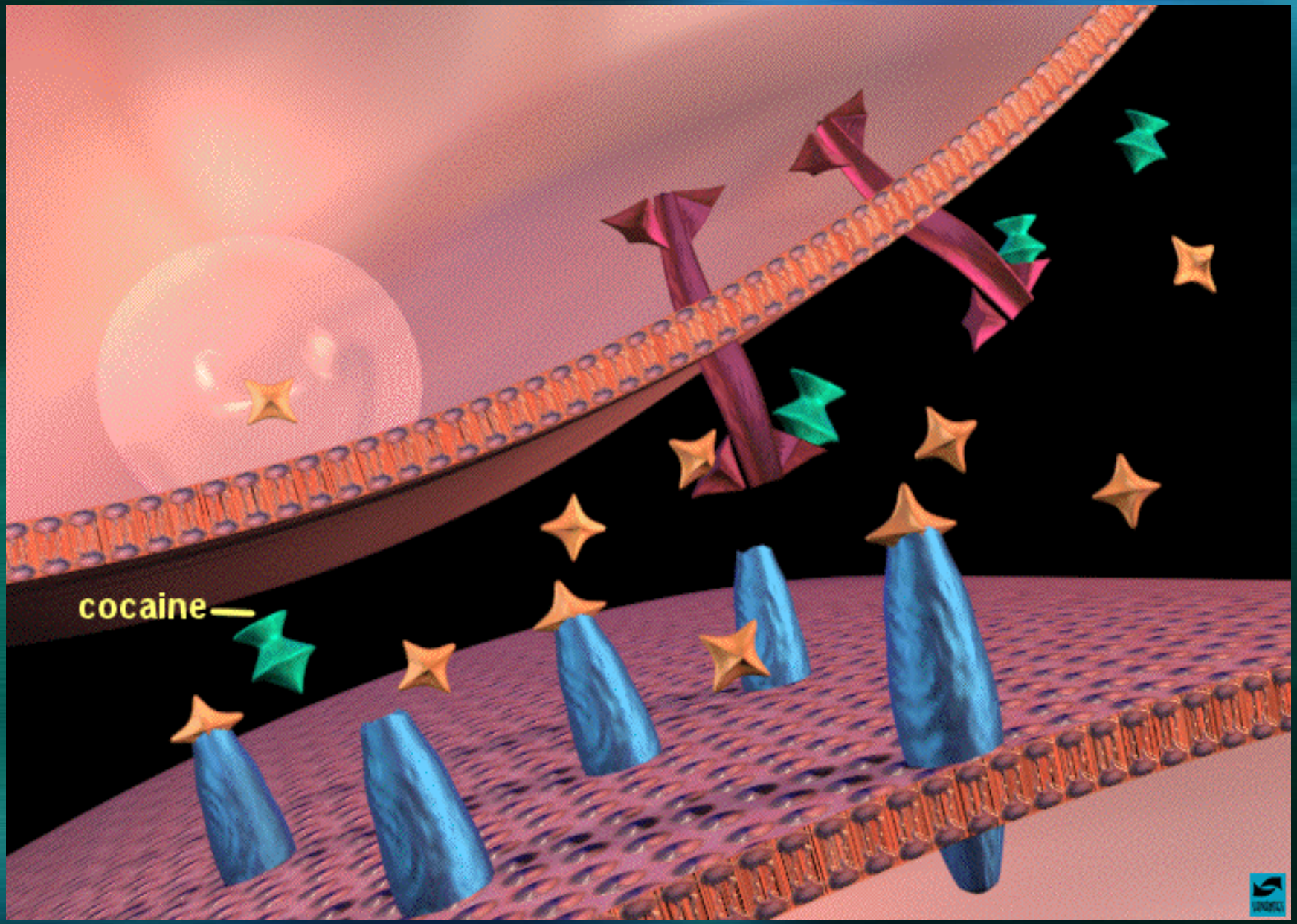
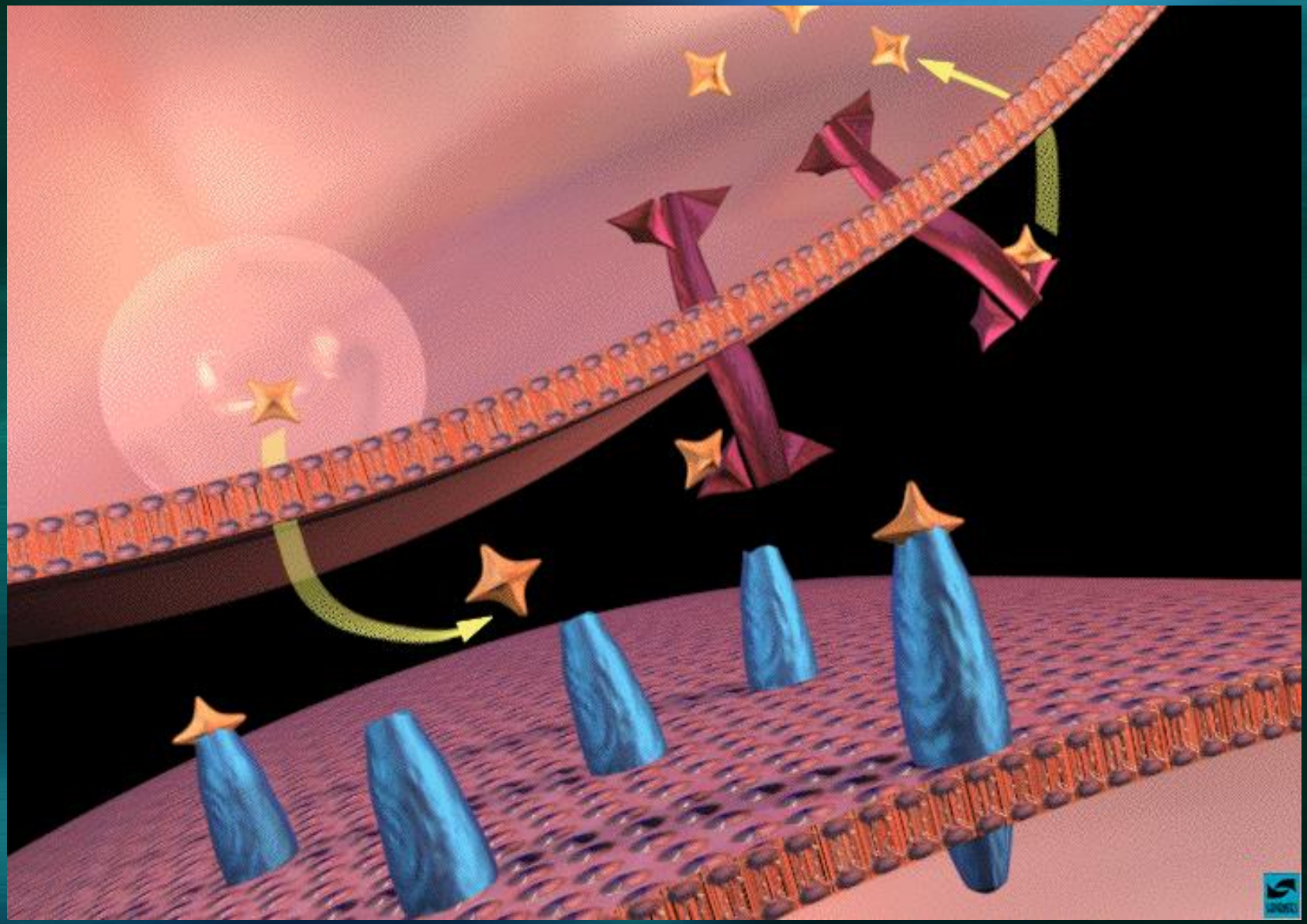
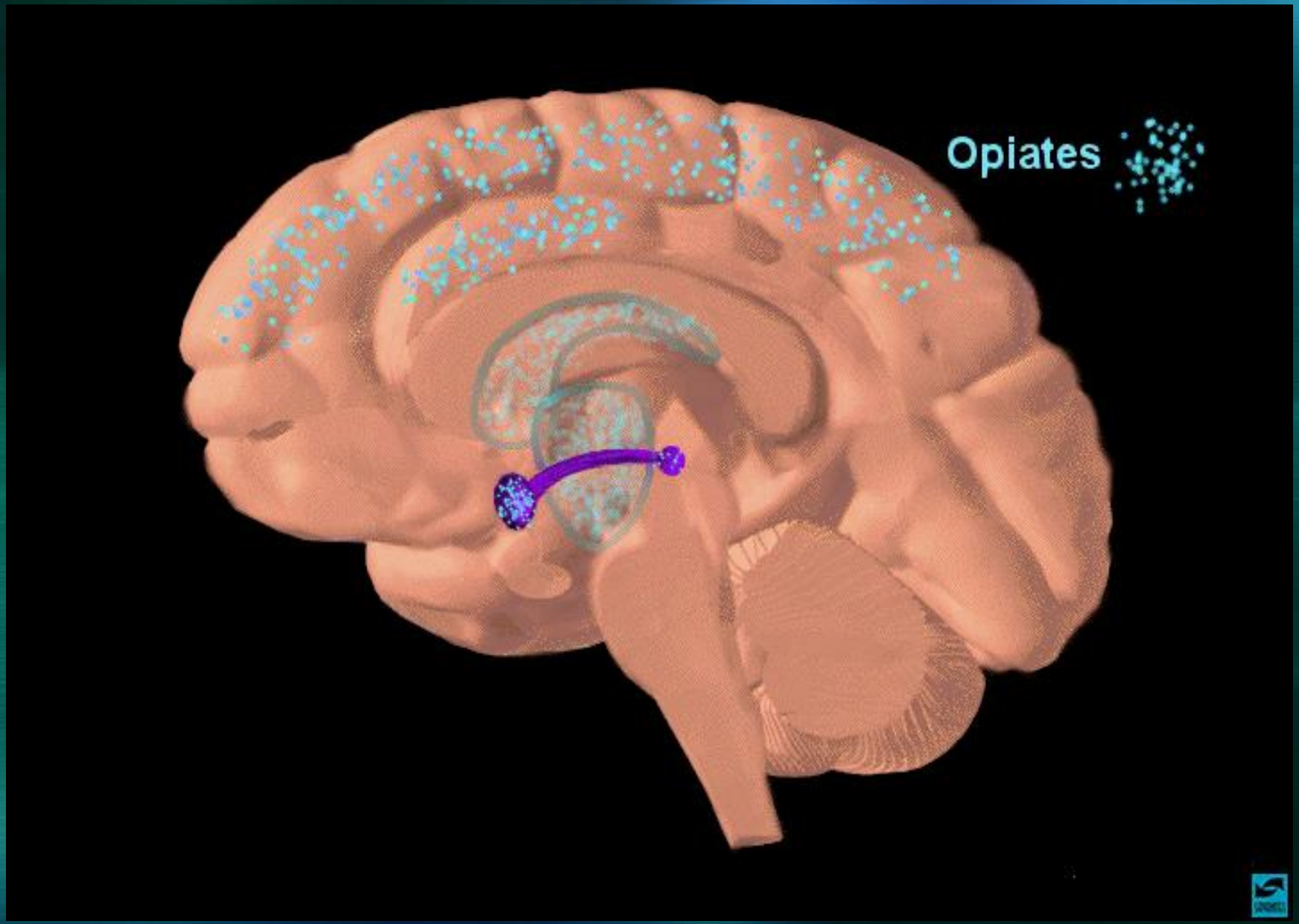
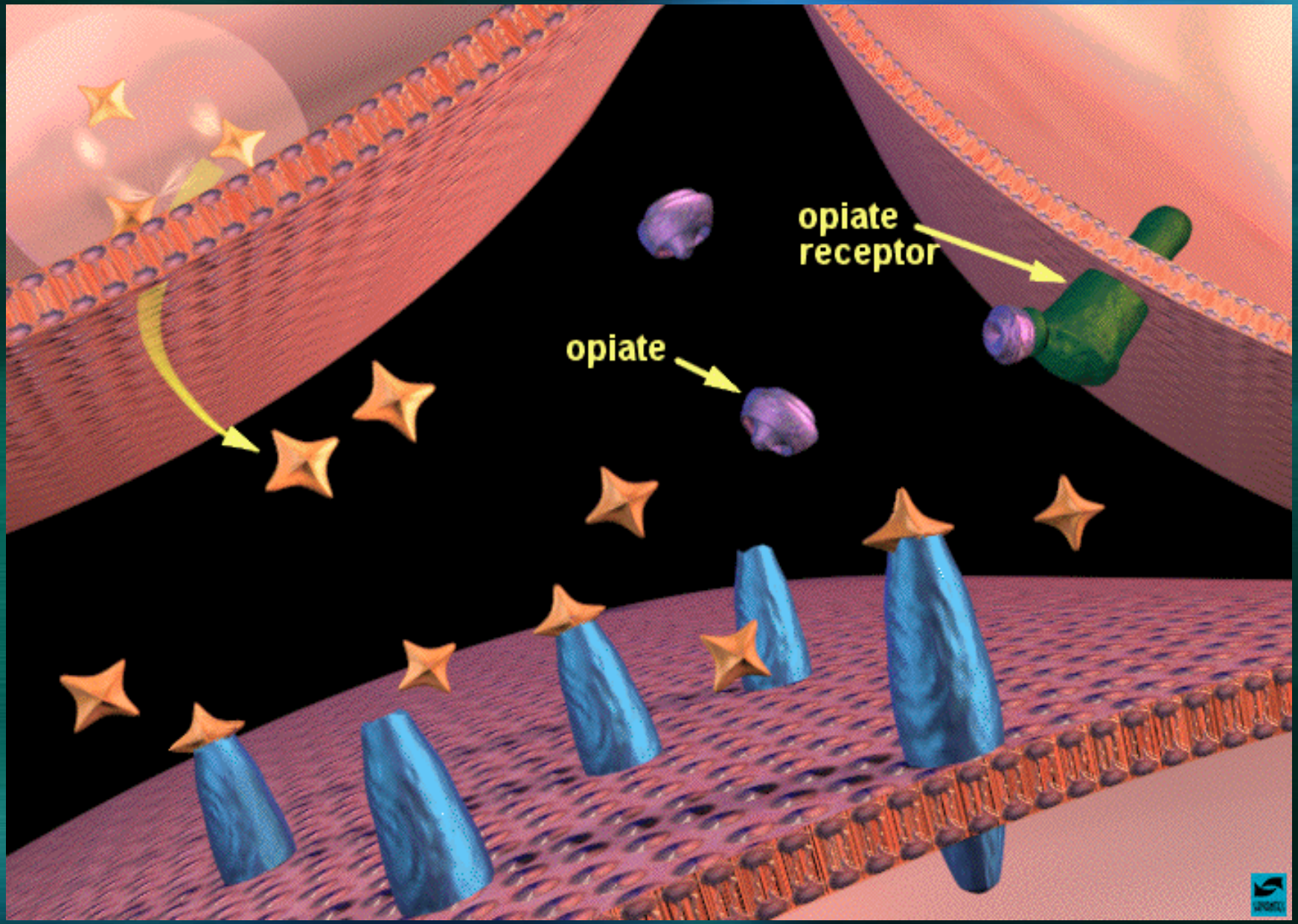
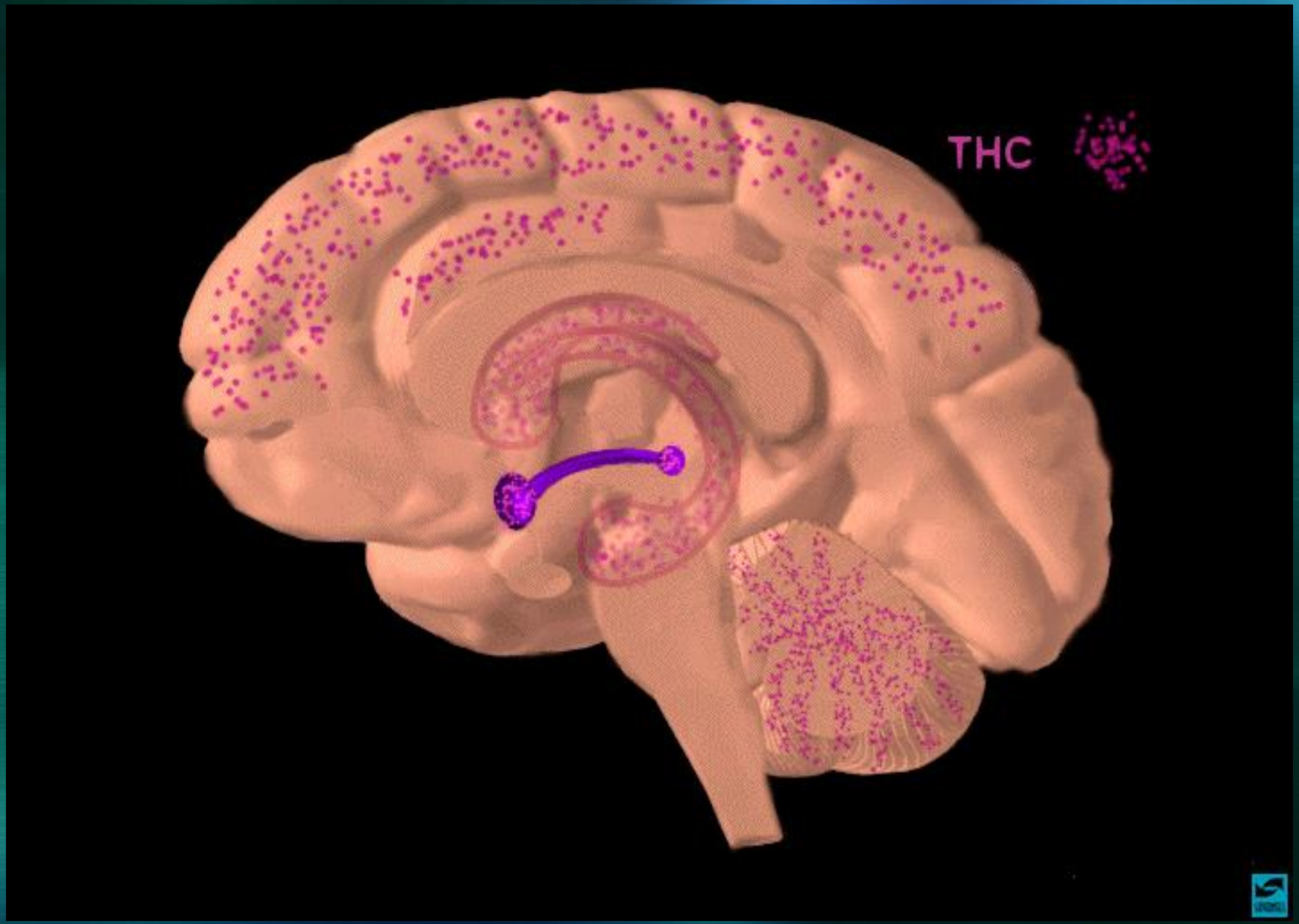

Cocaine

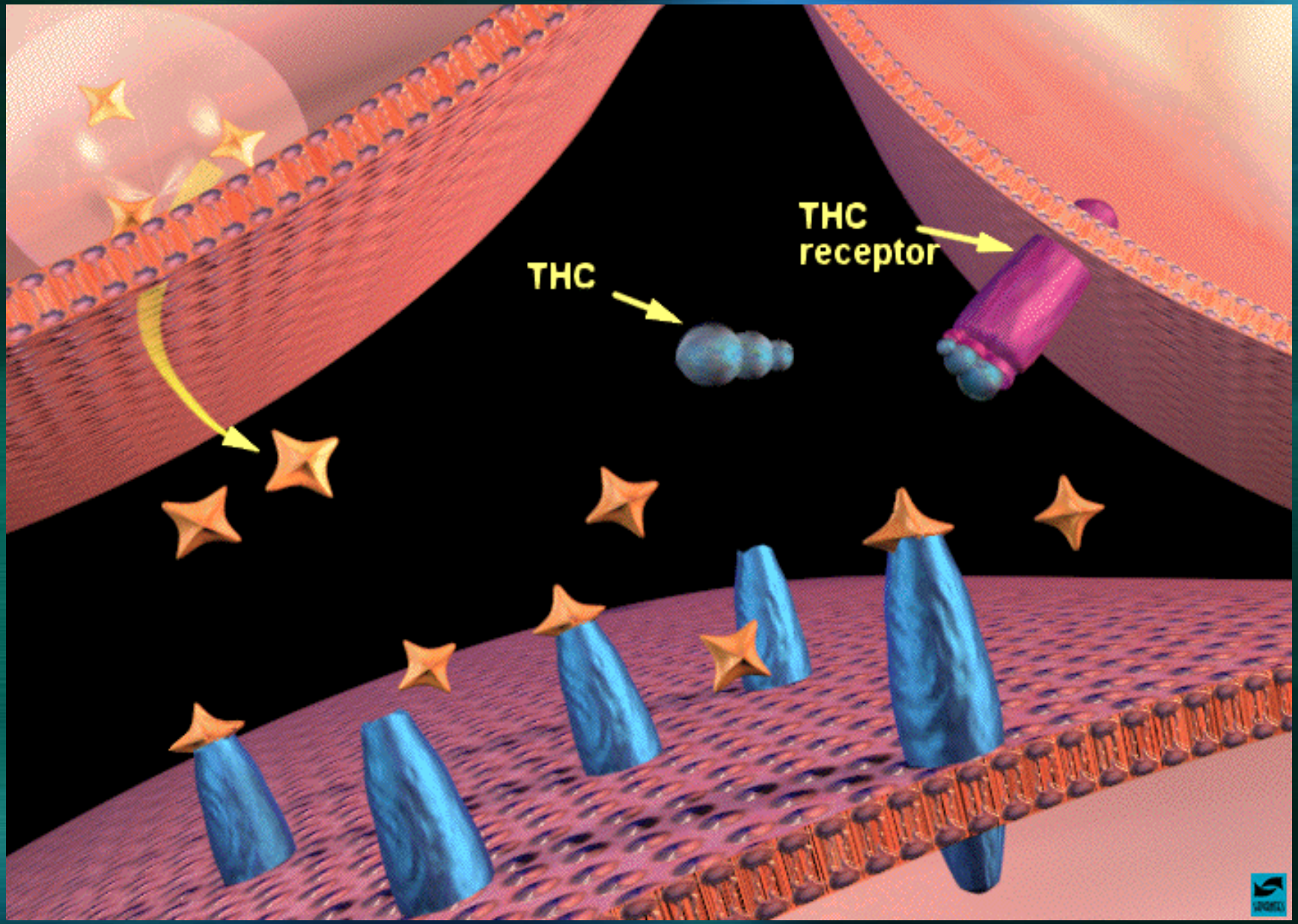

cocaine

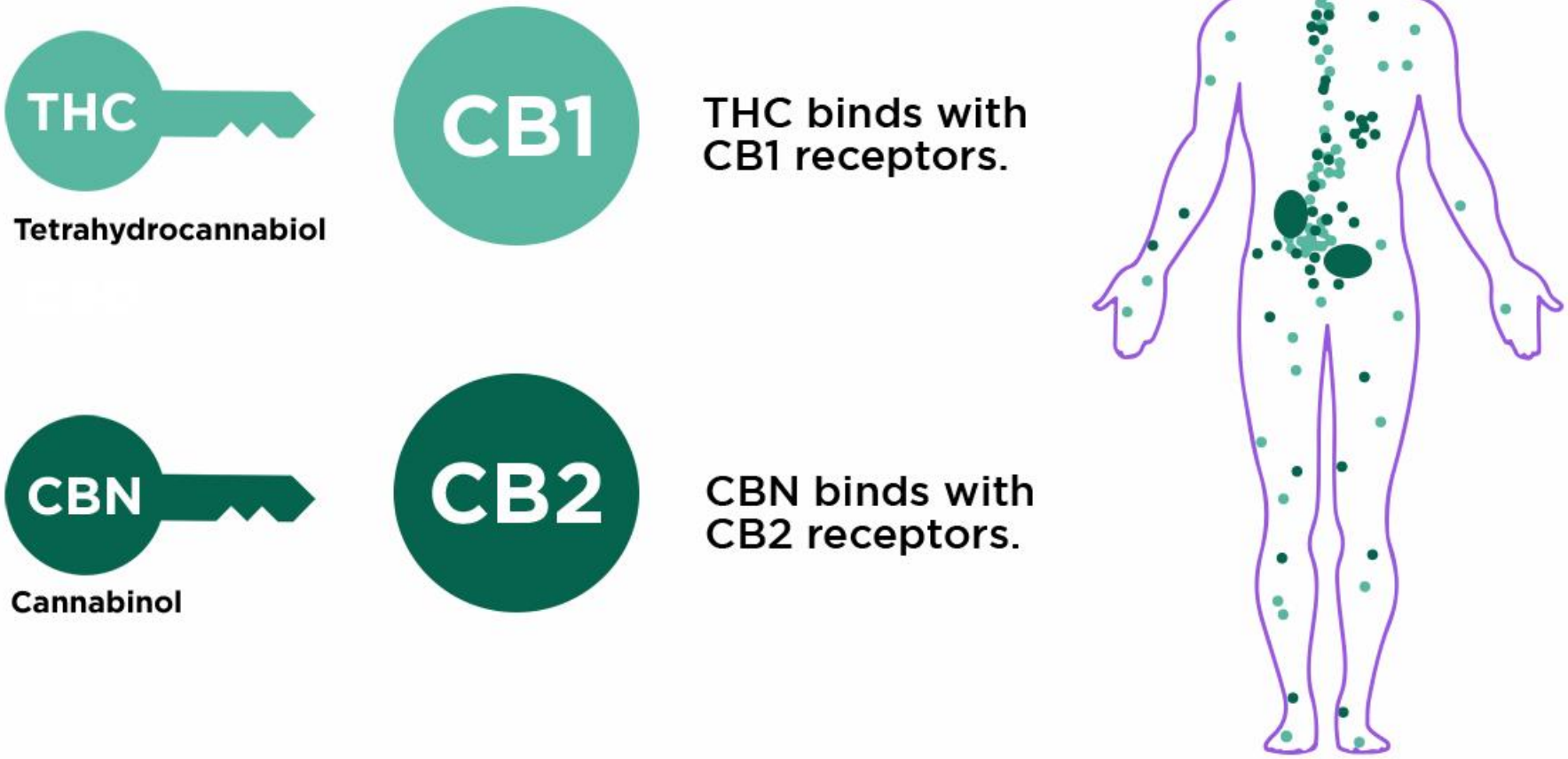



Opiates


opiate
receptor
opiate


THC


THC
receptor
THC


THC
Tetrahydrocannabiol
CB1
THC binds with
CB1 receptors.
CBN
Cannabinol
CB2
CBN binds with
CB2 receptors.

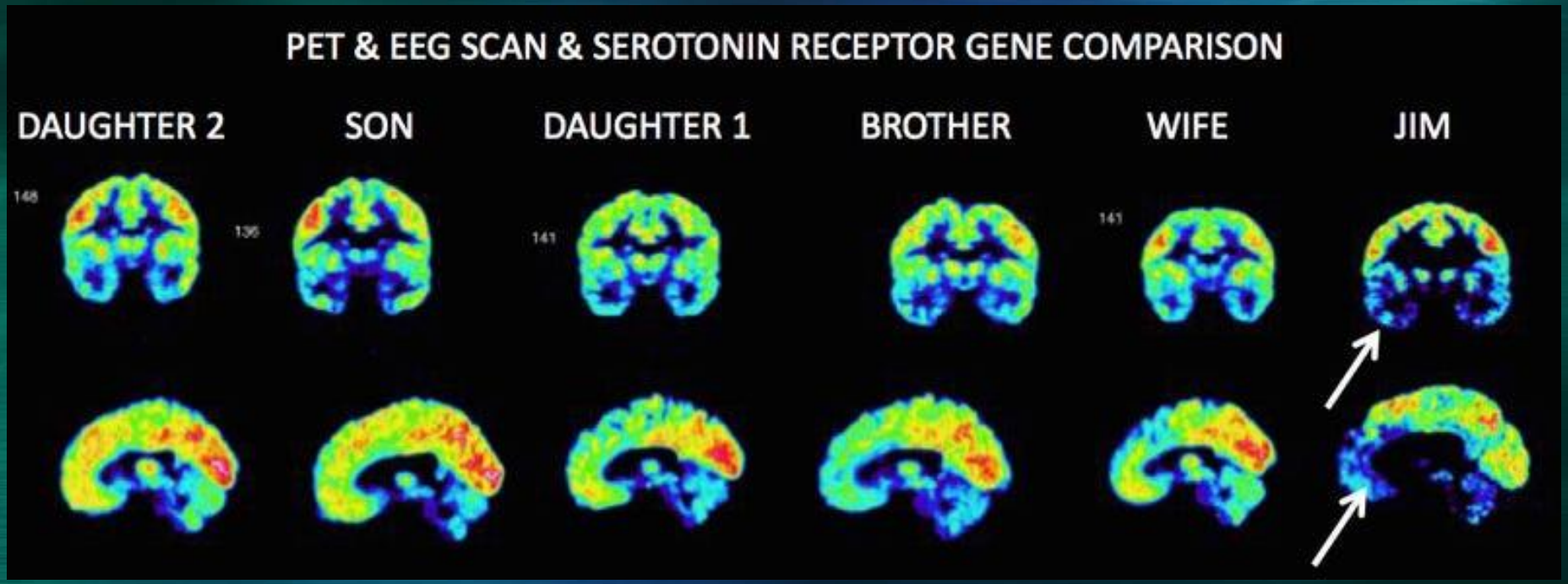
Agonists and antagonists

- Agonist: Fits into receptor site and causes an action
- Antagonist: Occupies the receptor site, but does not cause an action except possibly reversing the action of the agonist

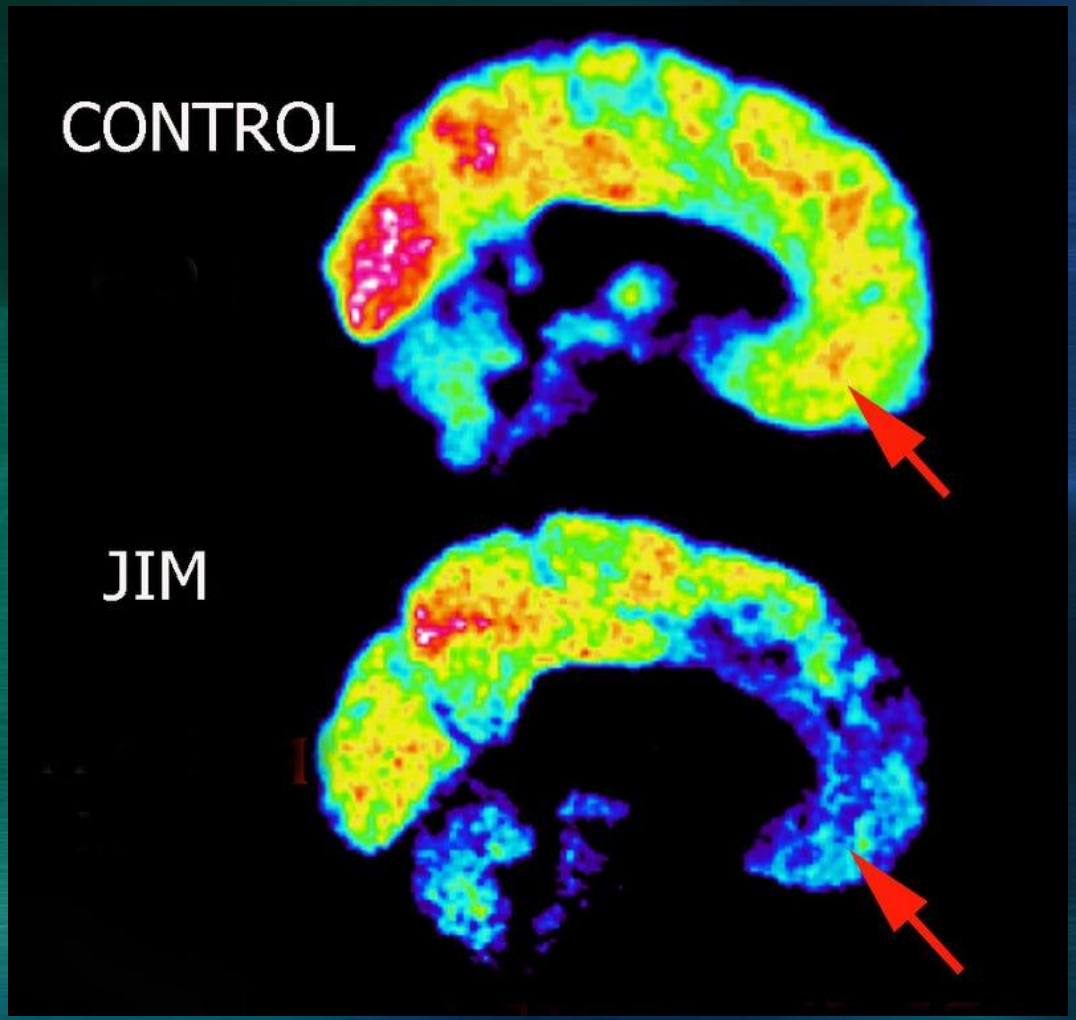
Studying the brain

- Brain lesioning
- EEG
- Imaging
  - CAT (3 dimensional)
  - PET (Glucose metabolism)
  - MRI (Electrical field/radio waves to construct images)
  - f-MRI (Provides images of the brain in action)
  - TMS (“Virtual lesion”)

JIM VS OTHER FAMILY MEMBERS



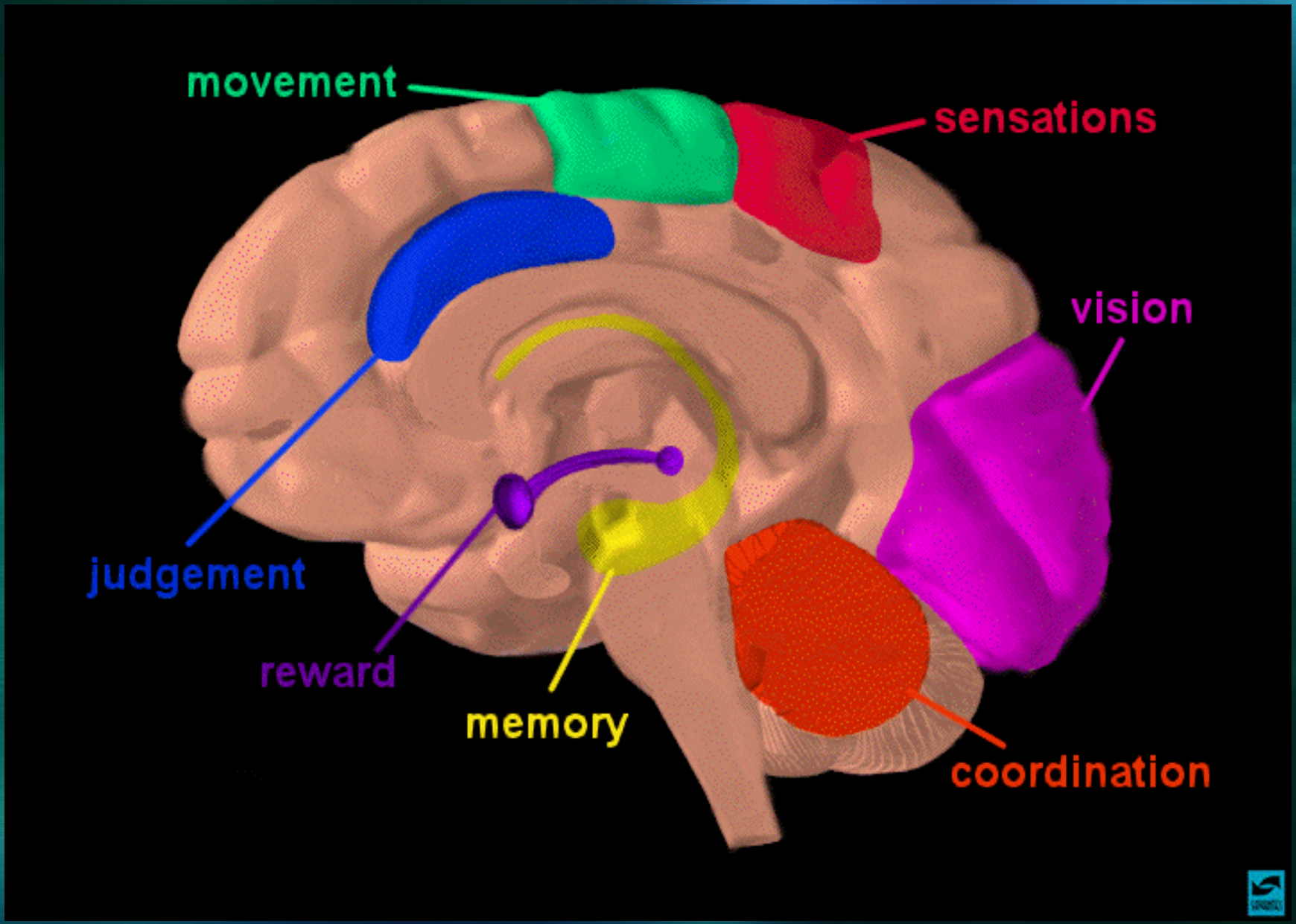
NORMAL VS SOCIOPATHIC BRAIN



Reduced activity in an area towards the center of the brain called the orbital cortex thought to play a role in regulating our emotions and impulses as well as morality and aggression.

Structure of the brain

- Hind brain
- Midbrain
- Forebrain
  - Limbic system
  - Amygdala
  - Hippocampus
- Thalamus
- Hypothalamus
- Cortex


movement
sensations
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Hindbrain

- Brain stem
  - Medulla
  - Pons
- Cerebellum

Limbic System

- Amygdala
- Hippocampus
- Hypothalamus
- “Reward circuit”

Amygdala

- Discrimination (identification) of objects necessary for survival
- Involved in fear responses

Hippocampus

- Involved in memory
- Identifies those memories that are important and should be “encoded” in the cortex

Thalamus

- A relay center between lower and upper brain
- “Sorts out” and relays messages to the appropriate part of the cortex

Hypothalamus

- Located below (“hypo”) the thalamus
- Monitors
  - Eating
  - Drinking
  - Sex
- Involved in emotional states, particularly stress (works with pituitary gland)

Cerebral Cortex

- “Neocortex”
- Lobes
  - Frontal
  - Parietal
  - Occipital
  - Temporal
- Somatosensory cortex
- Motor cortex
- Association cortex

Lobes of the brain

- Temporal lobe
  - Hearing
  - Advanced visual processing
- Occipital lobe
  - Vision
- Parietal lobe
  - Bodily sensation
- Frontal lobe
  - Most advanced part of the brain

Frontal Lobe

- Thinking (abstract and concrete)
- Recent memory
- Conscience
- Self-awareness
- Self control
- Emotion

Cerebral Cortex

- “Neocortex”
- Lobes
  - Frontal
  - Parietal
  - Occipital
  - Temporal
- Somatosensory cortex
- Motor cortex
- Association cortex

Brain hemispheres

- Left hemisphere
  - Speech
  - Understanding language
  - Singing words to a song
- Right hemisphere
  - Non-verbal information
    - Spatial recognition
    - Visual recognition
    - Emotion