

Prescription Drugs

J. Randall Webber, MPH, CADC
JRW Behavioral Health Services
www.randallwebber.com



Some Types of Rx Drugs

- Antibiotics
- Birth control medications and devices
- Cardiovascular drugs (e.g., high blood pressure)
- Gastrointestinal drugs (e.g., GERD)
- Anticonvulsants
- HIV drugs
- **Antihistamines**
- **Psychiatric medications (antidepressants, neuroleptics)**
- **Controlled substances**

BEWARE OF DRUG MISINFORMATION

Drug information tips

- Always ask:
 - How do you know that?
 - Could I see the evidence?
- Good sources:
 - Journals
 - Science magazines
 - Reputable websites
 - Colleges and universities
 - NAADAC
- One source or many?

NEUROTRANSMITTERS

- **Naturally-occurring brain chemicals**

Neurotransmitters

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

NEUROTRANSMITTERS

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

NEUROTRANSMITTERS

DRUG

NEUROTRANSMITTER

LSD

Serotonin

Methamphetamine

Norepinephrine

Opioids

Endorphins

NEUROTRANSMITTERS

DRUG

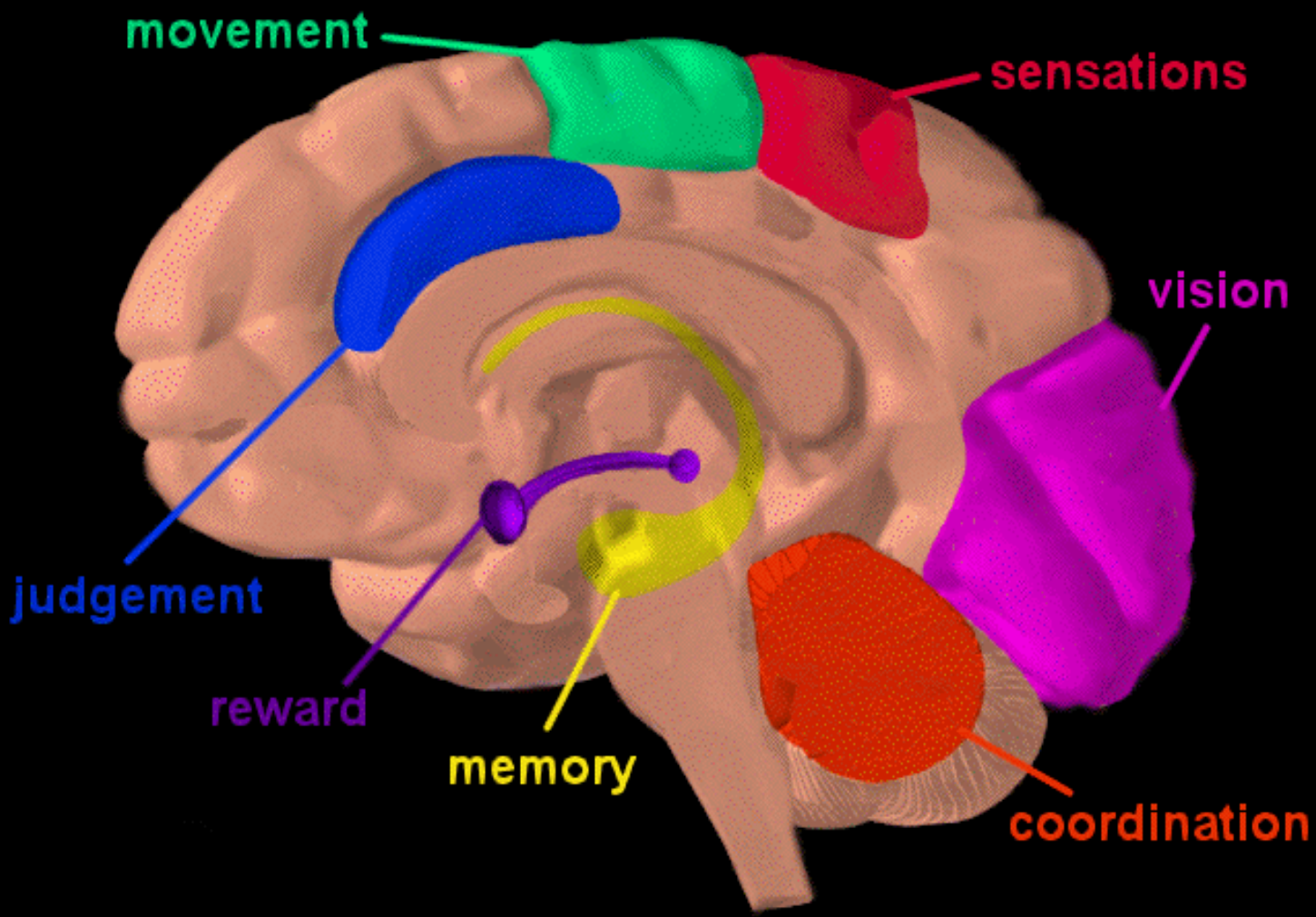
NEUROTRANSMITTER

THC

Anandamide

PCP

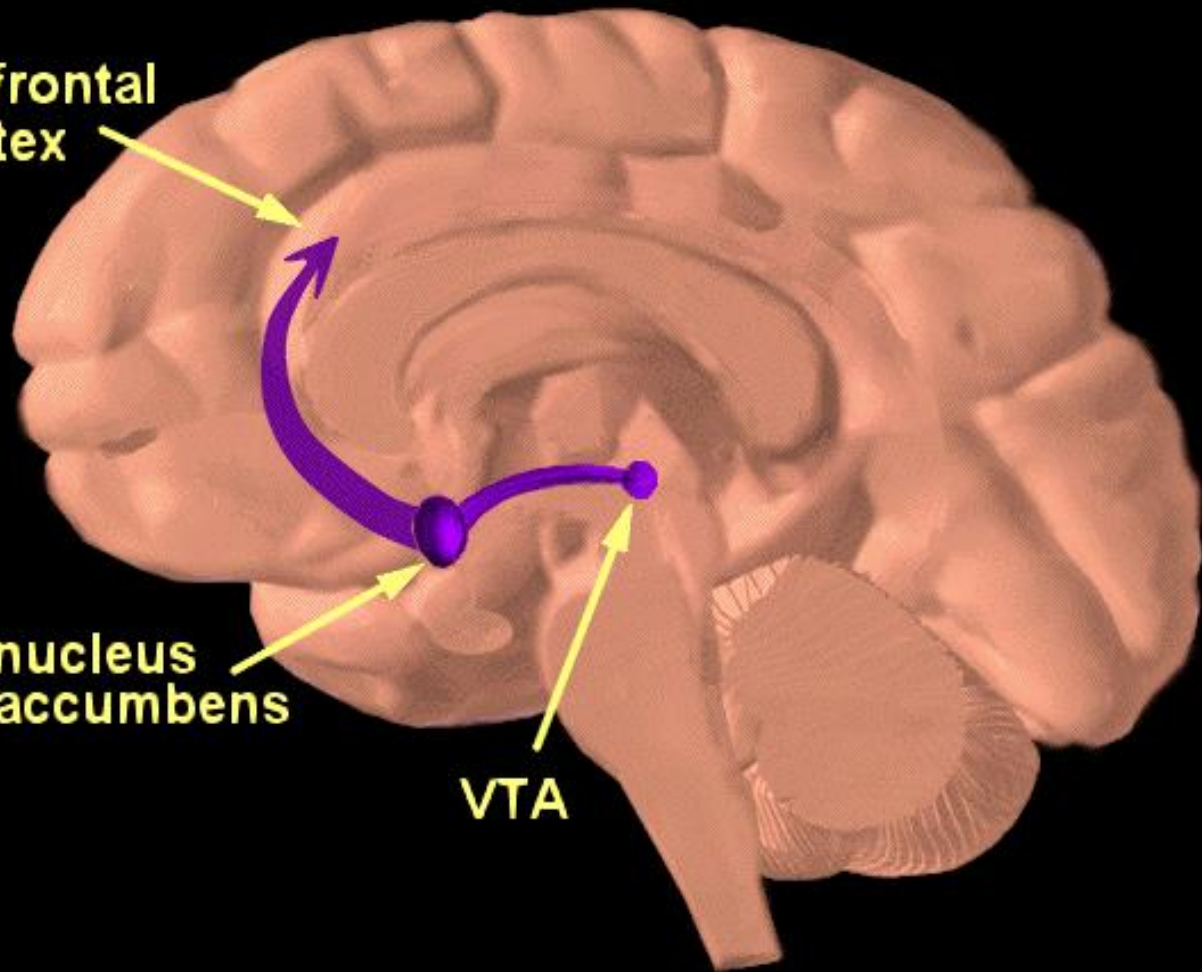
Receptor site identified but not associated neurotransmitter



prefrontal cortex

nucleus accumbens

VTA



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**

First Generation (Sedating) Antihistamines

- Diphenhydramine (Benadryl)
- Dimenhydrinate (Dramamine)
- Brompheniramine (Dimetapp)

Antidepressants

- Tricyclics (impramine, protriptyline)
- MAO-Inhibitors (Parnate)
- Selective serotonin reuptake inhibitors
 - Prozac, Zoloft, Lexapro
- Selective norepinephrine reuptake inhibitors (Effexor)

Antidepressants: Misuse Potential

- Mood change: Yes, but gradual
- Misuse potential: Minimal
- Psychiatric impairment potential: Minimal
- Physical toxicity: Minimal at prescribed doses

Neuroleptics

- Used to treat schizophrenia and bipolar disorder
 - **Lithium**
 - **Risperidone** (Risperdal)
 - **Quetiapine** (Seroquel)
 - **Olanzapine** (Zyprexa)
 - **Ziprasidone** (Zeldox)
 - **Paliperidone** (Invega)
 - **Aripiprazole** (Abilify)
 - **Clozapine** (Clozaril)

Neuroleptics

- Mood change: Possible
- Misuse potential: Minimal/absent
- Psychiatric impairment potential: Minimal (except for side effects)
- Physical toxicity: Possibility of tardive dyskinesia

Controlled Substances

- Criteria for placement:
 - Valid medical use
 - Potential for misuse
 - Current state of knowledge concerning its safety
 - Risk to public health

Controlled Substances

- **I: Heroin, cannabis, MDMA, LSD, psilocybin**
- **II: Cocaine, oxycodone, methadone, fentanyl, amphetamines**
- **III: Buprenorphine, ketamine, hydrocodone**
- **IV: Benzodiazepines**
- **V: Low dose opioids (e.g., Tylenol with codeine)**

What do people need to know about prescription drugs?

- Addiction potential?
- Tolerance?
- Withdrawal symptoms?
- Physical toxicity/bodily damage?
- Psychological dangers?
- **Misrepresentation**

Misrepresentation

DEA warns of sharp increase in fake prescription pills laced with fentanyl and meth

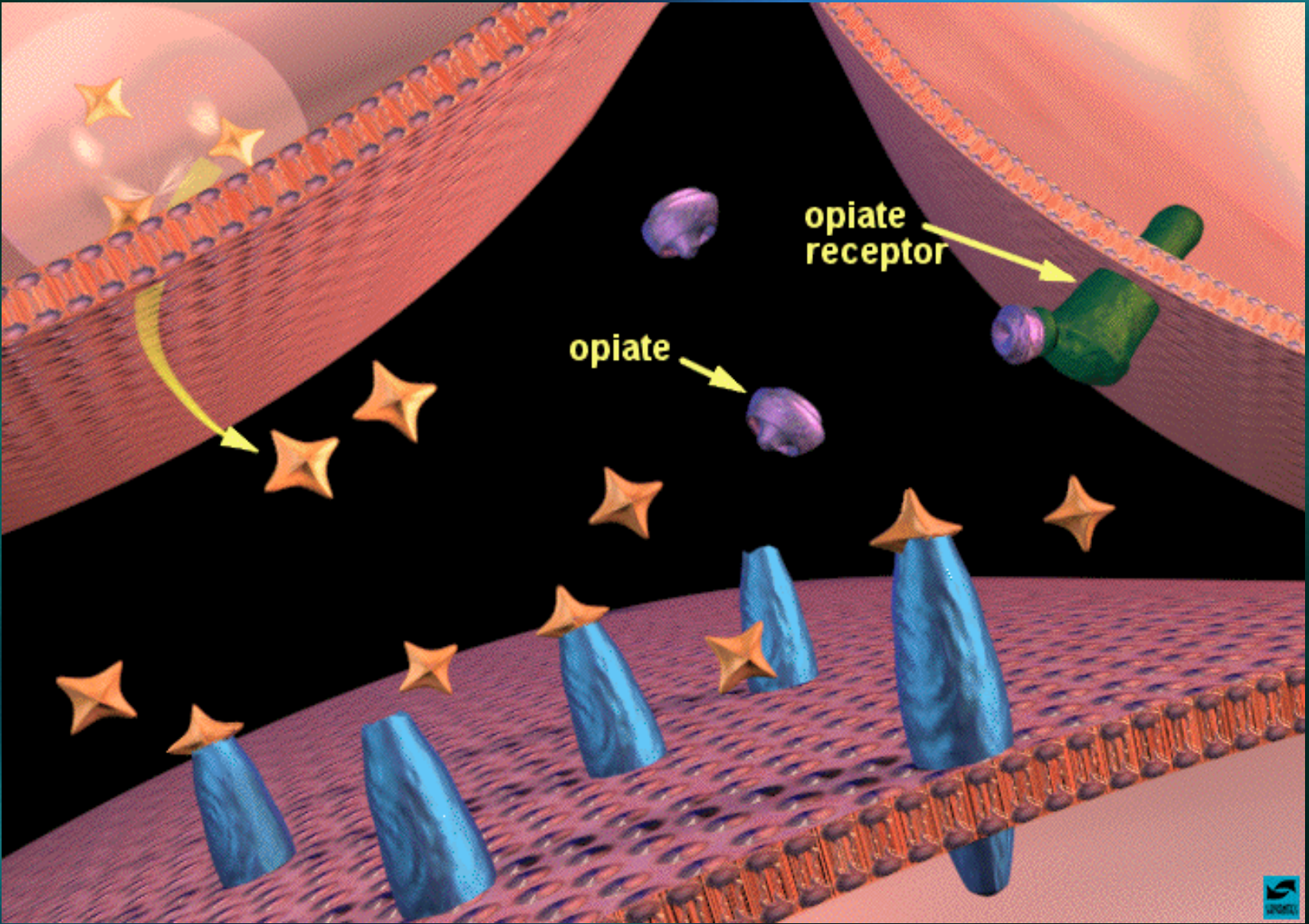
By Nadia Kounang, CNN

Updated 2:34 PM ET, Tue September 28, 2021

OPIOIDS

Endogenous Opioids

- Endorphins
- Enkephalins



Opioid agonists and antagonists

AGONISTS

- Morphine-like effects
- Stop withdrawal

ANTAGONISTS

- Anti-morphine (antagonism)
- Precipitate withdrawal

Opioids

- Morphine
- Hydrocodone (Vicodin)
- Oxycodone (OxyContin/Percodan)
- Fentanyl
- Methadone
- Buprenorphine (Buprenex, Subutex, Suboxone, Sublocade)
- Tramadol (Ultram)

Buprenorphine Misuse

- Rare among persons without OUD
- Among those with OUD who have a buprenorphine Rx, 75% did not misuse (*JAMA*, October 14, 2021)

Tramadol

- Schedule IV
- Opioid agonist
- MAO-Inhibitor
- Used by verterinarians

Opioids: Basics

- Addiction potential high
- Tolerance develops
- Physical dependence withdrawal symptoms moderate to serious/not life-threatening
- Immediate physical toxicity potential (overdose) moderate to high
- Long-term physical toxicity potential low
- Acute and chronic psychiatric impairment potential low

ADDICTION POTENTIAL

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

Opioid effects

- Sedation (“nodding”)
- Euphoria
- Pain relief
- Respiratory depression (slowed breathing)
- Constipation
- Constricted pupils

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Opiate Withdrawal

- Signs of w/d:
 - Drug hunger (craving)
 - Dilated pupils
 - Yawning
 - Lacrimation (eyes tear)
 - Rhinitis (runny nose)
 - Fever
 - Restlessness
 - Stomach, leg and back cramps

Opiate Withdrawal

- Signs of w/d:
 - Insomnia
 - Nausea
 - Diarrhea
 - Vomiting
 - Chills/cold flashes with goose bumps ("cold turkey")
 - Sweating
 - Leg spasms ("kicking the habit")

Opiate Withdrawal

- Signs of w/d:
 - Rapid pulse
 - Increased blood pressure
 - Anxiety
 - Depression
 - Muscle and bone pain

Opioids: Basics

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Opioids and Pregnancy

- Research recommends not stopping opioids during pregnancy in women with OUD
- Infants exhibit withdrawal symptoms and need to be detoxified
- Use in pregnancy linked to:
 - Preterm birth
 - Stillbirth
 - Poor fetal growth (e.g., low birthweight)
- Educational disabilities may be linked to other factors

PRESCRIPTION STIMULANTS

Cocaine Vs. Rx Stimulants

- 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*

Amphetamine Addicts





Prescription Stimulants

- Adderall (dextroamphetamine and amphetamine)
- Vyvanse (lisdexamfetamine)
- Desoxyn (methamphetamine)
- Ritalin/Concerta (methylphenidate-not an amphetamine)

Adderall

- Dextroamphetamine/Amphetamine mixture
- ADHD
- “Study drug”
- Increase in ER visits
- Increase in students seeking help for addiction

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

THE MASSACHUSETTS
DAILY COLLEGIAN

A free and responsible press serving the UMass community since 1890

February 15, 2018

Abusing Adderall is a serious problem for adults
between the ages of 18-25

Stimulants: Effects of Standard Dose

- Increase in pulse, breathing and blood pressure
- Alertness
- Decrease in appetite
- Increased ability to focus and concentrate
- Euphoria (less likely in ADHD users)

Stimulants

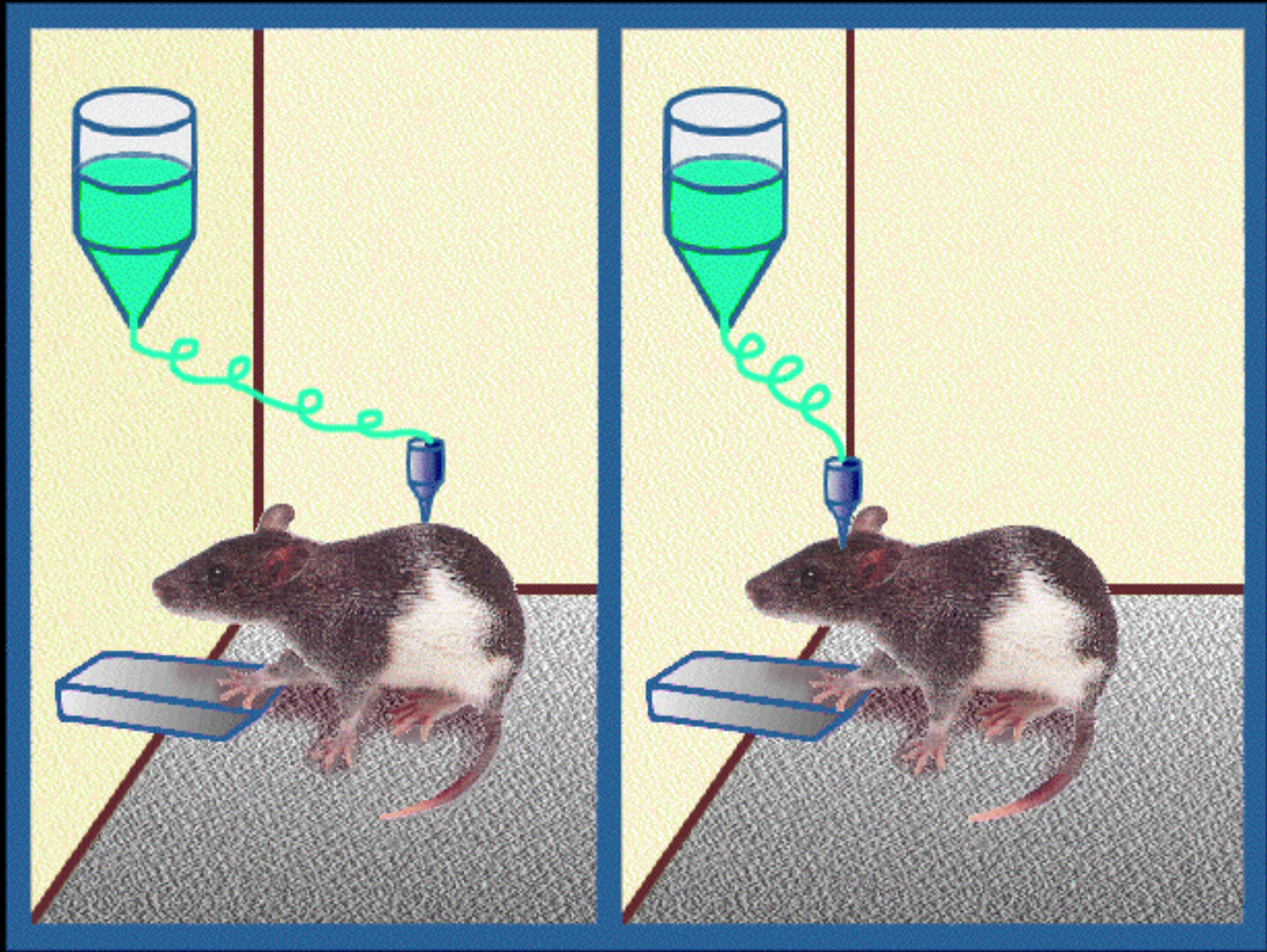
(cocaine, amphetamines, methylphenidate)

- High addiction potential*
- Tolerance develops
- Moderate to high potential for physical toxicity
- Moderate to high potential for psychiatric impairment

* Method of administration affects nature of the high

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





Stimulant Overdose

- Cardiovascular complications
- High body temperature
- Seizures

Amphetamine Psychosis

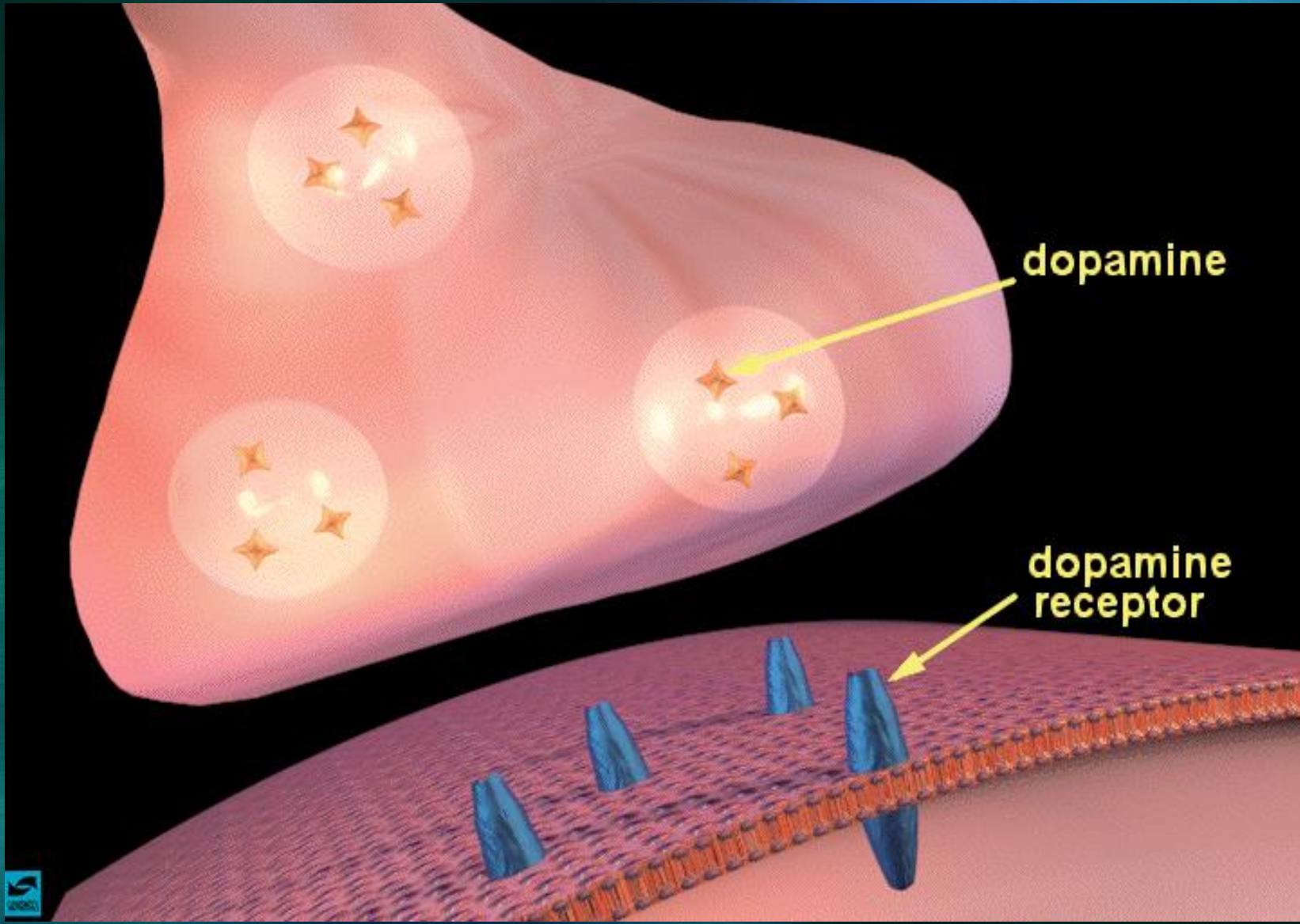
- First reported in 1933
- More common with amphetamines than methylphenidate (*New England Journal of Medicine*, 2019)
- About 1 in 660 people taking amphetamines for ADHS developed psychotic symptoms
- As dose and frequency increase, risk of psychosis goes up
 - Contributing factors
 - ↑ dopamine levels
 - Sleep deprivation

Amphetamine Psychosis

- Anxiety
- Suspiciousness
- Hallucinations (visual, auditory and tactile)
- Paranoid delusions
- Violence not common

Amphetamine Psychosis

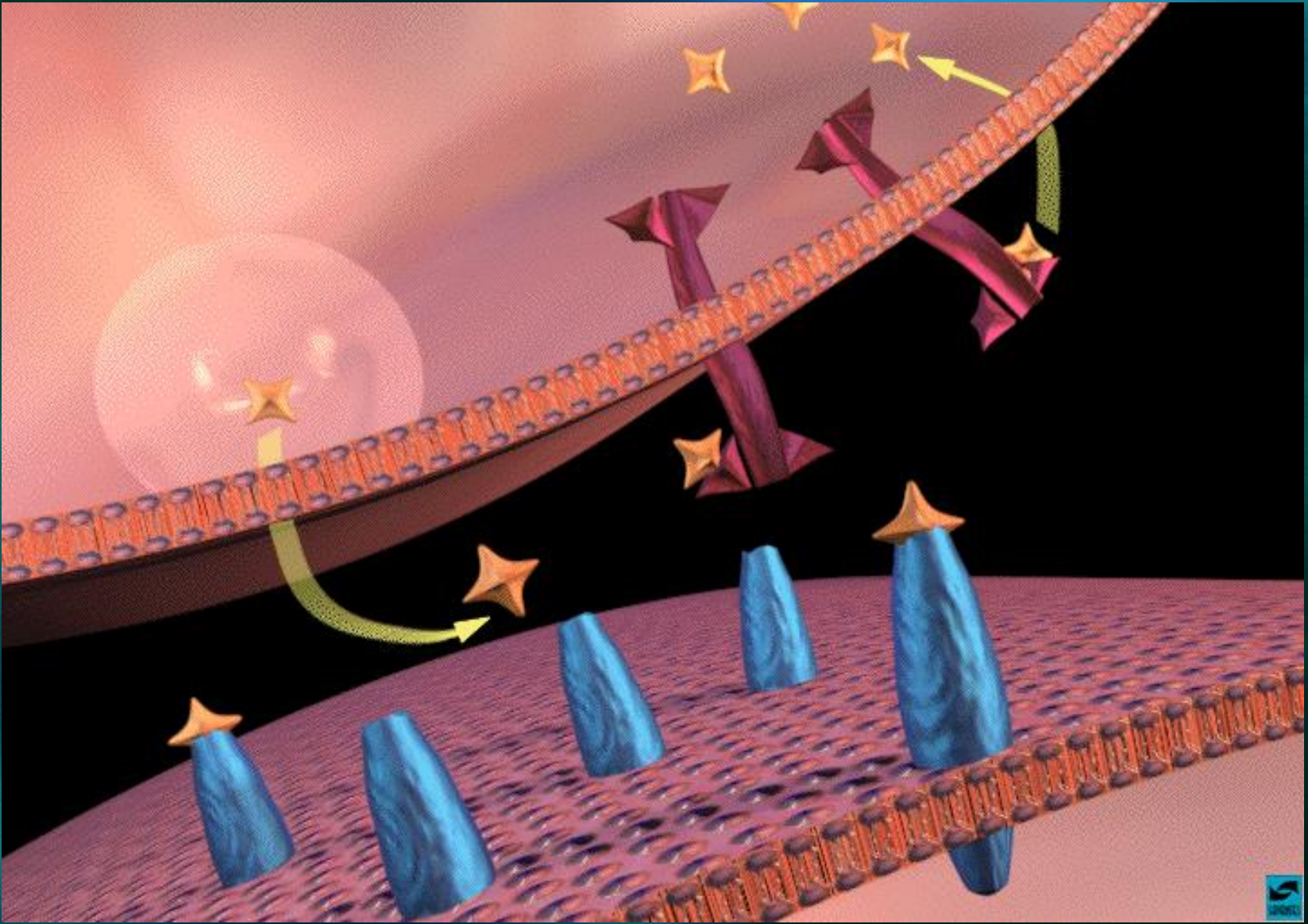
- Treatment:
 - Abstinence
 - Antipsychotic drugs
 - Olanzapine (Zyprexa)
 - Haloperidol (Haldol)

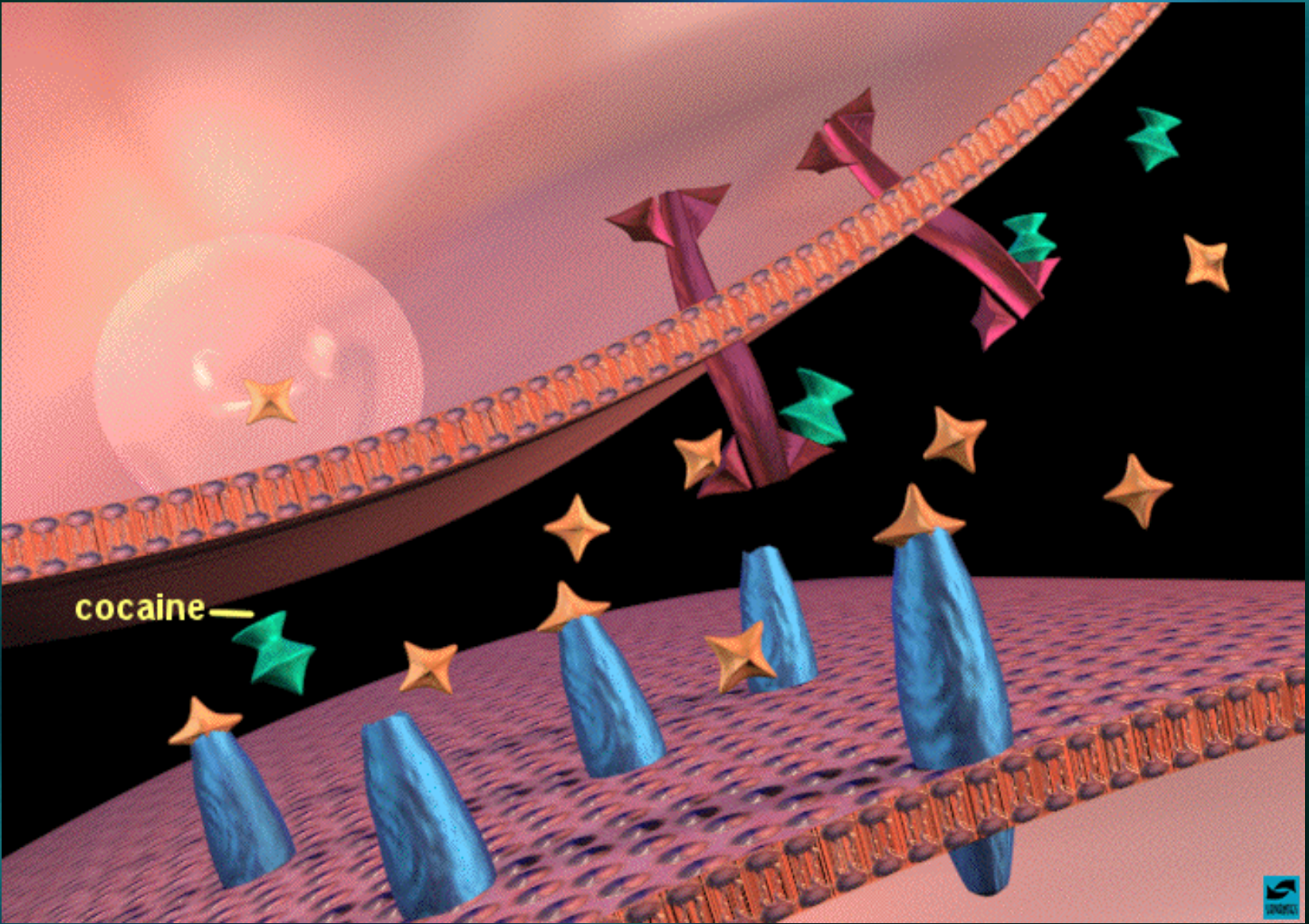


dopamine

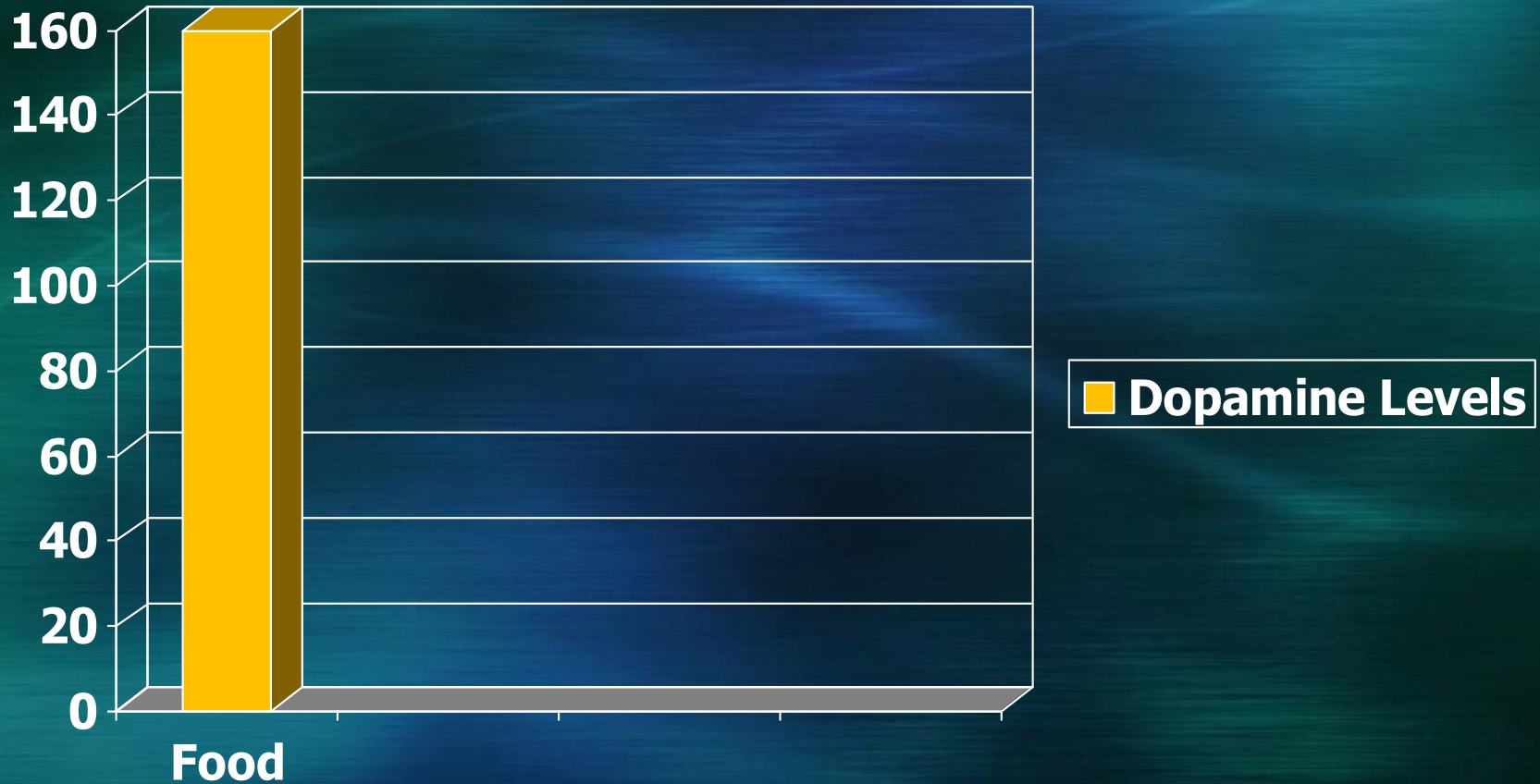
dopamine
receptor



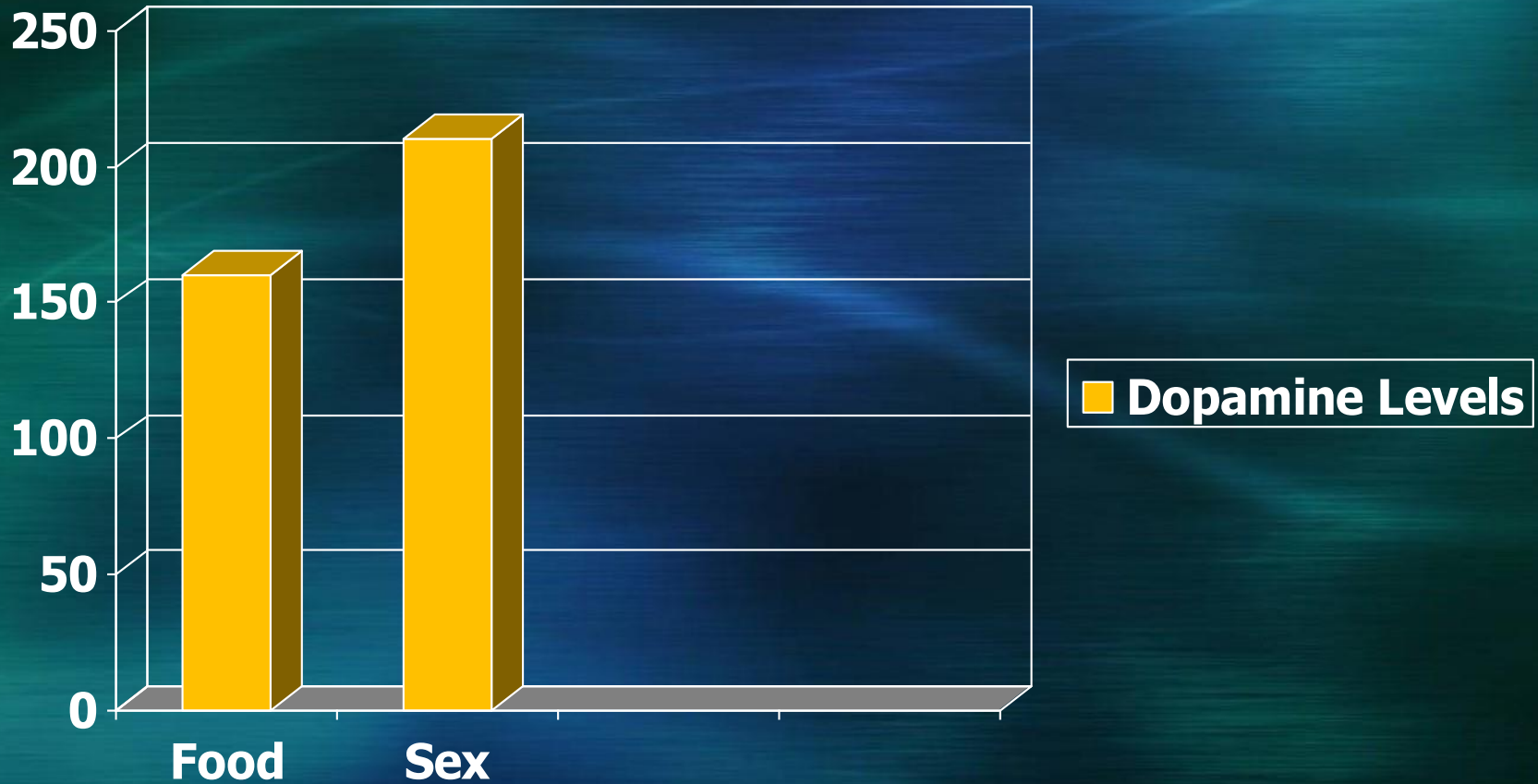




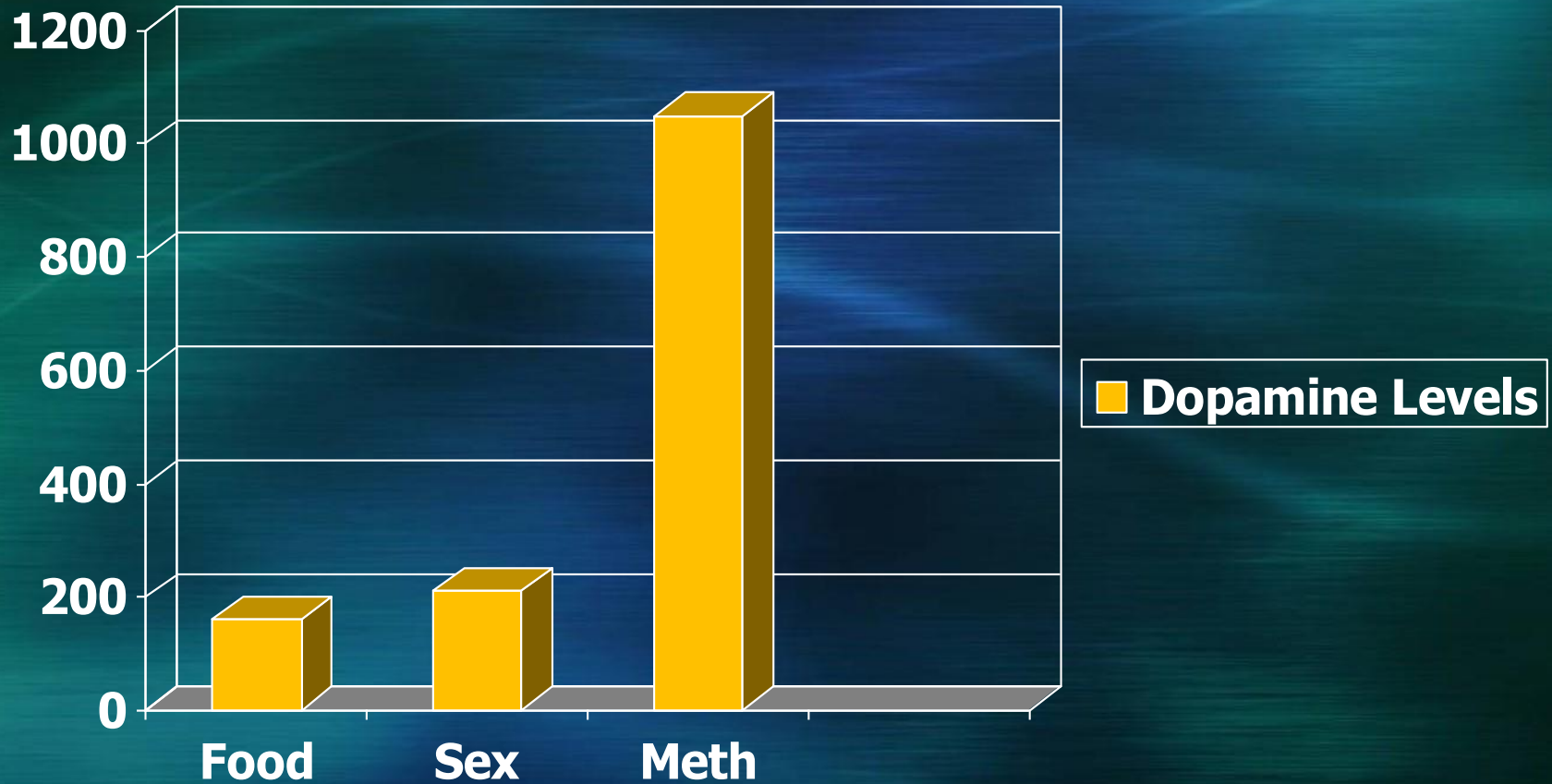
Dopamine Levels in the Shell of the Nucleus Accumbens (% of baseline)



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



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



Amphetamine Use Disorder

- 11 DSM criteria
- Compulsive use despite negative consequences
- May use for days at a time (no sleep or food)
- Tolerance
- Withdrawal symptoms
 - Depression
 - Lack of energy
 - Hypersomnia

Stimulants and Pregnancy

- Admissions for pregnancy-related methamphetamine use disorder increased from 8% of federally funded admissions in 1994 to 24% in 2006
- Lethargy, somnolence and poor feeding sometimes found in amphetamine-exposed infants
- Other birth problems unclear

CNS depressants

- Addiction potential moderate to high
- Tolerance develops
- Physical dependence withdrawal symptoms moderate to severe/life-threatening
- Physical toxicity (overdose) potential moderate to high/other immediate & long-term physical toxicity low
- Low potential for psychiatric impairment

CNS Depressants

- Sedatives
- Benzodiazepines
- Novel Psychoactive Substances (NPS)

Sedative-Hypnotics

- Barbiturates (Rare, but physically dangerous)
- Non-barbiturates (“Z-drugs”)
 - **Zolpidem** (Ambien)
 - Eszopiclone (Lunesta)
 - Zaleplon (Sonata)
- Temazepam (Restoril)

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CNS depressants: Withdrawal symptoms

- Tremor
- Agitation
- Insomnia
- Sweating
- Elevated pulse and blood pressure
- Sensory hypersensitivity
- (Stomach cramps)
- (Nausea/vomiting)
- Seizures

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Benzodiazepines

- Xanax (alprazolam)
- Klonopin (clonazepam)
- Valium (diazepam)
- Ativan (lorazepam)

Benzodiazepines: Neurochemical Action

- Overall sedating effect
- Attachment to the gamma aminobutyric acid (GABA) 2a subreceptor
 - Sometimes call the “benzodiazepine subreceptor”

Benzodiazepines

- Used to treat anxiety & panic attacks
- Widely prescribed in U.S.
- Increasingly seen in emergency rooms (by themselves and with opioids)
- Some “street” benzodiazepines may contain fentanyl (counterfeit Xanax most common)

Benzodiazepines Vary in Potency and Duration

BNZ TYPE

- Xanax
- Klonopin
- Ativan
- Valium
- Librium

TYPICAL DOSE

- 0.25 mg
- 0.25-0.5 mg
- 0.5 mg
- 3.8 mg
- 12 mg

Benzodiazepines Vary in Potency and Duration

BNZ TYPE

- Xanax
- Klonopin
- Ativan
- Valium
- Librium

HALF LIFE

- 12 hours
- 30-40 hours
- 15 hours
- 36 hours
- 36 hours

NPS: Benzodiazepines

- Flualprazolam
- Etizolam

LINKEDIN EMERGING DRUGS OF ABUSE

Benzodiazepines and Pregnancy

- Infants of high dose users will be born physically dependent and require detoxification
- Some studies have shown physical and neurological abnormalities associated with regular benzodiazepine use, but...

Our findings suggest that benzodiazepines use is rare and may be associated with risk for certain birth defects. However, these results need replication and should be interpreted with caution. (Birth Defects Research, 2019)

THANK YOU FOR YOUR ATTENTION!

rwebber@randallwebber.com

randallwebber.com

309-242-9540