Using Addiction Science to Guide Treatment Planning

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

Treatment Planning

- Follows assessment, diagnosis and LOC determination
- A “road map” for facilitating change
- Elements:
  - Problem and problem description
  - Strengths
  - Goals
  - Objectives
  - Interventions

Addiction Science

- Aspects of physical science that are related to substance use disorders
  - Human physiology
  - Genetics
  - Pharmacology
- Behavioral sciences

Principles of Effective Treatment (NIDA)

- Addiction is a complex but treatable disease that affects brain function and behavior
- No single treatment is appropriate for everyone
- Treatment needs to be readily available
- Effective treatment attends to multiple needs of the individual, not just his or her drug abuse
- Remaining in treatment for an adequate period of time is critical

Principles of Effective Treatment

- Behavioral therapies—including individual, family, or group counseling—are the most commonly used forms of drug abuse treatment
- Medications are an important element of treatment for many patients, especially when combined with counseling and other behavioral therapies
- An individual's treatment and services plan must be assessed continually and modified as necessary to ensure that it meets his or her changing needs
- Many drug-addicted individuals also have other mental disorders

Principles of Effective Treatment

- Medically assisted detoxification is only the first stage of addiction treatment and by itself does little to change long-term drug abuse
- Treatment does not need to be voluntary to be effective
- Drug use during treatment must be monitored continuously, as lapses during treatment do occur
- Treatment programs should test patients for the presence of HIV/AIDS, hepatitis B and C, tuberculosis, and other infectious diseases as well as provide targeted risk-reduction counseling, linking patients to treatment if necessary

Principles of Effective Treatment

- Treatment varies depending on the type of drug and the characteristics of the patient. The best programs provide a combination of therapies and other **services**

Evidence-based strategies

- Cognitive-behavioral therapy (alcohol, marijuana, cocaine, methamphetamine, nicotine)
  - Emphasis on identifying high risk situations, developing strategies for managing them and coping/social skills training
- Contingency management/motivational incentives (alcohol, opioids, stimulants, marijuana, nicotine)
  - Contingency management (CM) principles = giving patients tangible rewards to reinforce positive behaviors such as abstinence.

Evidence-based strategies

- Community reinforcement plus vouchers (alcohol, cocaine, opioids)
  - Uses a range of recreational, familial, social, and vocational reinforcers, along with material incentives, to make a non-drug-using lifestyle more rewarding than substance use.
  - Focus on
    - improving family relations
    - Learning a variety of skills to minimize drug use
    - Receiving vocational counseling
    - Developing new recreational activities and social networks

Evidence-based strategies

- Motivational enhancement therapy (MET: alcohol, marijuana, nicotine)
  - Helps individuals resolve their ambivalence about engaging in treatment and stopping their drug use
  - Aims to evoke rapid and internally motivated change, rather than guide the patient stepwise through the recovery process.

Stages of change

- Precontemplation
- Contemplation
- Preparation
- Action
- Maintenance

Evidence-based strategies

- Matrix model (stimulants)
  - Multi-modality approach
    - Relapse prevention
    - Psychoeducation
    - Family sessions
    - Self-help group participation

Evidence-based strategies

- 12 step facilitation
  - An active engagement strategy designed to increase the likelihood of a substance abuser becoming affiliated with and actively involved in 12-step self-help groups
  - Three key ideas
    - Acceptance
    - Surrender
    - Active involvement in 12-step meetings and related activities.

Evidence-based strategies

- Family Behavior Therapy
  - **The family is the client**
  - Therapists seek to:
    - Engage families in applying the behavioral strategies taught in sessions
    - Help families acquire new skills to improve the home environment

Stress and Addiction

- Stress: The subjective experience of negative emotional states coupled with physiological activation that often produces uncomfortable physical sensations
  - Elevated pulse and blood pressure
  - Cardiovascular complications
  - Gastrointestinal distress
  - Muscle tension

Stress and relapse

- Stress (of many varieties) can be a factor in use and relapse
- Stress reduction:
  - Reduce cortisol levels
  - Increase alpha waves
  - Improve concentration
- Stress reduction techniques*
  - Yoga
  - Acupuncture
  - Exercise
  - Neurofeedback
  - Meditation/mindfulness

Types of brain waves

- Four types of brain waves:
  - Delta: Deep, dreamless sleep
  - Theta: REM sleep, dreaming
  - Alpha: Relaxation, calmness
  - Beta: Wakefulness, alertness, but also anxiety and stress

Stress and relapse

- Stress (of many varieties) can be a factor in use and relapse
- Stress reduction:
  - Reduce cortisol levels
  - Increase alpha waves
  - Improve concentration
- Stress reduction techniques*
  - Yoga
  - Acupuncture
  - Exercise
  - Neurofeedback
  - Meditation/mindfulness

Stress and relapse

- Stress reduction techniques*
  - Social companionship

Yoga

- Increases alpha waves
- Reduces back pain
- Lowers blood pressure and pulse

Acupuncture

- Thought to work by engaging the endorphin system
- Clinicians and clients say it lessens opioid withdrawal symptoms and reduces drug craving
- Same results in research as sham acupuncture

Exercise

- Animals will press a bar to earn exercise time
- Exercise reduces reinstatement of drug (cocaine, alcohol, opioids, nicotine) seeking in animals
- Reduces behavioral and neurobiological consequences of prolonged stress in laboratory animals
- ↑ endorphin levels
- Promotes relaxation
- ↓ anxiety and depression
- Aids mindfulness

Neurofeedback

- Provides client with real-time information regarding their brain wave activity
- Client taught to monitor brain wave activity and test methods of generating alpha waves

Meditation/mindfulness

- Generation of alpha wave activity

FAKE SCIENCE

“Krokodil”:

A Media Rumor Runs Wild

A lesson in how to divert attention from real problems

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

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."

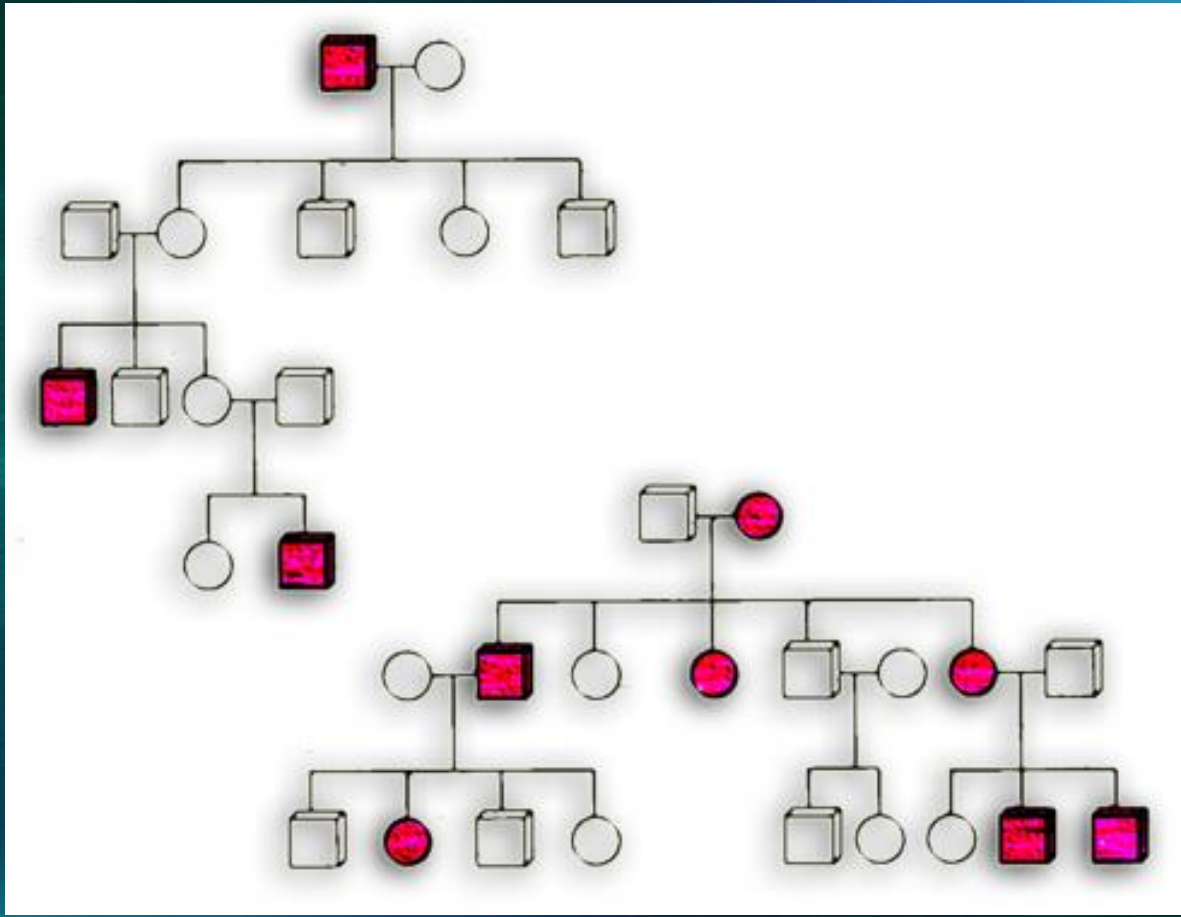
Some experts in law enforcement and public health say it's unlikely the drug will be widely used beyond the remote areas of Russia and eastern Europe where it became popular a decade ago.

Krokodil is a myth. So what?

- “Krokodil” symptoms probably caused by bacterial infection such as necroticizing fasciitis ("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?

Genetics

- DNA
- Chromosome
  - 23 pairs of chromosomes
  - 1 pair are sex chromosomes (XX or YX)
- Gene
- Allele
- Dominant Vs recessive genes
- Phenotype



Genetics

- Family studies
  - Probands
  - Relatives (1º, 2º, etc.)
  - Twin studies
  - Probabilistic Vs. deterministic
  - Drug availability
  - Environment
  - Cloninger
    - Milieu-limited (Type I)
    - Male-limited (Type II)

Cloninger's Typology of Alcoholism

Type I

- Affects both men and women
- Requires both genetic and environmental predisposition
- Late onset
- Can take on mild and severe forms
- Low novelty seeking and high harm avoidance

Type II

- Affects men
- Primarily genetic/weak environmental influence
- Early onset
- Moderate and severe forms
- High novelty seeking and low harm avoidance
- Congenitally high tolerance for alcohol

Genetics

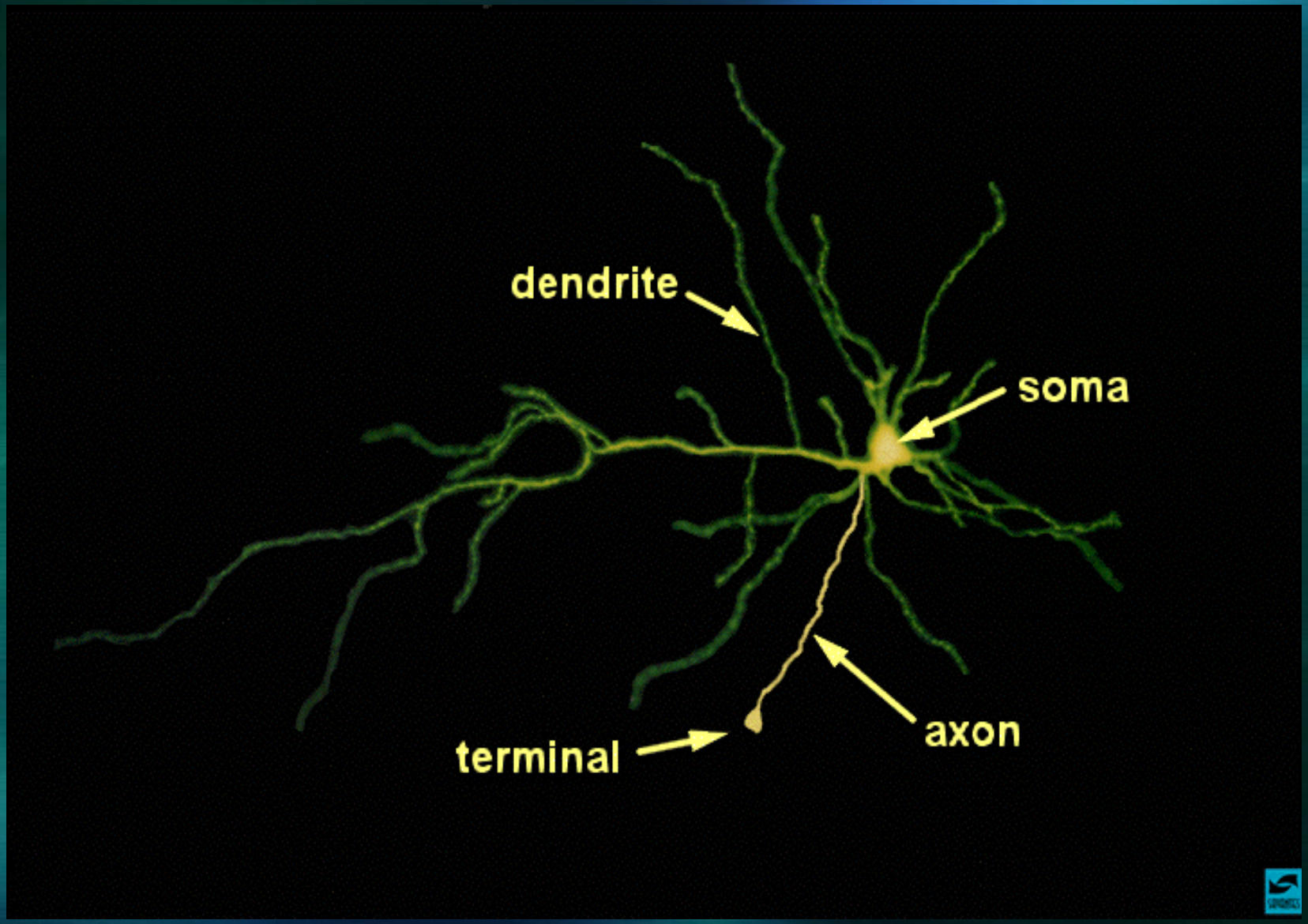
- 40-60% of risk for addiction is genetic, but some of the protective factors are too.
- Several “candidate” genes have been identified
  - The A1 allele of the dopamine receptor gene *DRD2* (alcohol and cocaine)
  - Nicotine use disorder
  - (Protective against nicotine use disorder)
  - Alcohol use disorder
  - *ALDH*2* gene (Protective against alcohol use disorder)
  - Amphetamine psychosis

Genetics

- General genetic risk is balanced by drug-specific risk and environmental factors
  - General genetic risk: 31%
  - Drug-specific risk*: 25%
  - Environmental risk: 44%

* Opioids: 50%
  Marijuana, sedatives and stimulants: 30%
  Psychedelics: 15%

Neuroscience

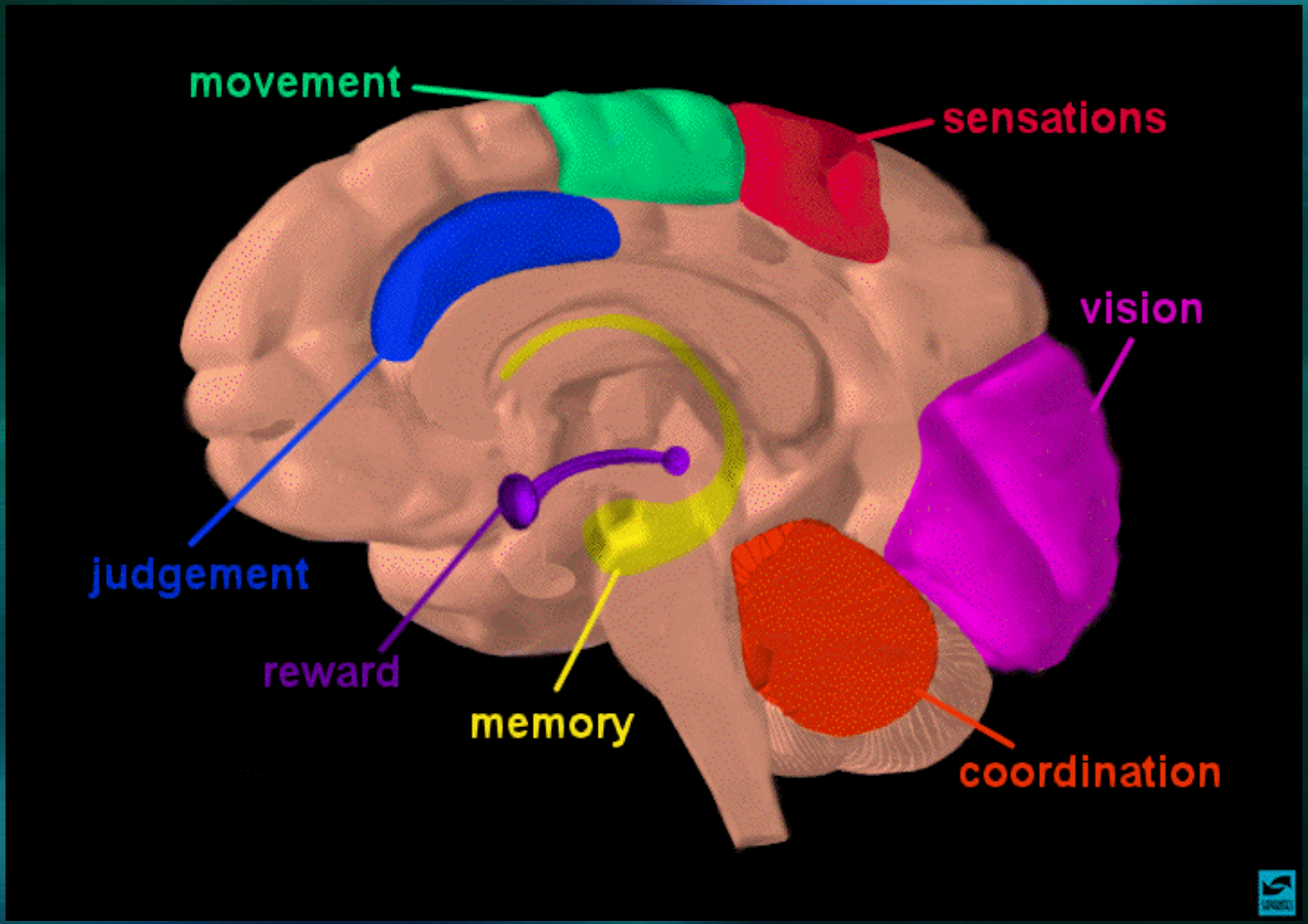

dendrite
soma
terminal
axon

Executive Functioning: Frontal lobes are "boss"

- Planning and organizing
- Monitoring (self-appraisal skills)
- Flexibility (problem solving, seeing multiple options)
- Shifting set (the ability to disengage from one activity to another thought or action)
- Self-restraint and self-control (inhibition of impulses)
- Organization

Executive Functioning: Frontal lobes are “boss”

- Self-restraint and self-control (inhibition of impulses)


movement
sensations
vision
judgement
reward
memory
coordination

The Memory of Drugs

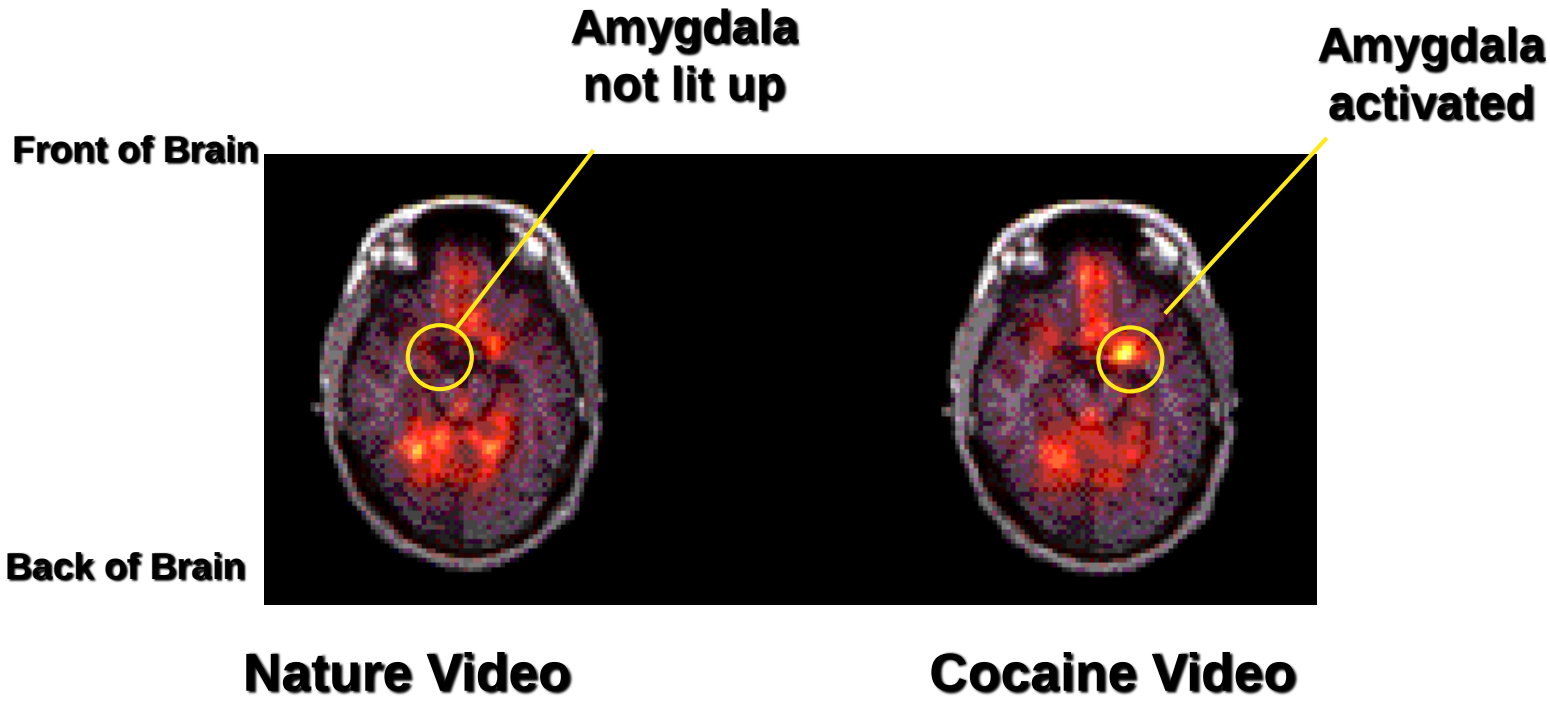
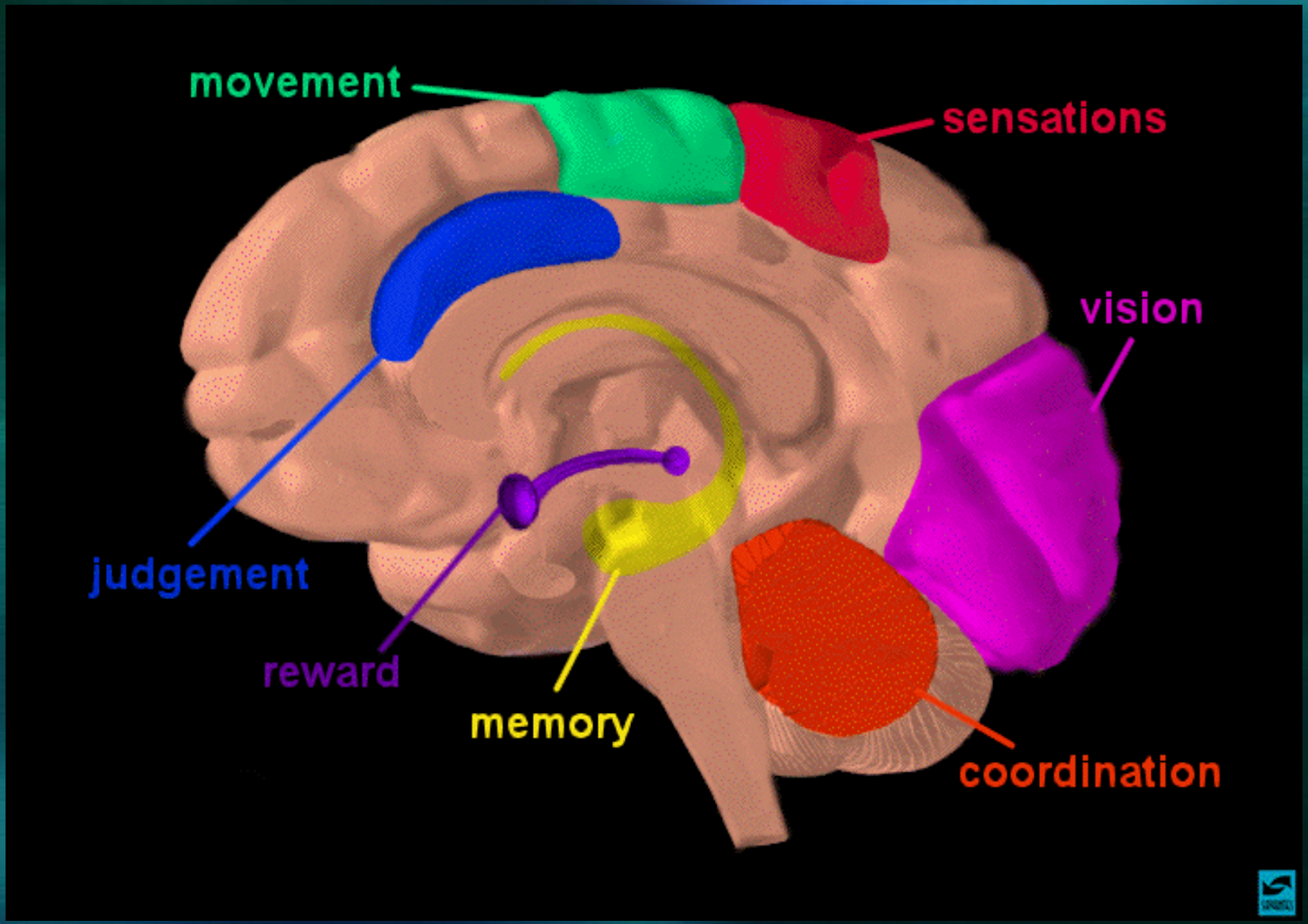
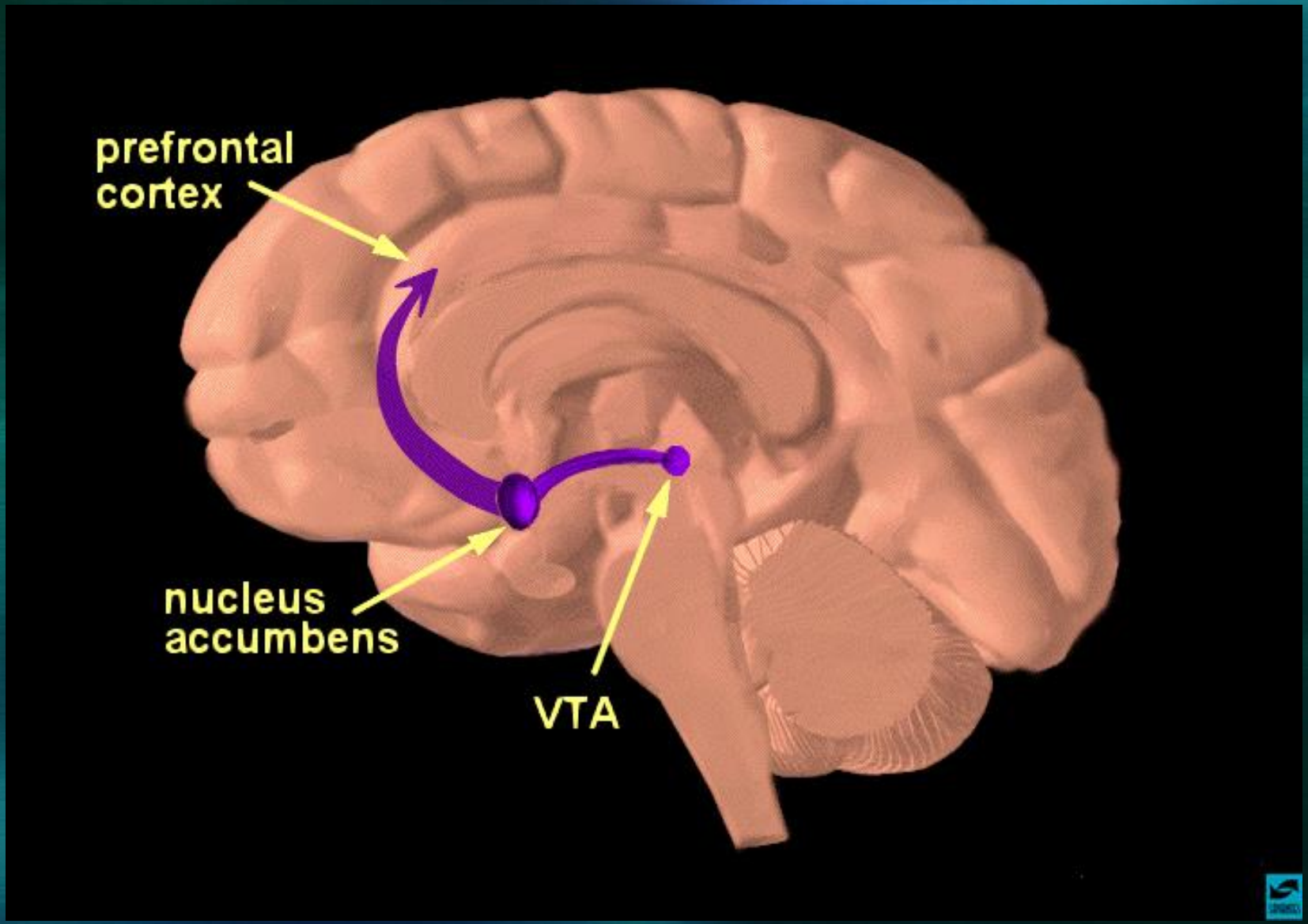
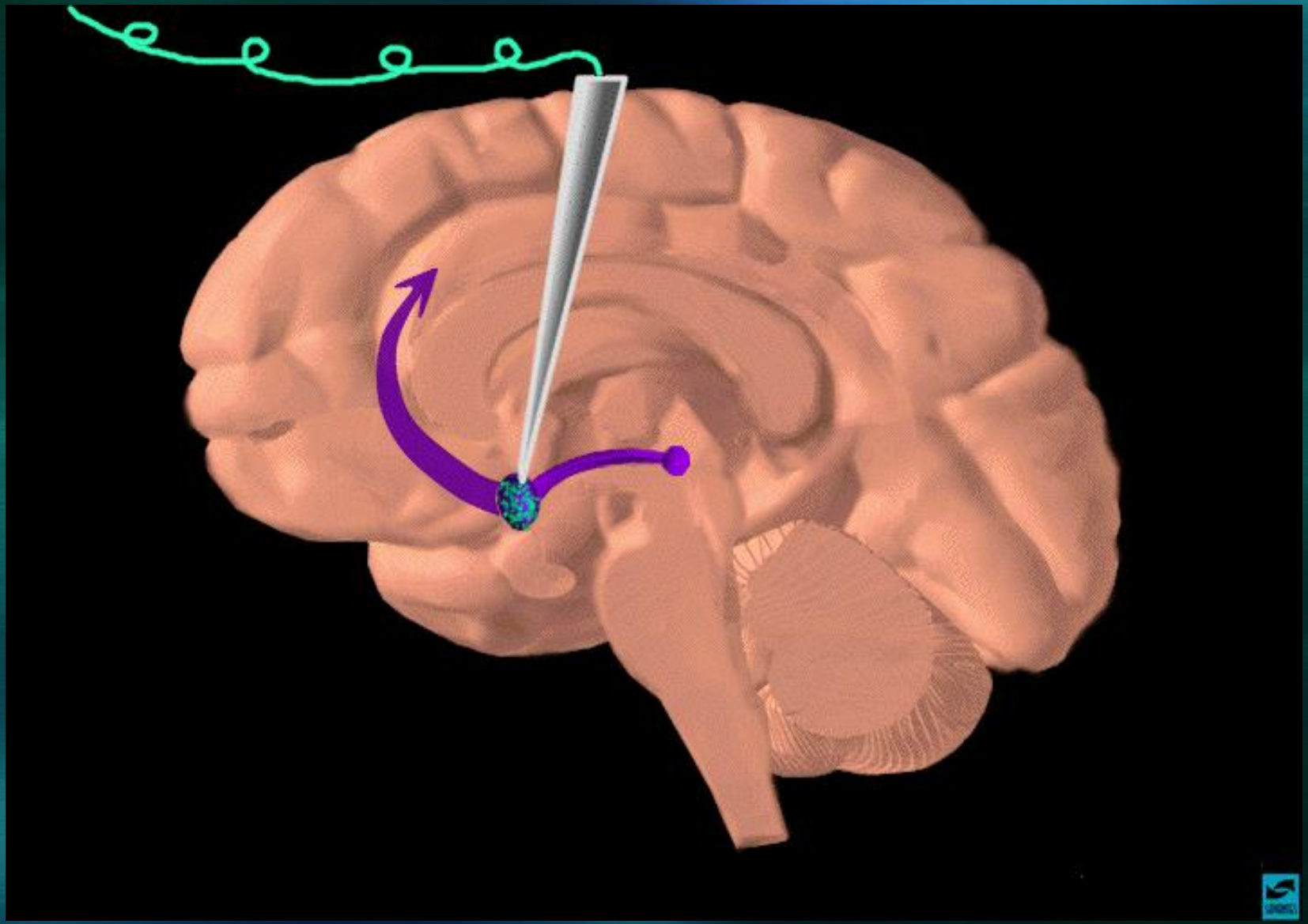


Photo courtesy of Anna Rose Childress, Ph.D.


movement
sensations
vision
judgement
reward
memory
coordination


prefrontal
cortex
nucleus
accumbens
VTA



NEUROTRANSMITTERS

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

Neurotransmitters

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

NEUROTRANSMITTERS

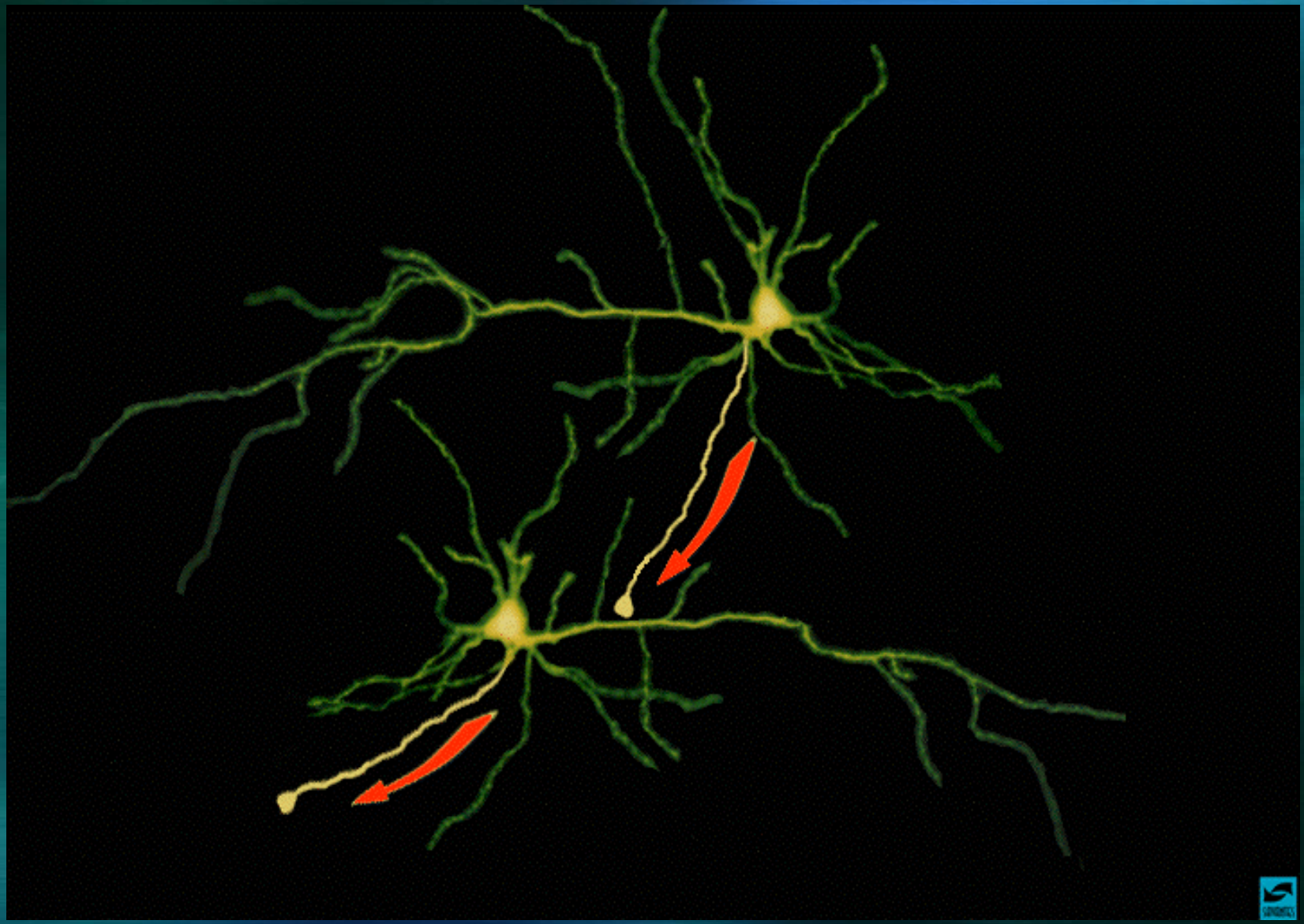
- Naturally-occurring brain chemicals
- Many psychoactive drugs resemble neurotransmitters:

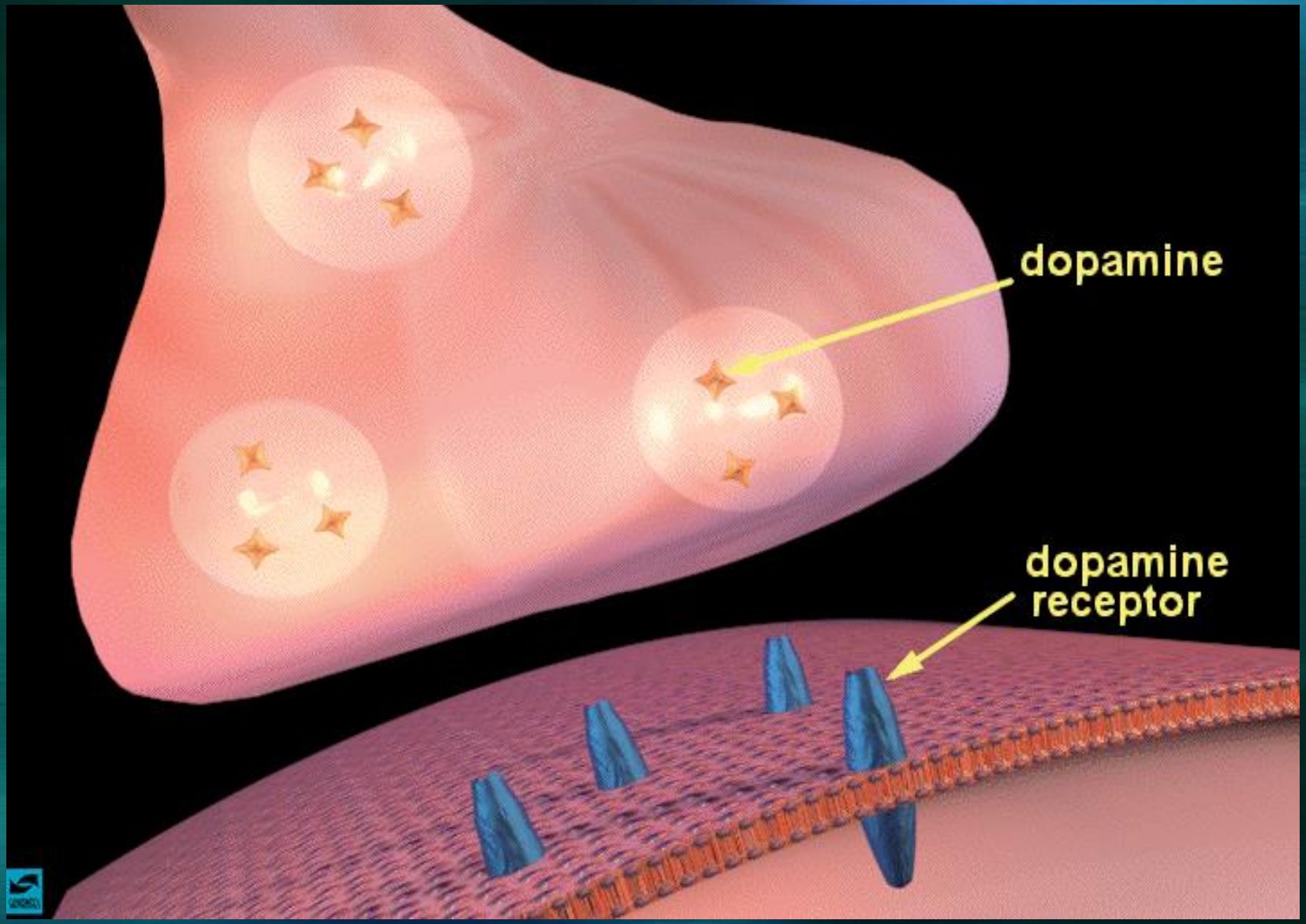
NEUROTRANSMITTERS

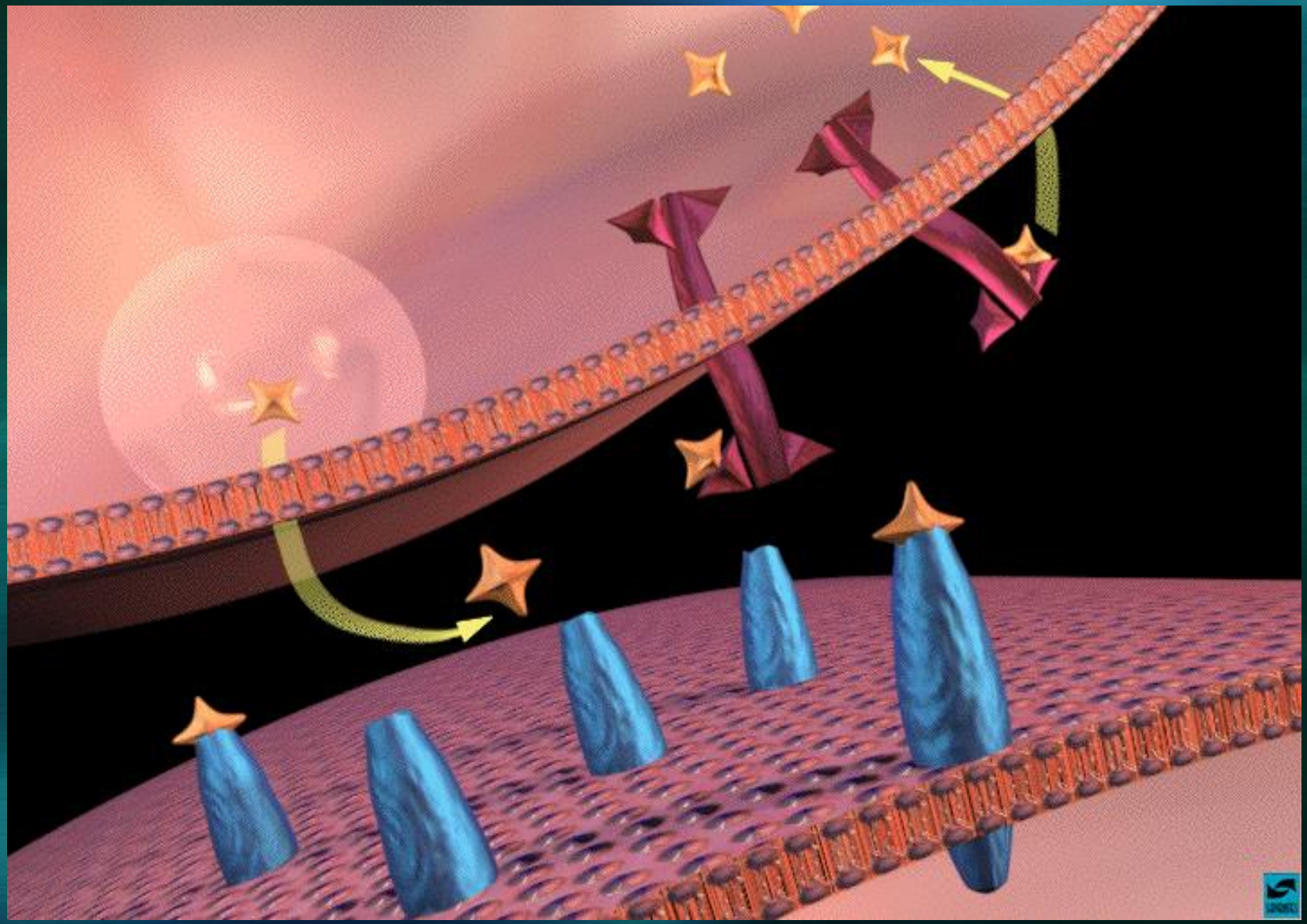
DRUG	NEUROTRANSMITTER
LSD	Serotonin
Methamphetamine	Norepinephrine
heroin	Endorphins

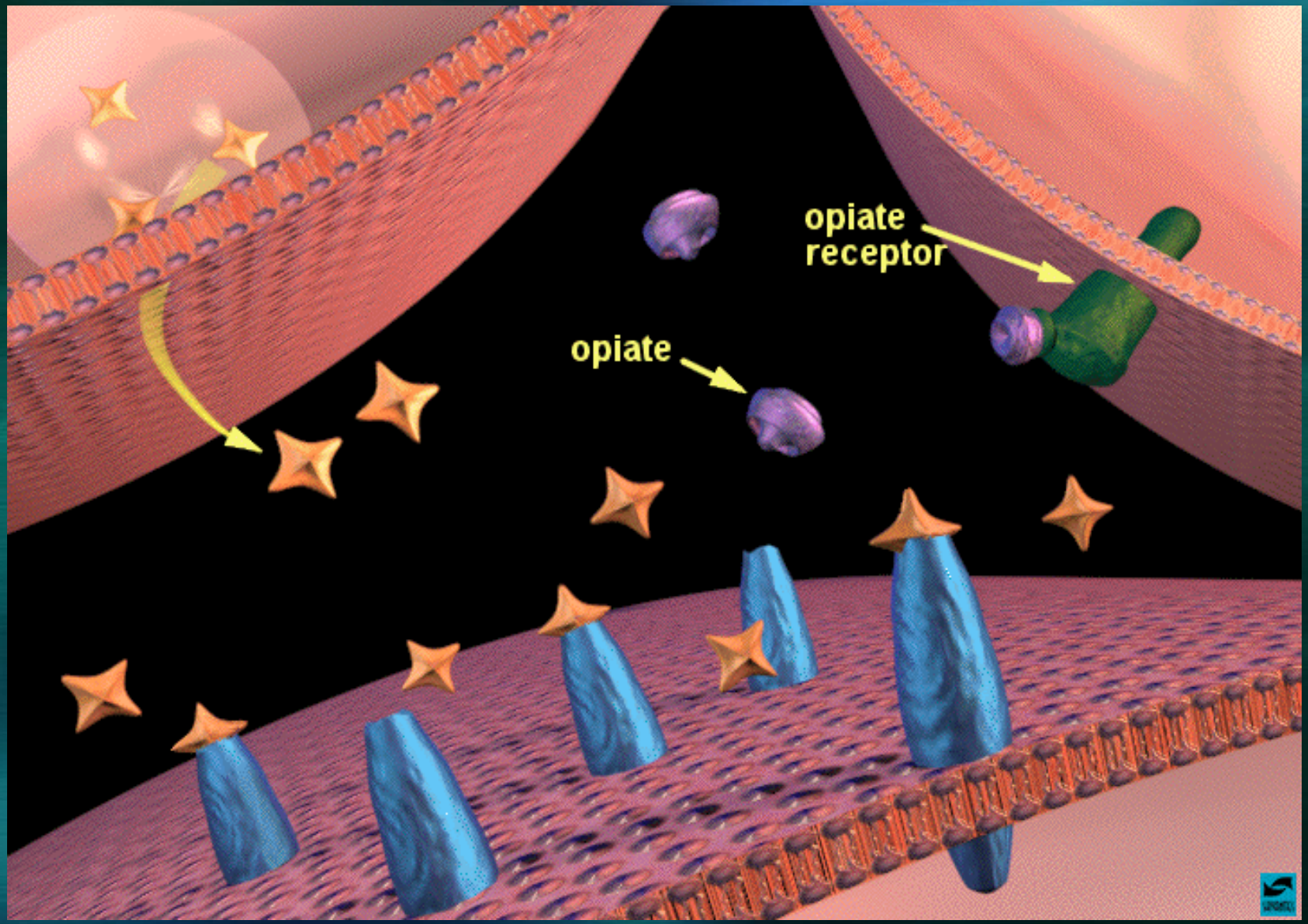
NEUROTRANSMITTERS

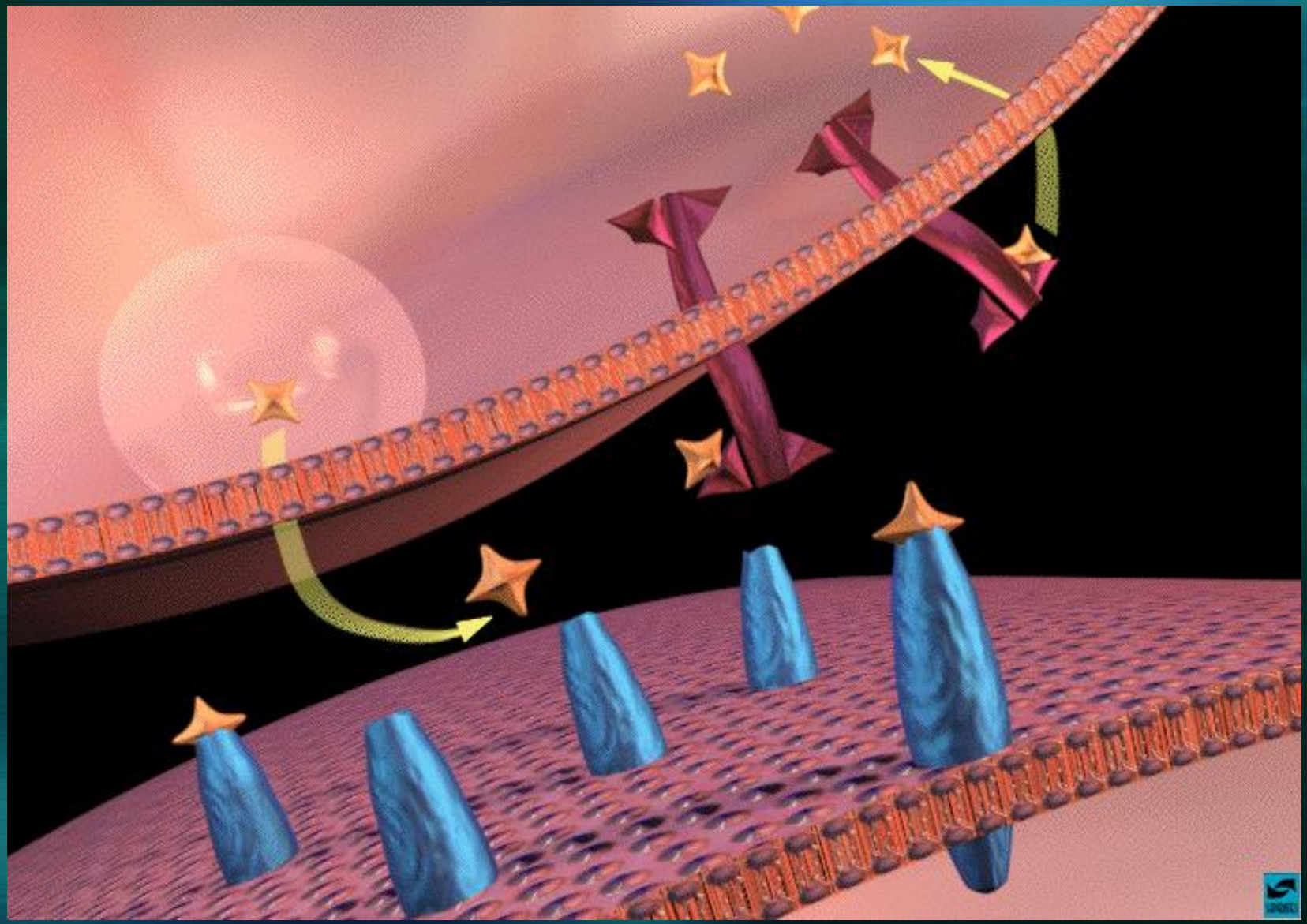
DRUG	NEUROTRANSMITTER
THC	Anandamide
PCP	Receptor site identified but not associated neurotransmitter

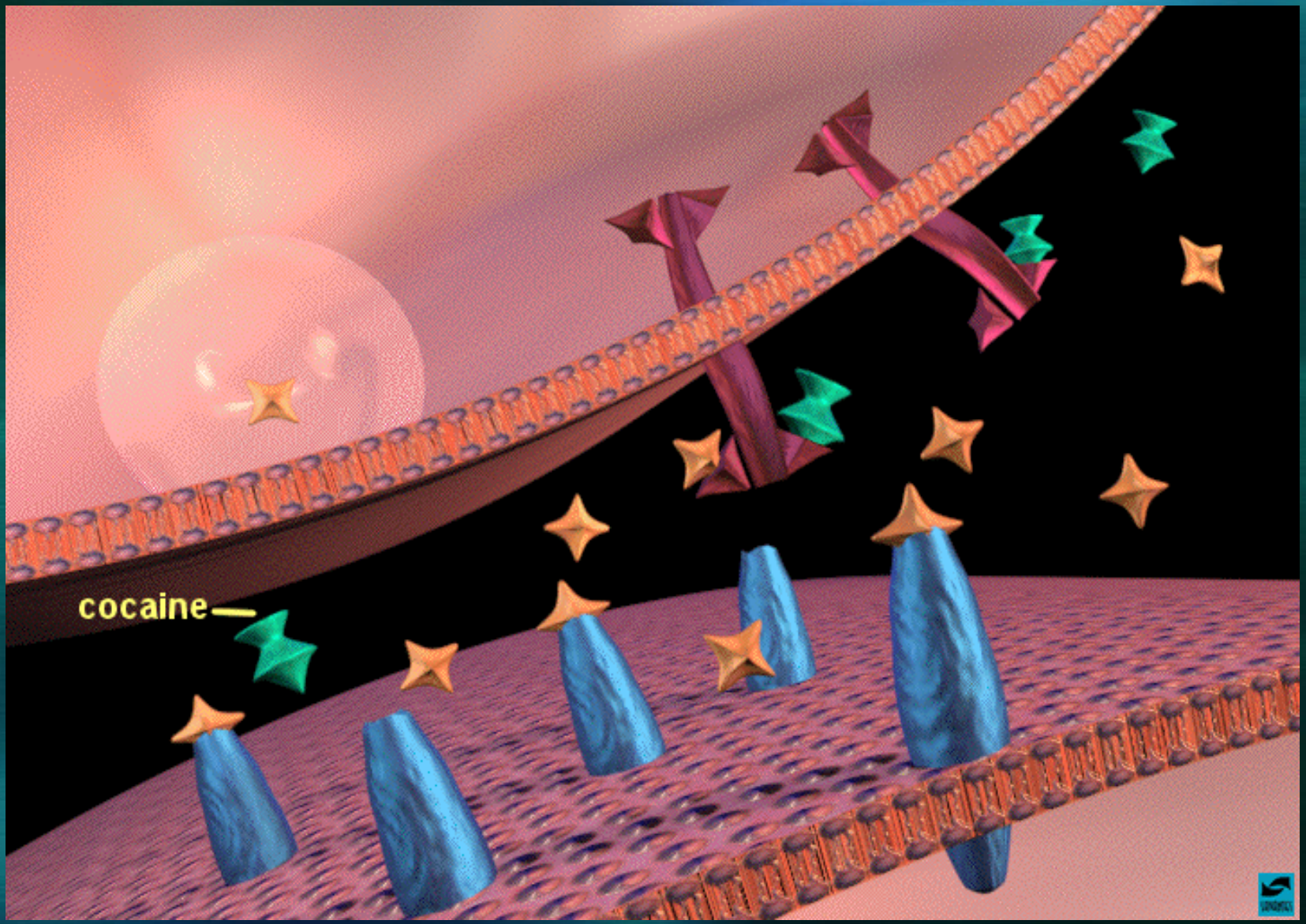


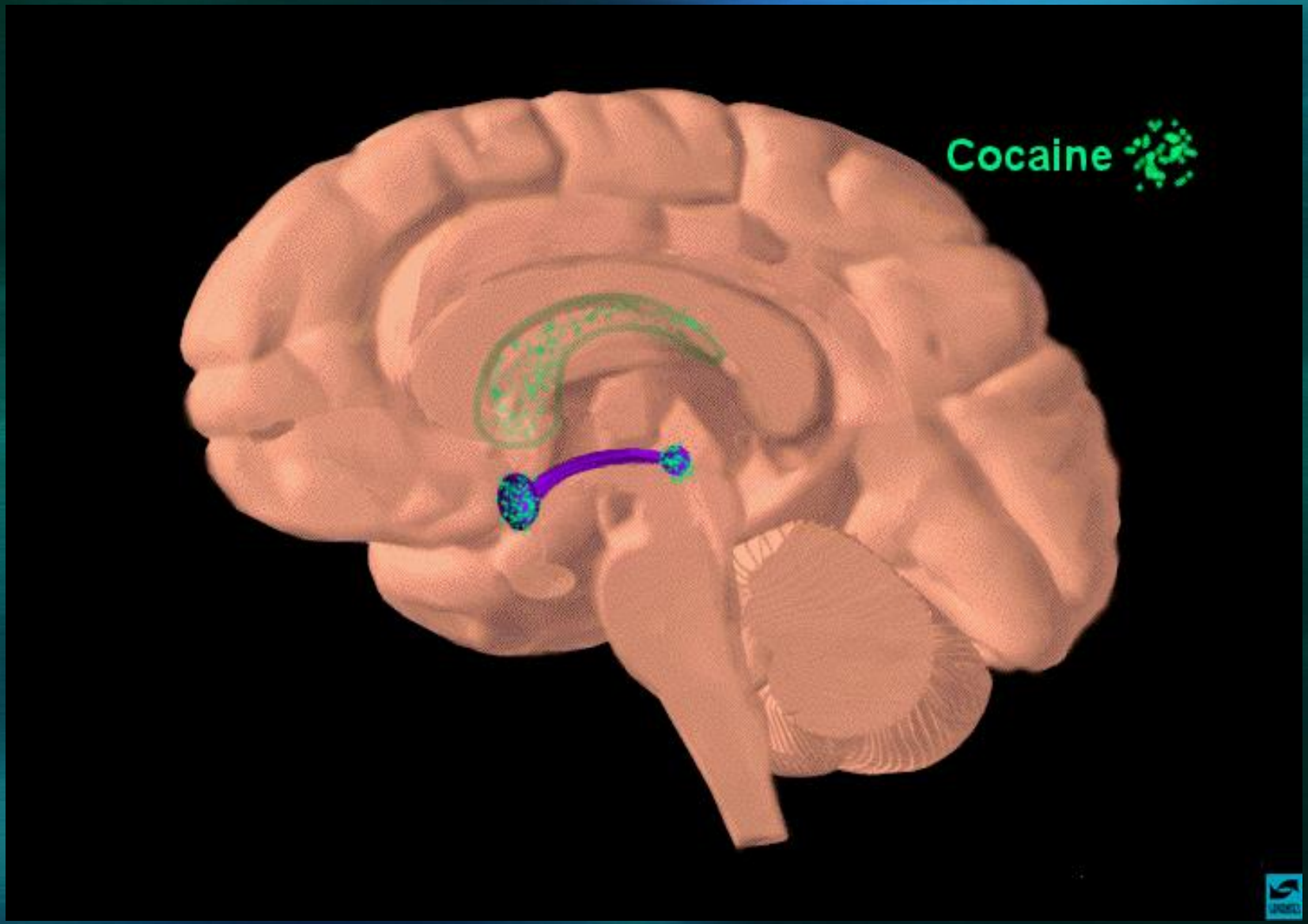

dopamine
dopamine receptor




opiate
receptor
opiate

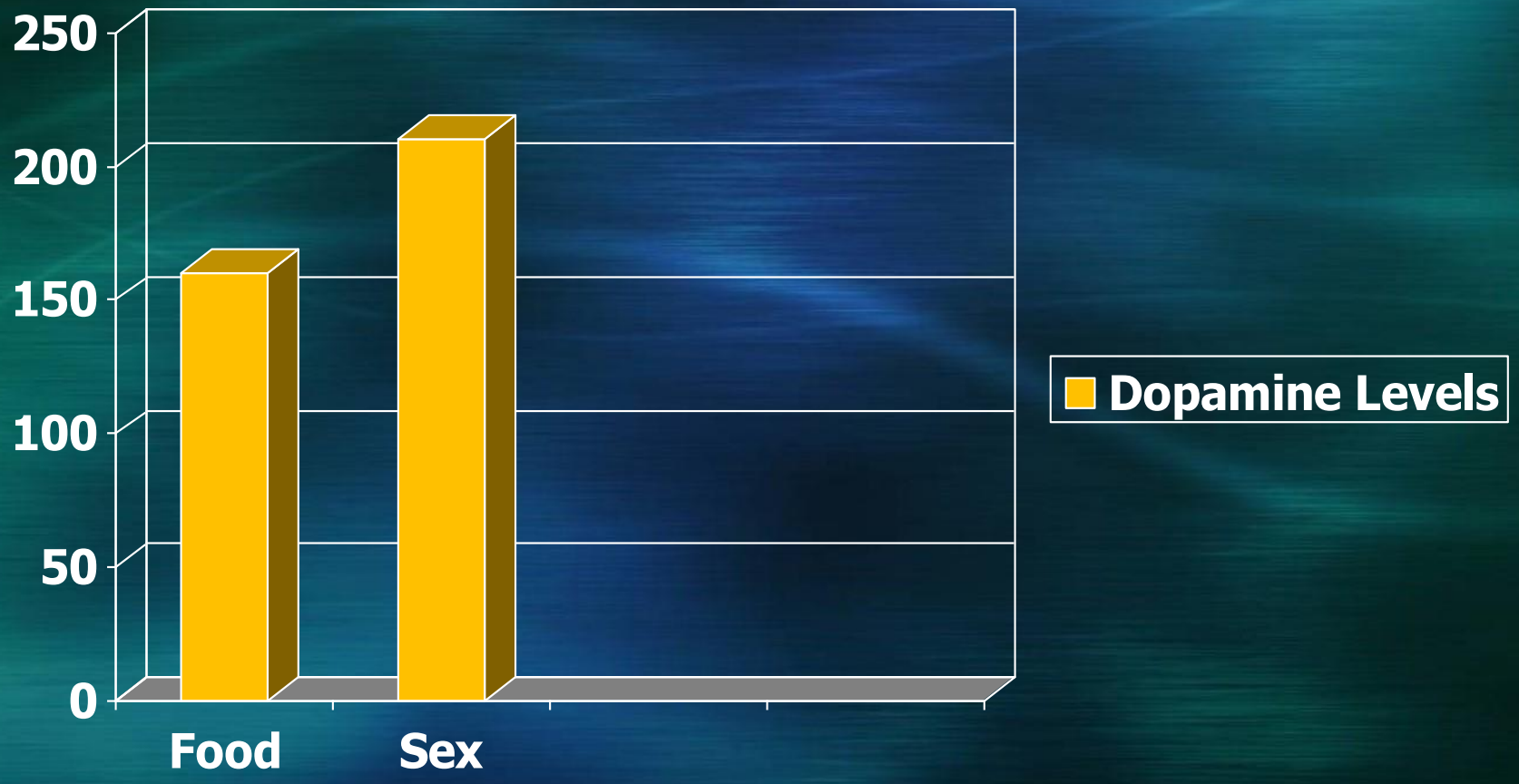



cocaine

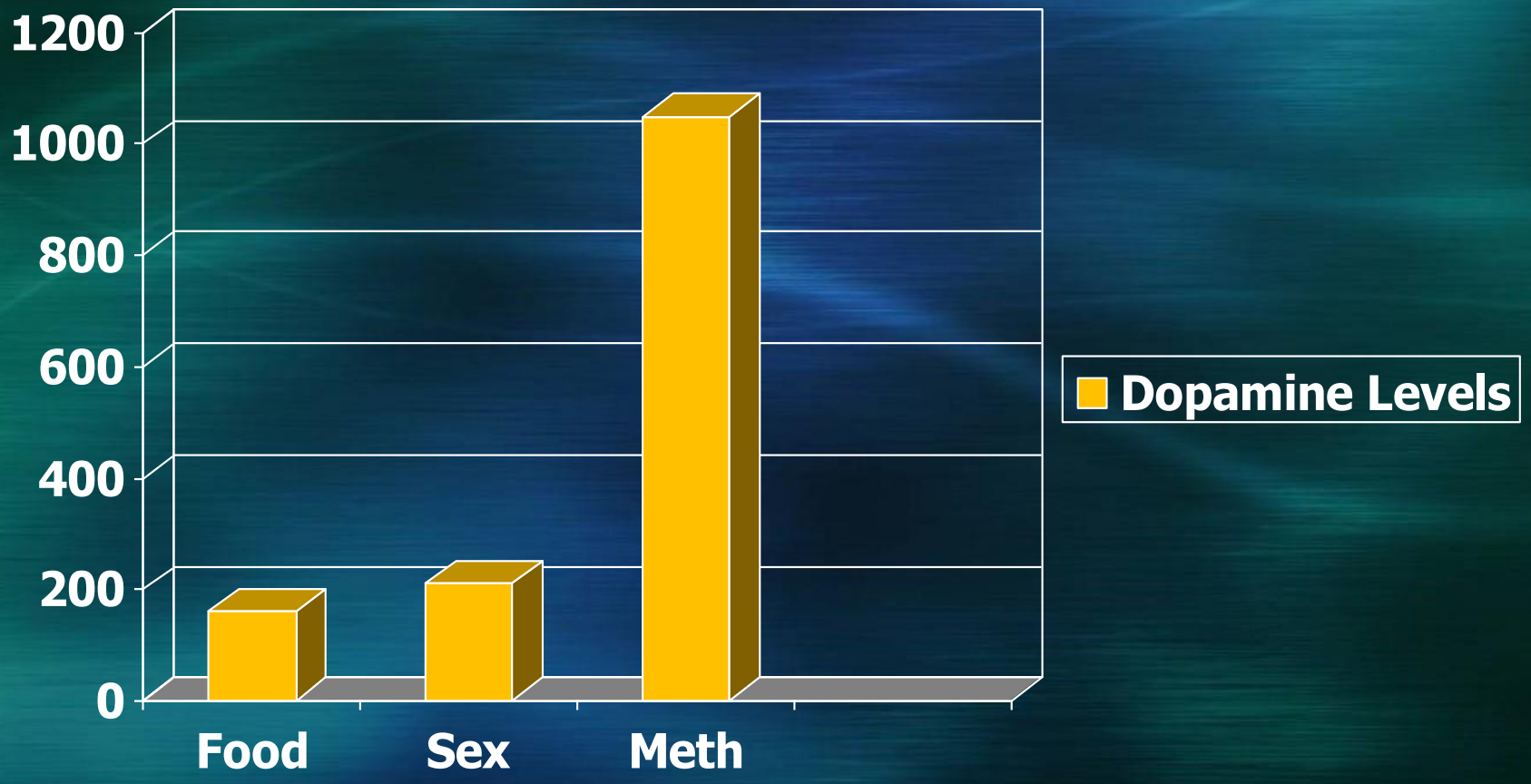

Cocaine

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)



Dopamine

- Liking
- Wanting
- Salience

Wanting Vs. Liking

- The brain's reward system has two elements: wanting and liking. These form the two components of pleasure
- Wanting = incentive salience (What drives us to place value on something, to desire it and to expect positive outcomes)
  - Usually unconscious
  - Basis for "triggers"
- Liking = enjoyment

Wanting Vs. Liking

- Wanted and liked: Food, cocaine (Before SUD)
- Wanted, not liked: Female cats & mating, cocaine (After SUD)
  - The person will expend great energy to get the drug (want it more and more), but like it less and less
  - Manipulation: Stimulate lateral hypothalamus & animal will eat, but not like it

Wanting Vs. Liking

- Liked, wanted (unconsciously) but not wanted (consciously): Hot fudge sundaes while on a diet

PHARMACOLOGY

TIME FACTORS

- Onset of action: How quickly does the drug produce an 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

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

Stimulants (cocaine, amphetamines)

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

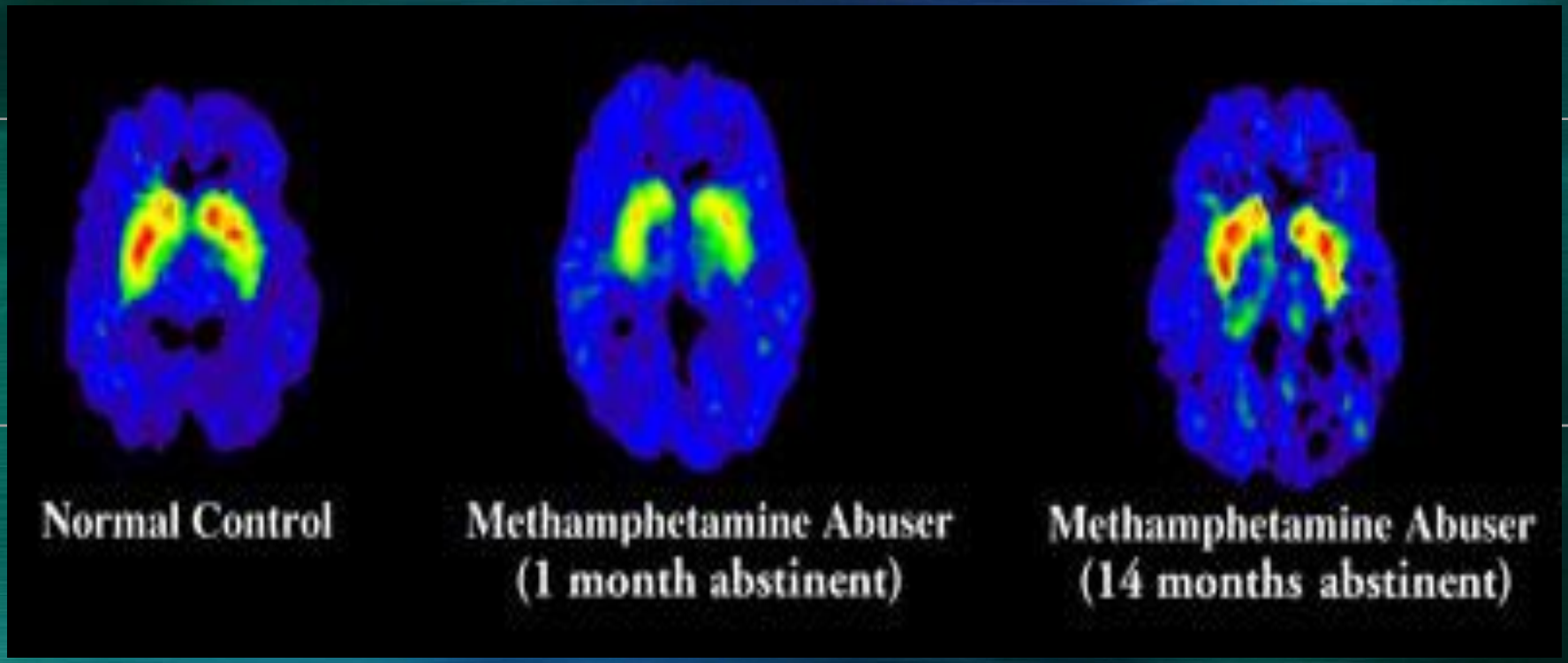
* Method of administration affects nature of the high

Amphetamine Addicts

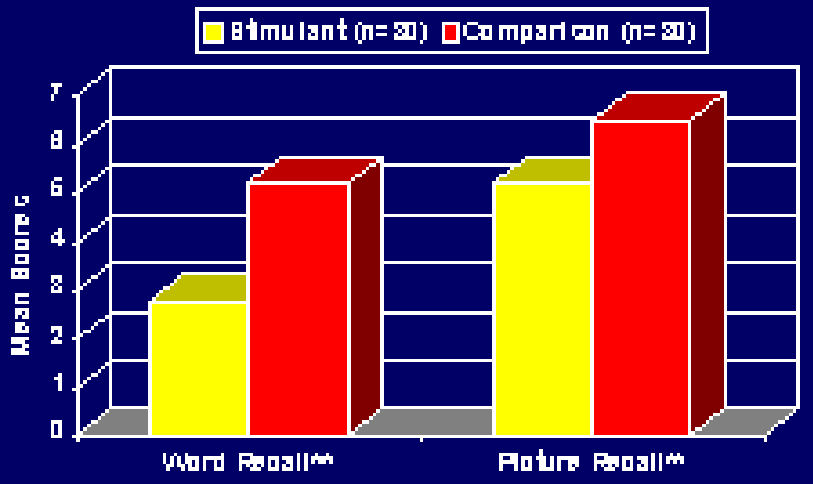
Methamphetamine Research

- Reduction in dopamine reuptake transporters (DAT)
  - Impairment of motor skills
  - Memory problems
  - Difficulty with written information

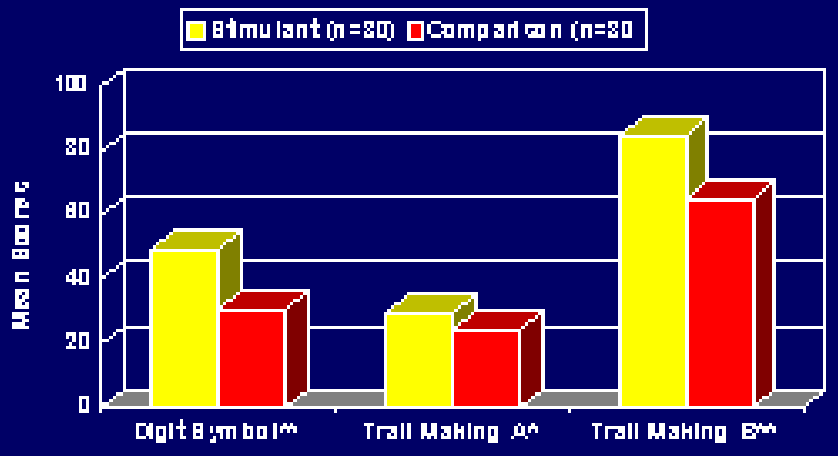
DAT Reduction Linked to Problems with Motor Skills and Memory



Memory Difference between Stimulant and Comparison Groups



Differences between Stimulant and Comparison Groups on tests requiring perceptual speed



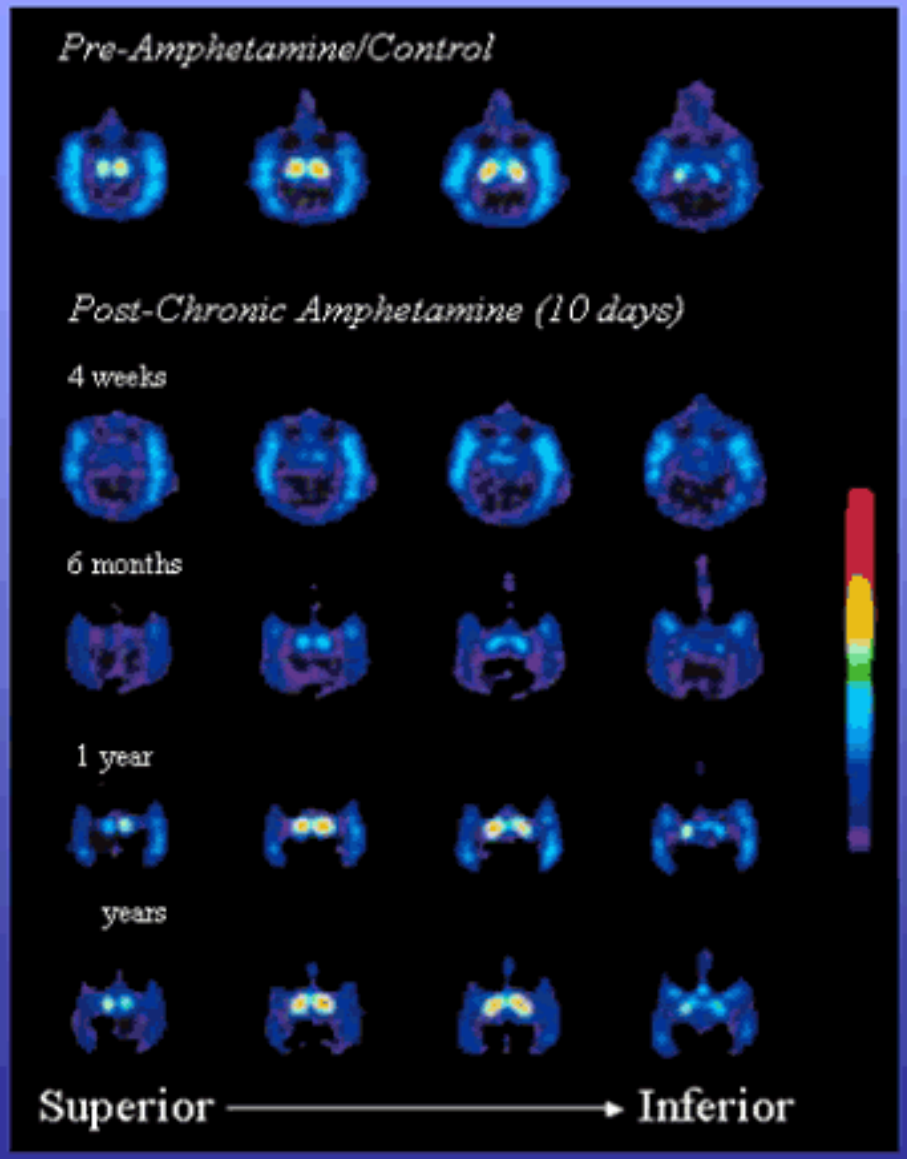
Summary

- Actively using MA addicts demonstrate impairments in:
  - the ability to manipulate information
  - the ability to make inferences
  - the ability to ignore irrelevant information
  - the ability to learn
  - the ability to recall material

Summary (cont.)

- Some deficits are resolved after a period of 12-weeks of abstinence:
  - The ability to ignore irrelevant information
  - The ability to manipulate information

Drugs Have Long-term Consequences



CANNABIS

December 5, 2017

Smokers are 7 times more likely to use marijuana daily, study says

Cannabis

- Low to moderate addiction potential
- Tolerance develops
- Low potential for physical toxicity
- Low for psychiatric impairment*

- Use seems to suppress REM sleep

* Adolescents have high risk of psychosis and cognitive impairment

CANNABIS RESEARCH

- Receptor sites
- Endogenous cannabinoids
- Antagonist
- Withdrawal
- Stimulation of the reward circuit

CANNABIS RESEARCH

- Cannabis/opiate interaction
- Cognitive Impairment

CANNABIS RESEARCH: Receptor Sites/Endogenous Cannabinoids

- CB_1 & CB_2
- Specific for endogenous cannabinoids
  - Anandamide
  - Arachnidonyl Glycerol
- Δ-9 THC also fits these receptors
- Other cannabinoids (e.g., cannabidiol) use CB_2 receptor

Receptors/Endogenous Cannabinoids: Clinical Implications

- Might some cannabis addicts have an endogenous cannabinoid deficiency?
- What would be the implications of this for recovery?

AGONISTS & ANTAGONISTS

- Agonist: Occupies receptor site and causes a change in the neuron
- Antagonist: Occupies receptor site

CANNABIS RESEARCH: Antagonist

- SR141617A
- Blocks the effects of cannabis, but not other drugs
- Will produce immediate reversal of cannabis effects

CANNABIS RESEARCH: Withdrawal

- Cannabis dependence can include withdrawal signs
- Severity: Mild to Moderate
- May be more severe in smokers with a long history of cannabis use
- Can last from 3-28 days

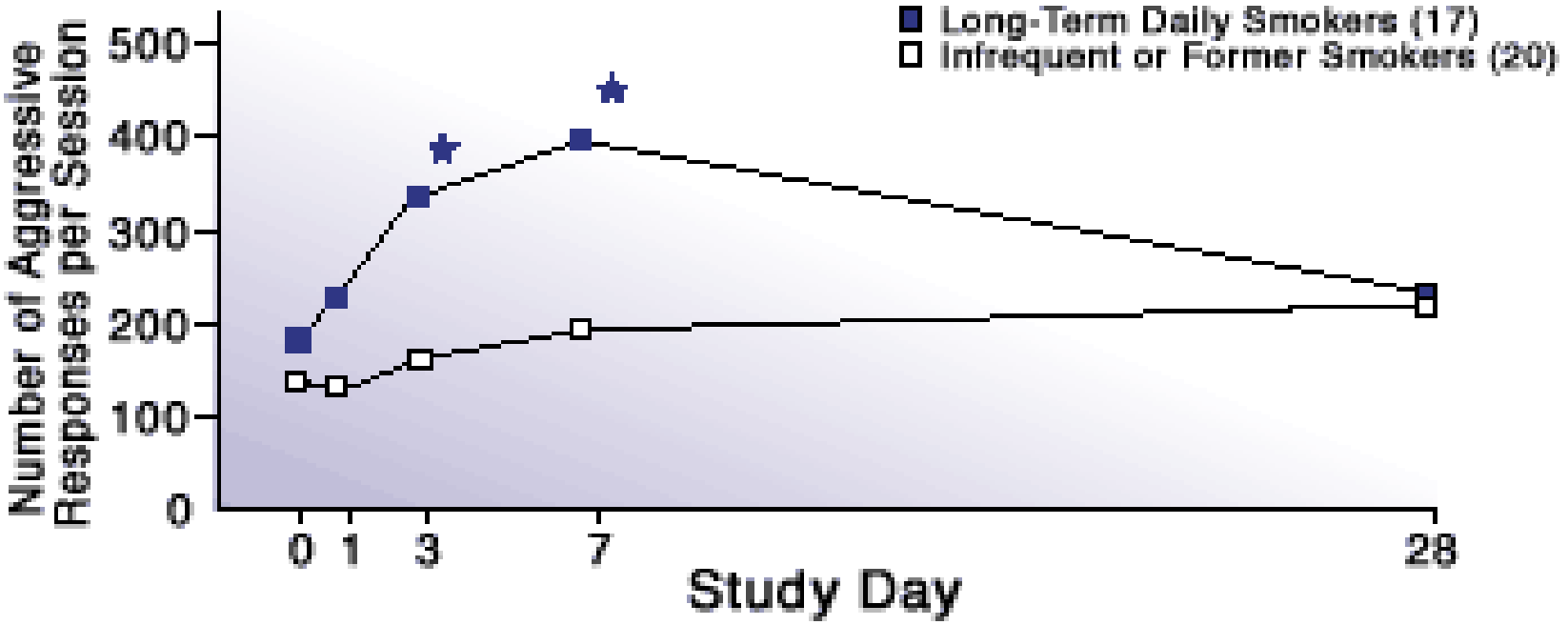
Withdrawal

- Drug use discontinuation (mild to moderate)
- Initiated by antagonist (moderate to severe)
- Symptoms (drug d/c)
  - Craving
  - Anxiety
  - Loss of appetite
  - Physical tension
  - Irritability/ Anger
  - Restlessness
  - Difficulty concentrating

Withdrawal

- **Symptoms**
  - **- Memory/cognitive impairment**
  - **- Problems with balance**
  - **- “Eye pressure”**
  - **- Sleep disturbance**
  - **- Aggressiveness:**
    - **In heavy vs former or light smokers**
    - **On days 3 & 7 of abstinence, but not day one (Kouri, 1999)**

Abstinence Elicits Aggressive Behavior in Long-Term Marijuana Smokers



Cannabis Withdrawal

- **Symptoms (precipitated by antagonist):**
  - **Stomach cramps**
  - **Nausea**
  - **Vomiting**
- **Under what conditions might a cannabis-dependent client experience antagonist-precipitated w/d?**

Cannabis Withdrawal

- **Implications:**
  - **Withdrawal symptoms may be a more serious issue than once thought**
  - **Treatment of cannabis dependency should take into account the physical discomfort experienced by some addicts**

Cannabis Withdrawal

- Research has suggested that the severity of cannabis withdrawal can be decreased by gabapentin (Neurontin), a medication used to treat seizures and neuropathic pain.
- Gabapentin Vs. placebo
  - More clean urines
  - Fewer days of use
  - Lower rating on Marijuana Withdrawal Checklist
- Gabapentin also seems to help reverse cognitive deficits

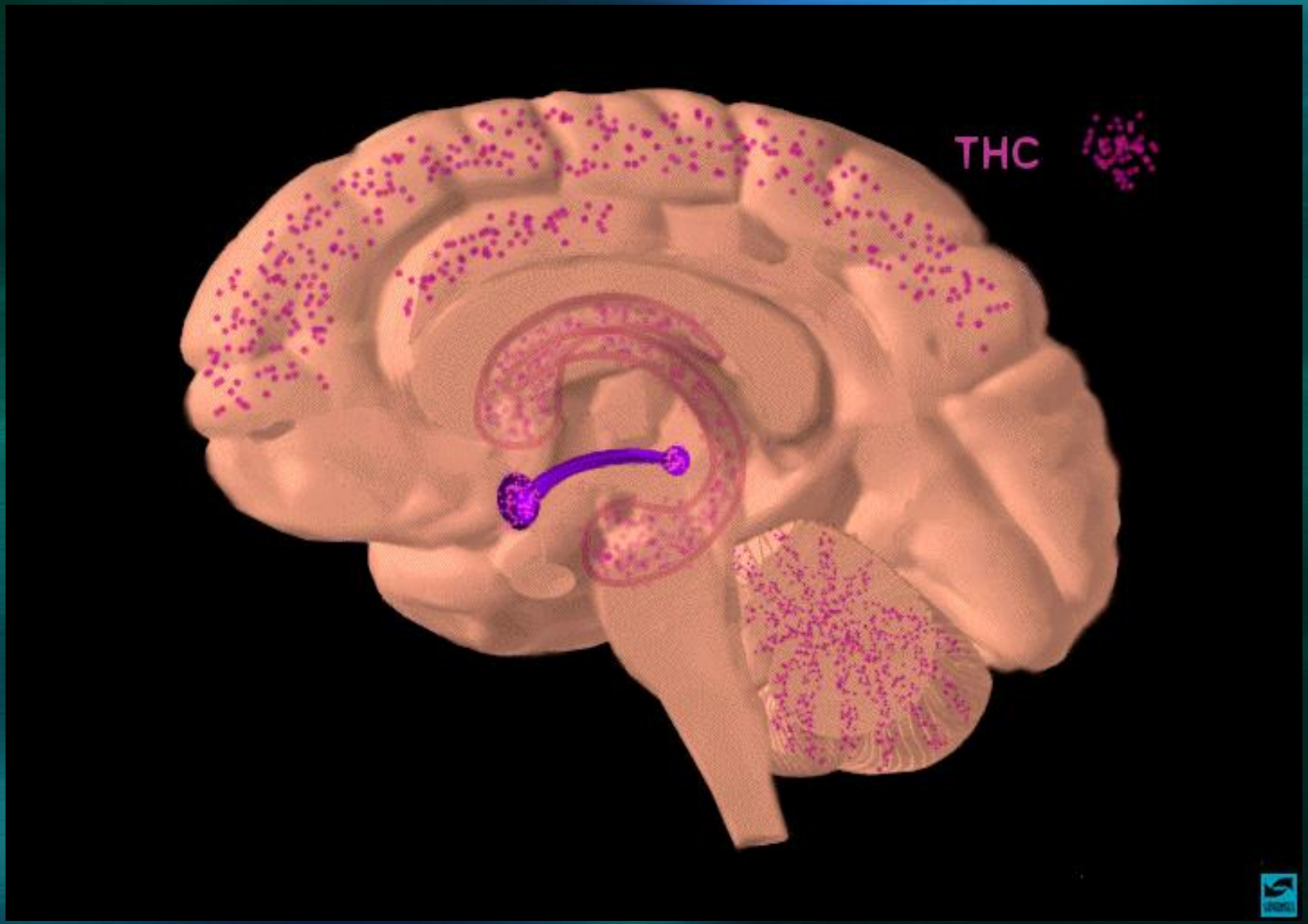
Δ-9 THC Self-Administration in Monkeys

- Using cocaine, animals conditioned to self-administer psychoactive drugs
- When cocaine replaced with saline, self-administration behavior stopped
- When saline replaced with THC, self-administration began again
- Treatment with cannabis antagonist extinguished THC self-administration

∆-9 THC Self-Administration in Monkeys

- Animals pressed “THC lever”
  ~ 30x/hour
- Lead Author:

"The drug-seeking behavior in these animals was comparable in intensity to that maintained by cocaine under identical conditions, and was obtained from a range of doses comparable to those self-administered by humans smoking a single marijuana cigarette. This finding suggests that marijuana has as much potential for abuse as other drugs of abuse, such as cocaine and heroin."


THC

ENDOGENOUS CANNABINOIDS & EXITNCTION OF ADVERSE MEMORIES

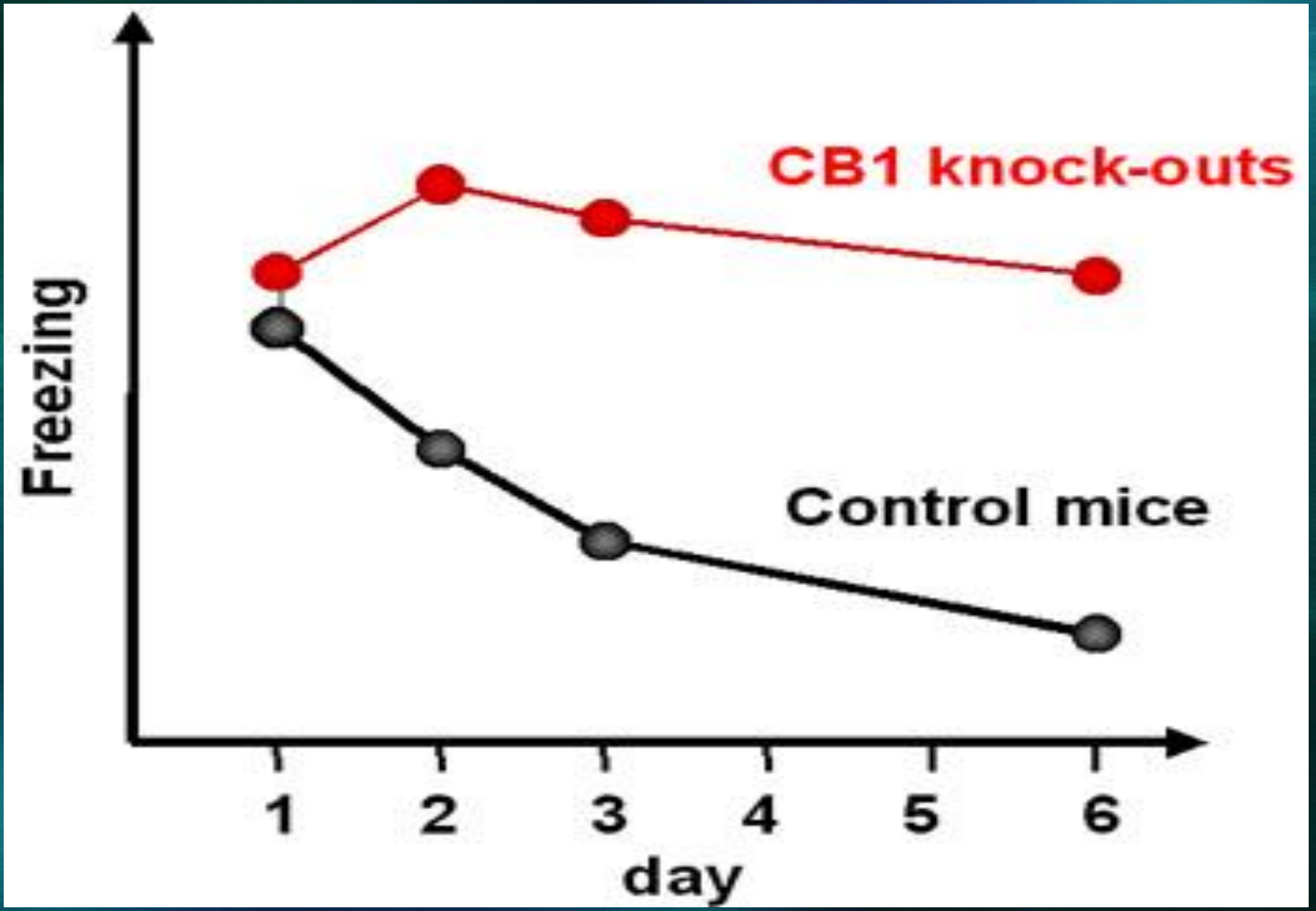
- Behavior associated with aversive memories will become extinguished without reinforcement
- The CB1 cannabis receptor and endogenous cannabinoids present in areas of the brain involved in memory
- Endogenous cannabinoid system plays a central role in extinguishing adverse memories

Cannabinoids & Aversive Memories

- Lutz, et al. gave mice mild electrical shocks at the same time a loud noise was played

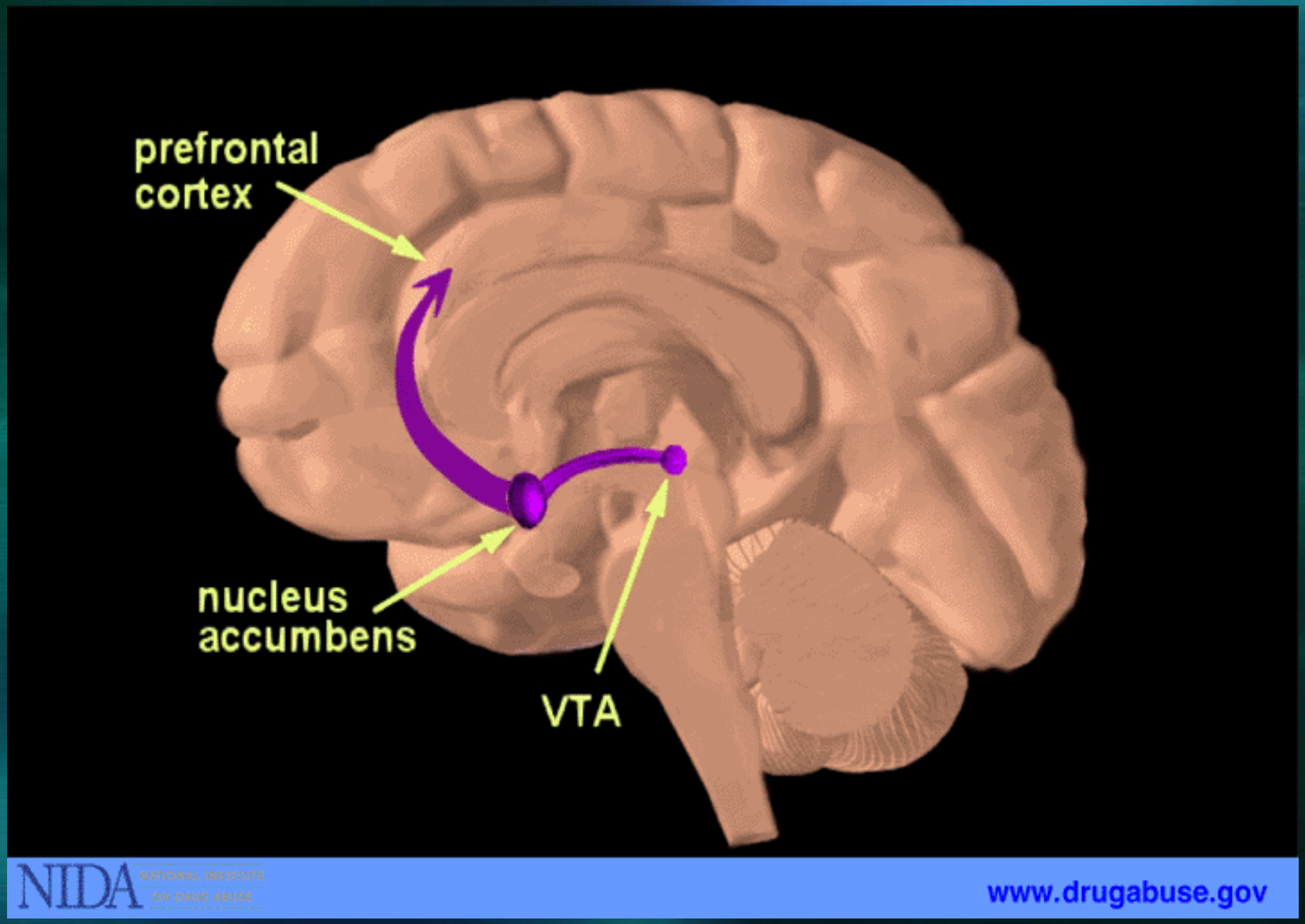
ENDOGENOUS CANNABINOIDS & EXITNCTION OF ADVERSE MEMORIES

- CB1-deficient mice show disruption in short- and long-term extinction of adverse memories related to auditory fear-conditioning tests
- Treatment of normal mice with cannabis antagonist SR141716A produced the same effect
- Tone presentation during extinction produced ↑ endocannabinoids in the basolateral amygdala complex.


CB1 knock-outs
Control mice
Freezing
1
2
3
4
5
6
day

ENDOGENOUS CANNABINOIDS & EXITNCTION OF ADVERSE MEMORIES

- Clinical questions:
  - Could individuals deficient in endogenous cannabinoids be less able to extinguish (”forget”) bad experiences?
  - Might this be a risk factor for cannabis abuse and dependence?
  - Might recovering cannabis addicts be flooded with adverse memories during withdrawal and the PAWS?



NIDA NATIONAL INSTITUTE ON DRUG ABUSE

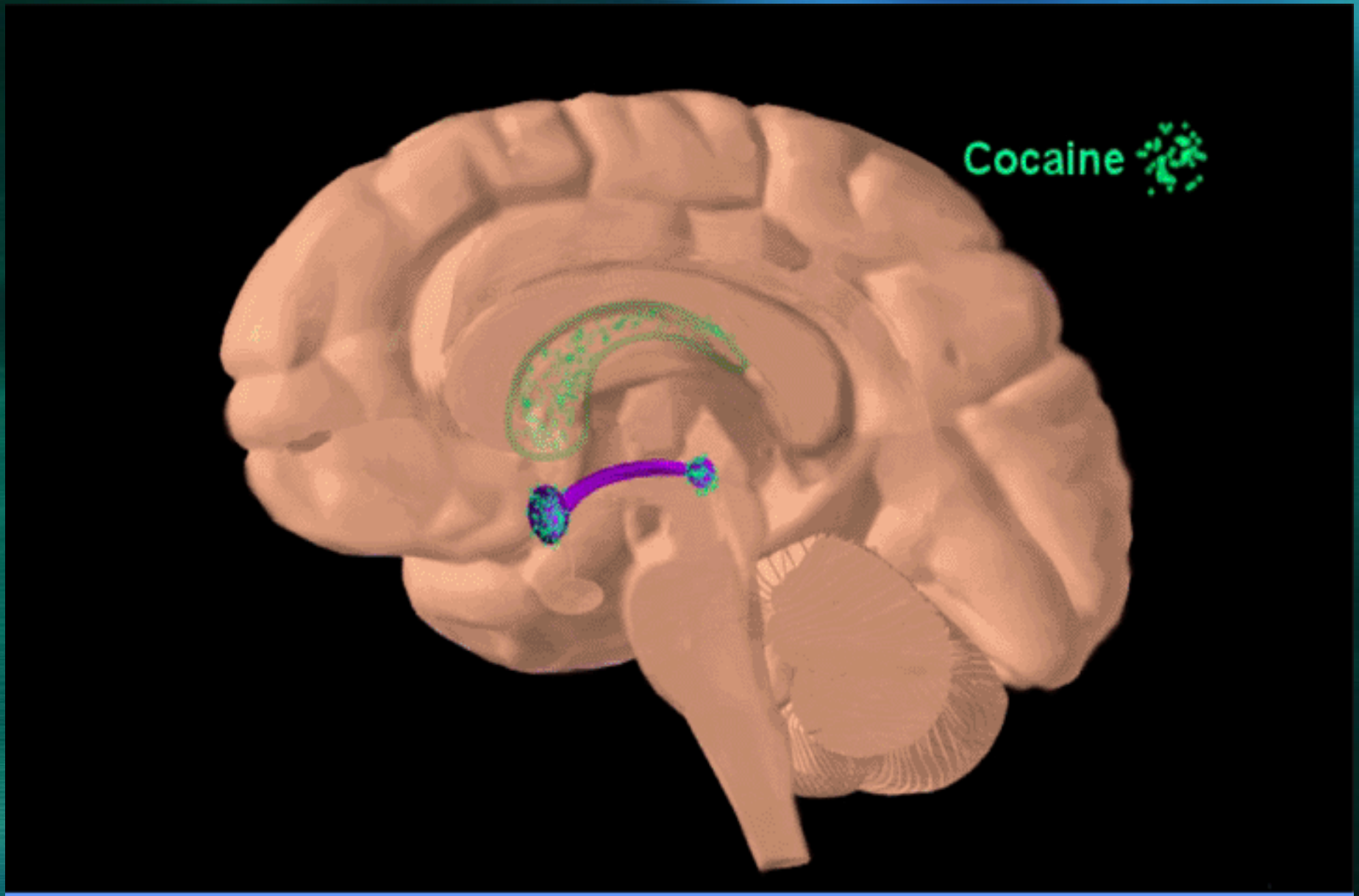
www.drugabuse.gov

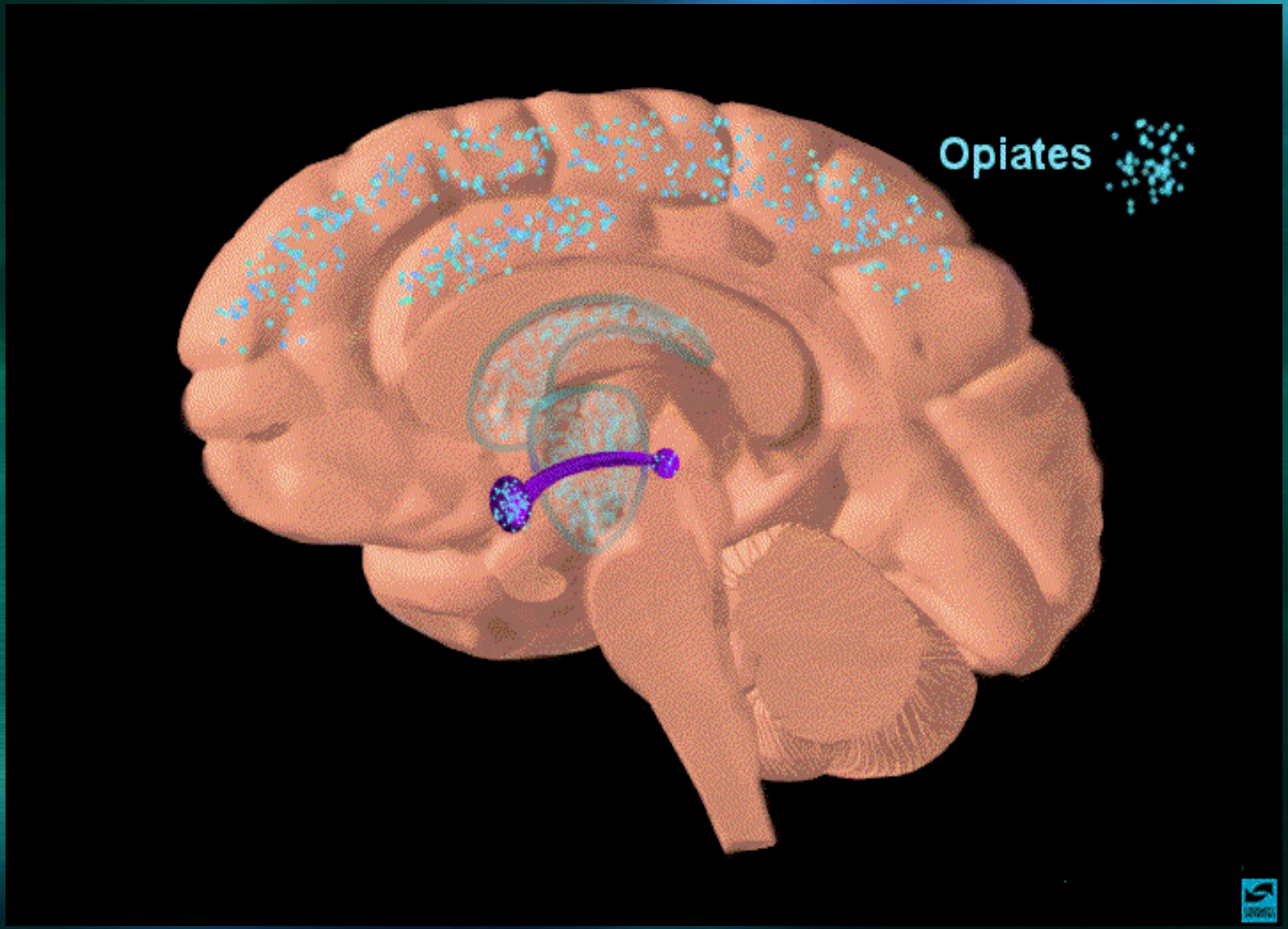
CANNABIS RESEARCH:

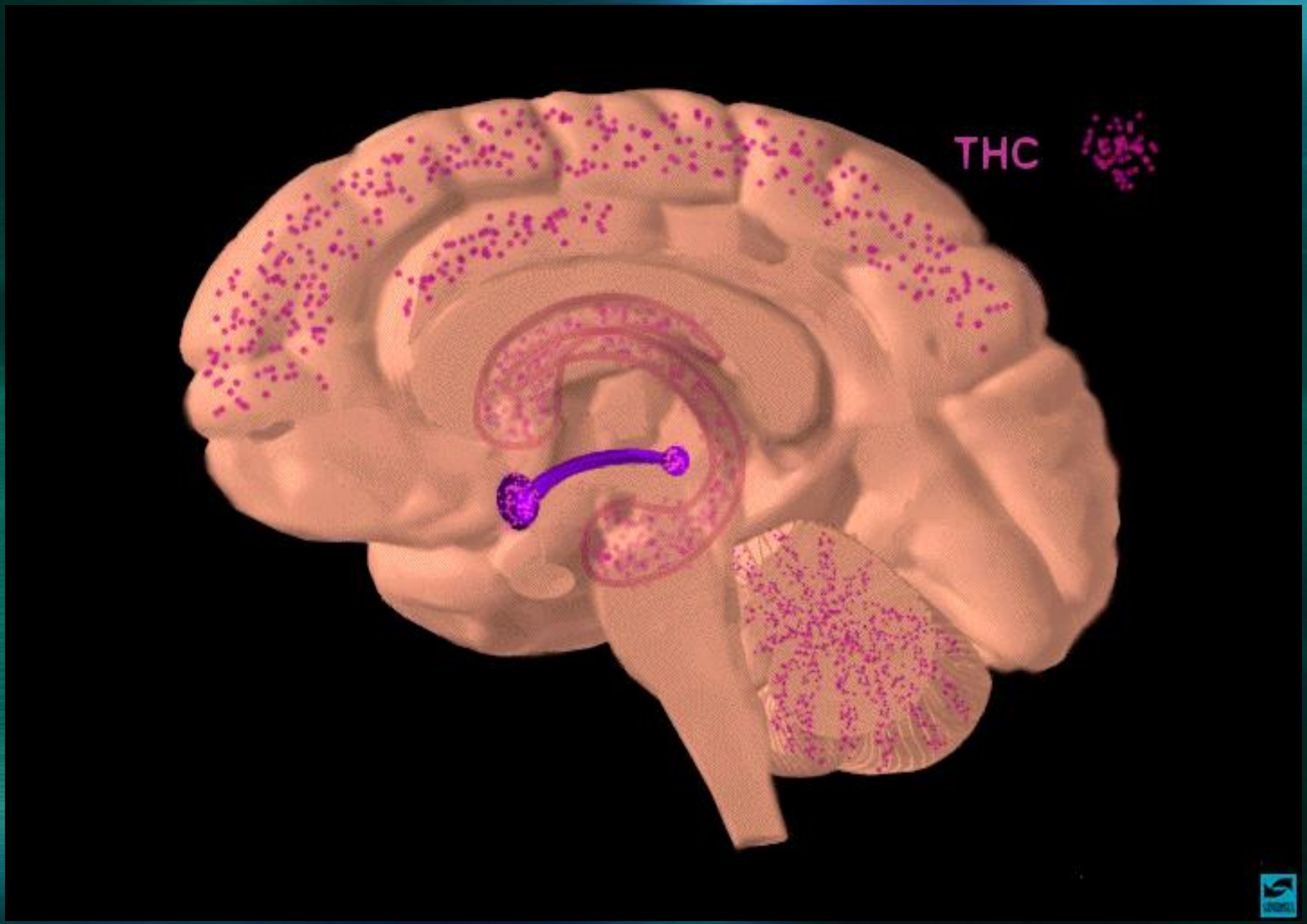
Stimulation of the Reward Circuit

- **Cannabis appears to produce some of its effects by increasing dopamine levels at the nucleus accumbens**

- **Highly addictive drugs such as cocaine and heroin act in a similar manner**


Cocaine


Opiates


THC

Stimulation of the Reward Circuit: Clinical Implications

- For some users, cannabis can produce a high more intense/rewarding than previously thought
- Cannabis + some other drug (e.g., methamphetamine) may produce a powerfully synergistic effect

Stimulation of the Reward Circuit: Clinical Implications

- Assess for strategic use of cannabis with other drugs
- Don’t minimize the problems posed by cannabis use
- Watch for anhedonia
- Educate clients
- Try to engage recovering cannabis addicts as volunteers

Cannabis/Opiate Interaction

- Cannabis appears to produce some of its effects by increasing dopamine levels at the nucleus accumbens, like heroin
- The opiate antagonist naloxone (Narcan®) prevents cannabis intoxication
- Drobinol (synthetic THC) can modestly alleviate some opiate withdrawal signs

Cannabis/Opiate Interaction

- **Cannabis antagonists do not prevent the actions of opiates**

Cannabis/Opiate Interaction

- **Implications:**
  - **Cannabis and opiates may share some common mechanism of brain action**
  - **Cannabis (at some dosage levels) may produce some opiate-like actions**
  - **Some cannabis use disorders may be more serious than once thought**

Cannabis/Opiate Interaction

- **Implications:**
  - **Cannabis smoking may be more of a threat to opiate abstinence than once thought**
  - **Recovering opiates addicts should avoid smoking marijuana**

Cannabis/Cocaine Interaction

- Like cocaine, cannabis produces some of its effects by blocking the reuptake of dopamine and increasing dopamine levels in the reward circuit
- Cannabis smoking may be more of a threat to cocaine abstinence than once thought

A Reverse “Stepping Stone” Theory

- **After the brain’s reward circuits are “primed” with cocaine, heroin, methamphetamine, cannabis “learns” to produce more rewarding effects (sensitization).**

Reverse "Stepping Stone": Clinical Implications

- **After addiction to traditionally more addicting drugs, the cannabis high may be different than it was before**
- **Dually addicted cannabis users may have more difficulty remaining abstinent**

Cognitive Impairment

- **Block & Ghoneim, 1993**
  - **Two groups of college students. Both had smoked marijuana for more than 2 years but less than 10. Both groups abstained for 24 hours prior to the test.**
    - **Heavy use group had smoked 27 out of the last 30 days**
    - **Light use group had not used for more than 3 of previous 30 days**

Cognitive Impairment

- **Ss performed battery of standard tests designed to assess their ability to pay attention, learn, and recall new information.**
- **Heavy users had impaired skills related to attention, memory, and learning 24 hours after they had last used the drug.**

Cognitive Impairment

- **Cannabis seems to affect the ability to learn and remember information primarily by impairing the ability to focus, sustain, and shift attention**
- **Memory itself was not affected**
- **“If we can get them to learn, they will be able to remember.”**

Pope, et al. 2001

- **Studied**
  - **Heavy users**
  - **Former heavy users**
  - **Controls (Smoked at least once but no more than 50 times during their lives. Smoked no more than once in the previous year)**
- **Participants ranged in age from 30 to 55**

Pope, et al. 2001

- All participants abstinent from marijuana and other drugs for the 28-day study
- Abstinence confirmed by urine tests
- Cognitive function evaluated through standardized neuropsychological tests at study entry and 1st, 7th, and 28th days of the study

Pope, et al. 2001

- **On study entry (day 0) and days 1 & 7, current heavy users scored significantly lower than control subjects on tests of verbal learning and memory.**

Pope, et al. 2001

- By day 28, differences between the scores of current heavy users and controls had disappeared
- Former heavy users showed no significant difference from control subjects on any of the tests on any of the subsequent testing days

Pope, et al. 2001

- Clear relationship between lower test scores and higher urine levels of THC metabolites at the beginning of the study, but no relationship between test scores and total lifetime marijuana use

Cognitive Impairment: Clinical Implications

- Clients who are heavy users of cannabis may experience a level of cognitive impairment that prevents them from doing many of the things we ask them to do
- Former heavy users seem not to be affected

Cognitive Impairment: Clinical Implications

- **“Resistance” or “lack of motivation” may actually be cognitive impairment**
- **Cognitive impairment may get worse before it gets better**

Cognitive Impairment: Clinical Implications

- **By the end of a month, much of the cognitive impairment may be reversed**
- **How can we make treatment easier for cannabis clients and ourselves?**

OPIOIDS

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

Opioid effects

- Sedation (“nodding”)
- Euphoria
- Pain relief
- Constipation
- Constricted pupils

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**

Medication-Assisted Treatment

Medication-Assisted Treatment

Providing opioid agonist or partial agonist medication as an adjunct to psychosocial treatment in order to improve engagement, retention and outcomes.

Treating Opiate Dependency: A Dilemma

- Physical dependence and craving are major barriers to abstaining from opiate use
- Detoxifying addicts with increasingly smaller doses of heroin or morphine is not an effective approach
- “Cold turkey” withdrawal is painful and unpleasant and often results in relapse

Using Medication to suppport opiate dependence treatment

Medications used to treat opiate dependency

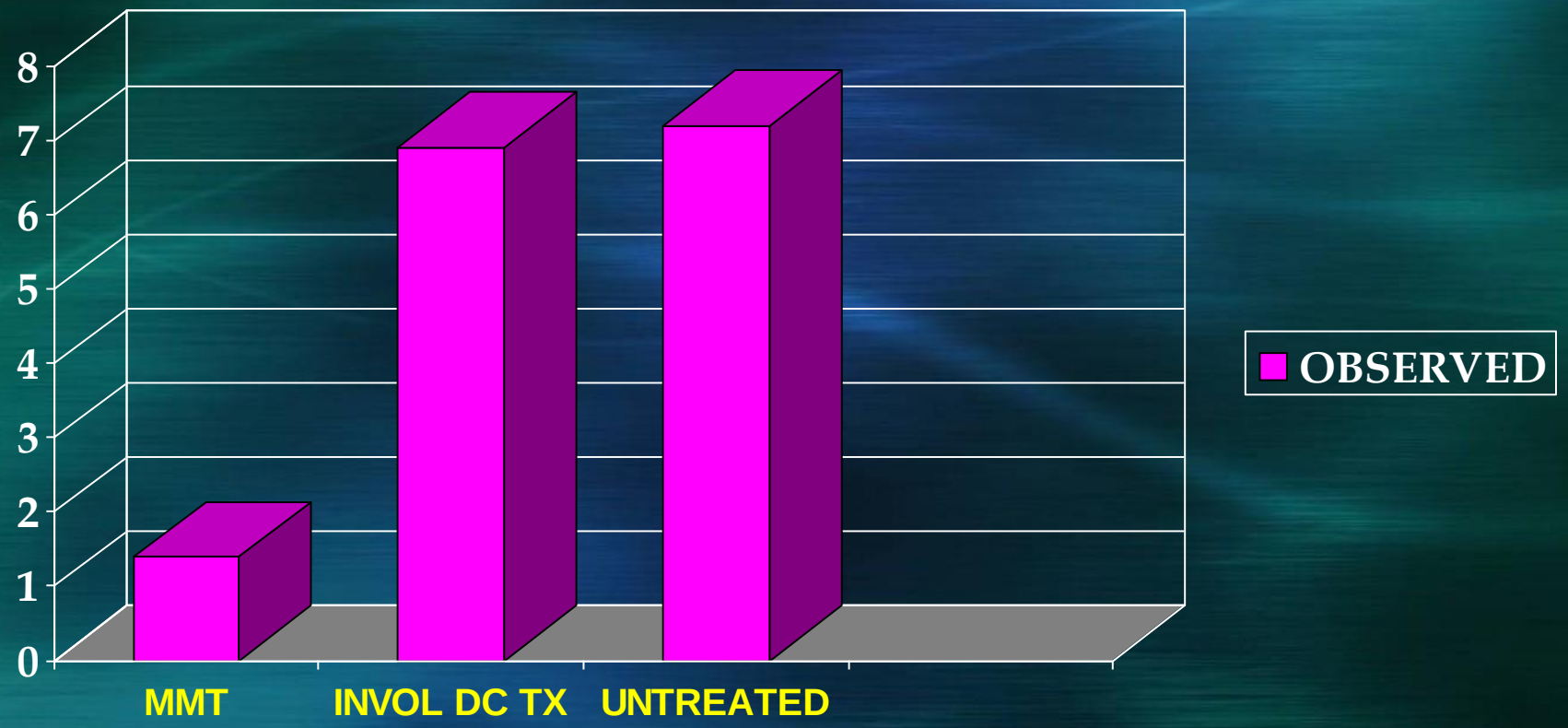
- Methadone
- Clonidine
- Buprenorphine
- Naltrexone

Advantages of methadone treatment

- 8-10 fold reduction in death rate
- Reduction of drug use
- Reduction of criminal activity
- Engagement in socially productive roles; improved family and social function
- Increased employment
- Improved physical and mental health
- Reduced spread of HIV
- Excellent retention

Reduction in death rate

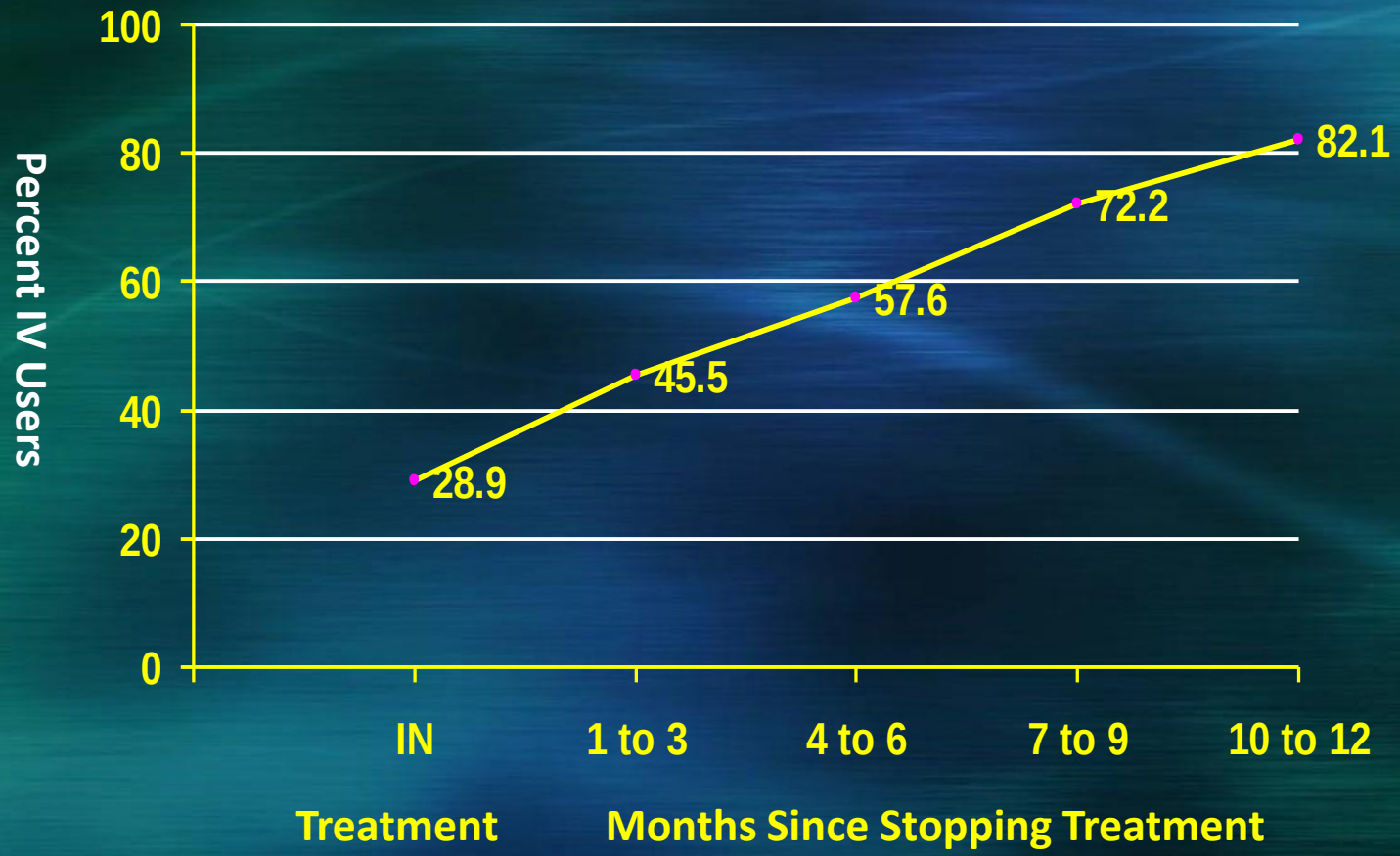
DEATH RATES IN TREATED AND UNTREATED HEROIN ADDICTS



Slide data courtesy of Frank Vocci, MD, National Institute on Drug Abuse

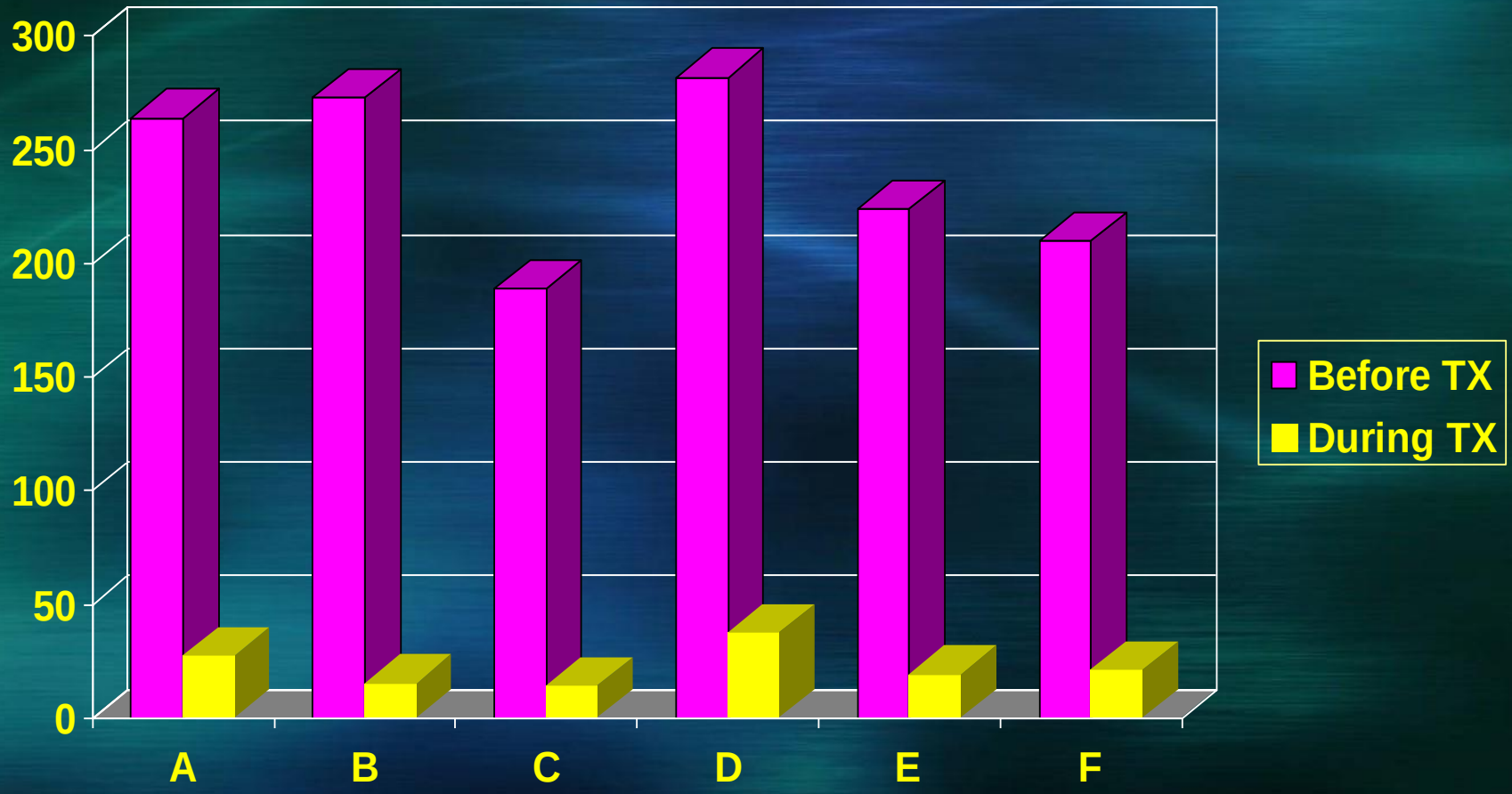
Reduction of drug use

Relapse to IV drug use after MMT
105 male clients who left treatment



Reduction of criminal activity

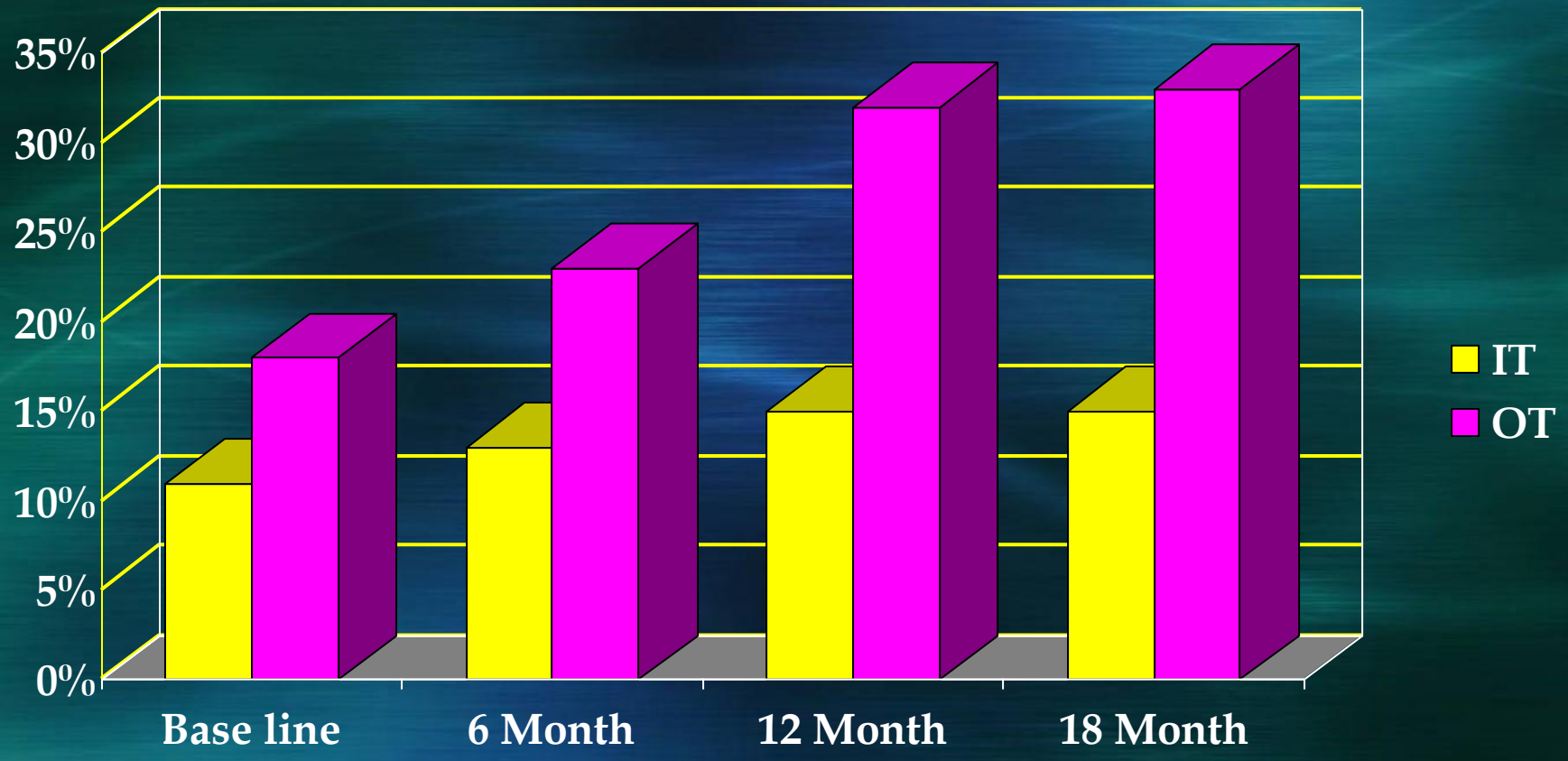
Crime among 491 clients before and during MMT at 6 programs



Adapted from Ball & Ross - The Effectiveness of Methadone Maintenance Treatment, 1991

Reduced spread of HIV

HIV CONVERSION IN TREATMENT



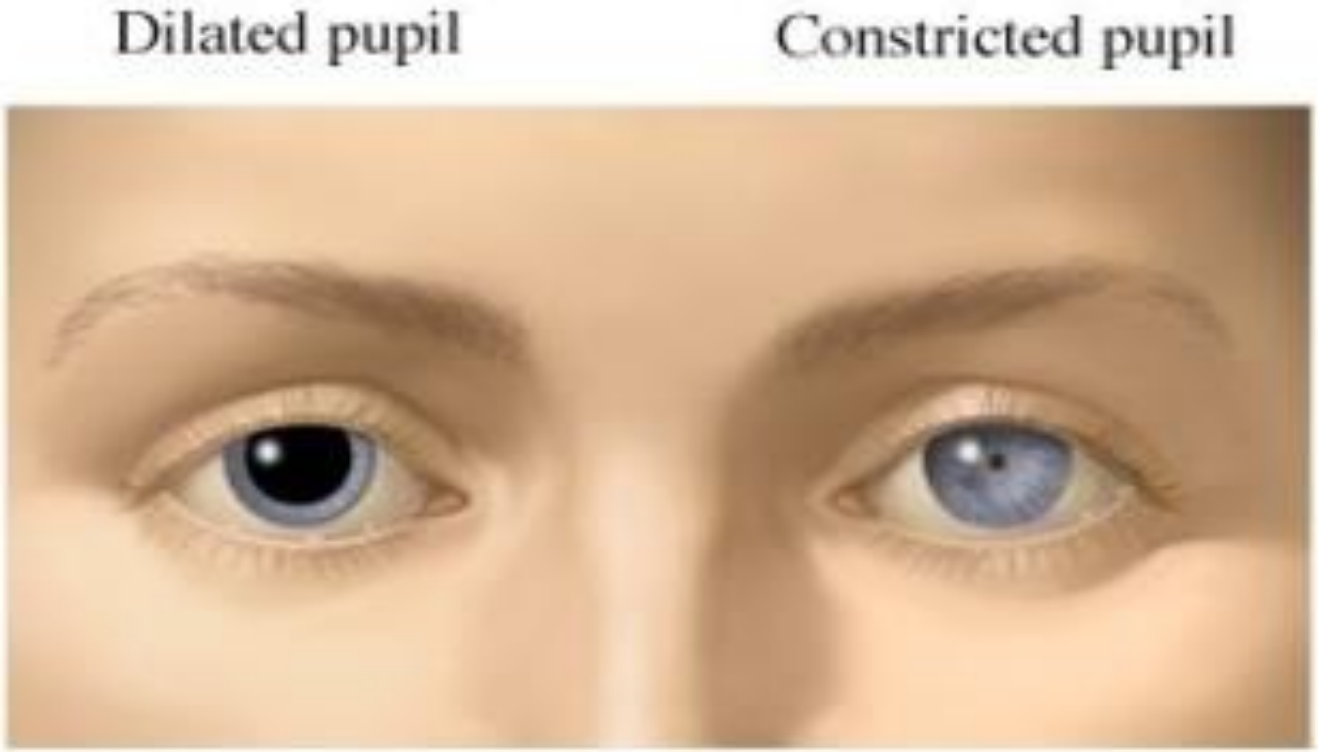
HIV infection rates by baseline treatment status:
In treatment (IT) n=138 not in treatment (OT) n=88

Source: Metzger, D. et. al. J of AIDS 6:1993. p.1052

The methadone maintenance process

- Client is accessed for physical dependency (a requirement for methadone treatment)
- A starting dose is administered
- Client is observed for effects of starting dose

Pupillary constriction/dilation



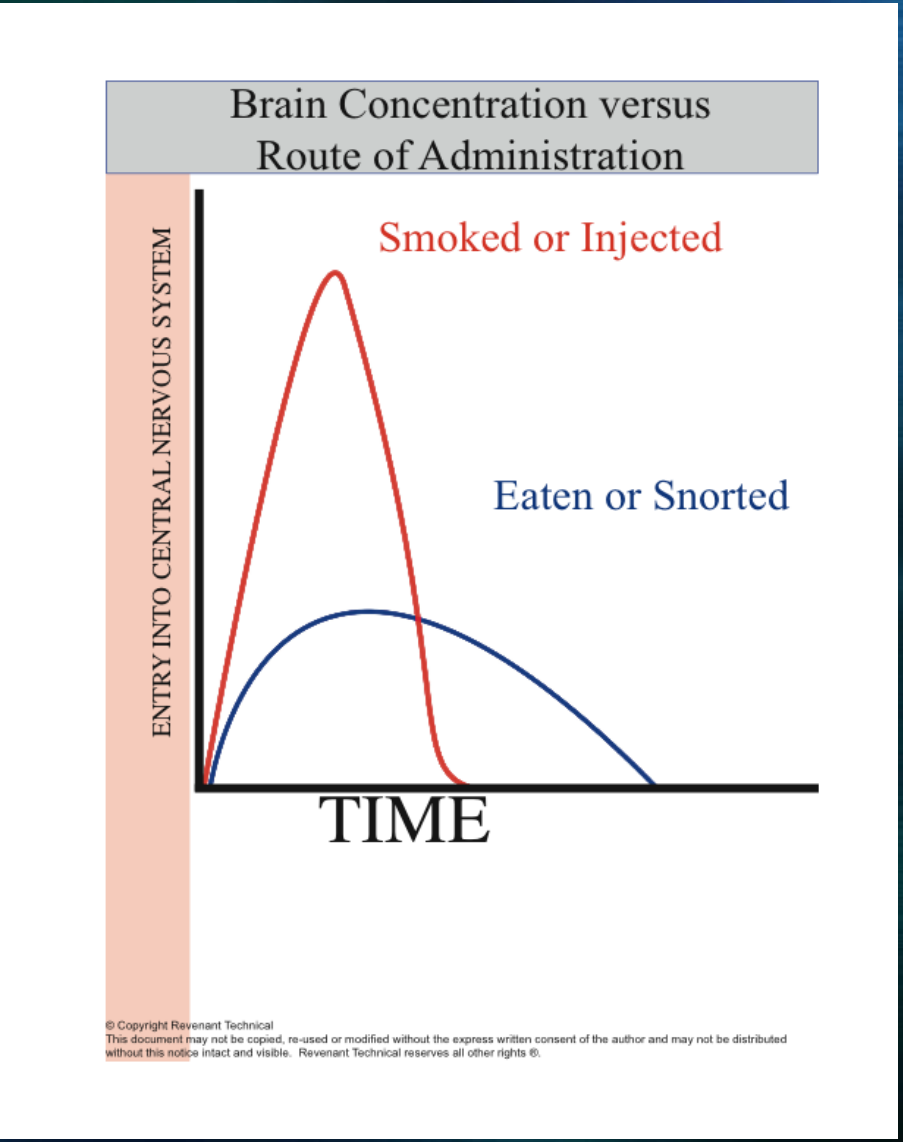
The methadone maintenance process

- Client is accessed for physical dependency (a requirement for methadone treatment)
- A starting dose is administered
- Client is observed for effects of starting dose
- Dose is increased if necessary
- Client participation in program is ruled out if low dose of methadone causes sedation

Methadone vs Heroin

Heroin	Methadone
Usually administered by injection or smoking	Administered by mouth
Rapid onset of action	Slow onset of action
Tolerance continuously increases	No continuing increase in tolerance levels after optimal dose is reached; relatively constant dose over time
Use is specifically for the sedating & euphoric effect	Client on stable dose rarely experiences euphoric or sedating effects

Rapid onset=More pleasurable reaction



Methadone vs Heroin

Heroin

- Client
  - feels less physical pain
  - Has blunted emotions
  - Can not drive or perform daily tasks normally and safely

Methadone

- Client able to
  - Perceive pain
  - Experience have emotional reactions
  - Perform daily tasks normally and safely

Methadone vs Heroin

Heroin

- Short-acting: effect lasts 4-6 hours
- May produce medical consequences based on adulteration and method of administration

Methadone

- Long acting: prevents withdrawal for 24 hours, permitting once-a day-dosing
- At sufficient dosage, blocks euphoric effect of normal street doses of heroin
- Medically safe when used on long-term basis (10 years or more)

Methadone vs Heroin

Heroin

- Short-acting: effect lasts 4-6 hours
- May produce medical consequences based on adulteration and method of administration

Methadone

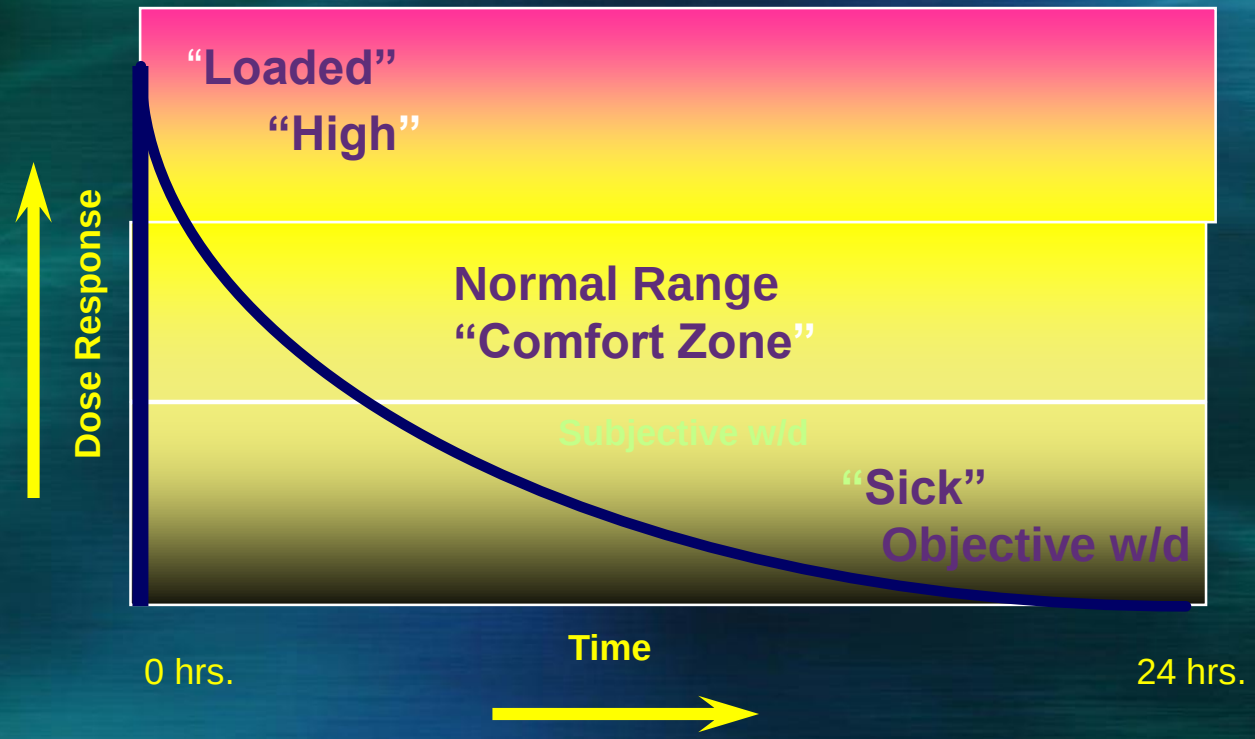
- Long acting: prevents withdrawal for 24 hours, permitting once-a day-dosing
- At sufficient dosage, blocks euphoric effect of normal street doses of heroin
- Medically safe when used on long-term basis (10 years or more)

Tracks and abscesses from i.v drug use

Tracks and abscesses from i.v drug use

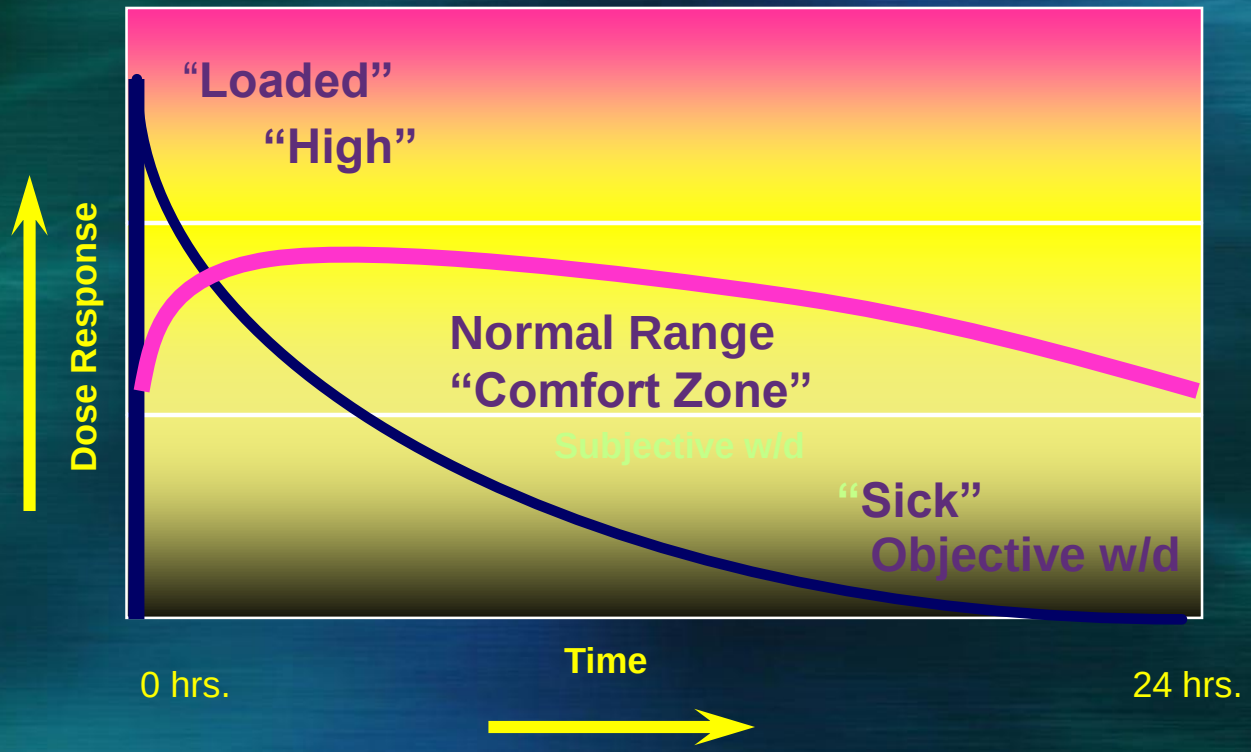
Heroin Simulated 24 Hr. Dose/Response

With established heroin tolerance/dependence



opiate Agonist Treatment of Addiction - Payte - 1998

Methadone Simulated 24 Hr. Dose/Response
At steady-state in tolerant patient



opiate Agonist Treatment of Addiction - Payte - 1998

How is methadone better than heroin?

- Legal
- Avoids needles
- Known amount ingested
- Slow onset: no “rush”
- Long acting: can maintain “comfort” or normal brain function
- Stabilized physiology, hormones, tolerance

MAT Misconception 2

- MAT clients are still addicted

- Truth: MAT clients will experience withdrawal symptoms if they stop taking their medication. However, withdrawal is not a diagnostic criteriuum when the client is taking opioids solely under medical supervision
- DSM-V requires at least 2 criteria out of a possible 11

DSM-V Criteria: Opiate Use Disorder

- Mild: 2-3 symptoms
- Moderate: 4-5 symptoms
- Severe: 6 or more symptoms

- Substance taken in larger amount and for longer period than intended
- Persistent desire or unsuccessful efforts to cut down or control use
- Great deal of time spent in activities to obtain, use, recover from effects
- Craving or a strong desire to use

DSM-V Criteria: Opiate Use Disorder

- Recurrent use resulting in failure to fulfill major role obligation at work, school or home
- Continued use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by effects of the substance
- Important social, occupational, or recreational activities given up or reduced
- Recurrent use in physically hazardous situations
- Continued use despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by use

DSM-V Criteria: Opiate Use Disorder

- Use continues despite knowledge of adverse consequences (e.g., failure to fulfill role obligation, use when physically hazardous)
- Tolerance
- Withdrawal

Summary

- Methadone:
  - is a safe medication when used properly
  - Does not cause intoxication if used appropriately
  - Is an adjunct to treatment
  - Blocks withdrawal symptoms/effects of other opiates
  - Reduces crime, death, HIV conversion & costs to society
  - Benefits the client, the community and the human services, child welfare and criminal justice system

Medication-assisted treatment: Buprenorphine

- Buprenorphine (Buprenex)
- Subutex® (buprenorphine sublingual tablets).
- Suboxone® (buprenorphine and naloxone sublingual tablets).
- Naloxone is not effective as an agonist unless it is injected
  - Guards against cooking and injecting Suboxone

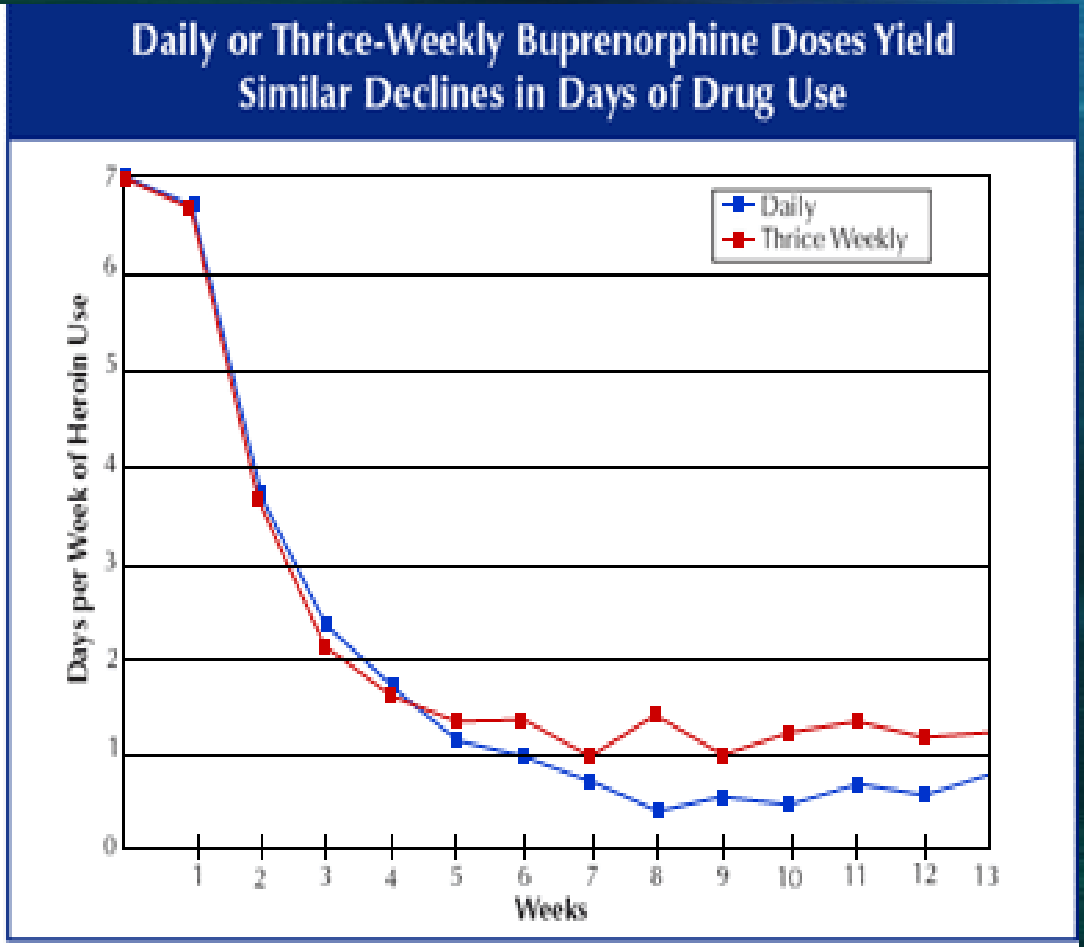
Buprenorphine

- Buprenorphine has duration of 24 hours.
- Buprenorphine produces less euphoria than morphine and heroin.
- Has an “agonist activity ceiling” with no increased benefits on increasing the dose.
- Compared with other opiates, causes a significantly lower degree of sedation and respiratory depression

Buprenorphine

- High doses of buprenorphine (≥100 times the analgesia dose) do not produce dangerous respiratory effects.
- Withdrawal syndrome less rapid and less intense than with a pure agonist such as heroin or methadone.
- Buprenorphine can be given to clients every other day, 3x/week or every six months rather daily like methadone

Buprenorphine 3x/week as Effective as Daily Doses

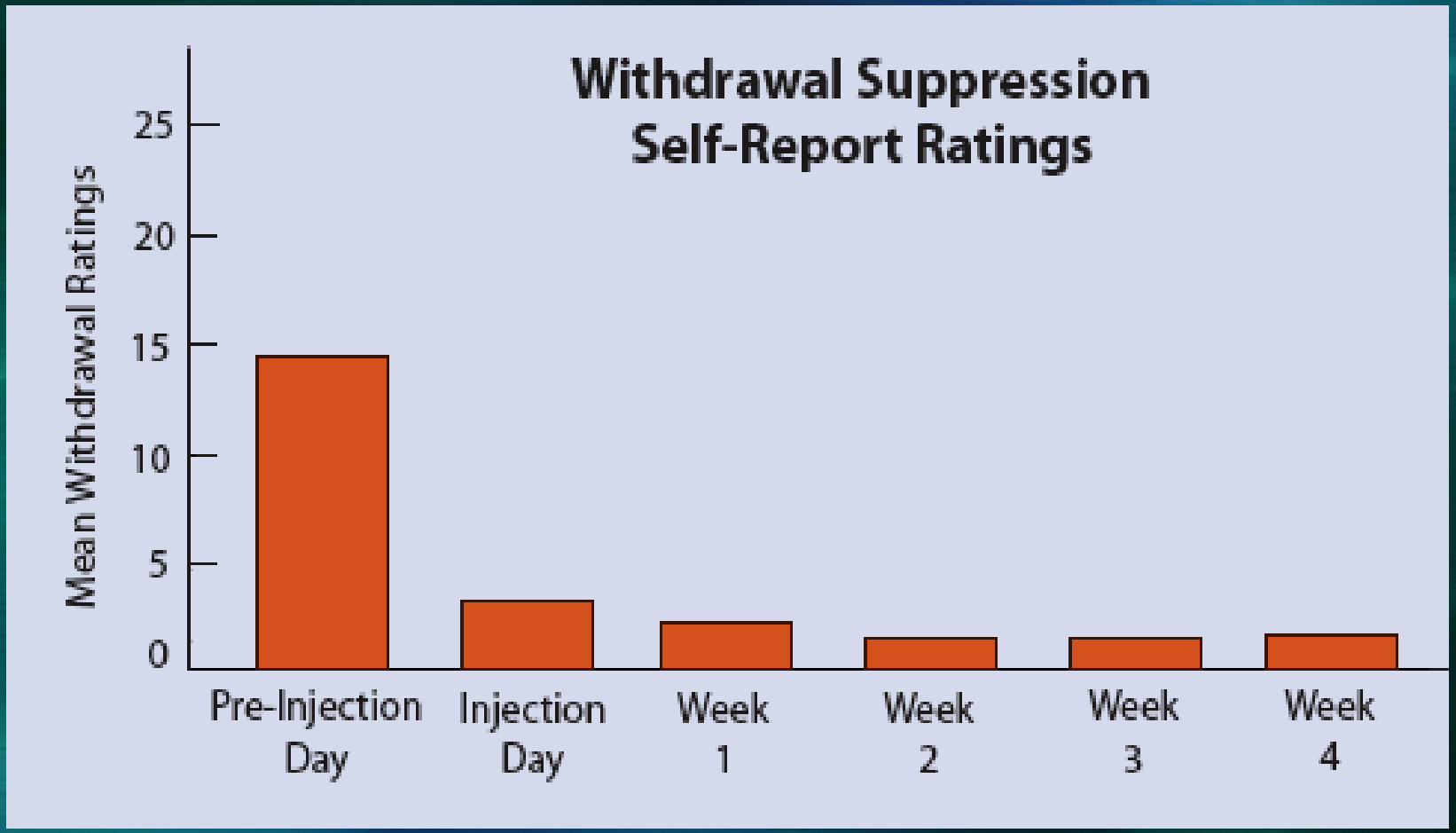


Patients in treatment for opioid addiction received either daily or thrice-weekly doses of buprenorphine. Both groups showed reductions in reported days of heroin use during a 13-week treatment program.

Sustained Release Buprenorphine

- One injection lasts for six weeks
- Treatment consists of a single injection of biodegradable polymer microcapsules containing 58 mg of “bup”
- For 6 weeks clients assessed for signs of heroin withdrawal and clients rated their withdrawal symptoms using a standard questionnaire.
- No client needed additional medication for withdrawal relief.

Long-Lasting Buprenorphine Reduces Withdrawal Symptoms in Heroin-Dependent clients



However:
Buprenorphine is not always the best choice

- Individuals with more severe heroin habits (need methadone ≥ 100 mg)

Naltrexone

- Opioid antagonist
- Client must be detoxified first
- Prevents opioid intoxication/overdose

THANK YOU FOR YOUR ATTENTION!