

ADDICTION & THE BRAIN

A LONG STORY...

Governor's Opioid Coordination Council
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ADDICTION & THE BRAIN A LONG STORY...

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ADDICTION & THE BRAIN

A LONG STORY...

Humans have been using mind altering substances since prehistoric time...



ADDICTION & THE BRAIN

A LONG STORY...

- **Alcohol:** The the earliest alcoholic drink dates back to 7,000-6,600 B.C.
- **Hallucinogens:** The earliest fossil remains of the hallucinogenic San Pedro cactus, found in a cave in Peru, date back to between 8,600 and 5,600 B.C.
- **Opium:** Remains of poppy seed capsules and traces of opiates have been discovered in the plaque and bones of human skeletons dating back to the 4th millennium B.C., along with prehistoric art showing parts of the poppy being used in religious ceremonies.
- **Coca leaves:** The earliest evidence of humans chewing coca dates back to South America around 8,000 years ago.
- **Tobacco:** Smoking pipes dating back to around 2,000 B.C. have been found in northwestern Argentina.

DRUG ADDICTION IS A COMPLEX ILLNESS

- Characterized by intense and, at times, uncontrollable drug craving along with compulsive drug seeking
- Wide variety of drugs nicotine, alcohol and illicit and prescription drugs
- Addiction is a brain disease because it affects multiple brain circuits including
 - Reward & motivation
 - Learning & memory
 - Inhibitory control over behavior (i.e. judgement)
- Some people are more vulnerable than others

DRUG ADDICTION IS A COMPLEX ILLNESS

- Addiction is more than compulsive drug taking
 - Often produces far-reaching health and social consequences
 - Mental & physical illnesses related to a drug-abusing lifestyle
 - Toxic effects of the drugs themselves (or adulterants)
 - Dysfunctional behaviors and altered priorities affecting
 - Family
 - Workplace
 - Other aspects of a person's life

Drug Abuse is a preventable behavior
&
Drug Addiction is a treatable disease

JUST CAN'T SAY NO	ILLICIT SUBSTANCES OF NOTE	HOW TREATMENT WORKS	ODDS & ENDS	PUBLIC HEALTH FOR \$20
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200	200	200	200	200
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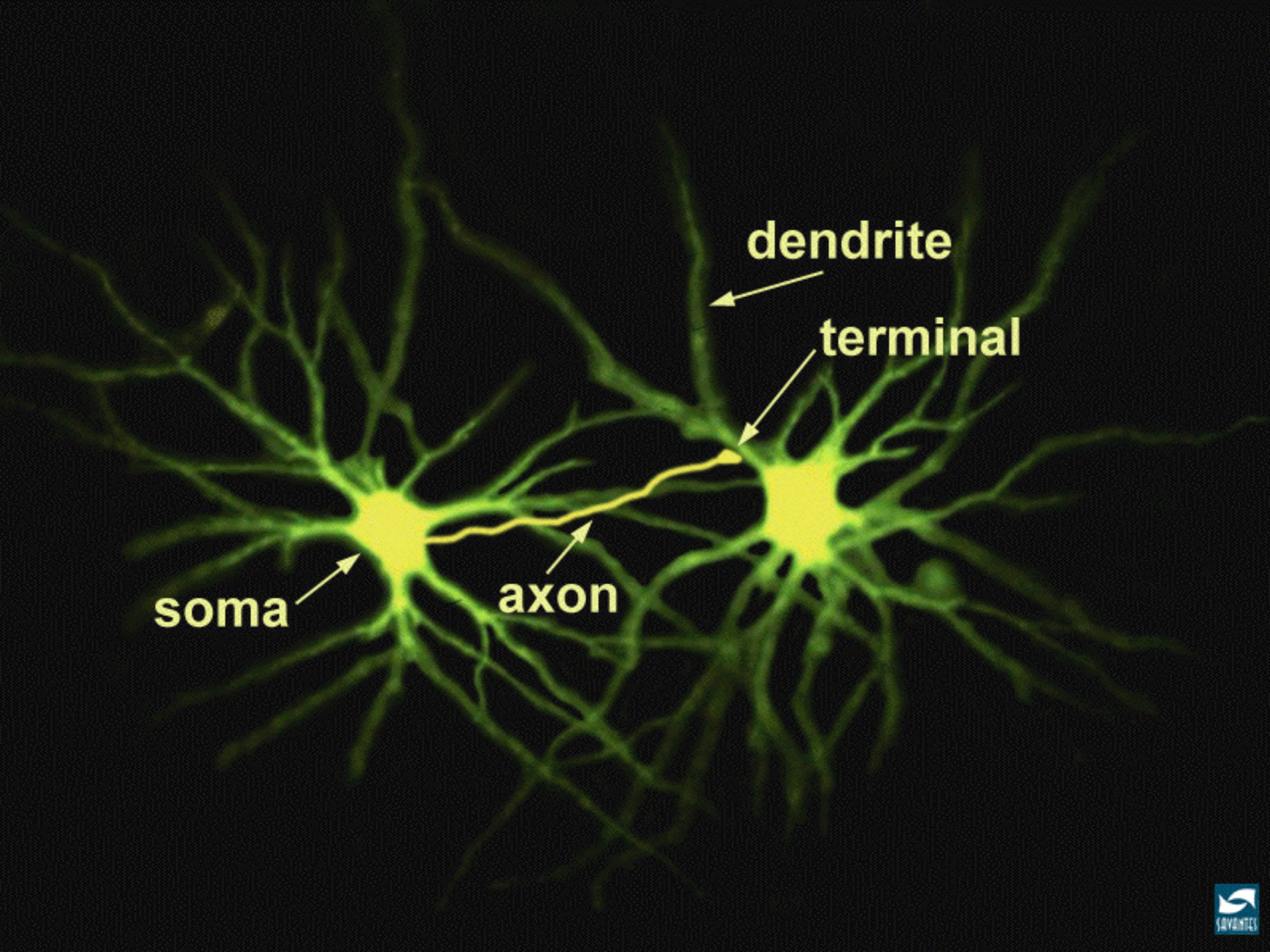
JUST CAN'T SAY NO

Why do drug-addicted persons keep using drugs?

Long-term drug use results in significant changes in brain function that can persist long after the individual stops using drugs.

A PEEK
UNDER THE
HOOD



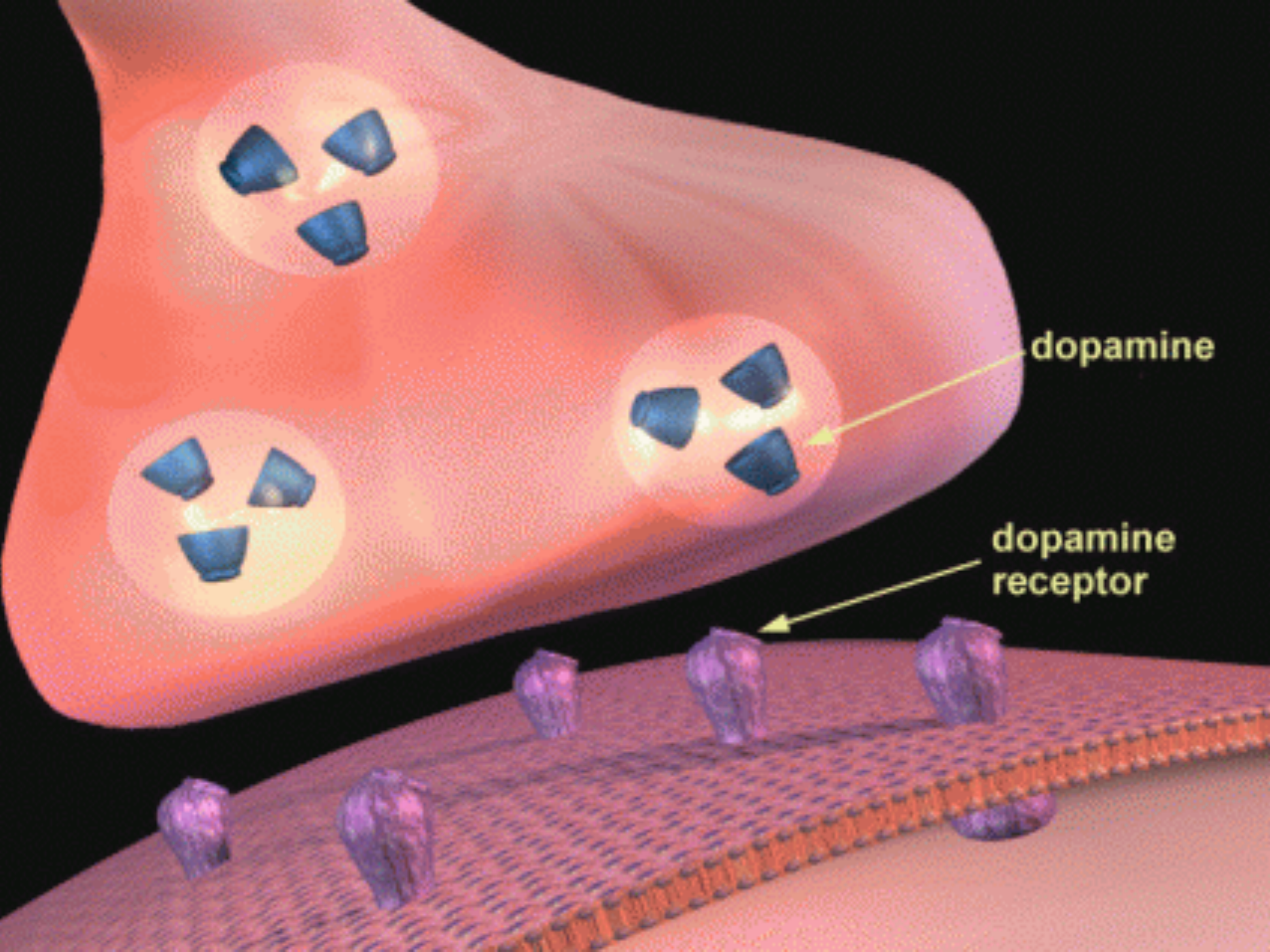


soma

axon

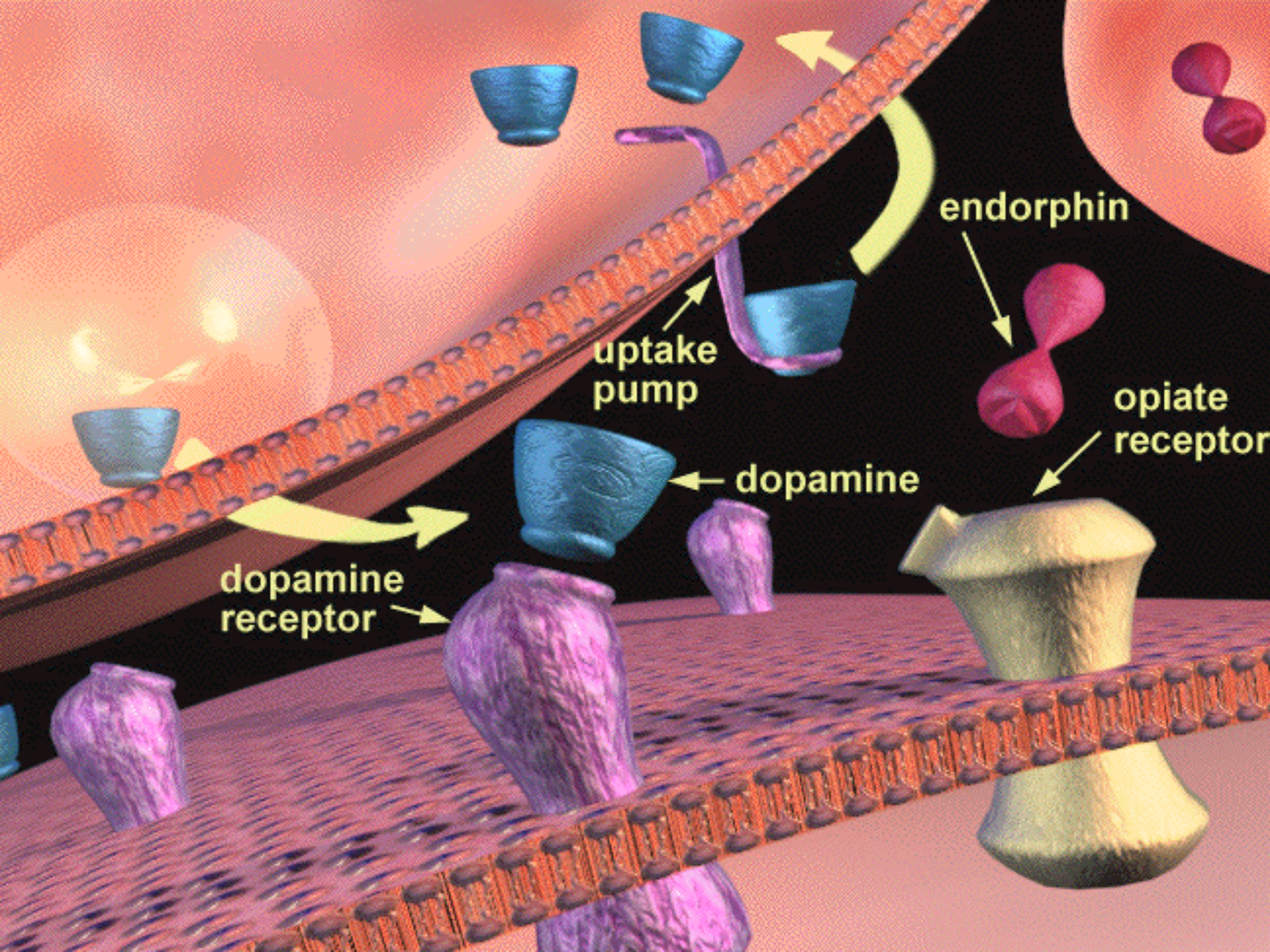
dendrite

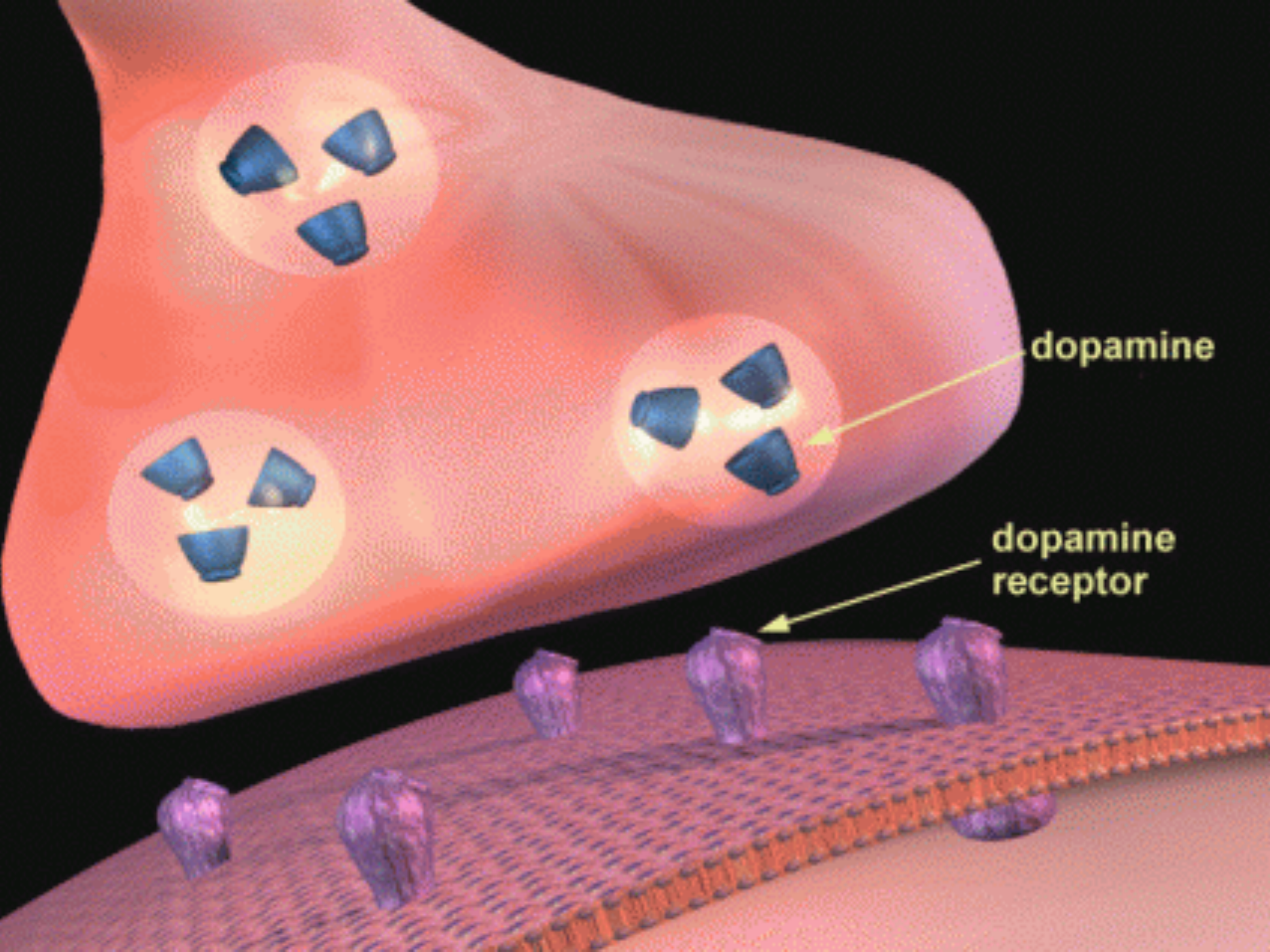
terminal



dopamine

dopamine
receptor





dopamine

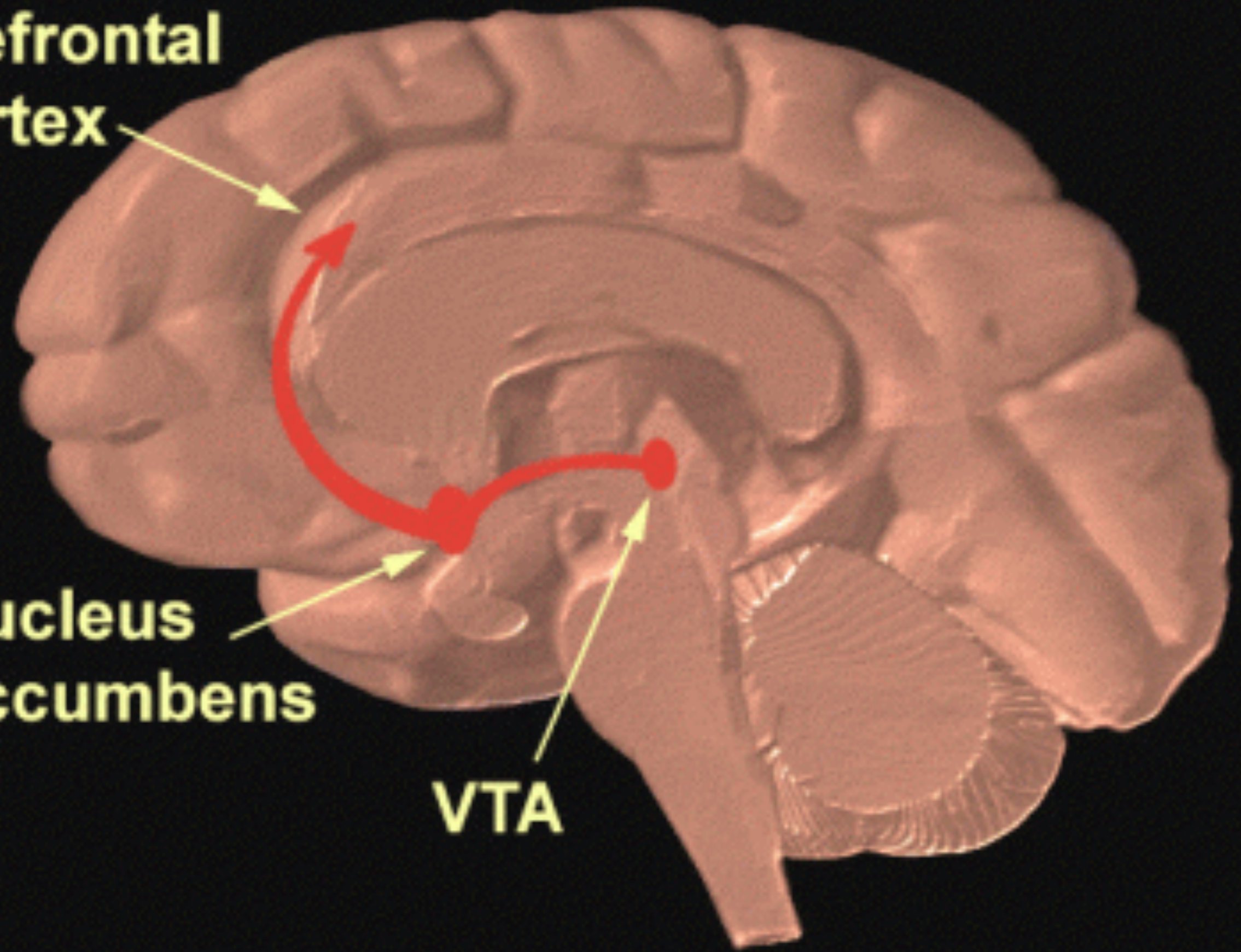
dopamine
receptor

The Reward Pathway and Addiction

**prefrontal
cortex**

**nucleus
accumbens**

VTA





Addiction

A state in which an organism engages in a compulsive behavior

- **behavior is reinforcing (rewarding or pleasurable)**
- **loss of control in limiting intake**

The Action of Heroin (Morphine)

Tolerance

A state in which an organism no longer responds to a drug

- a higher dose is required to achieve the same effect

Dependence

A state in which an organism functions normally only in the presence of a drug

- manifested as a physical disturbance when the drug is removed (withdrawal)

KEY IDEAS FOR THE BRAIN

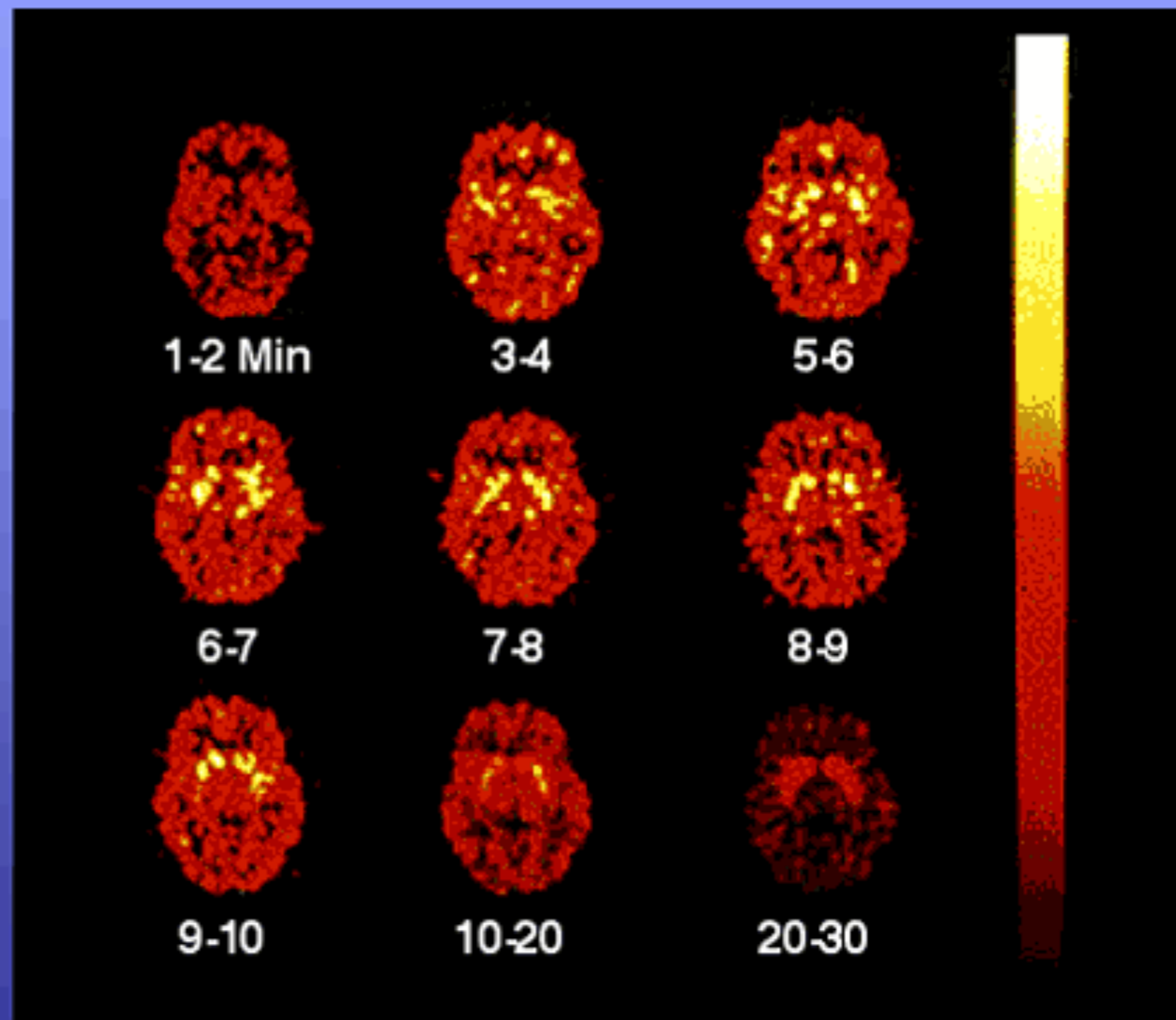
- The brain is an organ comprised of nerve cells (neurons) which communicate through electricity and chemicals (neurotransmitters)
- Neurons are organized into systems that are responsible for different brain functions
- One of these systems is the reward system; it helps us to survive but can be hijacked by activities and substances leading to...
- Maladaptive behavior, addiction, tolerance and dependence



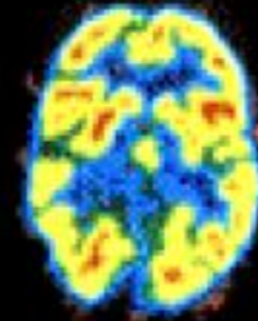
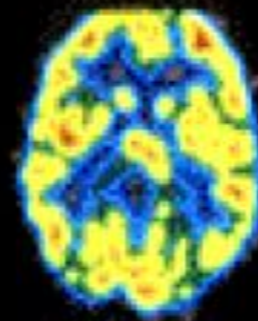
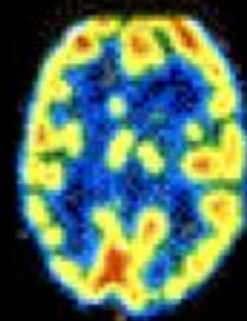
Positron Emission Tomography (PET)



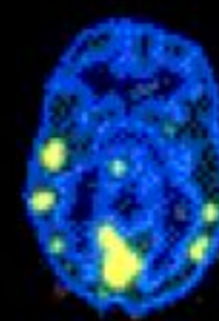
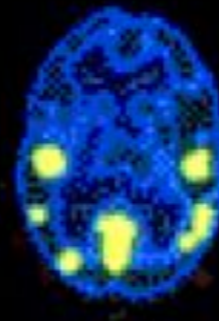
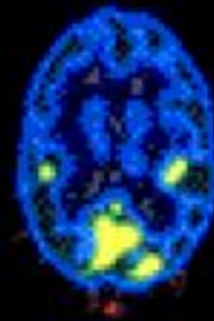
Your Brain on Drugs



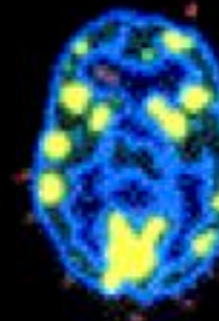
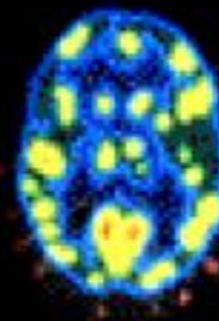
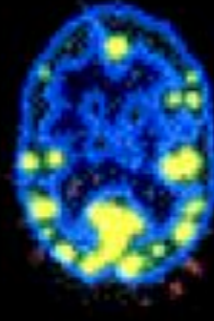
Your Brain After Drugs



Normal



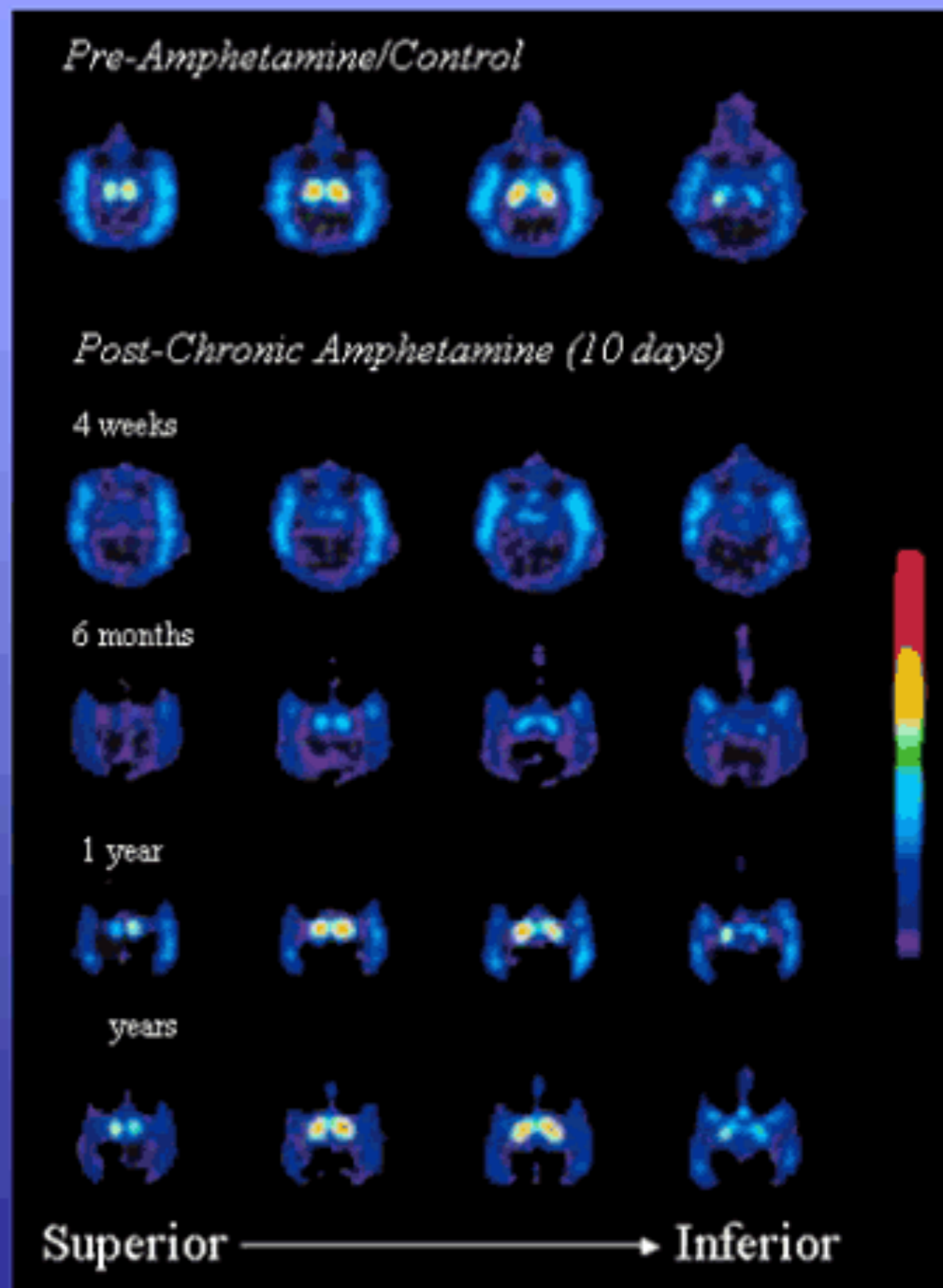
Cocaine Abuser (10 days)



Cocaine Abuser (100 days)



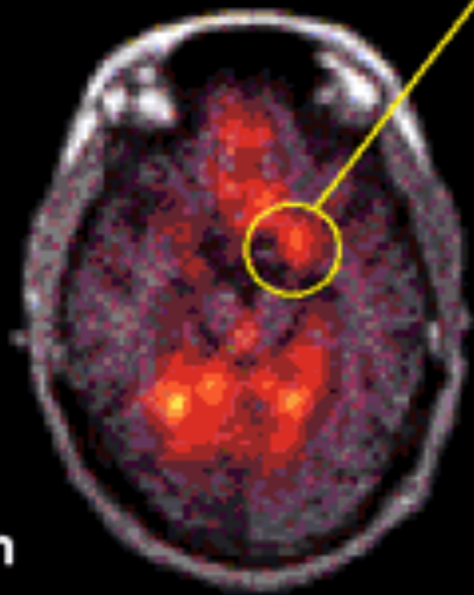
Drugs Have Long-term Consequences



The Memory of Drugs

Front of Brain

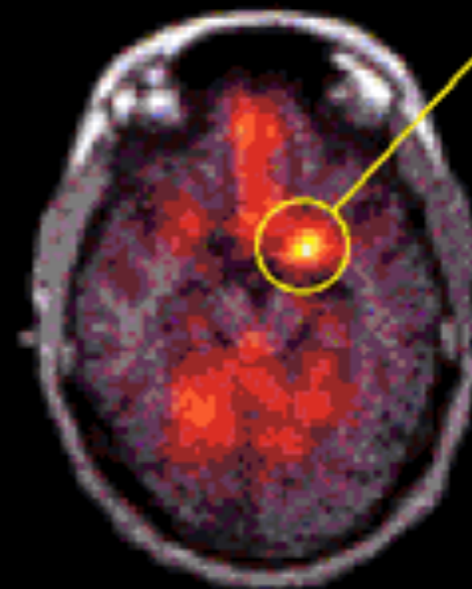
Amygdala
not lit up



Back of Brain

Nature Video

Amygdala
activated



Cocaine Video

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400	400	400	400	400
500	500	500	500	500

ILLICIT SUBSTANCES OF NOTE

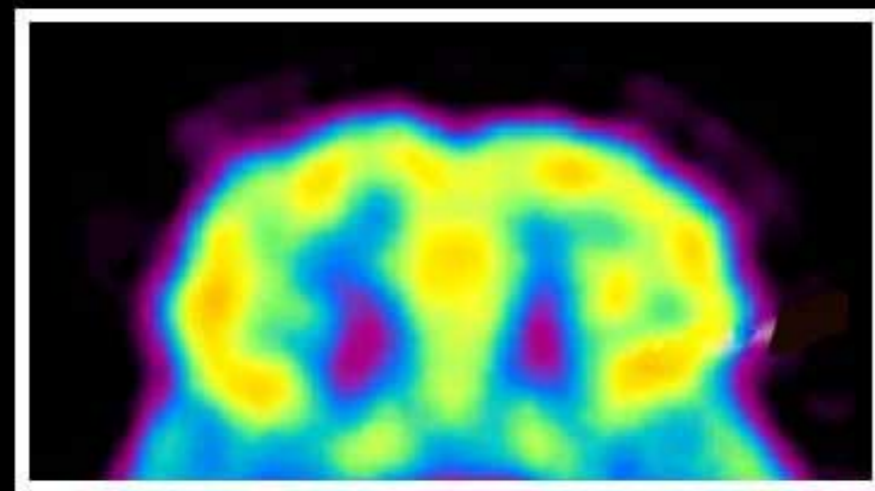
- Opioids
- Fentanyl
- Alcohol
- Marijuana
- Methamphetamine
- Cocaine

JUST CAN'T SAY NO	ILLICIT SUBSTANCES OF NOTE	HOW TREATMENT WORKS	ODDS & ENDS	PUBLIC HEALTH FOR \$20
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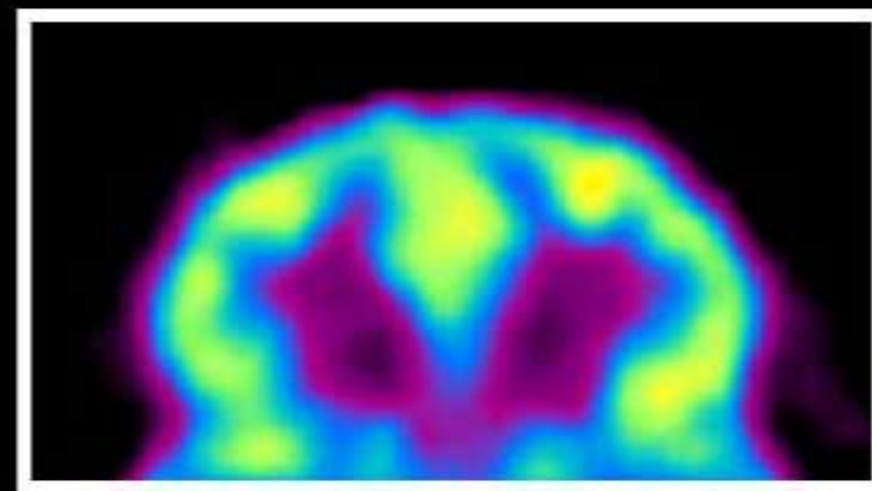
13 PRINCIPLES OF EFFECTIVE DRUG TREATMENT

I. DRUG ADDICTION IS A CHRONIC BRAIN DISEASE THAT AFFECTS BEHAVIOR

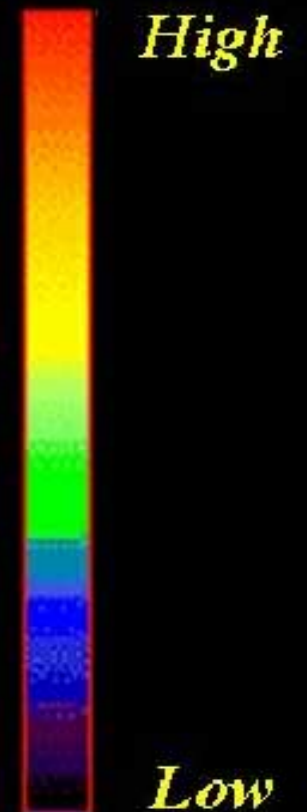
Disruption in Brain Circuits Involved in Reward and Punishment



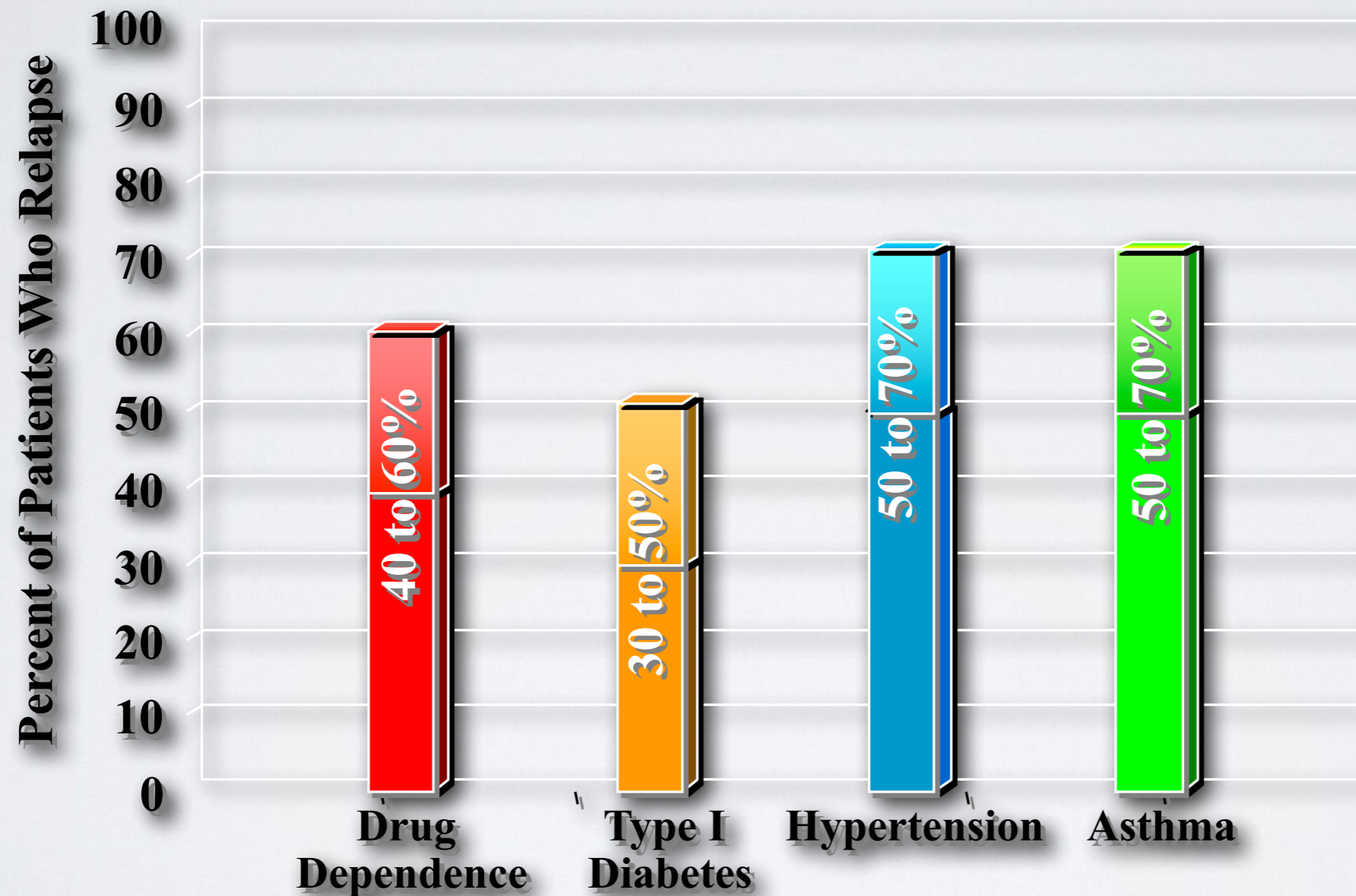
Control



Cocaine Abuser

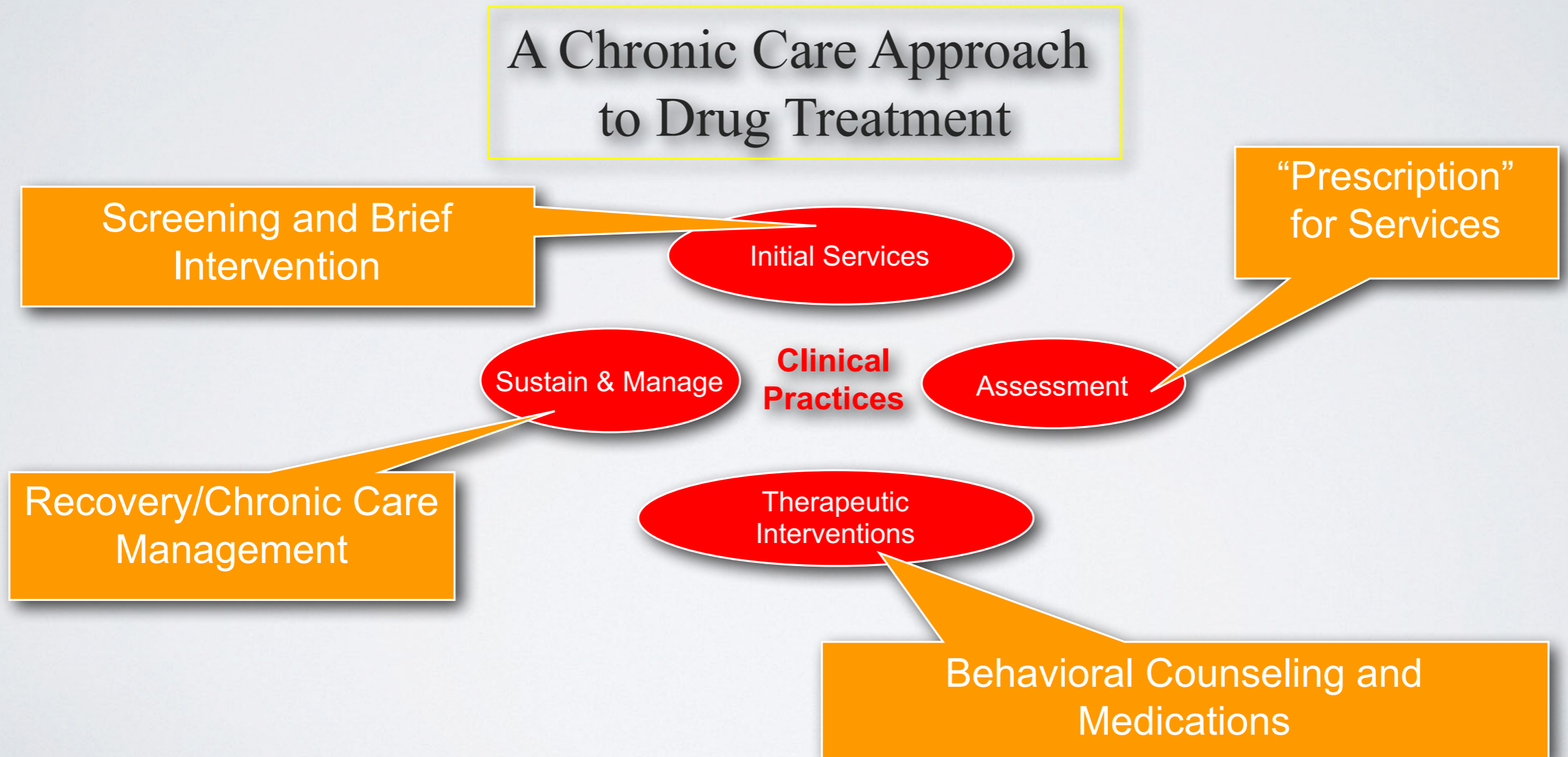


THE RELAPSE RATES FOR DRUG ADDICTIONS ARE SIMILAR TO OTHER CHRONIC MEDICAL CONDITIONS

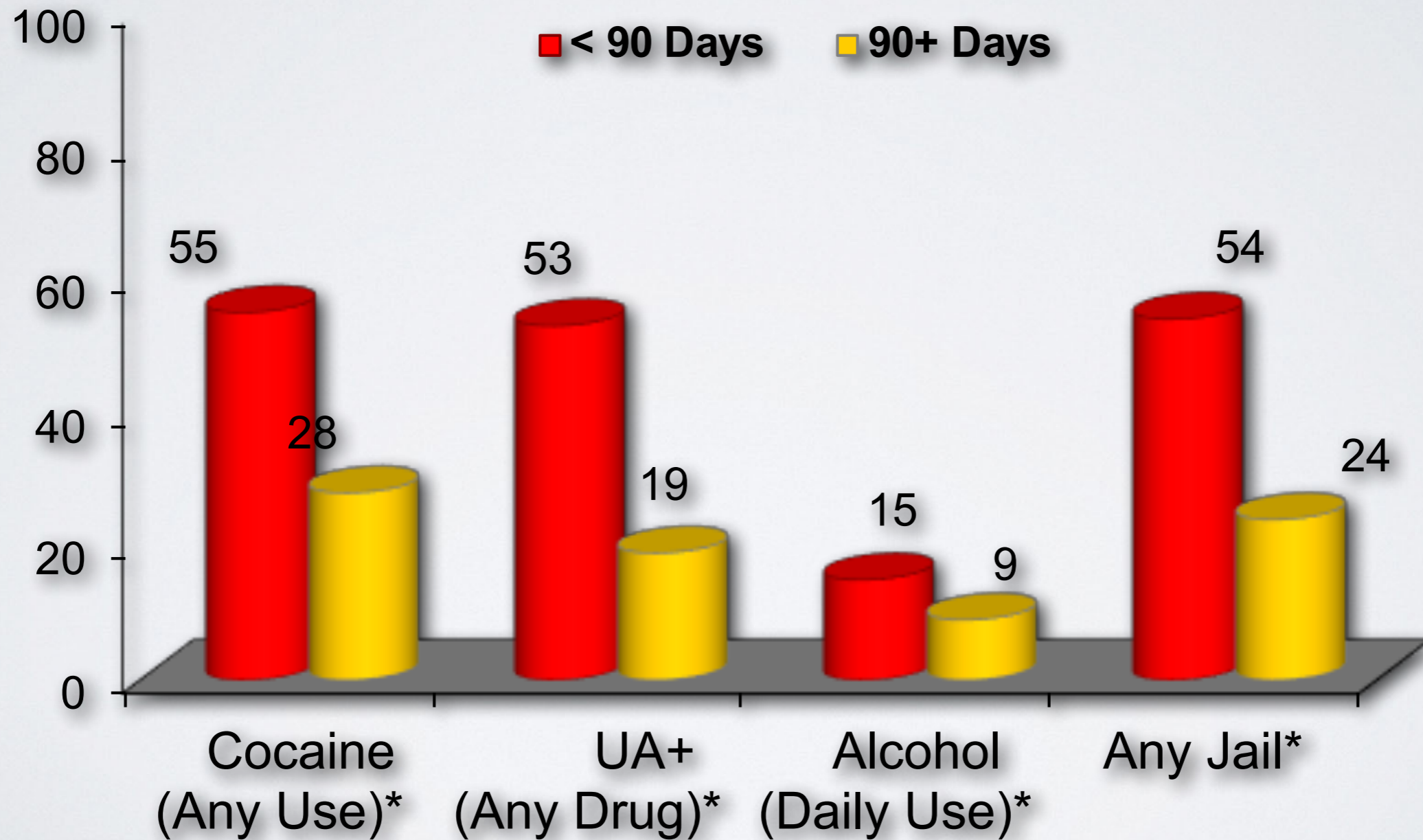


Source: McLellan, A.T. et al., JAMA, Vol 284(13), October 4, 2000.

2. RECOVERY FROM DRUG ADDICTION REQUIRES EFFECTIVE TREATMENT FOLLOWED BY MANAGEMENT OF THE DISORDER OVER TIME



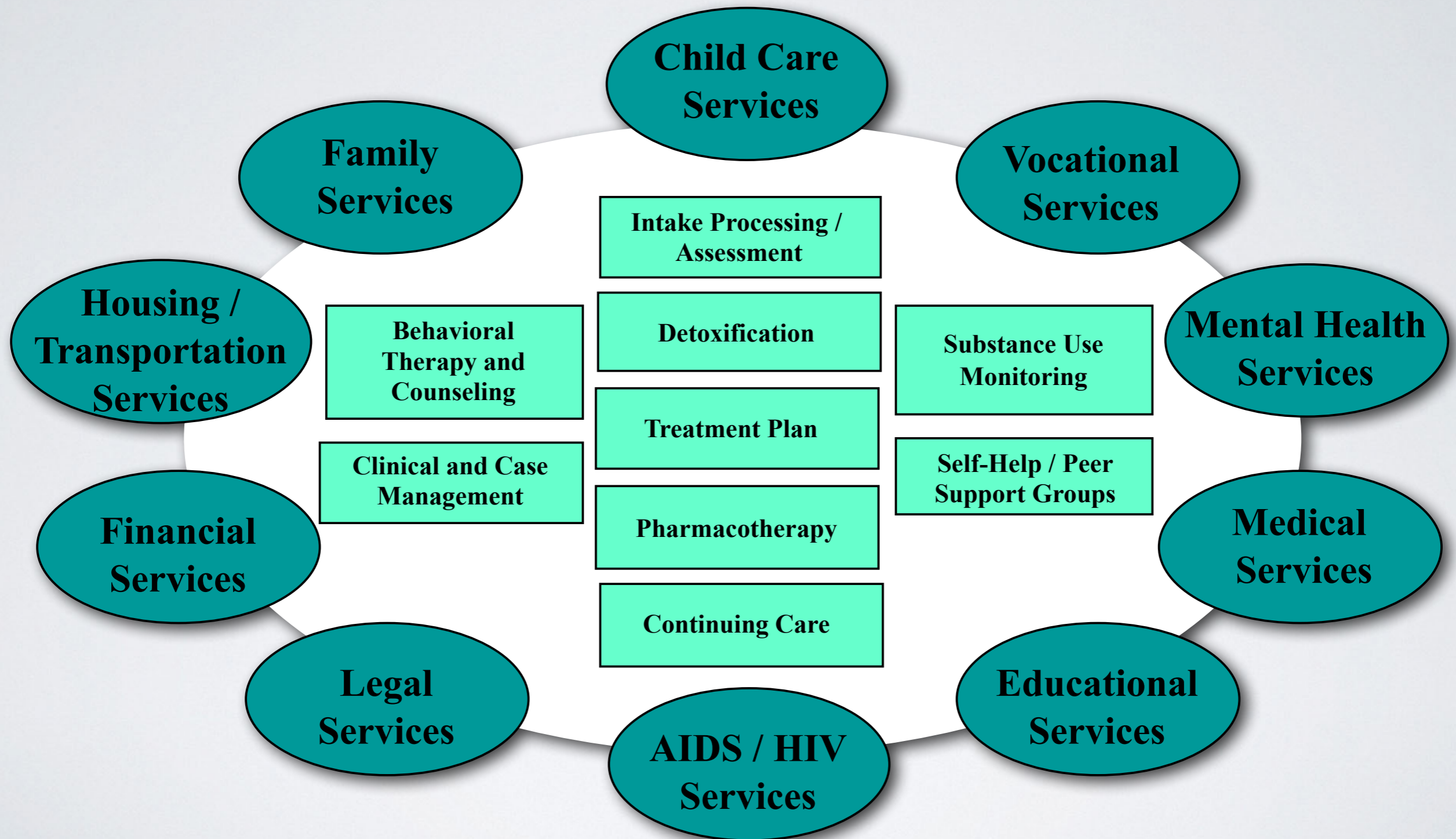
3. TREATMENT MUST LAST LONG ENOUGH TO PRODUCE STABLE BEHAVIORAL CHANGES



4. ASSESSMENT IS THE FIRST STEP IN TREATMENT

- Nature & extent of drug problem
- Strengths:
 - Family support
 - Employment history
 - Motivation
- Threats to recovery:
 - Criminal behavior
 - Mental health
 - General health
 - Family influences
 - Employment
 - Homelessness
 - HIV/AIDS

5. MATCHING SERVICES TO NEEDS IS CRITICAL FOR TREATMENT TO BE SUCCESSFUL



6. DRUG USE DURING TREATMENT SHOULD BE CAREFULLY MONITORED

- Know that lapses can occur
- Conduct Urinalyses
- Provide immediate feedback
- Intensify treatment as needed



7. TREATMENT SHOULD TARGET FACTORS ASSOCIATED WITH CRIMINAL BEHAVIOR

- Criminal thinking
- Antisocial values
- Anger & hostility
- Problem solving skills
- Conflict resolution skills
- Attitudes toward school & work
- Mental health factors
- Family functioning
- Barriers to care
- Alcohol & drug problems



INTERVENTIONS FOR DRUG ABUSING OFFENDERS

NOT Effective	Effective	Promising	Research Needed
Boot Camp	Residential Substance Abuse Treatment	Drug Courts	Reentry Programming
Intensive Supervision	Cognitive Behavioral Treatment (CBT)	Diversion to Treatment	Serious Violent Offender Reentry Initiative (SVORI)
Generic Case Management	Contingency Management	Moral Reasoning	Strengths-Based Case Management
	Medications	Motivational Interviewing	

8. TREATMENT PLANNING SHOULD INVOLVE TREATMENT & CRIMINAL JUSTICE PERSONNEL

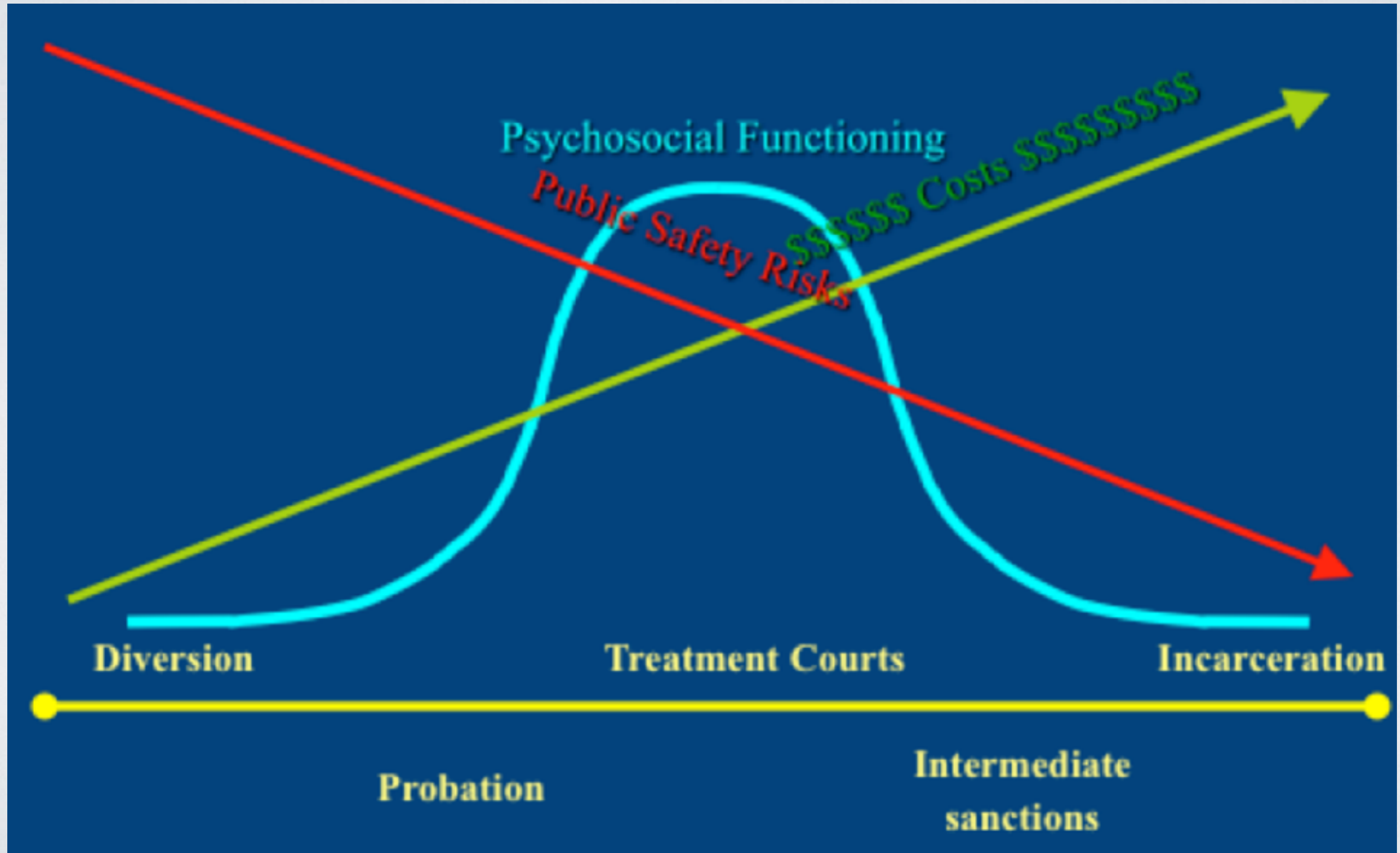
Public Health Approach
-disease
-treatment

High Attrition

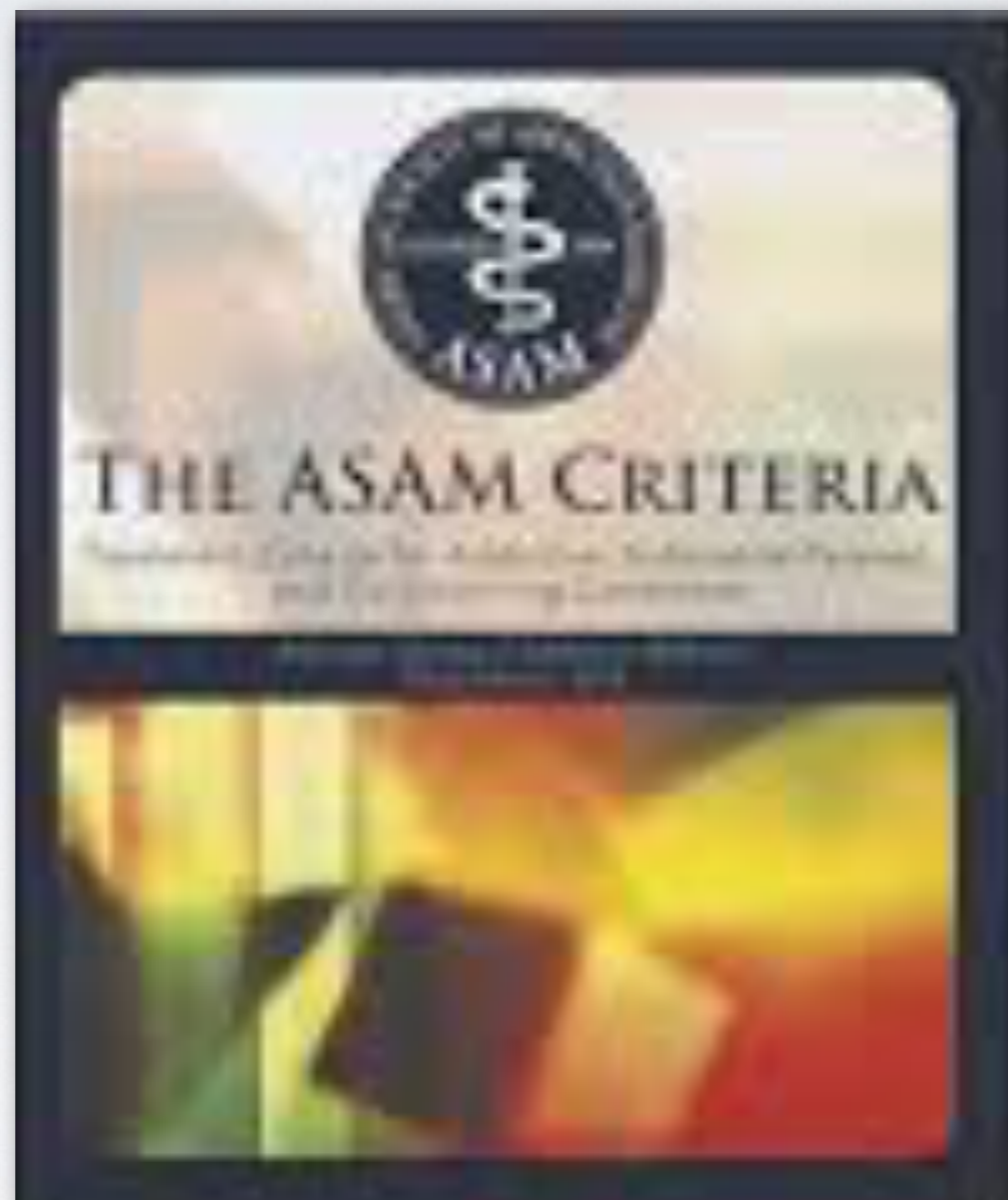
Public Safety Approach
-illegal behavior
-punish

High Recidivism

8. TREATMENT PLANNING SHOULD INVOLVE TREATMENT & CRIMINAL JUSTICE PERSONNEL



9. CONTINUITY OF CARE IS ESSENTIAL



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AT A GLANCE: THE SIX DIMENSIONS OF MULTIDIMENSIONAL ASSESSMENT		
ASAM's criteria uses six dimensions to create a holistic, biopsychosocial assessment of an individual to be used for service planning and treatment across all services and levels of care. The six dimensions are:		
1	DIMENSION 1	Acute Intoxication and/or Withdrawal Potential Exploring an individual's past and current experiences of substance use and withdrawal
2	DIMENSION 2	Biomedical Conditions and Complications Exploring an individual's health history and current physical condition
3	DIMENSION 3	Emotional, Behavioral, or Cognitive Conditions and Complications Exploring an individual's thoughts, emotions, and mental health issues
4	DIMENSION 4	Readiness to Change Exploring an individual's readiness and interest in changing
5	DIMENSION 5	Relapse, Continued Use, or Continued Problem Potential Exploring an individual's unique relationship with relapse or continued use or problems
6	DIMENSION 6	Recovery/Living Environment Exploring an individual's recovery or living situation, and the surrounding people, places, and things

9. CONTINUITY OF CARE IS ESSENTIAL



10. A BALANCE OF REWARDS AND SANCTIONS CAN ENCOURAGE PRO-SOCIAL BEHAVIOR AND TREATMENT PROGRESS

Rewards

Reinforce positive behavior

Use awards (non-monetary) to recognize progress

“Catch people doing things right”

Sanctions

Graduated

Consistent, prediction, fair

Treatment not a sanction!

Most likely to have desired effect the closer they follow the targeted behavior.

11. TREAT CO-EXISTING MENTAL DISORDERS IN AN INTEGRATED WAY

Attention Deficit Disorder

Bipolar Disorder

DRUG ABUSE

Conduct Disorders

Depression

Post-Traumatic Stress Disorder

12. MEDICATIONS ARE AN IMPORTANT ELEMENT OF TREATMENT

- Methadone



- Naltrexone



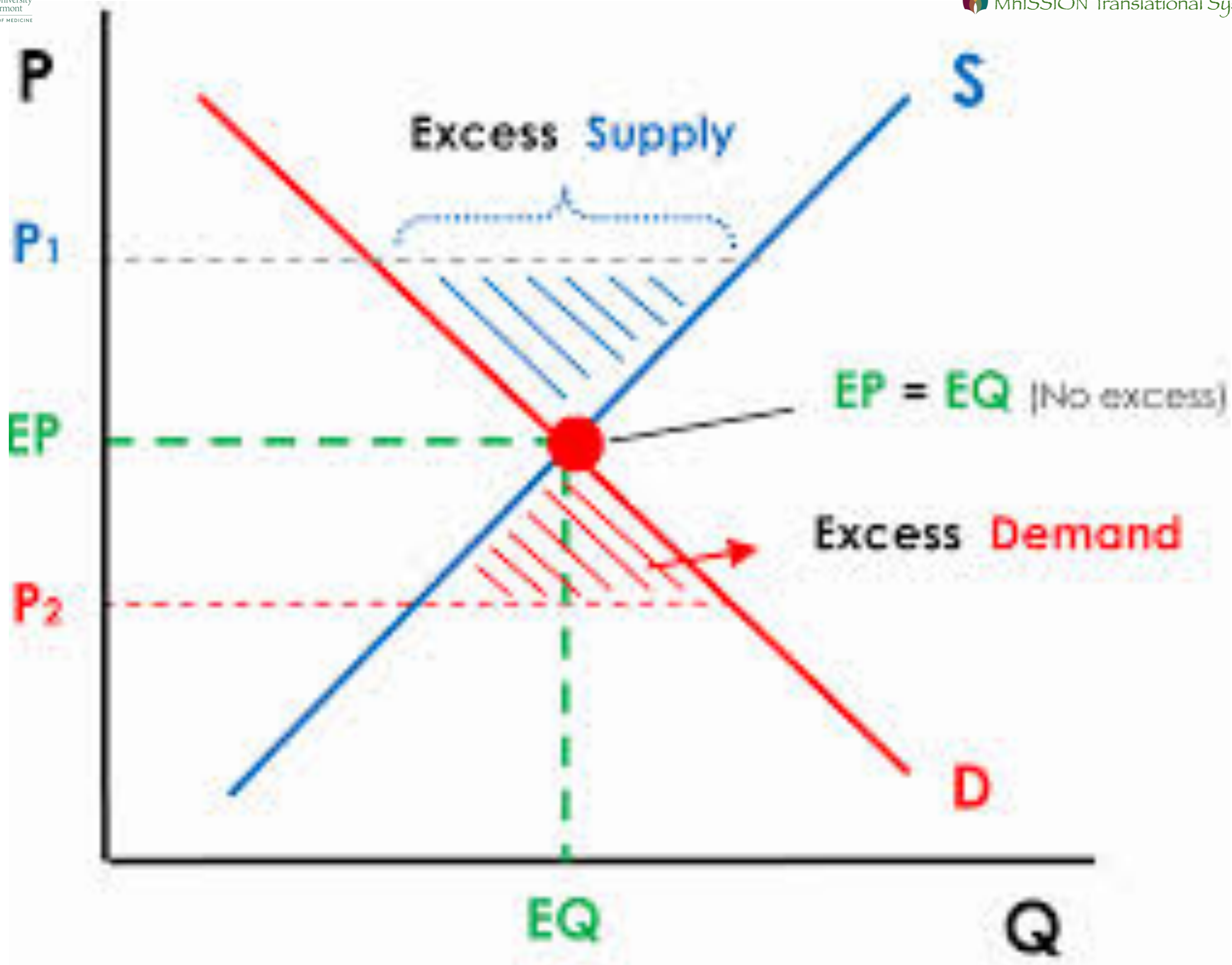
- Buprenorphine (Suboxone)



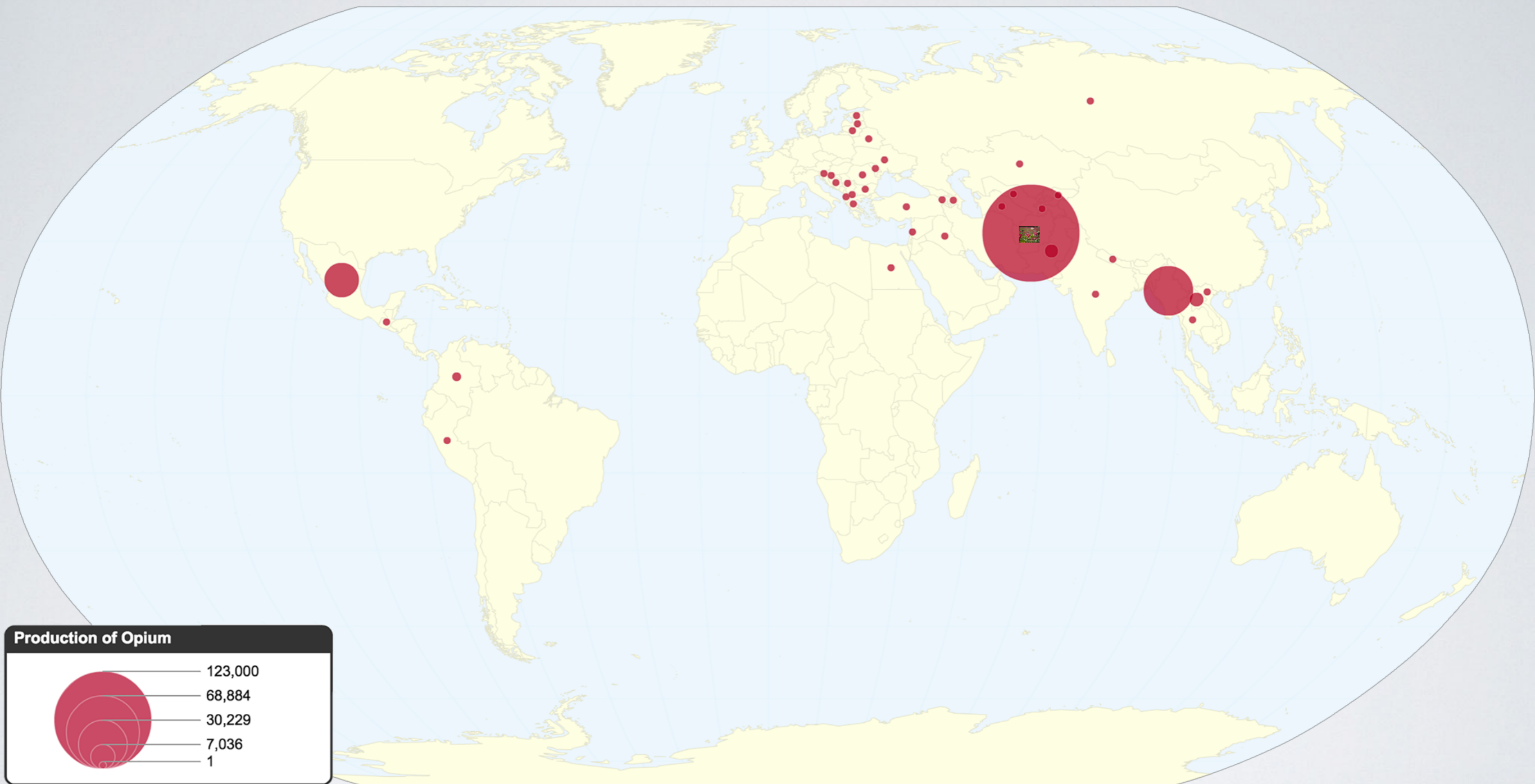
13. ASSESS FOR RISK REDUCTION AND TREATMENT NEEDS FOR HIV/AIDS, HEPATITIS C AND OTHER INFECTIOUS DISEASES

- Prison-based AIDS cases are 5 times as high as in the general population
- Disproportionate impact on the poor & substance abusers

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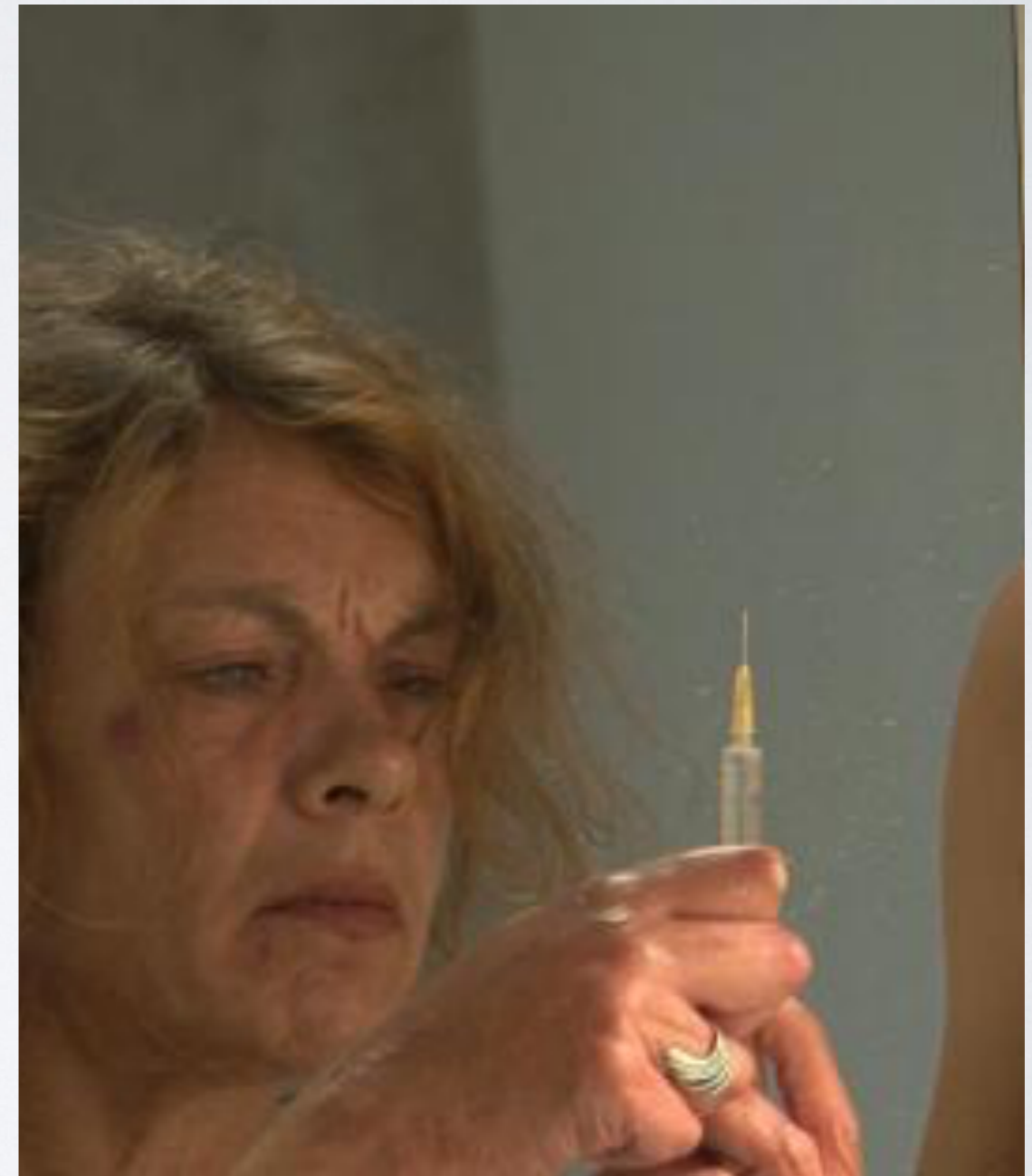


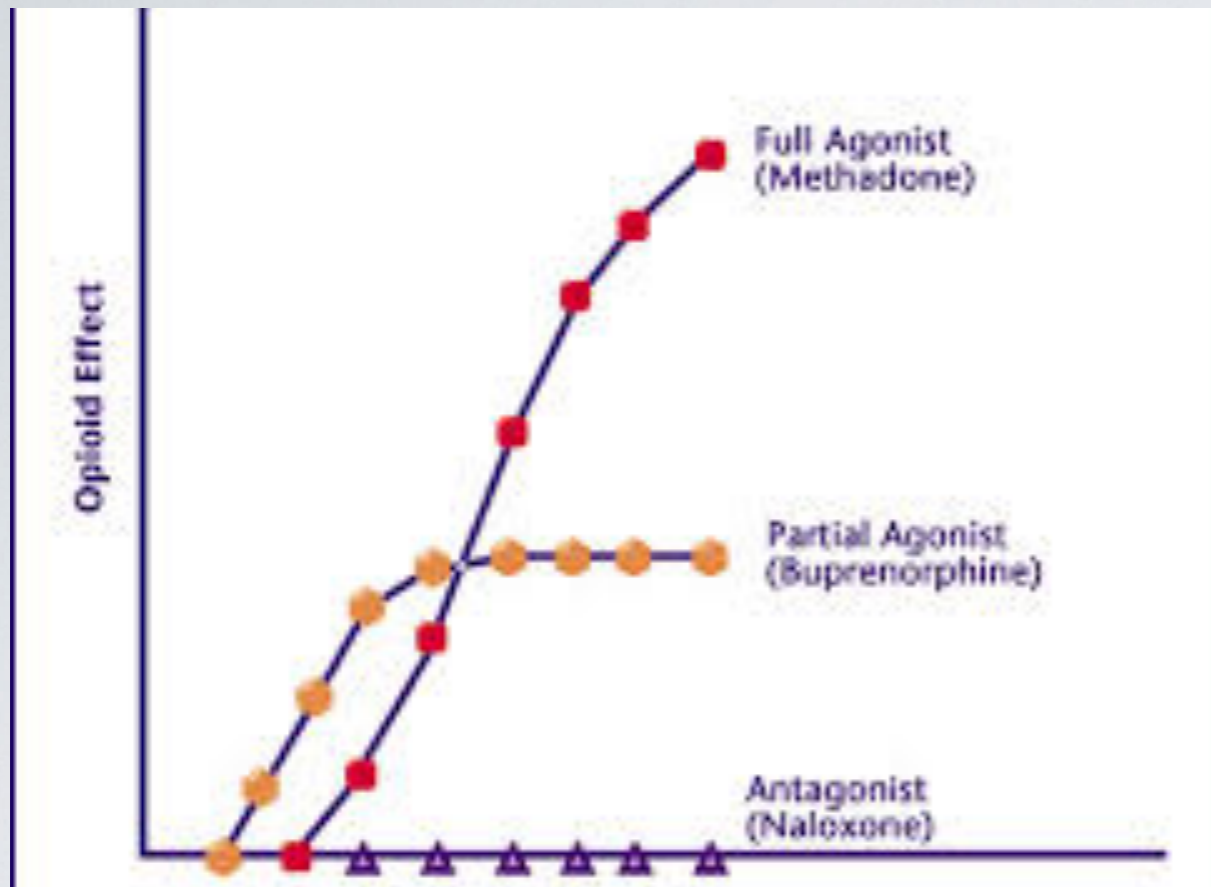




STATE-FUNDED HEROIN CLINICS

- Denmark, Holland & Switzerland
- Reduced the number of days spent on crimes by 70%
- Increased the number of addicts who find permanent housing by 30%
- Reduced side abuse (drink 50% less; benzos by 70%)





- Suboxone/buprenorphine



Table ES2. Two-year costs among 1,000 hypothetical patients treated for opioid dependence.

Outcome/Cost	MMT	BMT	SUB/VIV Taper	SUB/Oral NTX Taper	Vivitrol Alone	Oral NTX Alone
Treatment outcome (per 1,000):						
<i>In treatment</i>	630	523	550	500	416	277
<i>Relapsed</i>	185	292	265	315	400	538
<i>Drug –free</i>	177	176	177	176	173	169
<i>Died</i>	8	9	8	9	12	16
Cost (\$, per patient):						
<i>Drug therapy</i>	699	3,655	8,553	1,249	6,585	665
<i>Other SA services</i>	14,017	7,043	4,146	4,297	2,985	2,446
<i>Other health care</i>	23,926	25,993	25,454	26,441	28,109	30,844
SUBTOTAL	38,642	36,691	38,153	31,988	37,679	33,954
<i>Social costs</i>	92,068	102,337	98,033	105,917	119,239	141,076
TOTAL	130,710	139,028	136,187	137,905	156,918	175,030

MMT: methadone maintenance treatment; BMT: buprenorphine maintenance treatment; NTX: naltrexone; SUB: Suboxone; VIV: Vivitrol

NALOXONE/NARCAN

- Pure opioid antagonist
- Naloxone (Narcan) and Evzio (injectable form) used to counter the effects of opioid overdose
- Reverses depression of the CNS respiratory centers and counters hypotension
- Naloxone combined with opioids taken by mouth to decrease risk of misuse if injected (Suboxone)



STANDING ORDERS OR OPIATE ABUSE/OVERDOSE

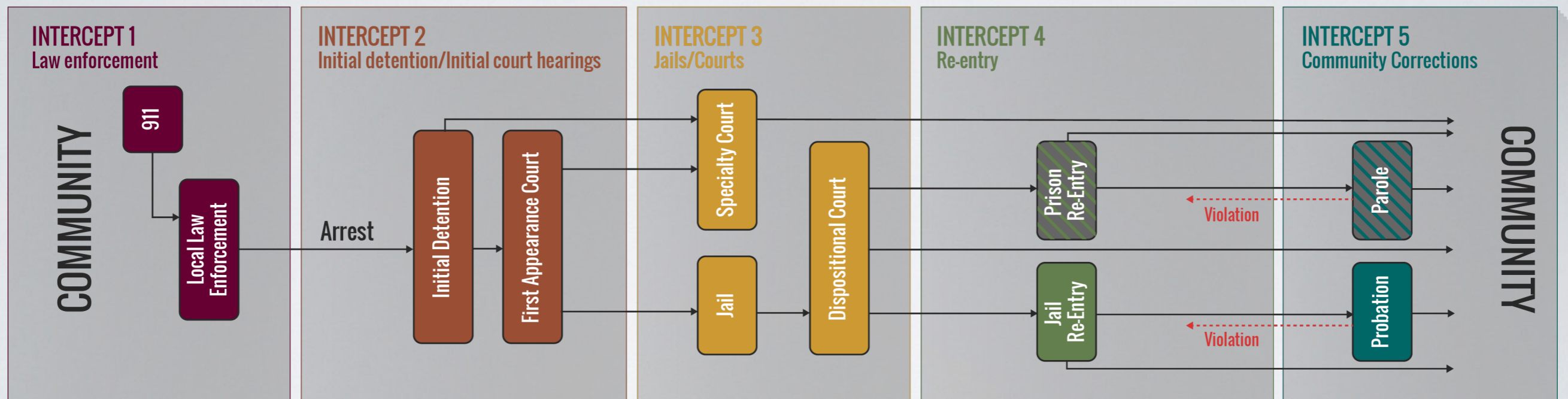
- EMTs:
 - Routine Patient Care
 - For suspected overdose with severe respiratory depression, administer naloxone 1mg (1ml) per nostril via atomizer for a total of 2 mg.
- Advanced EMTs:
 - For severe respiratory depression administer naloxone 0.4-2mg IV/IM/IO/SQ/intranasal
 - Establish IV access
 - If no response, may repeat initial dose every 5 minutes for a total of 10mg
- Paramedics:
 - Beta blockers and Ca Channel Blockers for severe bradycardia

EMT STANDING ORDERS		1-800-222-1222
E	<ul style="list-style-type: none"> • Routine Patient Care. • Consider contacting Poison Control at (800) 222-1222 as soon as practical for consultation. • For suspected opioid overdose with severe respiratory depression, administer naloxone 1 mg (1 mL) per nostril via atomizer for a total of 2 mg. • For suspected isolated cyanide poisoning, see Smoke Inhalation Protocol - Adult 2.21A. • For decontamination/hazardous materials exposure, see Hazardous Materials Exposure 9.0. • For hypoglycemia, see Diabetic Emergencies Protocol - Adult 2.7A. • For seizures, see Seizure Protocol - Adult 2.18A. • Call for Paramedic intercept, if available. If not available, call for AEMT intercept. 	
A	<p>ADVANCED EMT STANDING ORDERS</p> <ul style="list-style-type: none"> • For severe respiratory depression, administer naloxone 0.4 – 2 mg IV/IM/IO/SQ/intranasal. <ul style="list-style-type: none"> ○ Establish IV access. ○ Consider restraint. See Behavioral Emergencies Protocol 2.6. ○ Titrate to response. ○ If no response, may repeat initial dose every 5 minutes to a total of 10 mg. • Ingested Poison: <ul style="list-style-type: none"> ○ Consider activated charcoal 25 – 50 grams PO if ingestion is non-caustic substance, occurred within last 60 minutes, if patient is awake/alert, and protecting airway, AND if advised by Medical Control. 	
P	<p>PARAMEDIC STANDING ORDERS</p> <p>Suggested Treatments</p> <ul style="list-style-type: none"> • Beta Blocker and Ca Channel Blocker, see Bradycardia Protocol – Adult 3.1A. • Dystonic Reaction: <ul style="list-style-type: none"> ○ Diphenhydramine 25 – 50 mg IV/IM • Organophosphates, see Nerve Agent/Organophosphate Protocol – Adult 2.11A. • For severe agitation, seizures or hyperthermia: <ul style="list-style-type: none"> ○ Midazolam 2.5 mg IV/intranasal, may repeat once in 5 minutes; or 5 mg IM, may repeat once in 10 minutes, OR ○ Lorazepam 1 mg IV, may repeat once in 5 minutes; or 2 mg IM may repeat once in 10 minutes, OR ○ Diazepam 2 mg IV, may repeat once in 5 minutes, • Tricyclic with symptomatic dysrhythmias, (e.g., tachycardia and wide QRS): <ul style="list-style-type: none"> ○ Sodium bicarbonate 1 to 2 mEq/kg IV. 	

NALTREXONE/VIVITROL

- Opioid antagonist with less binding capacity than naloxone
- Used primarily in the management of alcohol & opioid dependence
- Also used for tobacco dependence, self-injurious behavior and various other addictions
- SHOULD NOT BE CONFUSED WITH NALOXONE IN CASES OF EMERGENCY OPIOID OVERDOSE





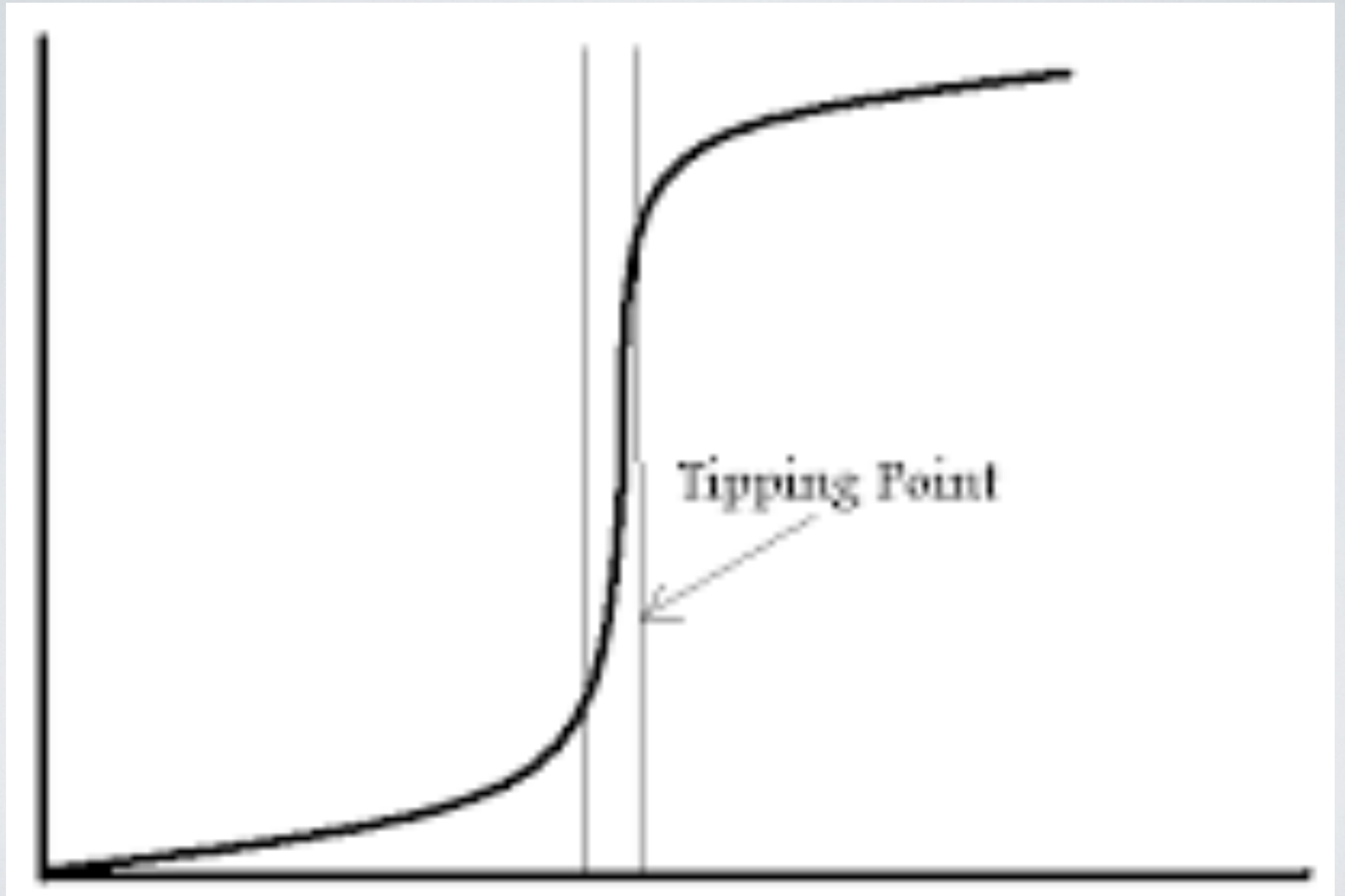
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Drug Abuse is a preventable behavior
&
Drug Addiction is a treatable disease

Public Health as a Practical System

Use current knowledge for maximum impact





Population Health



Experience of Care

Per Capita Cost

Q & A

Q & A

“Progress might have been alright once, but it’s gone on for too long.”

–Ogden Nash

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