

“Roots Run Deep”  
Opioid & OD  
Response

Bob Lutz, MD MPH  
10.23.23



# Definitions

**drug abuse/misuse** – the use of illegal drugs and/or the use of prescription drugs in a manner other than as directed by a doctor, such as use in greater amounts, more often, or longer than told to take a drug or using someone else's prescription

**drug addiction** – the preferred term is *substance use disorder*

**illicit drugs** – the nonmedical use of a variety of drugs that are prohibited by law – these drugs can include amphetamine- type stimulants, marijuana/cannabis, cocaine, heroin, other opioids, and synthetic drugs, such as illicitly manufactured fentanyl (IMF) and ecstasy (MDMA)

<https://www.cdc.gov/opioids/basics/terms.html>

# Definitions

**naloxone** – a drug that can reverse the effects of opioid overdose and can be life-saving if administered in time – sold under the brand name Narcan or Evzio

**narcotic drugs** – originally referred to any substance that dulled the senses and relieved pain - some people use the term to refer to all illegal drugs but technically, it refers only to opioids - *opioid* is now the preferred term

**nonmedical use** – taking prescribed or diverted prescription drugs (drugs not prescribed to the person using them) not in the way, for the reasons, in the amount, or during the time-period prescribed

<https://www.cdc.gov/opioids/basics/terms.html>

# Definitions

**non-pharmacologic therapy** – treatments that do not involve medications, including physical treatments (e.g., exercise therapy, weight loss) and behavioral treatments (e.g., cognitive behavioral therapy)

<https://www.cdc.gov/opioids/basics/terms.html>

# Definitions

**opioid** – natural, synthetic, or semi-synthetic chemicals that interact with opioid receptors on nerve cells in the body and brain to reduce the intensity of pain signals and feelings of pain

this class of drugs includes the illegal drug heroin, synthetic opioids such as fentanyl, and prescription medications, e.g., oxycodone, hydrocodone, codeine, morphine

prescription opioids are generally safe when taken for a short time and as directed by a provider, but because they produce euphoria in addition to pain relief, they can be misused and have addiction potential

<https://www.cdc.gov/opioids/basics/terms.html>

# Definitions

**opioid use disorder (OUD)** – a problematic pattern of opioid use that causes significant impairment or distress – diagnosis is based on specific criteria such as unsuccessful efforts to cut down or control use, or use resulting in social problems and a failure to fulfill obligations at work, school, or home, among other criteria

opioid use disorder is preferred over other terms with similar definitions, “**opioid abuse or dependence**” or “**opioid addiction**”

<https://www.cdc.gov/opioids/basics/terms.html>

# Definitions

**drug withdrawal** - a physiological response to the sudden quitting or slowing of use of a substance to which the body has grown dependent on

the various types of drug withdrawal syndromes may involve different combinations of physical, mental, and emotional symptoms—some of which can prove dangerous if left unmanaged

# Opiate Withdrawal Timeline



Last Dose

Symptoms Begin

**6-12 hours**

Short-Acting Opiates



**30 hours**

Long-Acting Opiates



**72 hours**

**Symptoms Peak**

- ✓ Nausea
- ✓ Vomiting
- ✓ Stomach Cramps
- ✓ Diarrhea
- ✓ Goosebumps
- ✓ Depression
- ✓ Drug Cravings





# Signs & Symptoms of Withdrawal

trembling and tremors

muscle pain or aches

hunger or loss of appetite

fatigue

sweating

irritability and agitation

depression

anxiety

nausea

vomiting

confusion

insomnia

paranoia

seizures

dilated pupils

# Definitions

## What's the difference between “tolerance,” “dependence,” and “addiction”?

**opioid tolerance** occurs when a person using opioids begins to experience a reduced response to medication, requiring more opioids to experience the same effect

**opioid dependence** occurs when the body adjusts its normal functioning around regular opioid use – unpleasant physical symptoms occur when medication is stopped

**opioid addiction (OUD)** occurs when attempts to cut down or control use are unsuccessful or when use results in social problems and a failure to fulfill obligations at work, school, and home – addiction often comes after the person has developed opioid tolerance and dependence, making it physically challenging to stop opioid use and increasing the risk of withdrawal

# tolerance

larger amounts of drug are needed for same effect

experience reduced effect with the same amount of drug

tolerance levels vary greatly

can lose tolerance if drug is not taken for prolonged period

- increased risk of overdose

# Two Types of Dependence

## **Physical**

the body's reaction to sustained exposure to a drug

physical and observable withdrawal symptoms

this process can be painful and consuming

## **Psychological**

sustained mental/emotional need for the drug or substance

can occur with essentially any substance

hardwiring of the brain – development of attachments or a need for the substance

may last longer than a physical dependence

# Drug Classifications

## **Stimulants**

substances that increase alertness, attention, energy, blood pressure, heart rate, and breathing rate

short-term effects - increased alertness, attention, energy; increased blood pressure and heart rate

long-term effects - cardiac problems, psychosis, anger, paranoia

## **Central Nervous System Depressants**

substances that slow brain activity, which makes them useful for treating anxiety and sleep problems

short-term effects - drowsiness, slurred speech, poor concentration, confusion, dizziness, problems with movement and memory, lowered blood pressure, slowed breathing.

long-term effects - unknown

## **Hallucinogens**

substances that distort the perception of reality

short-term effects - increased heart rate, nausea, intensified feelings and sensory experiences, changes in sense of time

long-term effects - speech problems, memory loss, weight loss, anxiety, depression and suicidal thoughts

# Drug Classification

## **Alcohol**

a depressant that slows the function of the central nervous system

short-term effects - reduced inhibitions, slurred speech, motor impairment, confusion, memory problems, concentration problems

long-term effects - development of an alcohol use disorder, health problems, increased risk for certain cancers

## **Cocaine**

a powerfully addictive stimulant drug made from the leaves of the coca plant native to South America

short-term effects - narrowed blood vessels, enlarged pupils, increased body temperature, heart rate, and blood pressure, headache, abdominal pain and nausea, euphoria

long-term effects - loss of sense of smell, nosebleeds, nasal damage and trouble swallowing from snorting, infection and death of bowel tissue from decreased blood flow

## **Heroin**

an opioid drug derived from morphine, a natural substance extracted from the opium poppy

short-term effects - euphoria, dry mouth, itching, nausea, vomiting, analgesia, slowed breathing and heart rate

long-term effect - collapsed veins, abscesses, endocarditis (infection of the lining and valves in the heart), constipation and stomach cramps, liver or kidney disease, pneumonia

# Drug Classification

## **Methamphetamine**

a stimulant drug chemically related to amphetamine but with stronger effects on the CNS

short-term effects - increased wakefulness and physical activity, decreased appetite, increased breathing, heart rate, blood pressure, temperature, irregular heartbeat

long-term effects - anxiety, confusion, insomnia, mood problems, violent behavior, paranoia, hallucinations, delusions, weight loss

## **Cannabis**

the main psychoactive (mind-altering) chemical in cannabis is delta-9-tetrahydrocannabinol (THC)

short-term effects - enhanced sensory perception and euphoria followed by drowsiness/relaxation; slowed reaction time; problems with balance and coordination

long-term effects - mental health problems, chronic cough, frequent respiratory infections

## **Opioids**

pain relievers with an origin similar to that of heroin; opioids can cause euphoria and are often used non-medically, leading to overdose deaths

short-term effects - pain relief, drowsiness, nausea, constipation, euphoria, slowed breathing, death

long-term effects - increased risk of overdose or addiction

# Opioid vs. Opiate



opiate – active ingredient derived from the opium poppy (e.g., morphine and codeine, heroin (semi-synthetic))

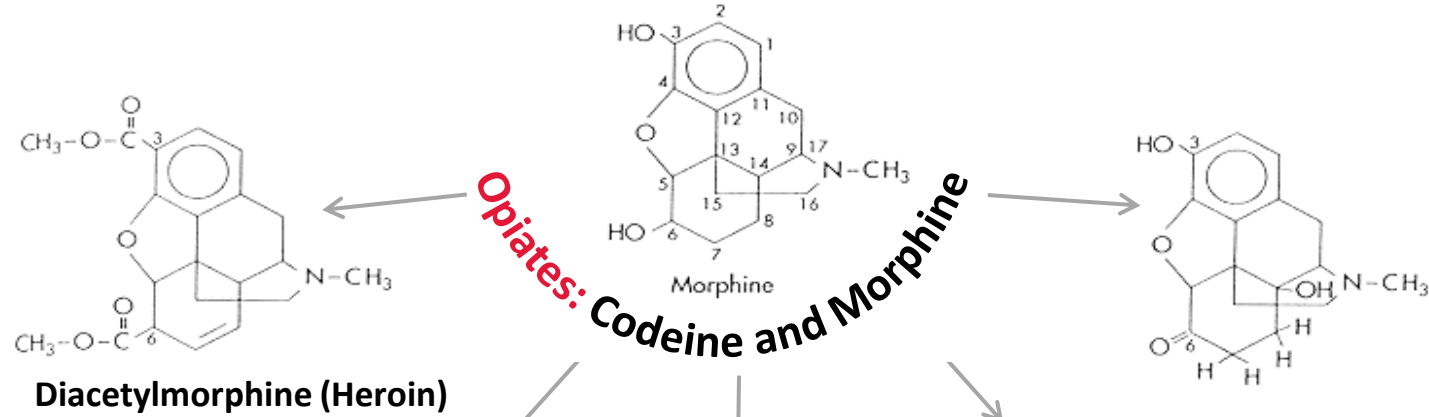


opioids – entire class of natural, semi-synthetic, synthetic

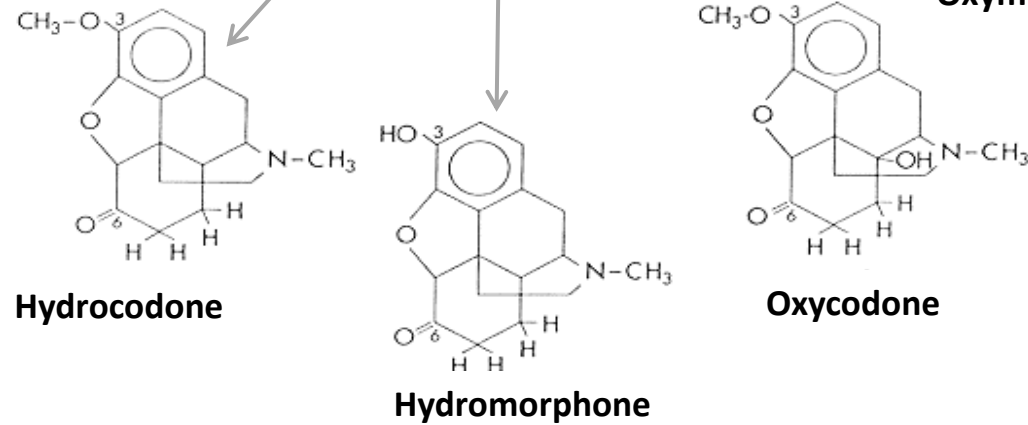
Fentanyl (Actiq<sup>®</sup>, Subsys<sup>®</sup>)  
Hydromorphone (Dilaudid<sup>®</sup>)  
Methadone (Dolophine<sup>®</sup>)  
Oxycodone  
OxyContin<sup>®</sup> (synthesized from thebaine, an opium alkaloid, making it semi-synthetic)



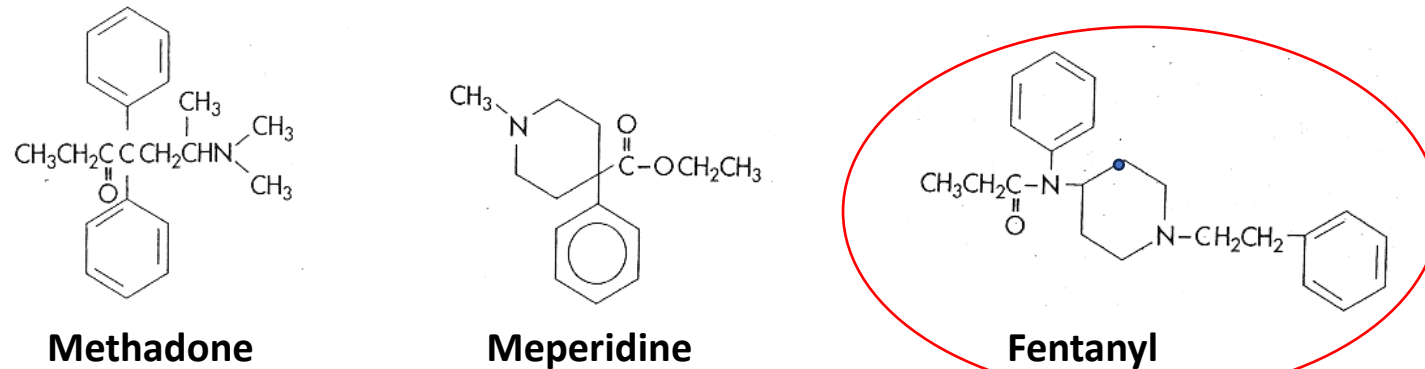
Natural (Opiates)



Semisynthetic



Synthetic



# How Do Opioids Work in the Brain?



opioids are highly addictive

brain cells can become dependent on exogenous opioids to the extent that users require regular dosing to function in their daily routine

opioids initially cause a rush of pleasure (euphoria)

opioids slow down the thought process, reaction time, and memory → impacts the way a person who uses opioids acts and make decisions



# Acute Effects of Opioids

euphoria

pain relief

sense of well-being

depression of the CNS

drowsiness & lethargy

sedation

impaired attention & memory

confusion, delirium

seizures

pupil constriction

slurred speech

constipation, urinary retention

nausea

slowed heart rate

suppresses cough reflex

histamine release

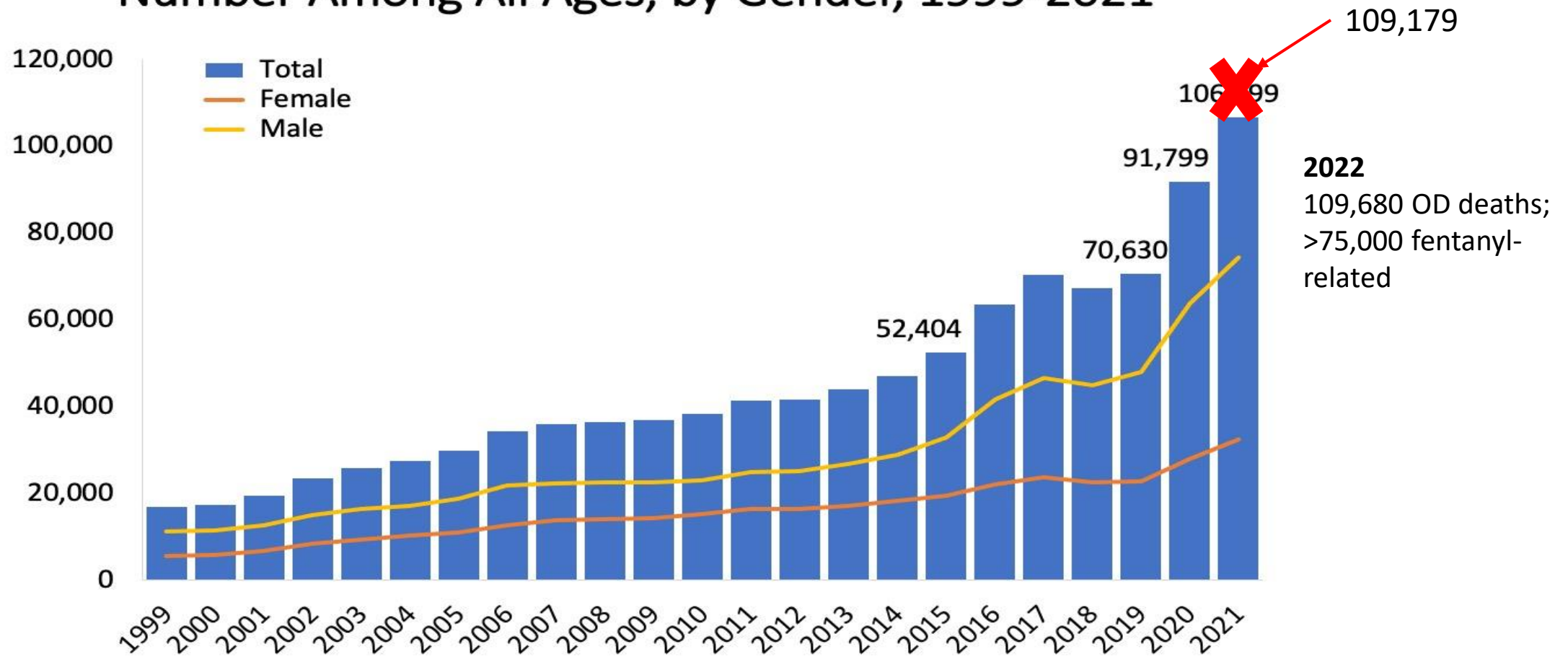
warm flushing of the skin

dry mouth

respiratory depression

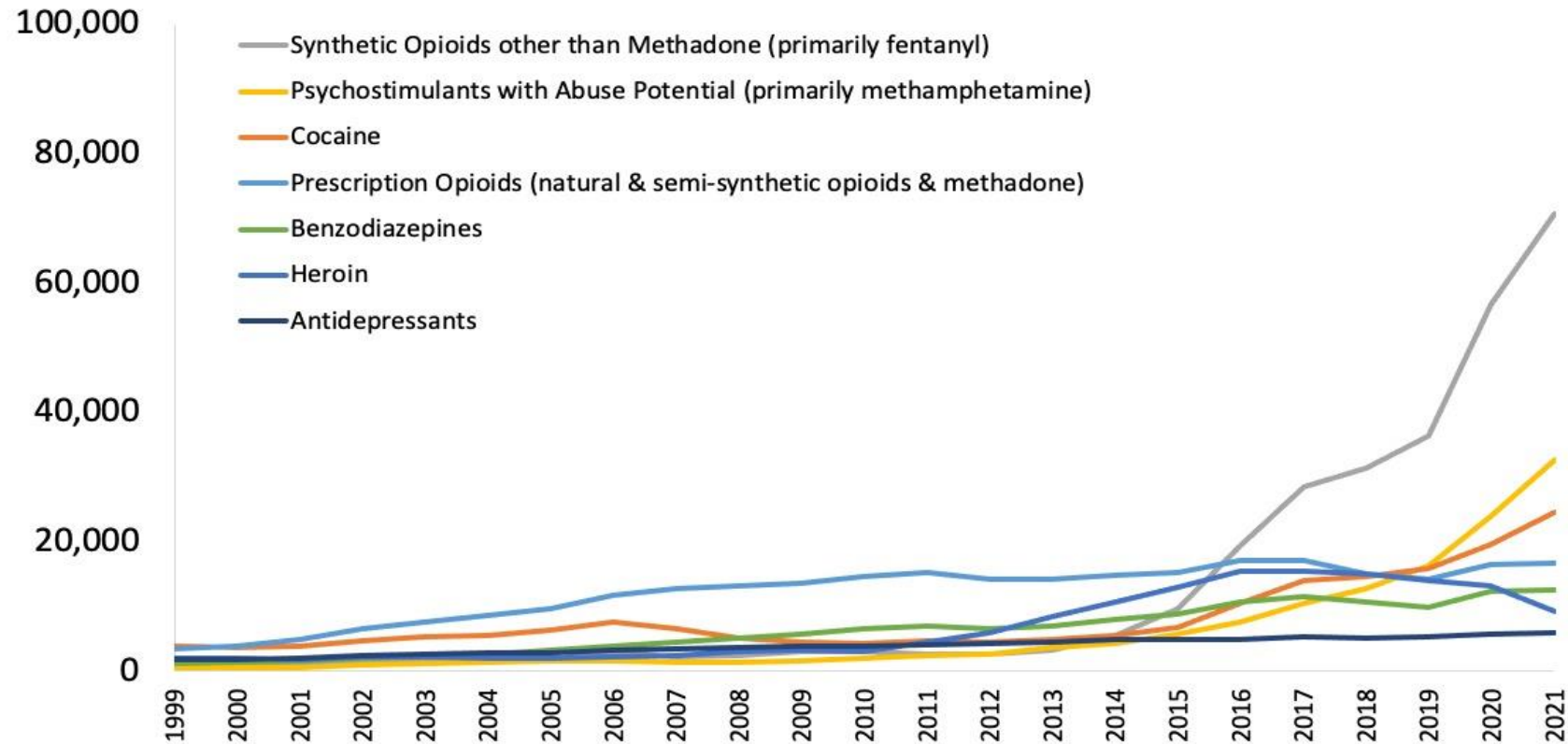


# Figure 1. National Drug-Involved Overdose Deaths\*, Number Among All Ages, by Gender, 1999-2021



\*Includes deaths with underlying causes of unintentional drug poisoning (X40–X44), suicide drug poisoning (X60–X64), homicide drug poisoning (X85), or drug poisoning of undetermined intent (Y10–Y14), as coded in the International Classification of Diseases, 10th Revision. Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999-2021 on CDC WONDER Online Database, released 1/2023.

## Figure 2. National Drug-Involved Overdose Deaths\*, Number Among All Ages, 1999-2021

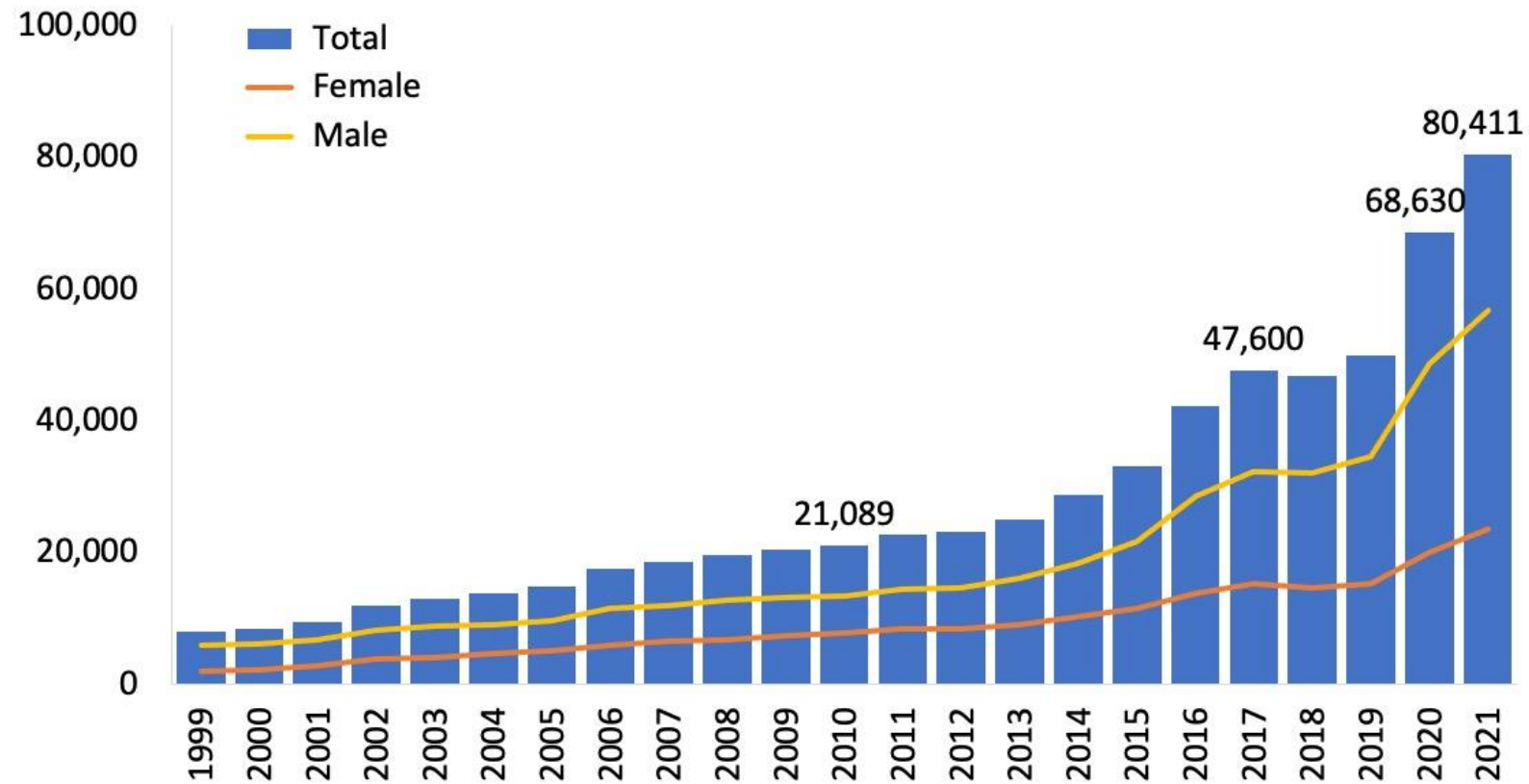


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<https://nida.nih.gov/research-topics/trends-statistics/overdose-death-rates>

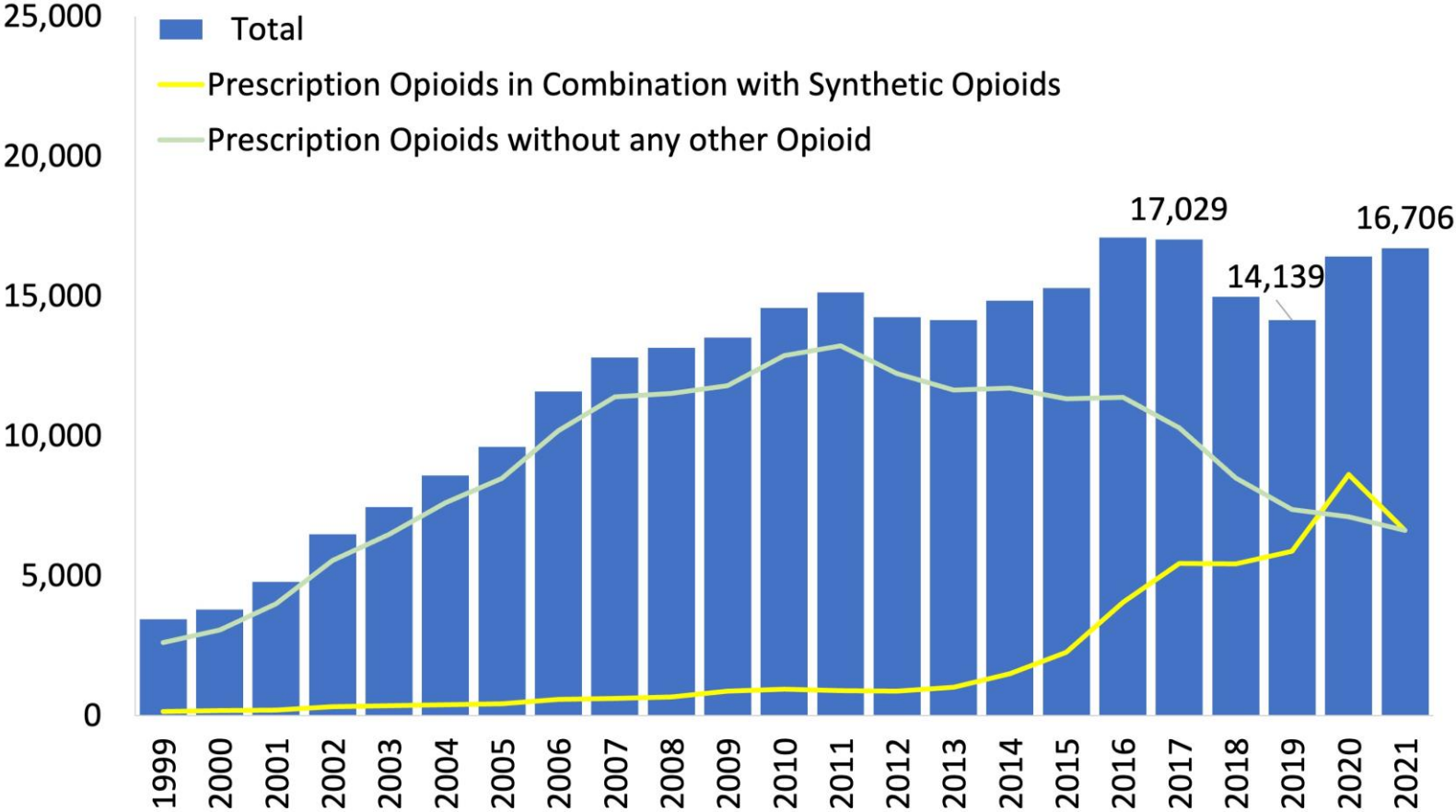


Figure 3. National Overdose Deaths Involving Any Opioid\*, Number Among All Ages, by Gender, 1999-2021



\*Among deaths with drug overdose as the underlying cause, the “any opioid” subcategory was determined by the following ICD-10 multiple cause-of-death codes: natural and semi-synthetic opioids (T40.2), methadone (T40.3), other synthetic opioids (other than methadone) (T40.4), or heroin (T40.1). Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999-2021 on CDC WONDER Online Database, released 1/2023.

# Figure 4. National Overdose Deaths Involving Prescription Opioids\*, Number Among All Ages, 1999-2021

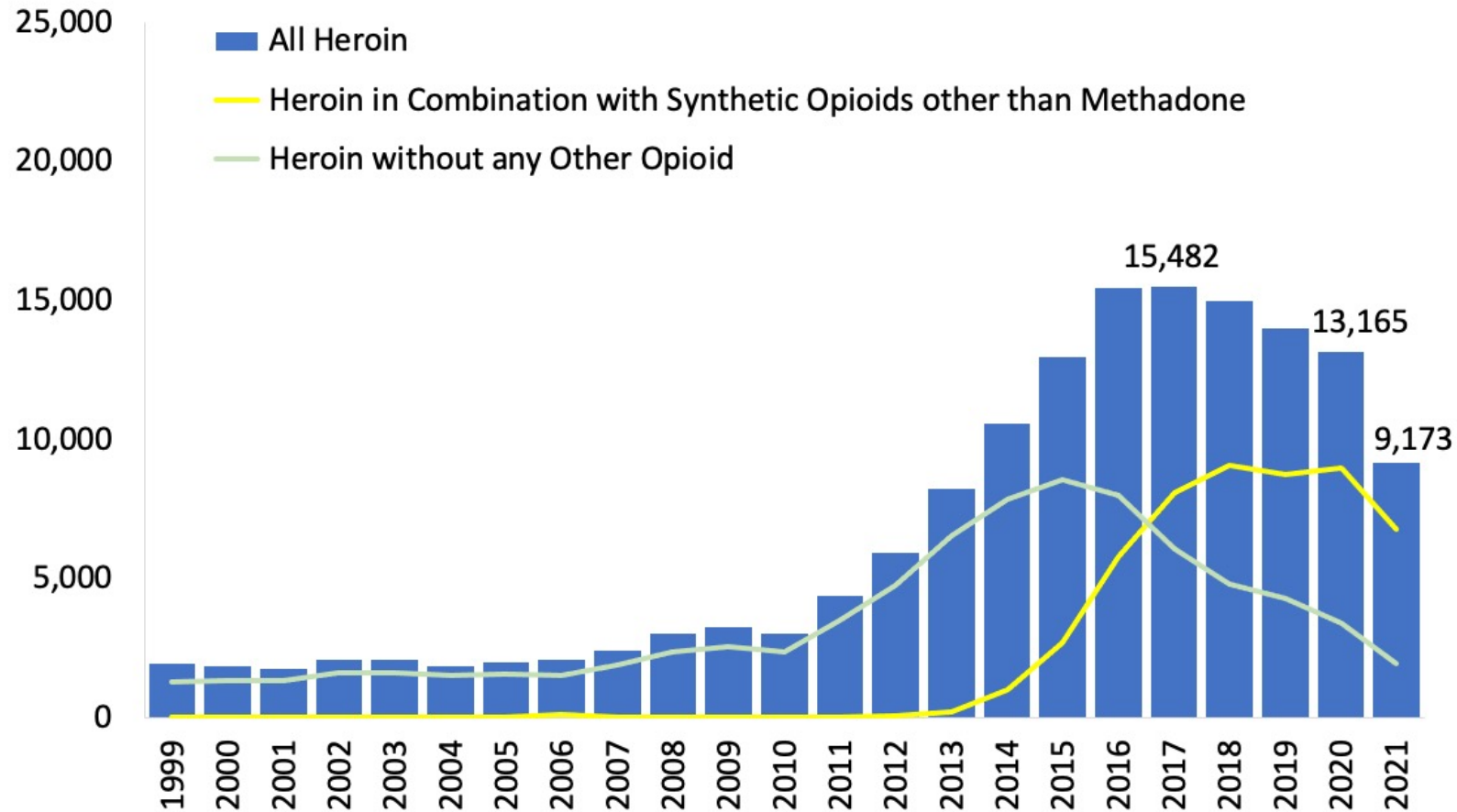


\*Among deaths with drug overdose as the underlying cause, the prescription opioid subcategory was determined by the following ICD-10 multiple cause-of-death codes: natural and semi-synthetic opioids (T40.2) or methadone (T40.3). Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999-2021 on CDC WONDER Online Database, released 1/2023.

<https://nida.nih.gov/research-topics/trends-statistics/overdose-death-rates>



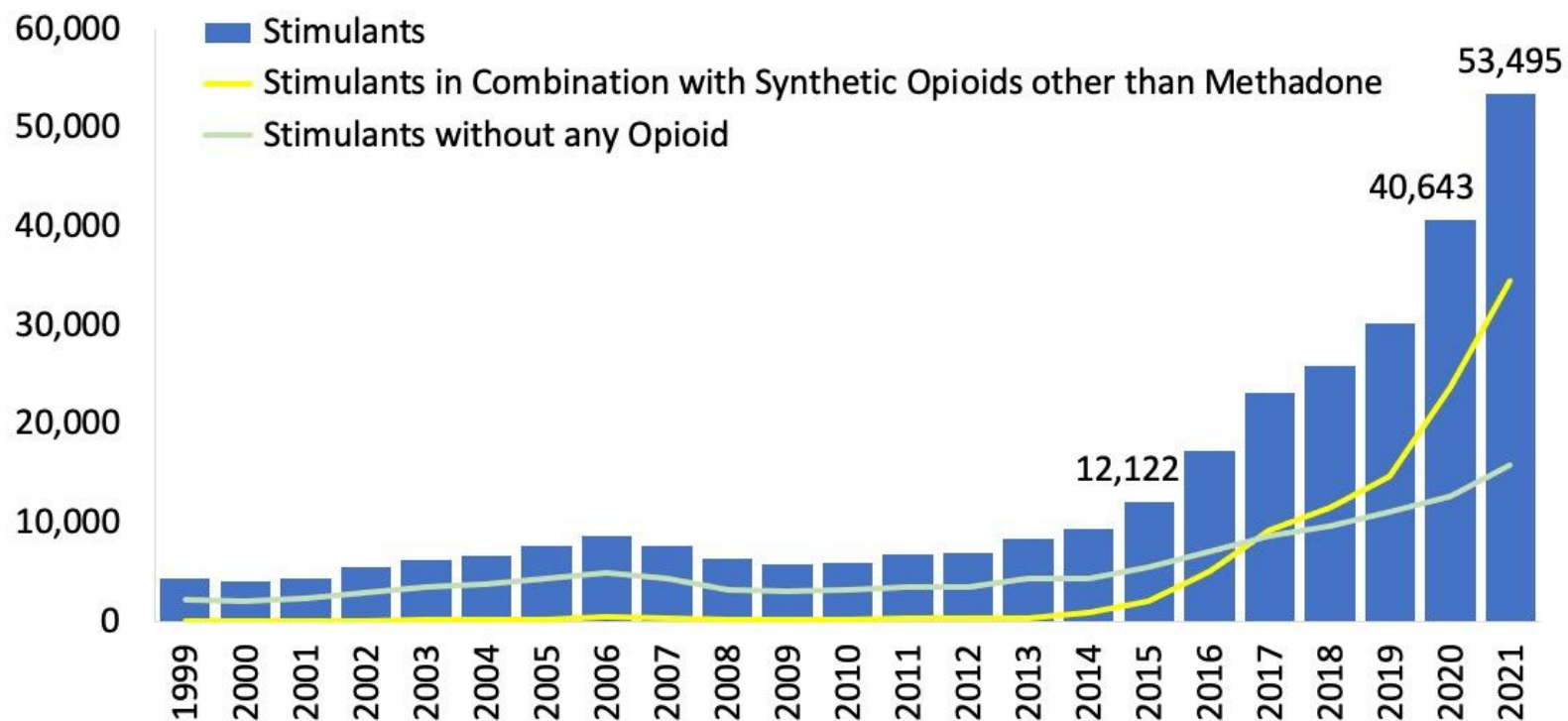
Figure 5. National Overdose Deaths Involving Heroin\*, by other Opioid Involvement, Number Among All Ages, 1999-2021



\*Among deaths with drug overdose as the underlying cause, the heroin category was determined by the T40.1 ICD-10 multiple cause-of-death code. Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999-2021 on CDC WONDER Online Database, released 1/2023.

<https://nida.nih.gov/research-topics/trends-statistics/overdose-death-rates>

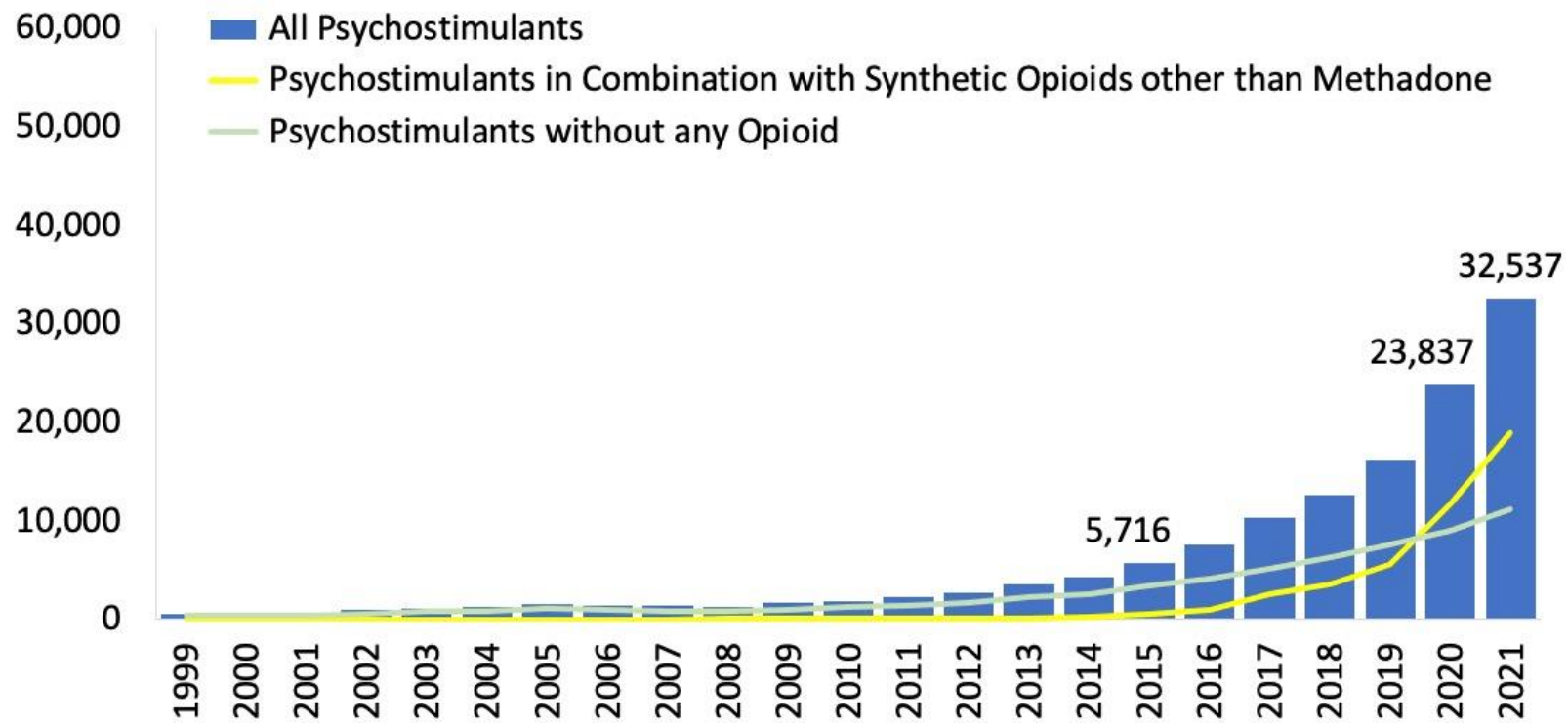
Figure 6. National Overdose Deaths Involving Stimulants (Cocaine and Psychostimulants\*), by Opioid Involvement, Number Among All Ages, 1999-2021



\*Among deaths with drug overdose as the underlying cause, the psychostimulants with abuse potential (primarily methamphetamine) category was determined by the T43.6 ICD-10 multiple cause-of-death code. Abbreviated to *psychostimulants* in the bar chart above. Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999-2021 on CDC WONDER Online Database, released 1/2023.

<https://nida.nih.gov/research-topics/trends-statistics/overdose-death-rates>

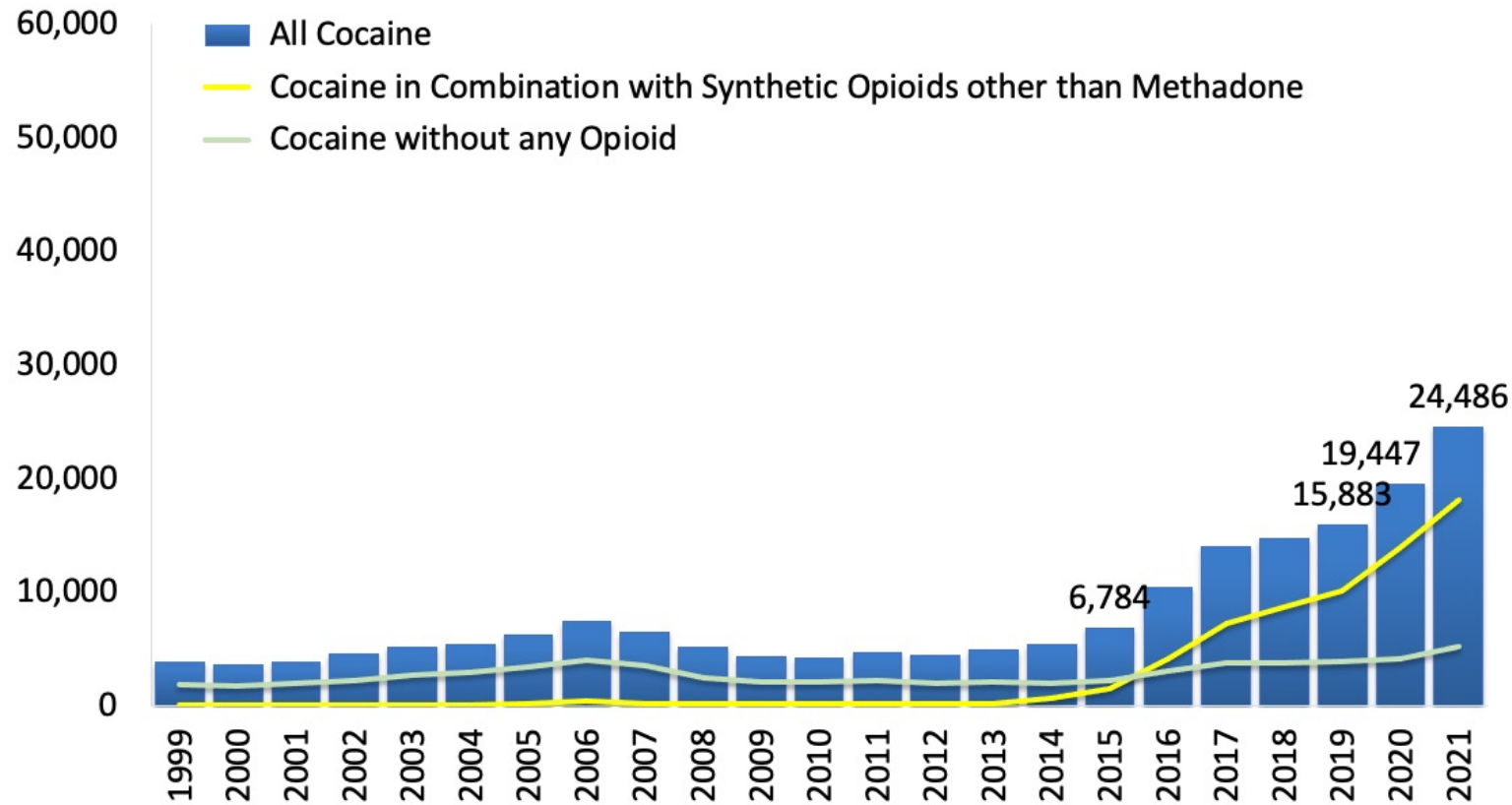
Figure 7. National Overdose Deaths Involving Psychostimulants with Abuse Potential (Primarily Methamphetamine)\*, by Opioid Involvement, Number Among All Ages, 1999-2021



\*Among deaths with drug overdose as the underlying cause, the psychostimulants with abuse potential (primarily methamphetamine) category was determined by the T43.6 ICD-10 multiple cause-of-death code. Abbreviated to *psychostimulants* in the bar chart above. Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999-2021 on CDC WONDER Online Database, released 1/2023.

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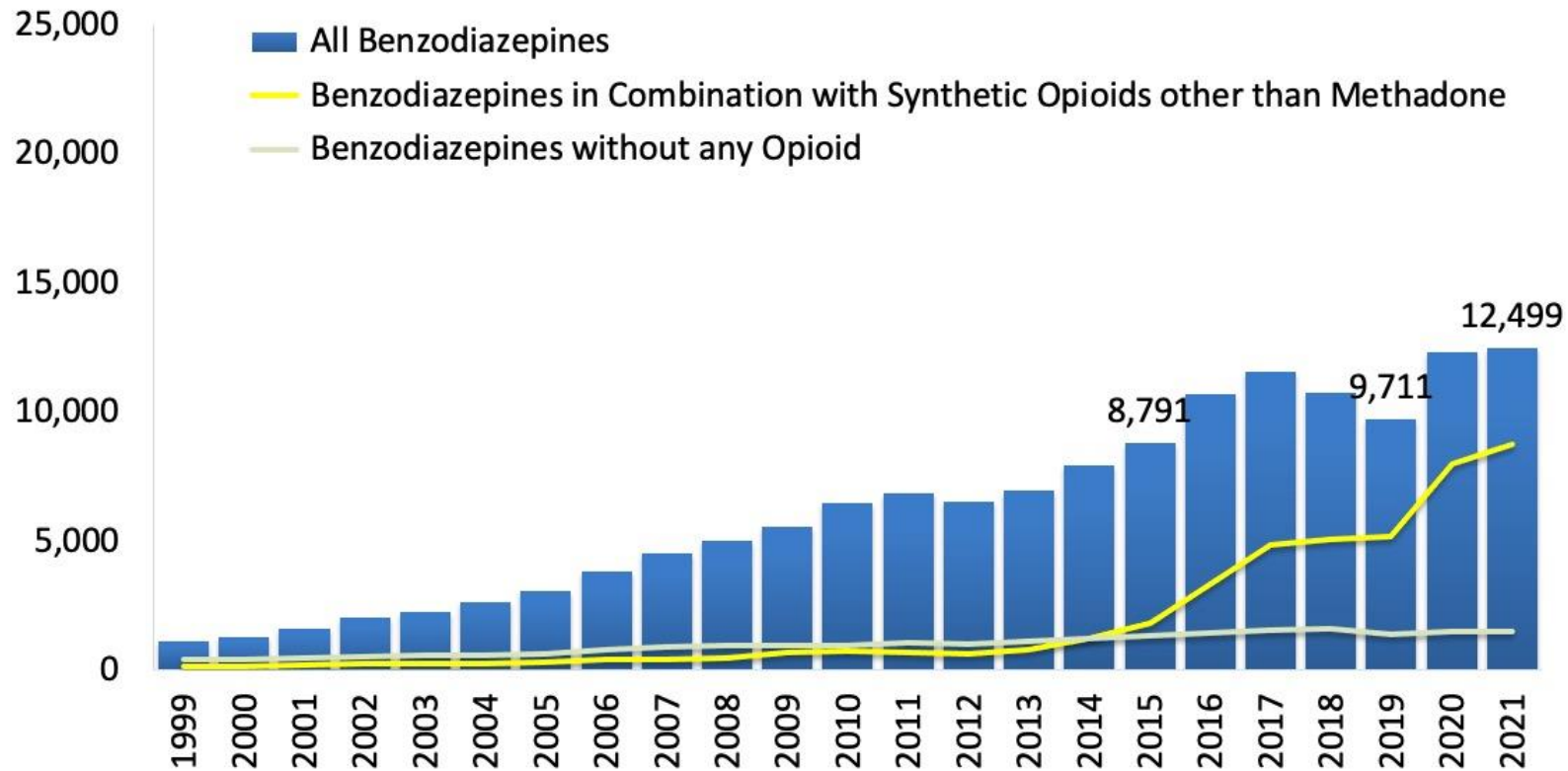
Figure 8. National Drug Overdose Deaths Involving Cocaine\*, by Opioid Involvement, Number Among All Ages, 1999-2021



\*Among deaths with drug overdose as the underlying cause, the cocaine category was determined by the T40.5 ICD-10 multiple cause-of-death code. Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999-2021 on CDC WONDER Online Database, released 1/2023.



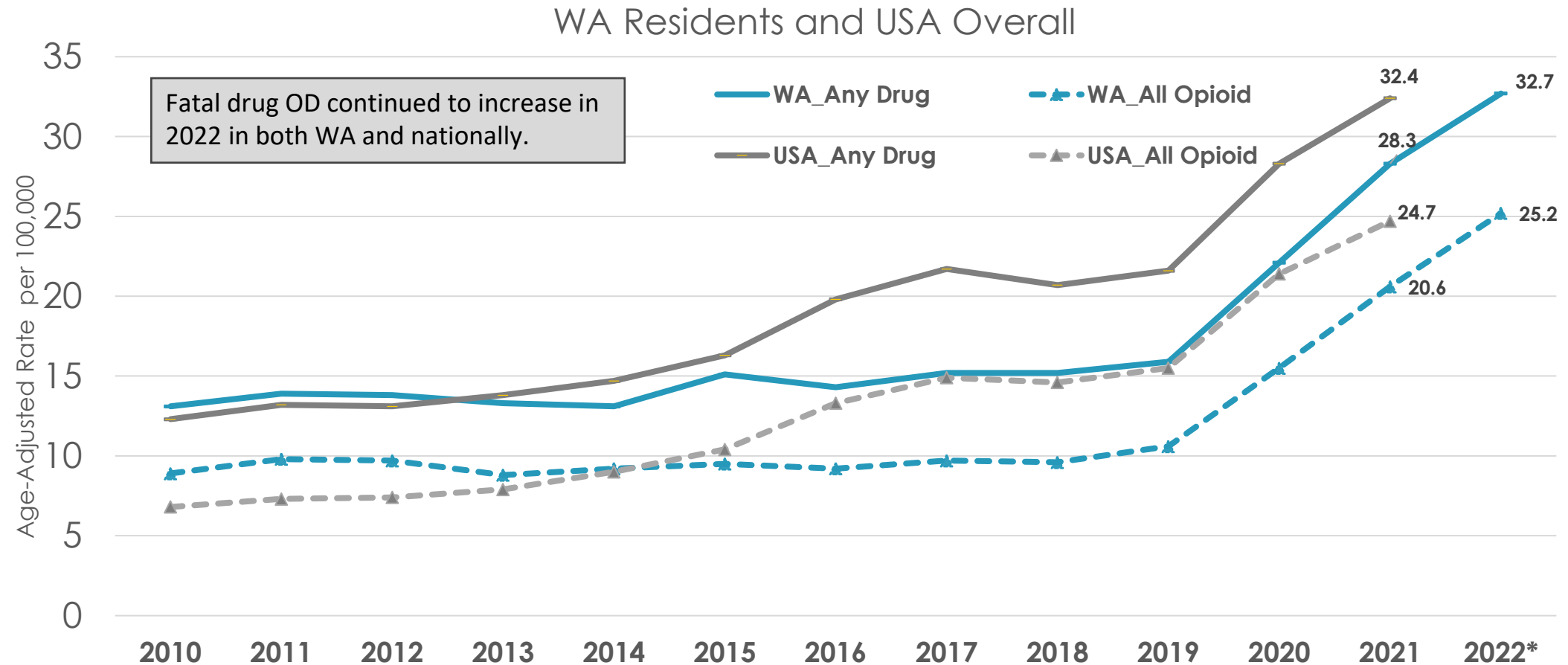
# Figure 9. National Drug Overdose Deaths Involving Benzodiazepines\*, by Opioid Involvement, Number Among All Ages, 1999-2021



\*Among deaths with drug overdose as the underlying cause, the benzodiazepine category was determined by the T42.4 ICD-10 multiple cause-of-death code. Source: Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999-2021 on CDC WONDER Online Database, released 1/2023.

<https://nida.nih.gov/research-topics/trends-statistics/overdose-death-rates>

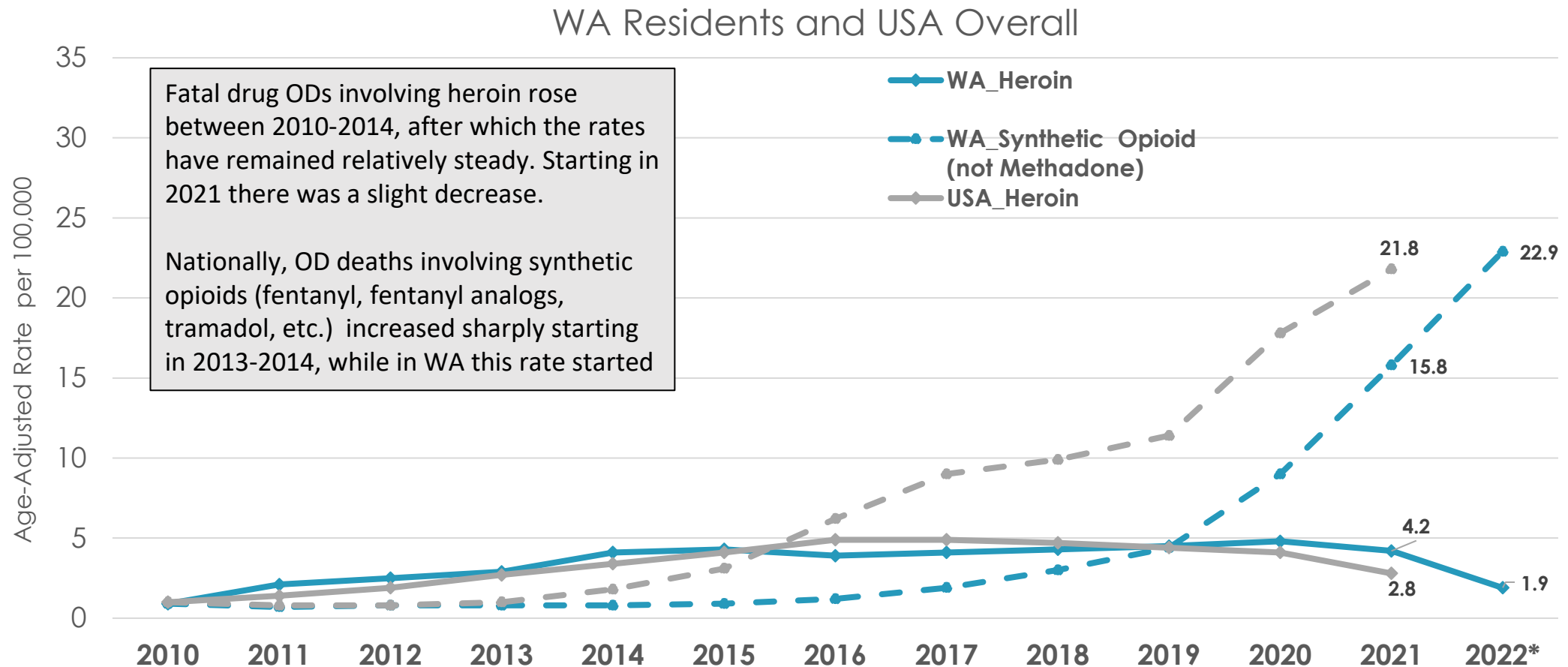
# Overdose Death Rate by Drug Type USA and WA (2000-2021, WA: 2022\*)



2022 WA data are finalized.  
 \*2022 data for USA have not been released yet.

Source: WA DOH death certificates CDC Wonder

# Overdose Death Rate by Drug Type USA & WA (2000-2021, WA: 2022\*)

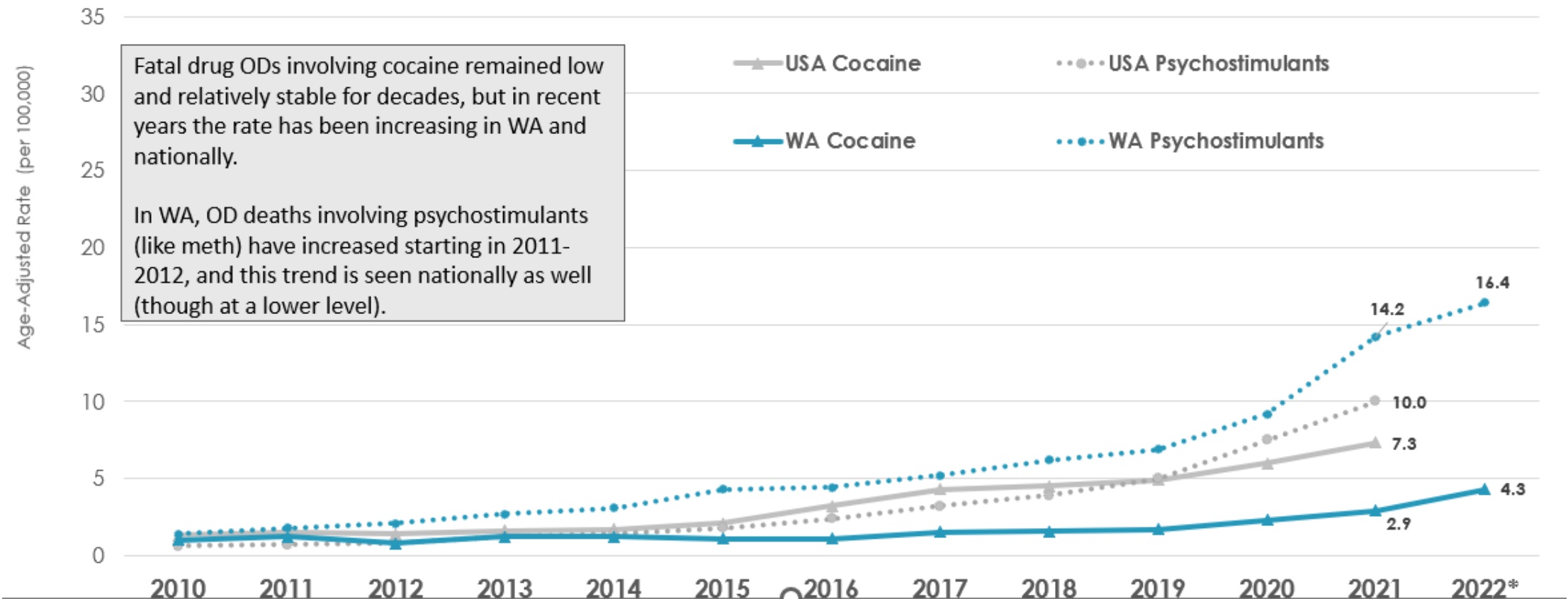


2022 WA data are finalized.  
 \*2022 data for USA have not been released yet.

Source: WA DOH death certificates CDC Wonder

# Overdose Death Rate by Drug Type USA & WA (2000-2021, WA: 2022\*)

WA Residents and USA Overall



2022 WA data are finalized.

\*2022 data for USA have not been released yet.

Source: WA DOH death certificates CDC Wonder



# Confirmed Overdose Deaths among WA Residents

Drug Type	2017	2018	2019	2020	2021	2022
Any Drug	1163	1181	1259	1731	2264	2703
Any Opioid	739	744	827	1194	1619	2048
Heroin	306	329	347	384	344	154
Synthetic Opioids	142	224	337	672	1214	1850
Rx Opioid (not Fentanyl)*	342	305	267	328	402	303
Psychostimulants	390	473	540	728	1142	1363
Cocaine	111	129	132	187	232	361

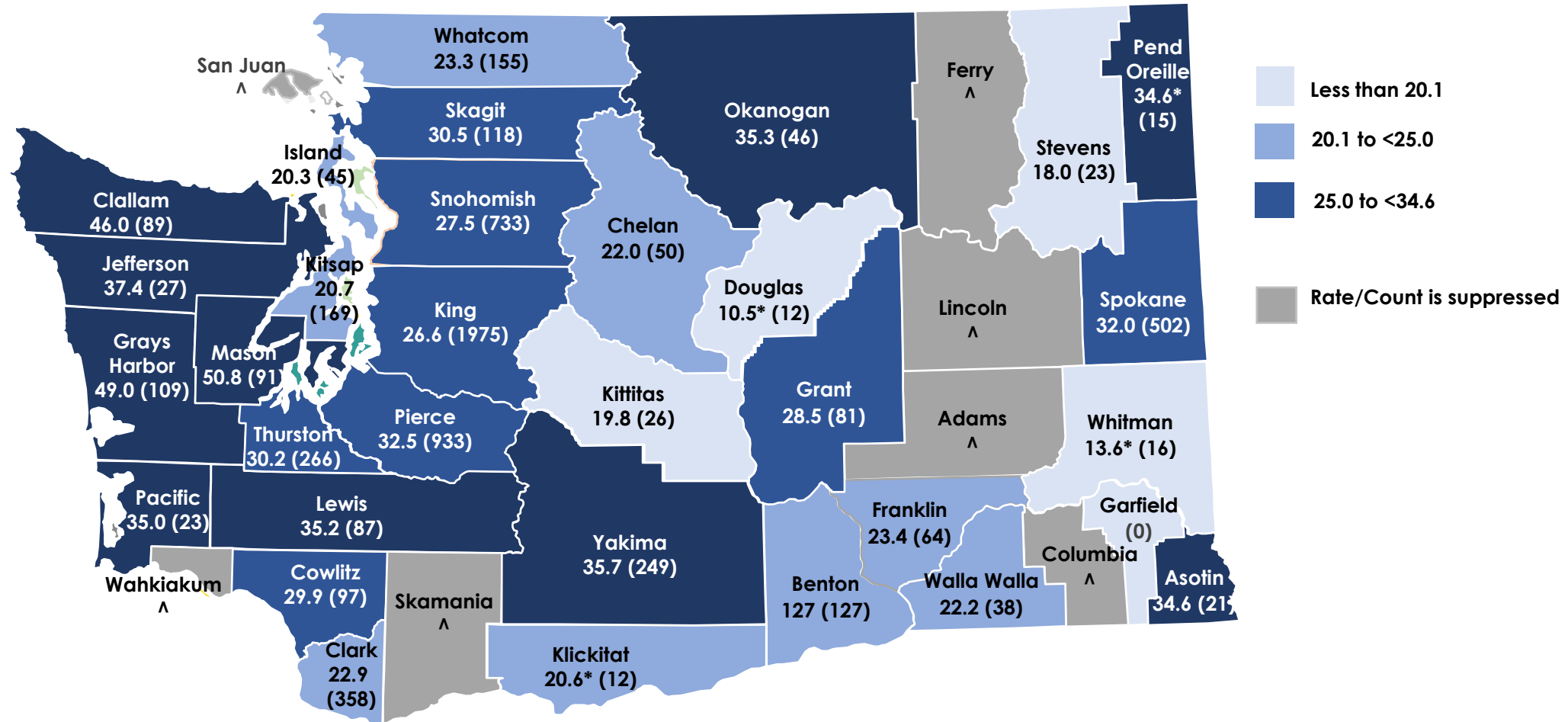
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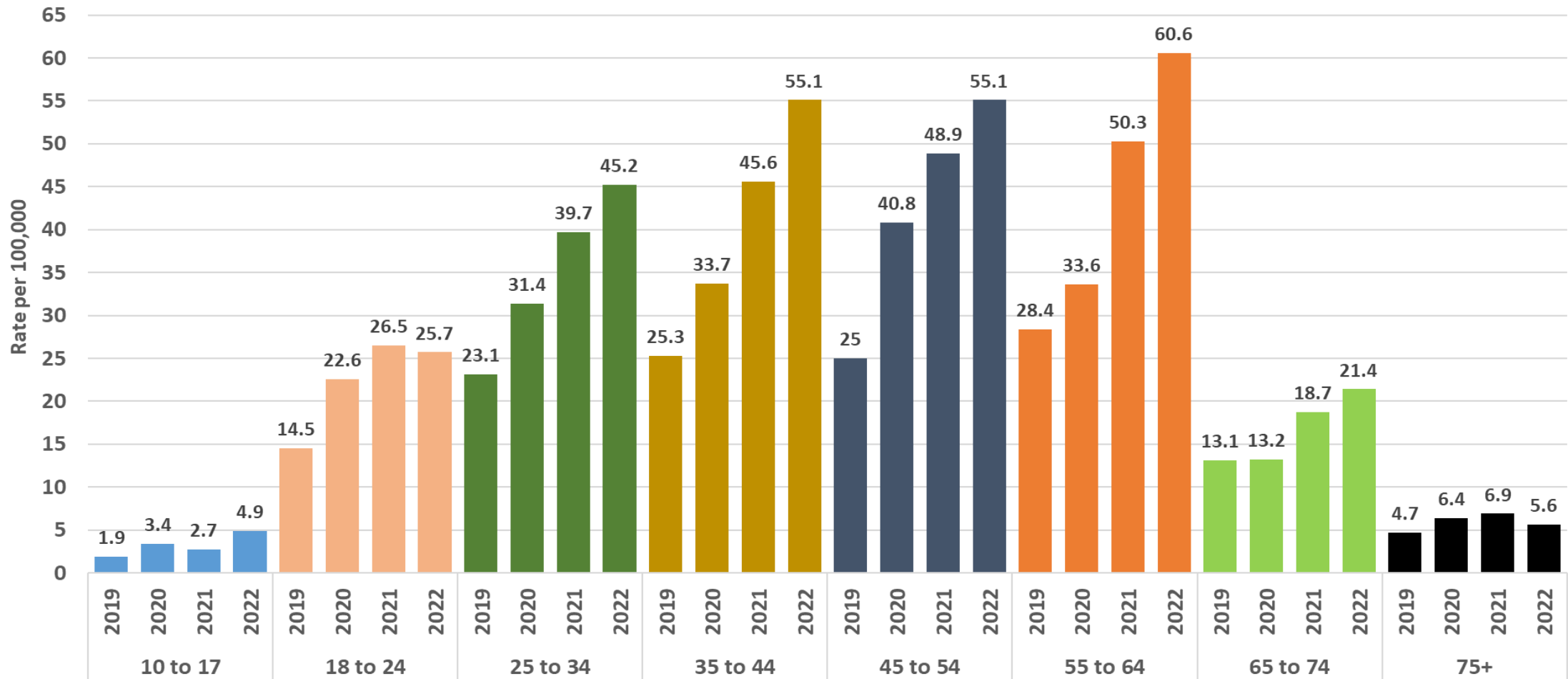
Source: WA DOH death certificates CDC Wonder

# Drug overdose death rates (and counts) by County (2020-2022)

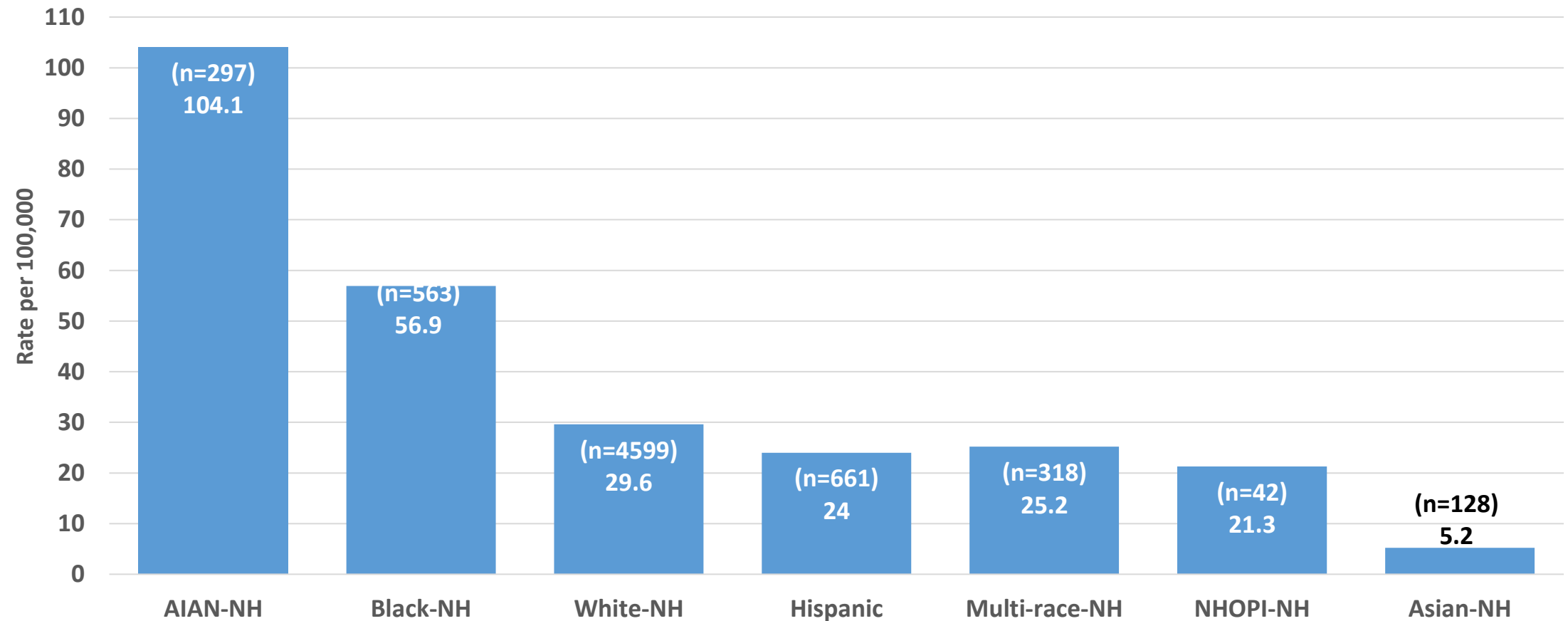
## (State Age-Adjusted Rate = 27.7/100,000)



# Drug OD Death Rates by Age



# Drug OD death rates by race/ethnicity among Washington residents(2020-2022)







Frontal cortex

Striatum

Substantia nigra

Functions

- Reward (motivation)
- Pleasure, euphoria
- Motor function (fine tuning)
- Compulsion
- Perseveration

Nucleus accumbens

VTA

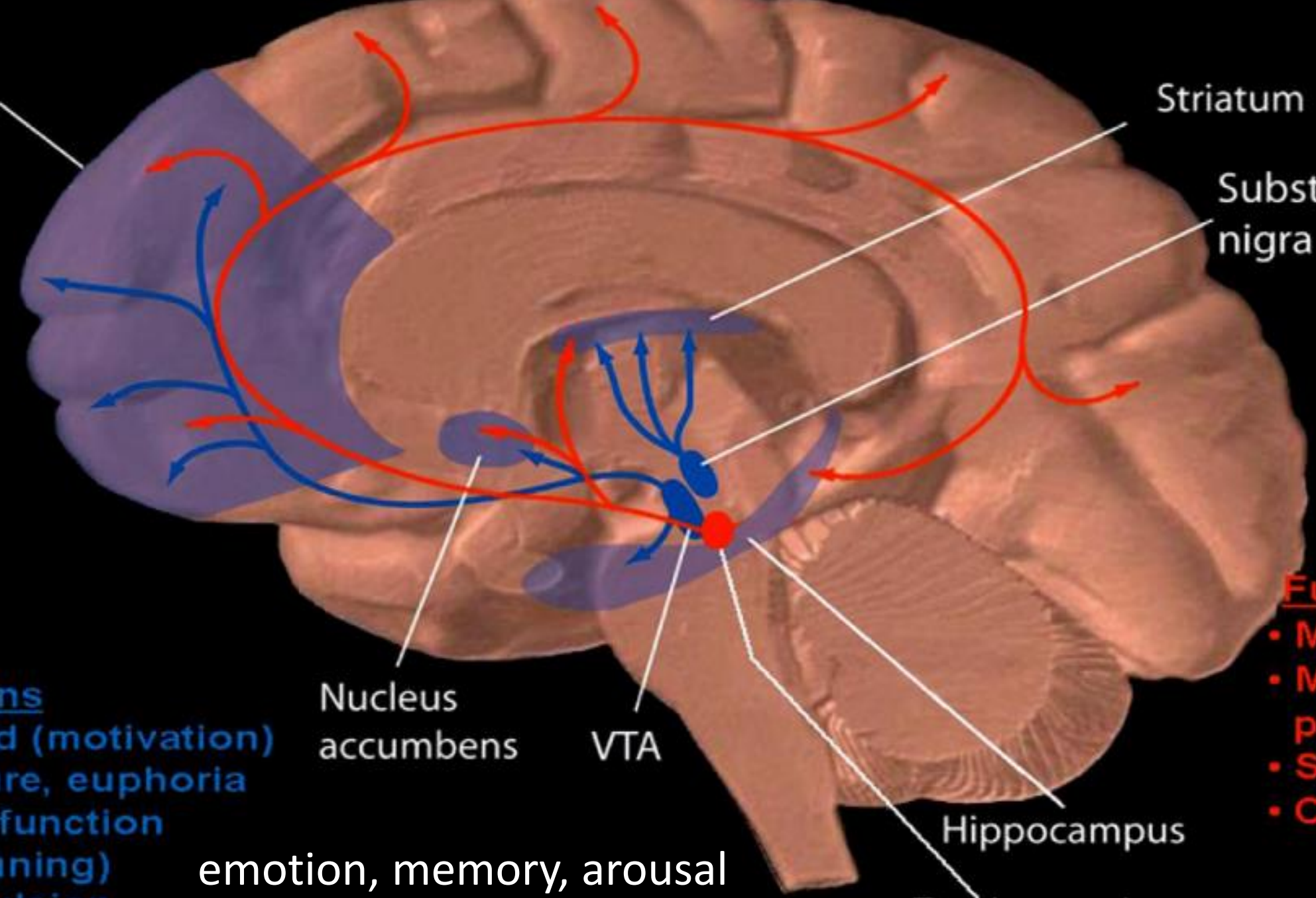
Hippocampus

Raphe nucleus

Functions

- Mood
- Memory processing
- Sleep
- Cognition

emotion, memory, arousal



# Neurotransmitters

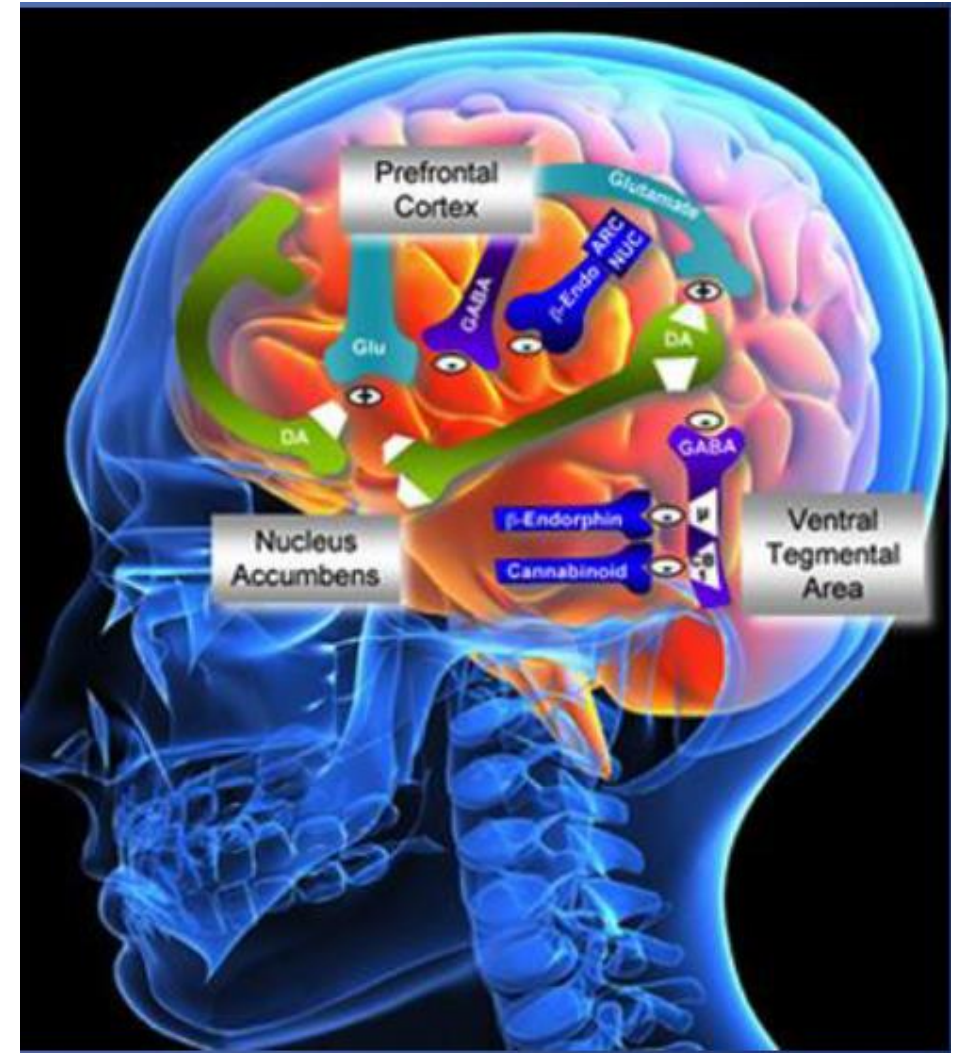
**dopamine\*** – pleasure & reward

**serotonin** – mood, sleep, appetite, perceptions

**GABA** – an inhibitory neurotransmitter that helps calm or relax the brain

**endorphins** – alleviate pain, stress

**glutamate** – locks the pleasurable experience into memory, responsible for withdrawal symptoms



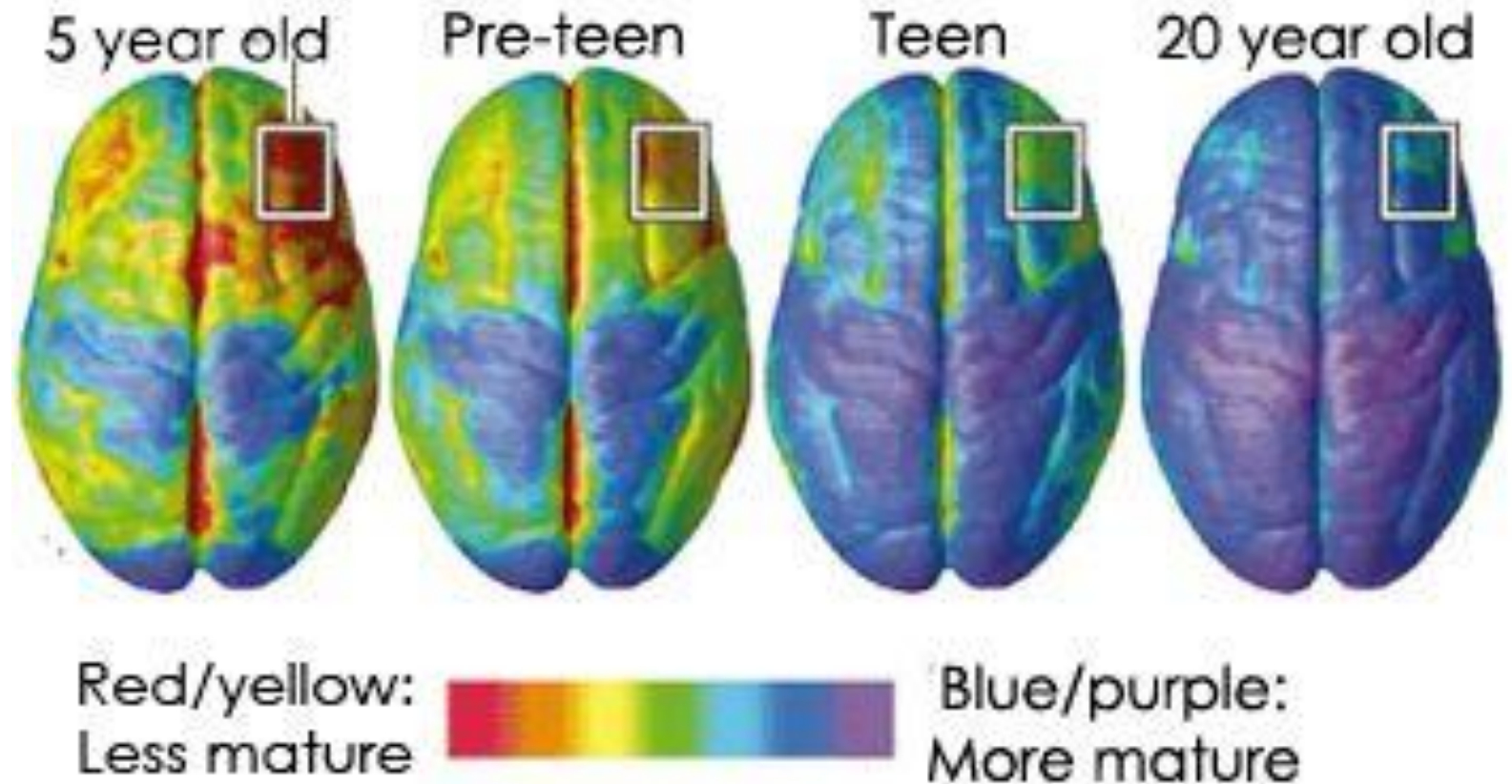


# Adolescent Brain Differences

the brain is still developing into 20s & exposure to drugs and alcohol can alter or delay development

decision-making guided more by the amygdala and less by the frontal cortex (emotion/reaction)

decision-making of SUD similar







What does this mean?

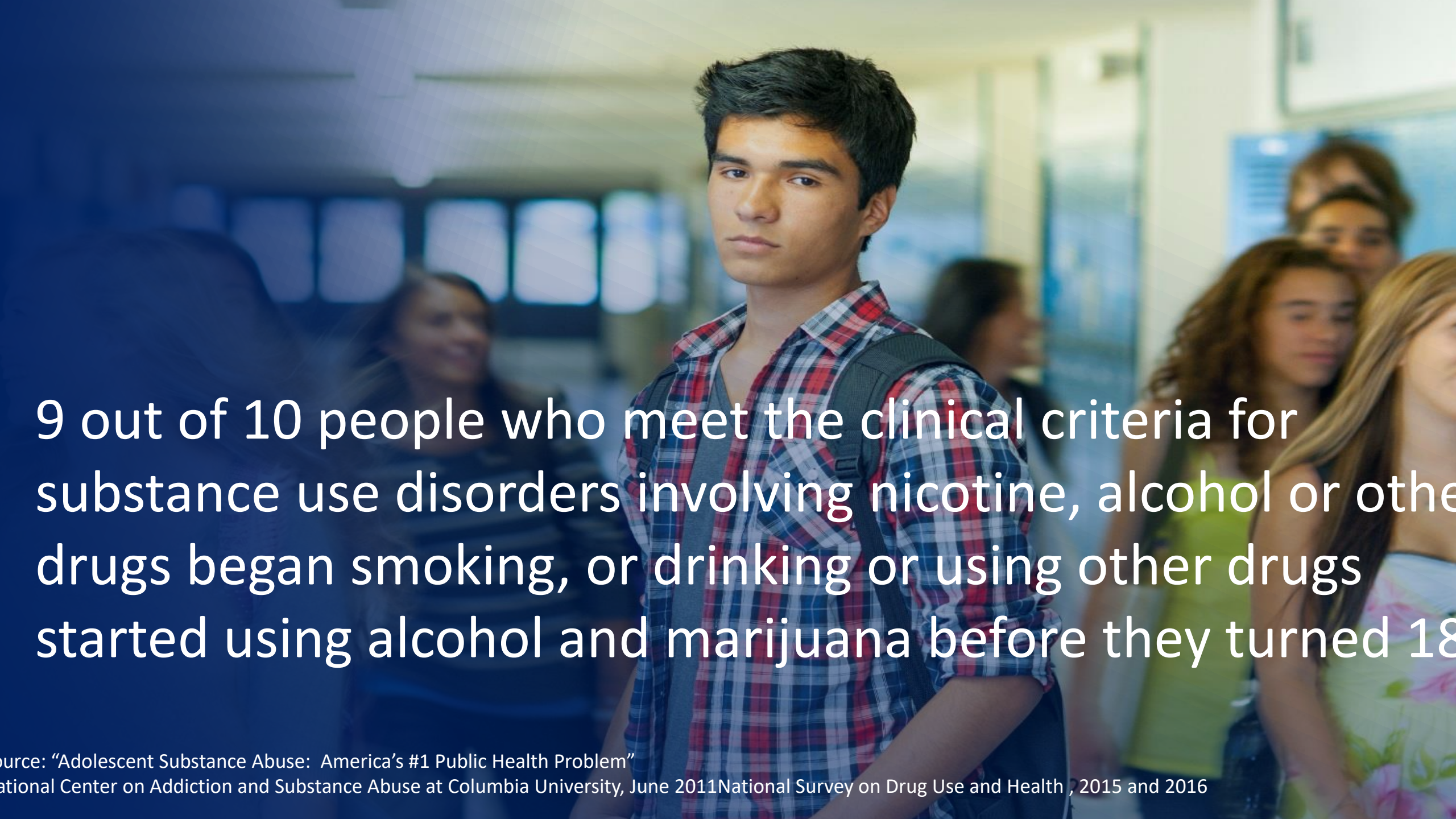
**physical, sensory-connected** activities may be preferred over complex, intellectually demanding ones

preference for activities with **high excitement & low effort** [video games, sports, sex, drugs] are often preferred

poor self control & emotion management  
→ **overreaction & exaggerated emotional response**







9 out of 10 people who meet the clinical criteria for substance use disorders involving nicotine, alcohol or other drugs began smoking, or drinking or using other drugs started using alcohol and marijuana before they turned 18

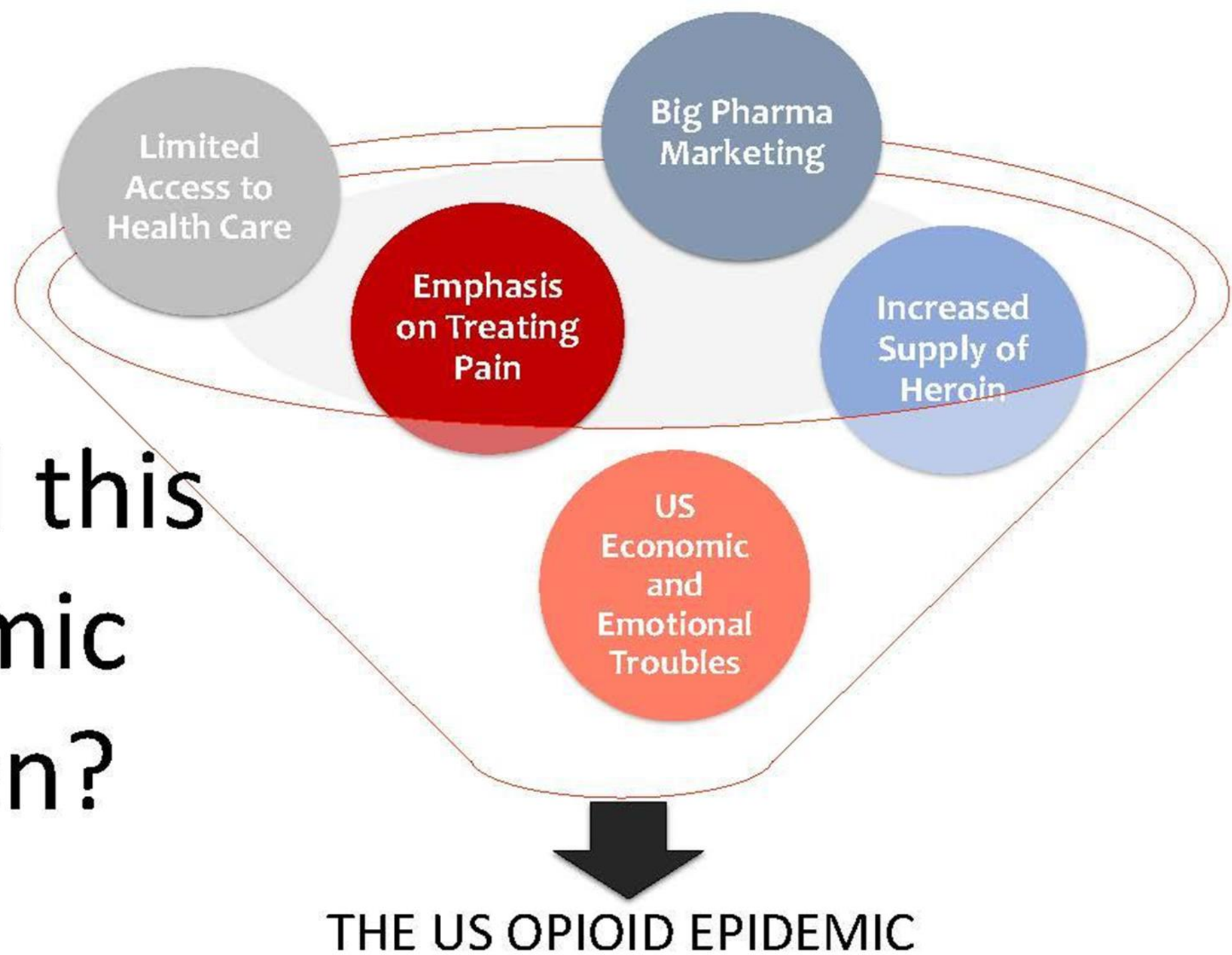
Source: "Adolescent Substance Abuse: America's #1 Public Health Problem"

National Center on Addiction and Substance Abuse at Columbia University, June 2011 National Survey on Drug Use and Health, 2015 and 2016

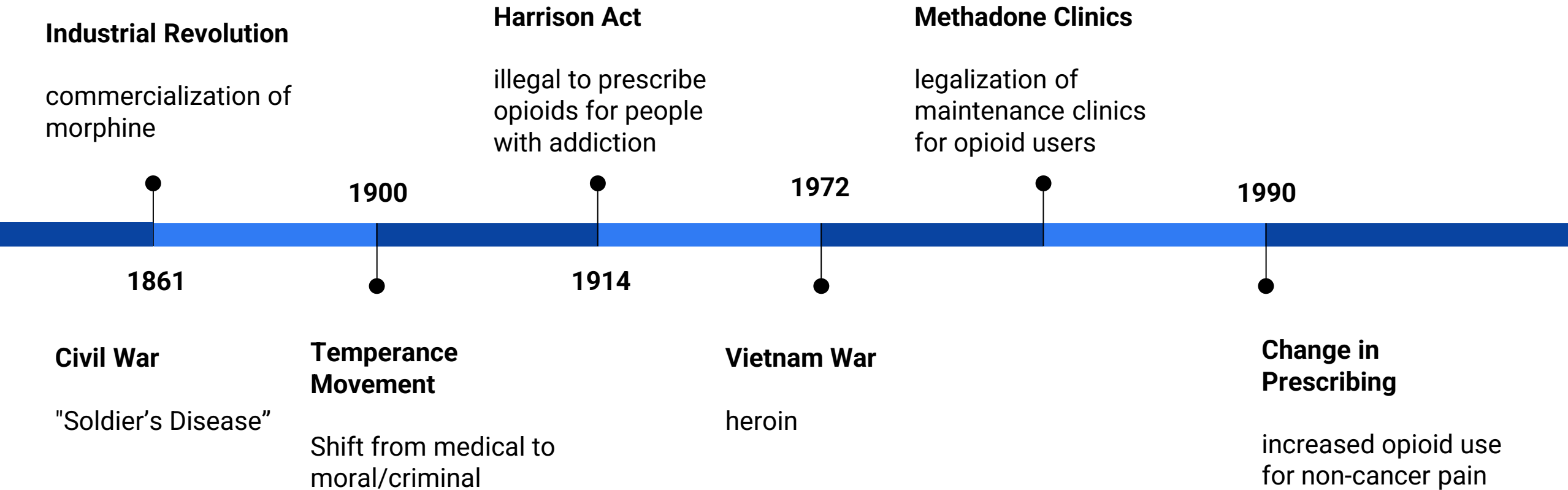




How did this epidemic happen?



# Not a New Problem





TELEPHONE  
BROOKLINE 3620

CHARLES D. B. FISK,  
SUPERINTENDENT

## THE FISK HOSPITAL

FOR THE TREATMENT OF

### ALCOHOLISM AND DRUG ADDICTION

*(By the Towns-Lambert method.)*

PRIVATE ROOMS —COMPETENT PHYSICIANS  
TRAINED NURSES.

#### CONSULTING PHYSICIANS:

RICHARD C. CABOT, M.D., Boston, Mass.

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WILLIAM OTIS FAXON, M.D., Stoughton, Mass.

LEONARD HUNTRESS, M.D., Lowell, Mass.

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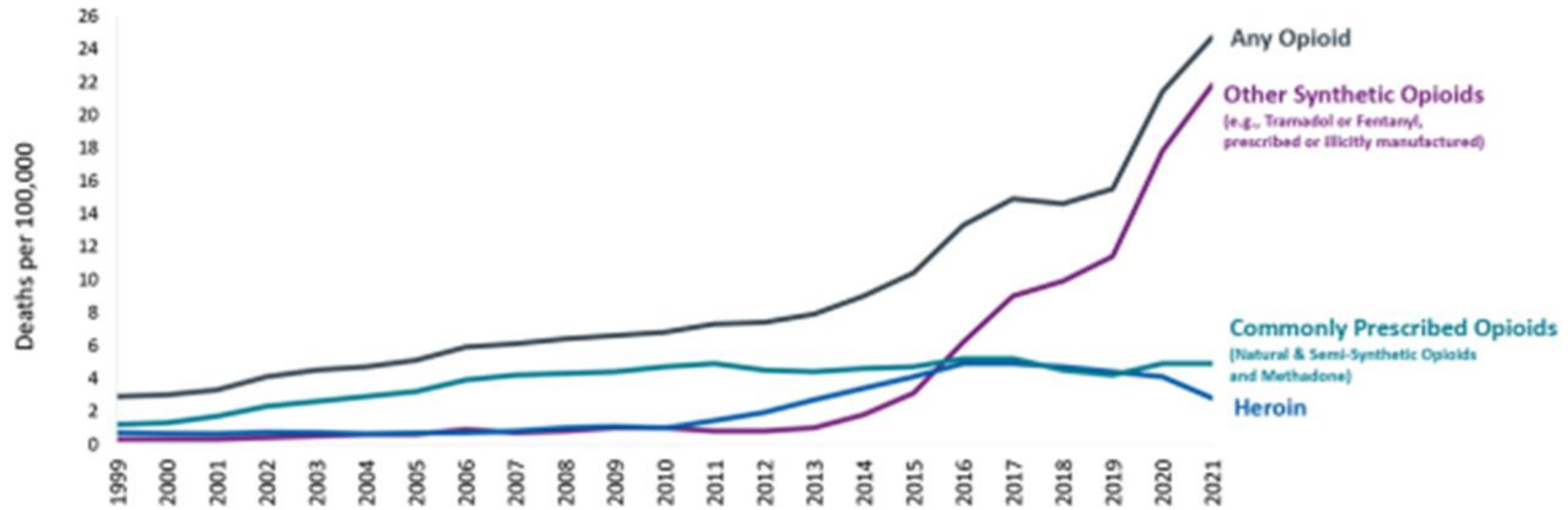
106 SEWALL AVENUE      BROOKLINE, MASS.

## The Modern Treatment of Alcoholism and Drug Addiction

**ALCOHOLISM:** The medical profession now recognize alcoholism as a disease; and as such, this vexed question has interest for physicians; and the best solution of its treatment is an important factor.



# Three Waves of Opioid Overdose Deaths



↑  
Wave 1: Rise in Prescription Opioid Overdose Deaths Started in the 1990s

↑  
Wave 2: Rise in Heroin Overdose Deaths Started in 2010

↑  
Wave 3: Rise in Synthetic Opioid Overdose Deaths Started in 2013

SOURCE: National Vital Statistics System Mortality File.



## ADDICTION RARE IN PATIENTS TREATED WITH NARCOTICS

*To the Editor:* Recently, we examined our current files to determine the incidence of narcotic addiction in 39,946 hospitalized medical patients<sup>1</sup> who were monitored consecutively. Although there were 11,882 patients who received at least one narcotic preparation, there were only four cases of reasonably well documented addiction in patients who had no history of addiction. The addiction was considered major in only one instance. The drugs implicated were meperidine in two patients,<sup>2</sup> Percodan in one, and hydromorphone in one. We conclude that despite widespread use of narcotic drugs in hospitals, the development of addiction is rare in medical patients with no history of addiction.

JANE PORTER  
HERSHEL JICK, M.D.  
Boston Collaborative Drug  
Surveillance Program  
Boston University Medical Center

Waltham, MA 02154

1. Jick H, Miettinen OS, Shapiro S, Lewis GP, Siskind Y, Slone D. Comprehensive drug surveillance. *JAMA*. 1970; 213:1455-60.
2. Miller RR, Jick H. Clinical effects of meperidine in hospitalized medical patients. *J Clin Pharmacol*. 1978; 18:180-8.

# Oxycodone & Oxycodone CR

## Oxycodone (Roxycodone)

immediate release

acute pain

4-6 hrs duration of action

tablets (30mg), liquid

## Oxycodone CR (Oxycontin)

controlled release

chronic pain; already tolerant to opioids

12 hrs duration of action (BID dosing)

tablets (80 or 160 mg)

long acting oxycodone; delayed absorption “abuse-resistant”





# Oxycodone & Oxycodone CR



## The Promotion and Marketing of OxyContin: Commercial Triumph, Public Health Tragedy

Art Van Zee, MD

I focus on issues surrounding the promotion and marketing of controlled drugs and their regulatory oversight. Compared with noncontrolled drugs, controlled drugs, with their potential for abuse and diversion, pose different public health risks when they are overpromoted and highly prescribed. An in-depth analysis of the promotion and marketing of OxyContin illustrates some of the associated issues.

Modifications of the promotion and marketing of controlled drugs by the pharmaceutical industry and an enhanced capacity of the Food and Drug Administration to regulate and monitor such promotion can have a positive impact on the public health. (*Am J Public Health*. 2009;99:221–227. doi: 10.2105/AJPH.2007.131714)

**CONTROLLED DRUGS, WITH their potential for abuse and diversion, can pose public health risks that are different from—and more problematic than—those of uncontrolled drugs when they are overpromoted and highly**

prescribed. An in-depth analysis of the promotion and marketing of OxyContin (Purdue Pharma, Stamford, CT), a sustained-release oxycodone preparation, illustrates some of the key issues. When Purdue Pharma introduced OxyContin in 1996, it was aggressively marketed and highly promoted. Sales grew from \$48 million in 1996 to almost \$1.1 billion in 2000.<sup>1</sup> The high availability of OxyContin correlated with increased abuse, diversion, and addiction, and by 2004 OxyContin had become a leading drug of abuse in the United States.<sup>2</sup>

Under current regulations, the Food and Drug Administration (FDA) is limited in its oversight of the marketing and promotion of controlled drugs. However, fundamental changes in the promotion and marketing of controlled drugs by the pharmaceutical industry, and an enhanced capacity of the FDA to regulate and monitor such promotion, can positively affect public health.

OxyContin's commercial success did not depend on the merits

of the drug compared with other available opioid preparations. The *Medical Letter on Drugs and Therapeutics* concluded in 2001 that oxycodone offered no advantage over appropriate doses of other potent opioids.<sup>3</sup> Randomized double-blind studies comparing OxyContin given every 12 hours with immediate-release oxycodone given 4 times daily showed comparable efficacy and safety for use with chronic back pain<sup>4</sup> and cancer-related pain.<sup>5,6</sup> Randomized double-blind studies that compared OxyContin with controlled-release morphine for cancer-related pain also found comparable efficacy and safety.<sup>7–9</sup> The FDA's medical review officer, in evaluating the efficacy of OxyContin in Purdue's 1995 new drug application, concluded that OxyContin had not been shown to have a significant advantage over conventional, immediate-release oxycodone taken 4 times daily other than a reduction in frequency of dosing.<sup>10</sup> In a review of the medical literature, Chou et al. made similar conclusions.<sup>11</sup>

The promotion and marketing of OxyContin occurred during a recent trend in the liberalization of the use of opioids in the treatment of pain, particularly for chronic non-cancer-related pain. Purdue pursued an "aggressive" campaign to promote the use of opioids in general and OxyContin in particular.<sup>1,12–17</sup> In 2001 alone, the company spent \$200 million<sup>18</sup> in an array of approaches to market and promote OxyContin.

### PROMOTION OF OXYCONTIN

From 1996 to 2001, Purdue conducted more than 40 national pain-management and speaker-training conferences at resorts in Florida, Arizona, and California. More than 5000 physicians, pharmacists, and nurses attended these all-expenses-paid symposia, where they were recruited and trained for Purdue's national speaker bureau.<sup>19(22)</sup> It is well documented that this type of pharmaceutical company symposium influences physicians' prescribing,

\$ 1 Billion sales within 5 years of FDA approval  
marketed aggressively to PCPs for non-cancer pain  
Purdue sued by 48 states for fueling the crisis



# Current Drug Epidemic





# Why are Opioids so Addictive



WHY ARE  
**OPIOIDS**  
SO ADDICTIVE?



# Why People Use Drugs

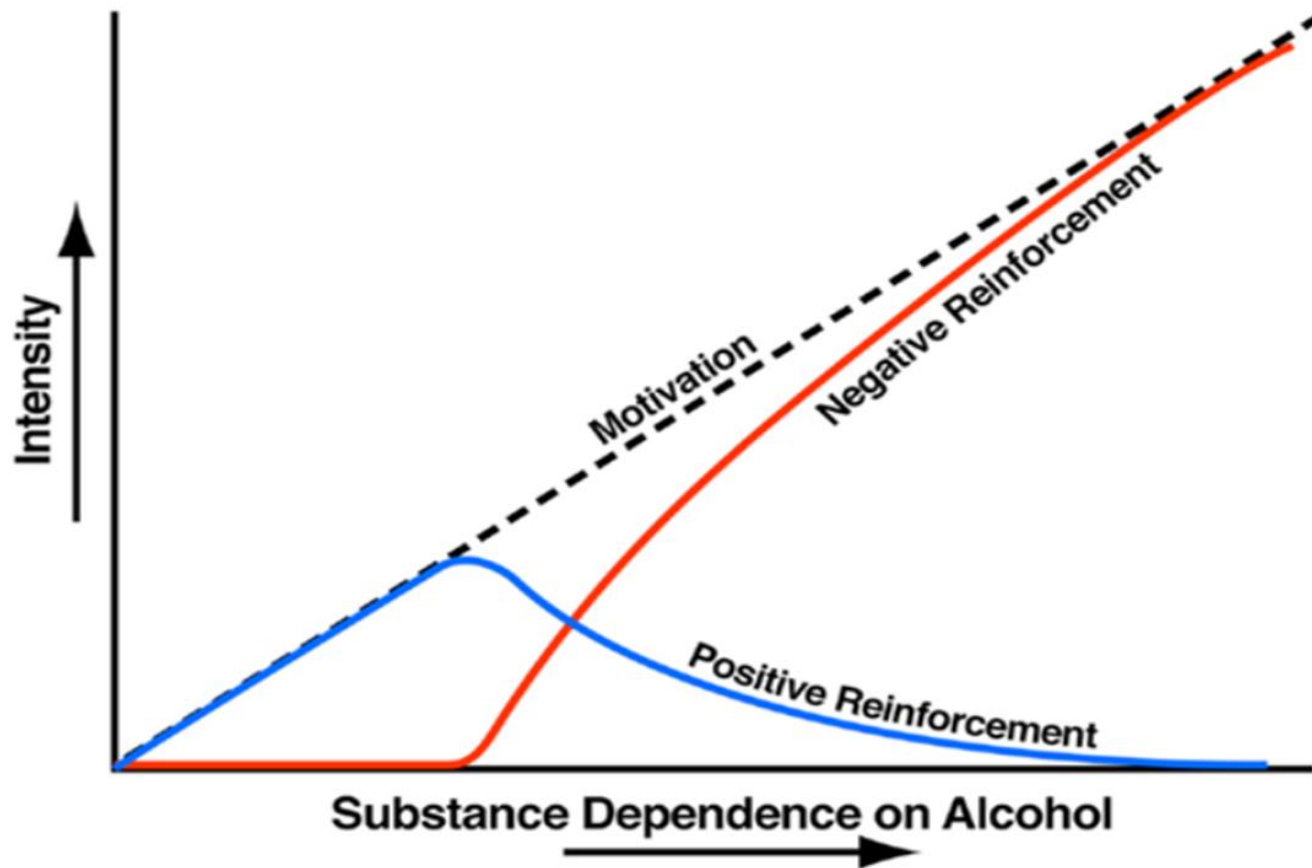
**TO FEEL GOOD**  
and have novel  
feelings,  
sensations,  
experiences  
**AND**  
to share them



**TO FEEL BETTER**  
and lessen -  
anxiety  
worries  
fears  
depression  
hopelessness  
withdrawal

# Why People Use/Seek Drugs?

Theoretical Framework for Understanding Addiction and Motivation for Alcohol/Drug Seeking Over the Lifetime



**positive reinforcement**  
pleasurable experience

**negative reinforcement**  
adverse experience  
drug withdrawal  
depression  
abuse/trauma  
neglect/poverty  
social deprivation



Biological  
Dysregulation

Psychological

Cultural

SUBSTANCE  
USE  
DISORDER

Social

Environmental



# Major Paradigm Shift Occurred in the Late 1990s

FRONTIERS IN NEUROSCIENCE

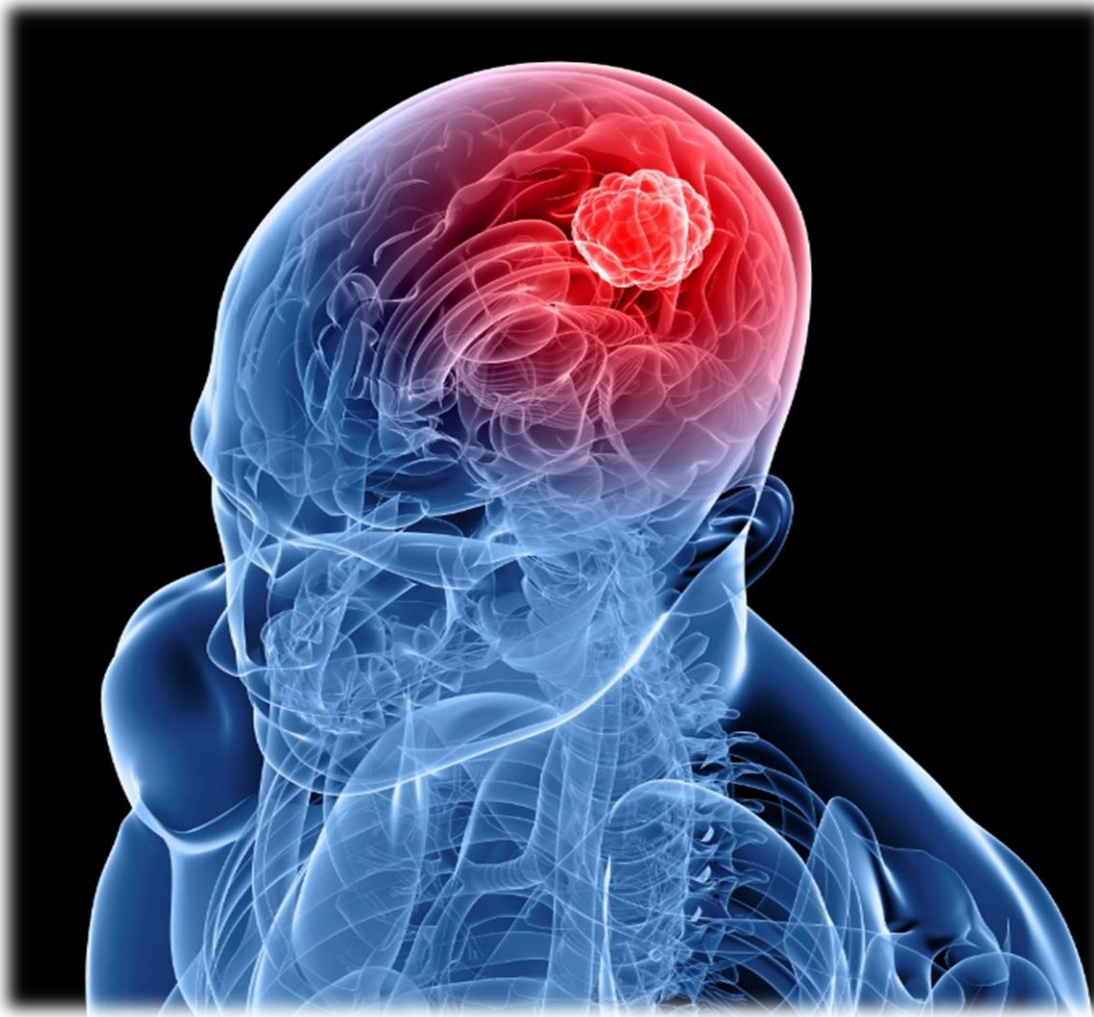
## Addiction Is a

Scientific advances over the past 20 years have shown that addiction is a relapsing disease that results from the prolonged use of drugs. Like many other brain diseases, addiction has several aspects that are important parts of the disorder. Treatment approaches will include biological, psychological, and social interventions. Recognizing addiction as a chronic, relapsing disease with compulsive drug seeking and use can impact society's overall health and social policy strategies and help diminish the health and social costs associated with drug abuse and addiction.

recognizing addiction as a chronic, relapsing brain disorder characterized by compulsive drug seeking and use can impact society's overall health and social policy strategies and help diminish the health and social costs associated with drug abuse and addiction.

the public, because drug use, directly or indirectly, is now a major vector for the transmission of many serious infectious diseases—particularly acquired immunodeficiency syndrome (AIDS), hepatitis, and tu-

# American Society of Addiction Medicine (ASAM)



“Addiction is a primary, chronic disease of brain reward, motivation, memory and related circuitry. Dysfunction in these circuits leads to characteristic biological, psychological, social, and spiritual manifestations. This is reflected in an individual pathologically pursuing reward and/or relief by substance use and other behaviors.”

# Addiction – Chronic Brain Disease

changes over time

brain structure

prefrontal cortex, limbic system

brain pathways (neural connections)

dopamine pathway, serotonin pathway

neurochemicals

dopamine, serotonin, endorphin, glutamate



# Dopamine & Substance Use

dopamine -

neurotransmitter released during a pleasurable experience

connected to the reward circuit of the brain

acts by reinforcing pleasurable that are pleasurable

leads to neural changes that help form habits

released during substance use and reinforces the connection between the substance and the pleasurable experience

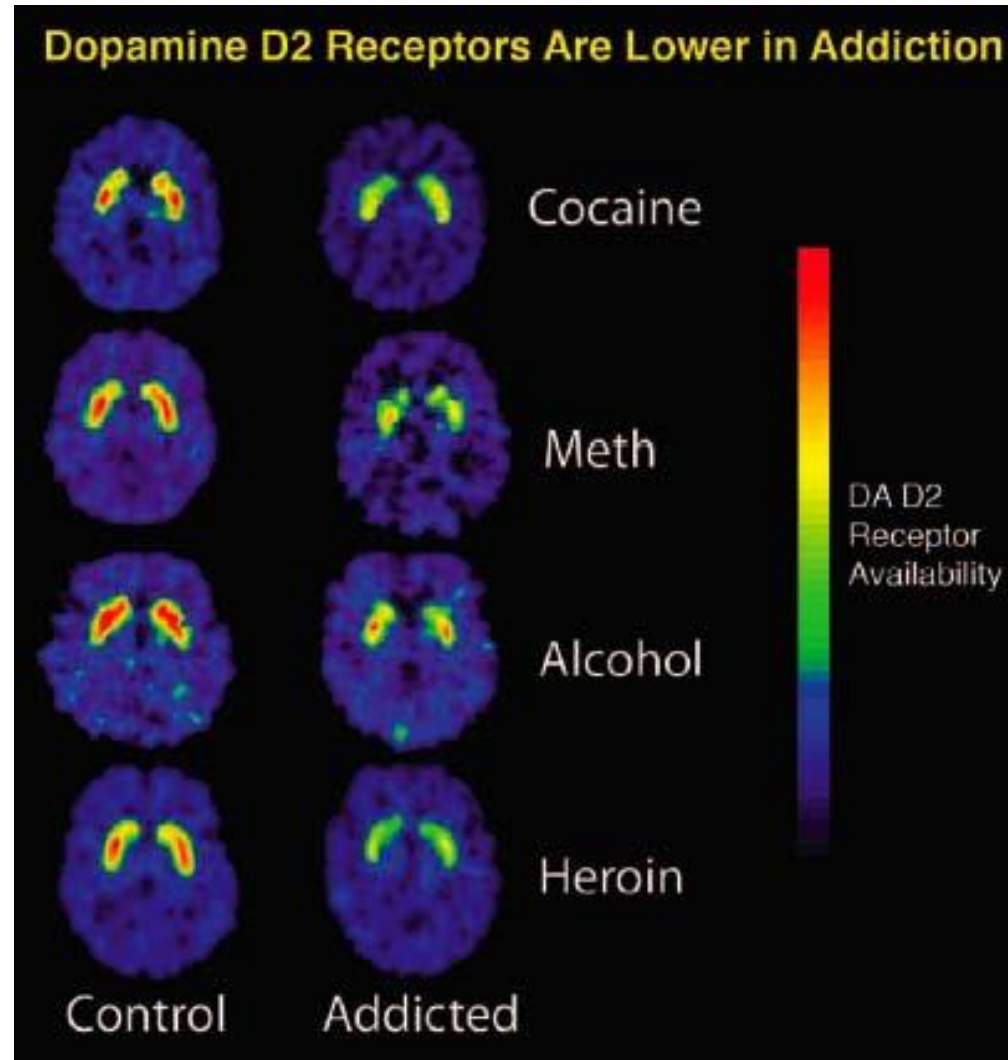
trains the brain to repeat the pleasurable experience

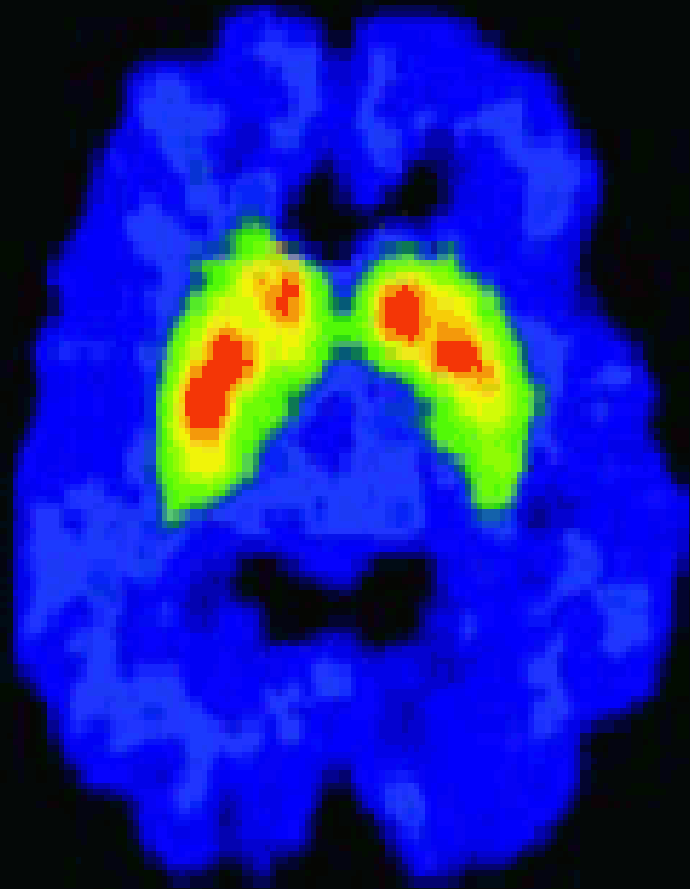
# Dopamine & Substance Use

physical need/dependence on outside source of opioids develops  
the brain comes to rely on the outside source (e.g., heroin, prescription opioid pain medications) to trigger production and release of dopamine  
the body and brain can't immediately match the dopamine production if the outside source is cut off (e.g., "dope sickness," "kicking," opioid withdrawal)  
as opioids are taken on a regular basis over the course of days/weeks/months, greater amount to feel the same effects is needed as to first opioid exposure (tolerance)  
factors that influence tolerance - **strength/potency** of the opioid, **route** of administration, and **frequency** of use

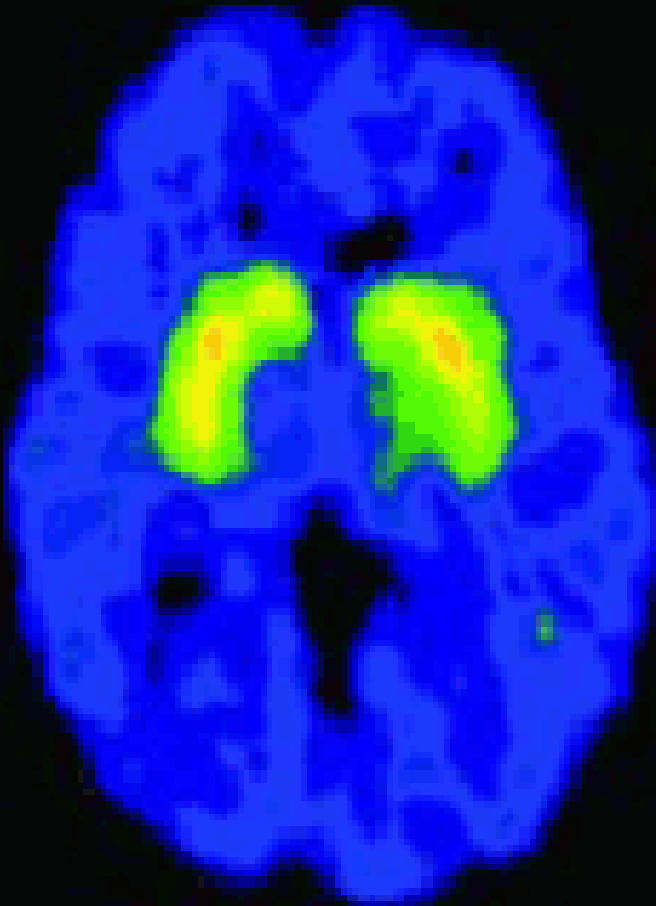


# Dopamine Receptors in Addiction

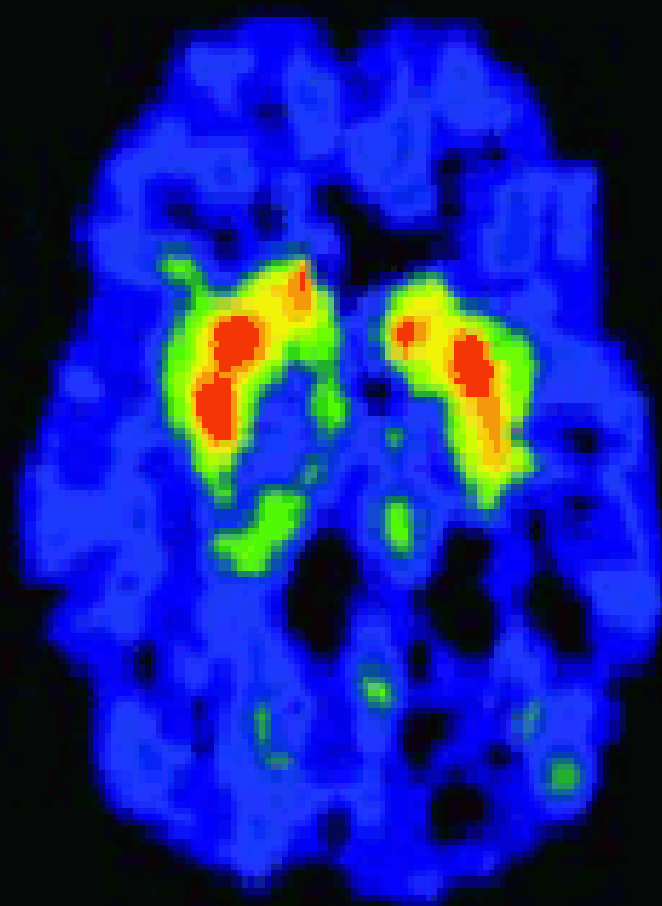




**Normal**



**SUD  
1 month abstinence**



**SUD  
14 months abstinence**





brain imaging studies show physical changes in areas of the brain when a drug is ingested that are critical to -

judgment

decision making

learning and memory

behavior control

the changes alter the way the brain works and help explain the compulsion and continued use despite negative consequences

# Mechanism

opioid receptors are activated by endogenous opioid proteins and are expressed throughout the brain to play a critical role in mood regulation, pain, reward, addictive behaviors, and substance use disorders

opioid receptors are involved in various brain signaling pathways, including the mesolimbic pathway - the “reward pathway”

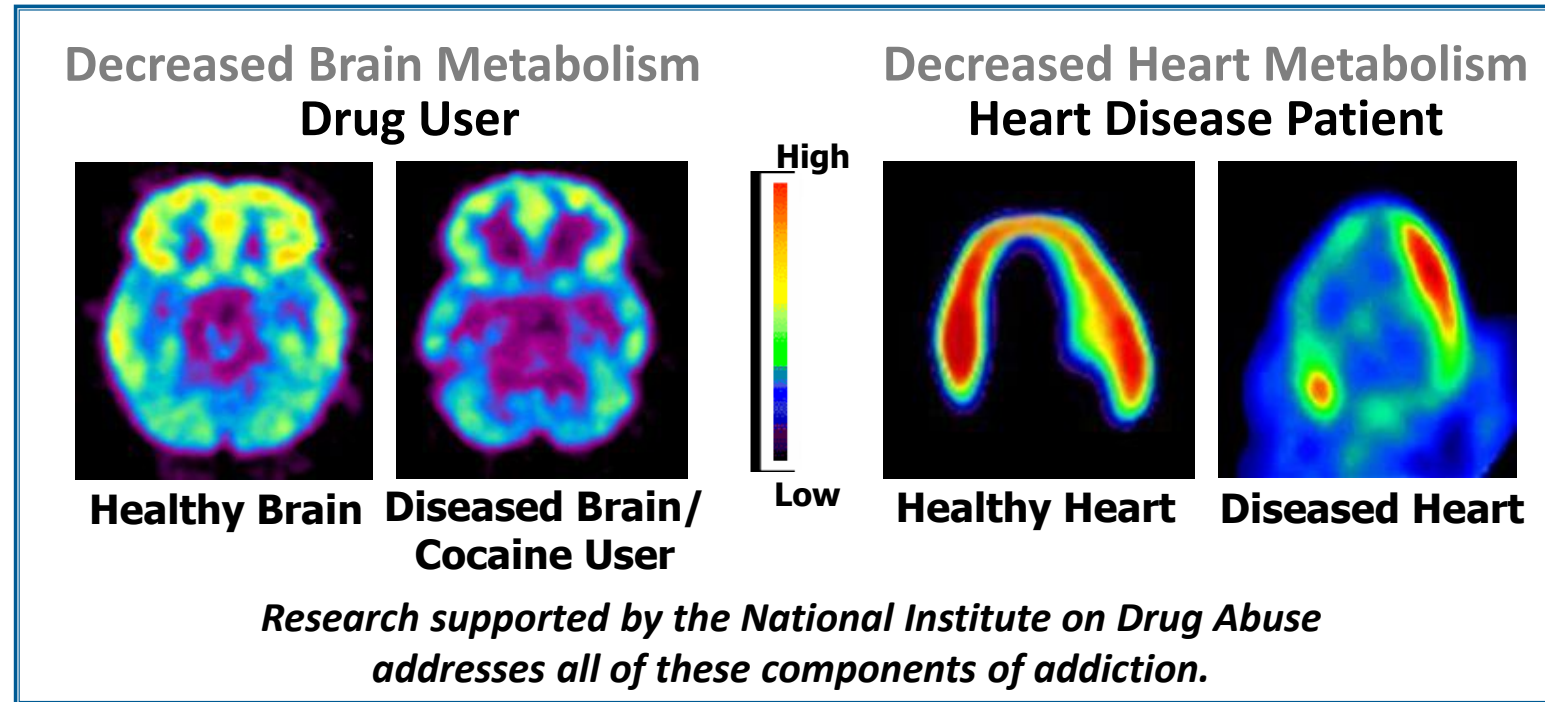
the mesolimbic pathway plays an important role in the positive reinforcement of natural rewards, e.g., food and drugs of abuse

# Mechanism

many abused drugs activate mu-opioid receptors, leading to positive reinforcing effects

alcohol consumption can also cause the release of endogenous opioids, which bind to *mu* (and delta receptors), thereby increasing the release of dopamine in the nucleus accumbens to induce reward and positive reinforcement effects

# Addiction is Like Other Chronic Illnesses



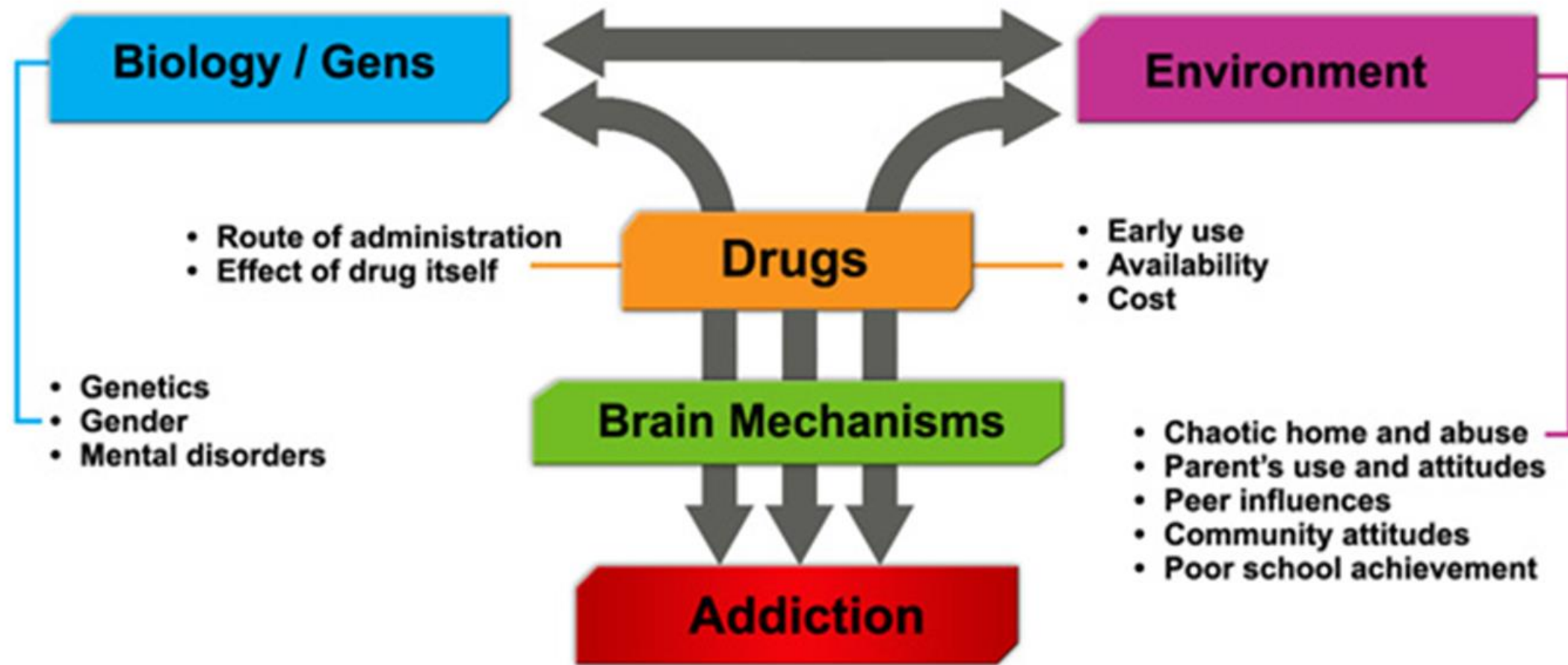
it's preventable

it's treatable

it changes biology

if untreated, it can last a lifetime

# Factors Leading to Addiction



# Addict's Dilemma

the brain is hard wired to seek rewards - food, water, sex (for survival)

addictive drugs activate the same reward pathway creating powerful desires that mimic survival needs

psyche – automatically seeks refuge from STRESS/ PAIN

prefrontal cortex (judgment & decision making) – tells the addict to stop ... bad things are happening

limbic system (pleasure/reward/survival) system override those commands with uncontrollable cravings and a compulsive drive to seek rewards and refuge from stress/pain

# Addiction cycle (4 Cs)

**Craving** (dopamine; brain is hard wired to crave rewards)

**Compulsion** (low serotonin levels)

Loss of **Control** (damage to the prefrontal cortex; right & wrong)

**Continued use** despite consequences – further damage to prefrontal cortex (interferes with judgement)



# Risk Factors for OUD

10-20% of opioid users at risk (licit/illicit)

## **Higher Risk**

co-occurring psychiatric (depression/ADHD)

family history substance use

prior h/o SUD

men > women

ACEs

# Risk Factors for OUD

poverty

unemployment

young age

prescribed opioids for more than 3-5 days

history of criminal activity or legal problems including DUIs

regular contact with high-risk people or high-risk environments

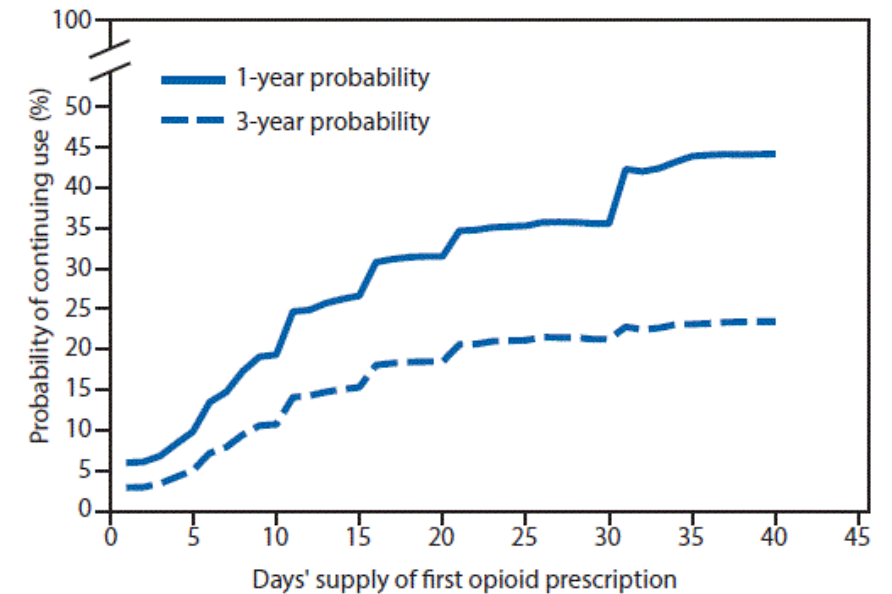
problems with past employers, family members and friends (mental disorder)

risk-taking or thrill-seeking behavior

heavy tobacco use

stressful circumstances

prior drug or alcohol rehabilitation



# Signs & Symptoms of OUD

## **physical**

change in appetite

pupil size

    small: opioid intoxication

    large: opioid withdrawal

nausea & vomiting

sweating

shaking

## **behavioral**

changes in -

    personality/attitude

    friends

    activities, sports, hobbies

poor attendance/grades

increased isolation, secrecy

wearing long sleeved shirts

mood changes - irritable, nervous, giddy,  
nodding off

criminal behavior



# Fentanyl – Pharmaceutical (licit)

Forms	Potency	Onset	Duration	Route of Administration
lozenge	50 X more potent than heroin	IV – immediately	IV- 0.5- 1 hr.	injectable
patch		SL/ buccal- 5 min	SL/buccal - varies	through mucus membranes in the mouth
sublingual (SL) or buccal preparations	100 X more potent than morphine	Patch- 6 hr.	Patch- 72-96 hr.	skin
solution (IV, subQ, etc.)				

# Fentanyl – Illicitly Manufactured (IMF)

Forms	Potency	Onset	Duration	Tolerance
tablets- swallowed or smoked  powder- mixed with other substances	<b>At Least, could be more</b>  50X > potent than heroin  100X > potent than morphine	~ 2-5 min.	1-4 hrs.	tolerance develops quickly – the more you take, the more you need

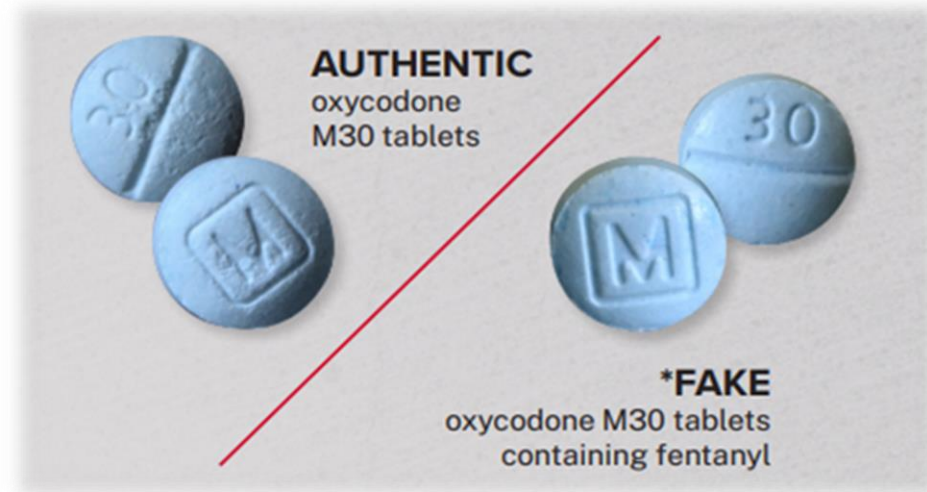
# IMF

used for multiple reasons (e.g., recreation, maintenance)

sold on its own or found in heroin, powder form, counterfeit pills (e.g., M30s), crystal methamphetamine, cocaine & other drugs

unknown purity & origin

chance of unintentional use







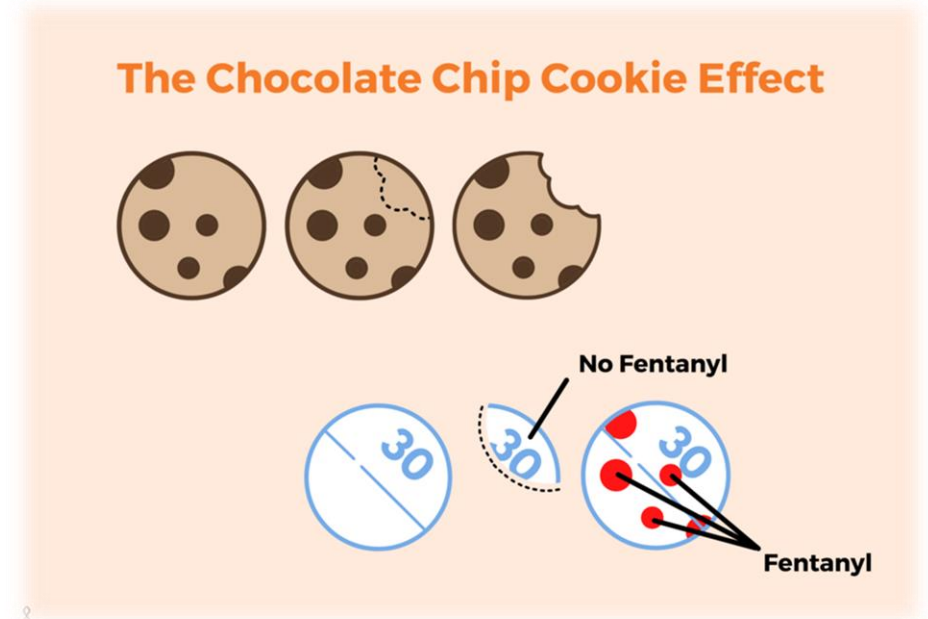


# IMF

criminal drug networks in Mexico are mass-producing deadly fentanyl and fentanyl-laced, fake prescription pills, using chemicals largely sourced from China

drug traffickers are mixing cocaine, heroin, methamphetamine, and, in some instances, marijuana with fentanyl

these drug combinations are resulting in many users unknowingly being exposed to potentially deadly doses of fentanyl





# Xylazine – “Tranq”

veterinary anesthetic

not approved for human use

adulterant

“sleep-cut” – xylazine + fentanyl

effects

sedation

pain relief

muscle relaxation

breathing difficulty

+/- euphoria



# Xylazine

first overdose in 1979

Philadelphia in 2006- xylazine in the heroin supply, 90% of tested samples in 2021

hiatus 2007-2018, reappeared in 2019

adulterant – mixed with cocaine, heroin, fentanyl, meth

xylazine-laced fentanyl declared an emerging threat in July 2023

xylazine-related wounds

OD often fatal (naloxone not effective)







# Harm reduction

**Harm reduction** is a set of practical strategies and ideas aimed at reducing negative consequences associated with drug use...incorporates a spectrum of strategies that includes safer use, managed use, abstinence, meeting people who use drugs “where they’re at,” and addressing conditions of use along with the use itself.

<https://harmreduction.org/about-us/principles-of-harm-reduction/>

**Harm reduction** is a practical and transformative approach that incorporates community-driven public health strategies — including prevention, risk reduction, and health promotion — to empower people who use drugs (and their families) with the choice to live healthy, self-directed, and purpose-filled lives.

<https://www.samhsa.gov/find-help/harm-reduction>



# Harm reduction - supplies

## **OD reversal supplies, i.e., naloxone**

substance test kits, including fentanyl & xylazine test strips

safer sex kits, including condoms

sharps disposal and medication disposal kits

wound care supplies

medication lock boxes

supplies to promote sterile injection and reduce infectious disease

transmission through injection drug use — excluding sterile needles, syringes, and other drug paraphernalia\*

FDA-approved home testing kits for viral hepatitis (i.e., HBV and HCV) and HIV

educational materials on safer injection practices and HIV and viral hepatitis and prevention, testing, treatment, and care services

# Harm reduction - services

OD reversal education and training services

navigation services to ensure linkage to HIV and viral hepatitis prevention, testing, treatment, and care services — including antiretroviral therapy for HCV and HIV, pre-exposure prophylaxis (PrEP), post-exposure prophylaxis (PEP), prevention of mother to child transmission, and partner services

referral to hepatitis A and hepatitis B vaccinations (to reduce risk of viral hepatitis infection)

provision of education on HIV and viral hepatitis prevention, testing, and referral to treatment services

provision of information on local resources and/or referrals for PrEP



# Good Trends



**2010-** [Washington State Good Samaritan Law](#) enacted

protections against prosecution for drug use, possession and underage drinking if 911 is called for medical help during an overdose.

NOTE: protection not guaranteed if you have DoC supervision or an active warrant, or if there are other factors, e.g., scales or firearms at the scene, or controlled substance homicide.

**2015-** [Washington State “Naloxone Law”](#)

**2019 (April)** - [WA DOH OEND Program](#) goes live

**2019 (September)** - [Statewide Standing Order enacted](#)

**2022-** WA DOH [Statewide Mail Order Naloxone Program](#) enacted in partnership with the People’s Harm Reduction Alliance

**2023-** [NARCAN®](#) and [RiVive™](#) approved for over-the-counter sale

All **Medicaid** plans in WA cover the out-of-pocket cost for the patient

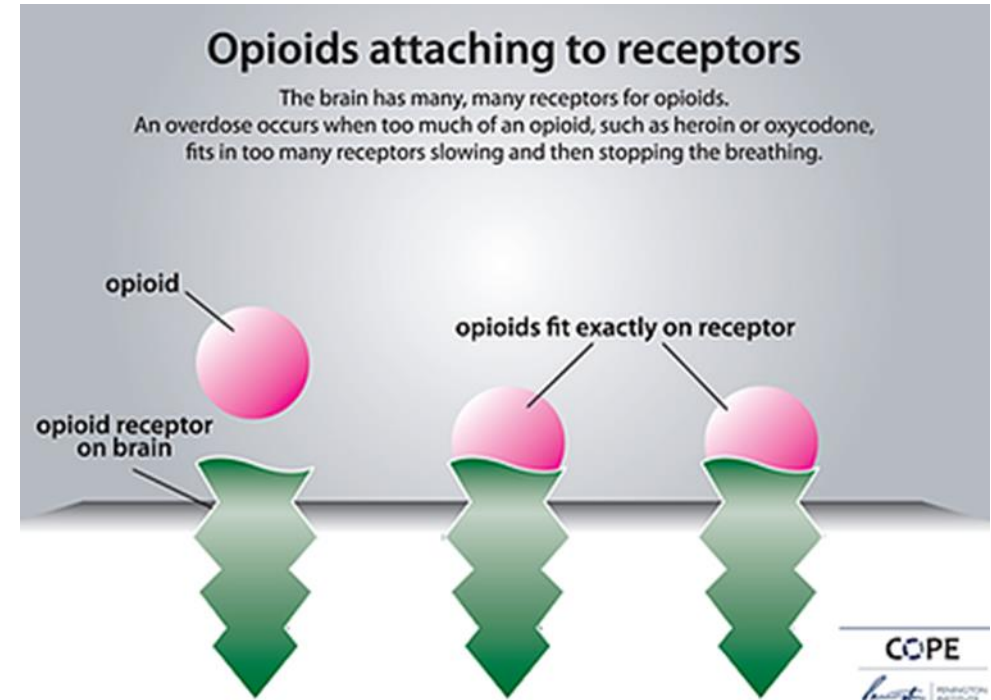


# Opioid OD

OD happens when a toxic amount of a drug, or combination of drugs overwhelms the body

opioid overdoses occur when there is so much opioid or a combination of opioids and other drugs in the body that bind to the *mu* receptors in the brainstem and slows/stops breathing → unresponsive to stimulation and/or breathing is inadequate

<https://harmreduction.org/issues/overdose-prevention/overview/overdose-basics/what-is-an-overdose/>



# Risk Factors

\*\*\*periods of abstinence/recently released from drug treatment

\*\*\*polysubstance use (especially alcohol and benzos)

\*\*\*route of administration (e.g., injection, smoking, snorting)

\*\*\*using alone

recent release from incarceration

use of street drugs/illicit drugs of unknown purity or origin

history of drug overdose

non-drug use related ailments (e.g., diabetes, COPD, etc.)

the need to use more often throughout the day and night (fentanyl short  $T_{1/2}$ )



# Signs & Symptoms of Opioid OD

loss of consciousness, unresponsive or awake but unable to talk  
breathing - very slow & shallow, erratic, or has stopped  
skin color - bluish-purple (cyanotic), grayish or ashen  
face – pale, clammy  
pupils – constricted, “pin-point”  
lips & fingernails – cyanotic  
choking sounds or a snore-like gurgling noise (“death rattle”)  
vomiting  
muscle tone - limp  
pulse – slow, erratic, or absent

# OD Response

1

Evaluate for  
signs of  
overdose

2

Call 911

3

Administer  
Reversal  
Agent

4

Support the  
person's  
breathing

5

Monitor the  
person's  
response

# OD Response

are you able to respond

scene size-up

evaluate for signs/symptoms of opioid OD

- visual check (lips/fingernails, breathing)

- physical check (responsiveness – verbal/physical)

call 911

- explicitly verbalize someone is not breathing

- provide a clear address/description of your location

naloxone

support breathing (consider PPE if available)

monitor response

repeat naloxone 2-3 minutes \*\*

# Reversal Agents

## **Naloxone**

brand & generic

strong affinity for opioid receptors

duration – 30-90 minutes

excellent safety profile

## **Nalmefene**

newly approved in May 2023

stronger affinity for opioid  $\mu$  receptors

duration – 4 hours

longer withdrawal symptoms post administration

# Naloxone & Nalmefene

3 types of intranasal naloxone

brand name Narcan –  
naloxone 4 mg/dose

generic naloxone nasal spray -

naloxone 4 mg/dose

brand name Kloxxado –

naloxone 8 mg/ dose

1 type of intranasal nalmefene

brand name Opvee -

nalmefene 2.7 mg/dose





# Naloxone

strong affinity for opioid receptors

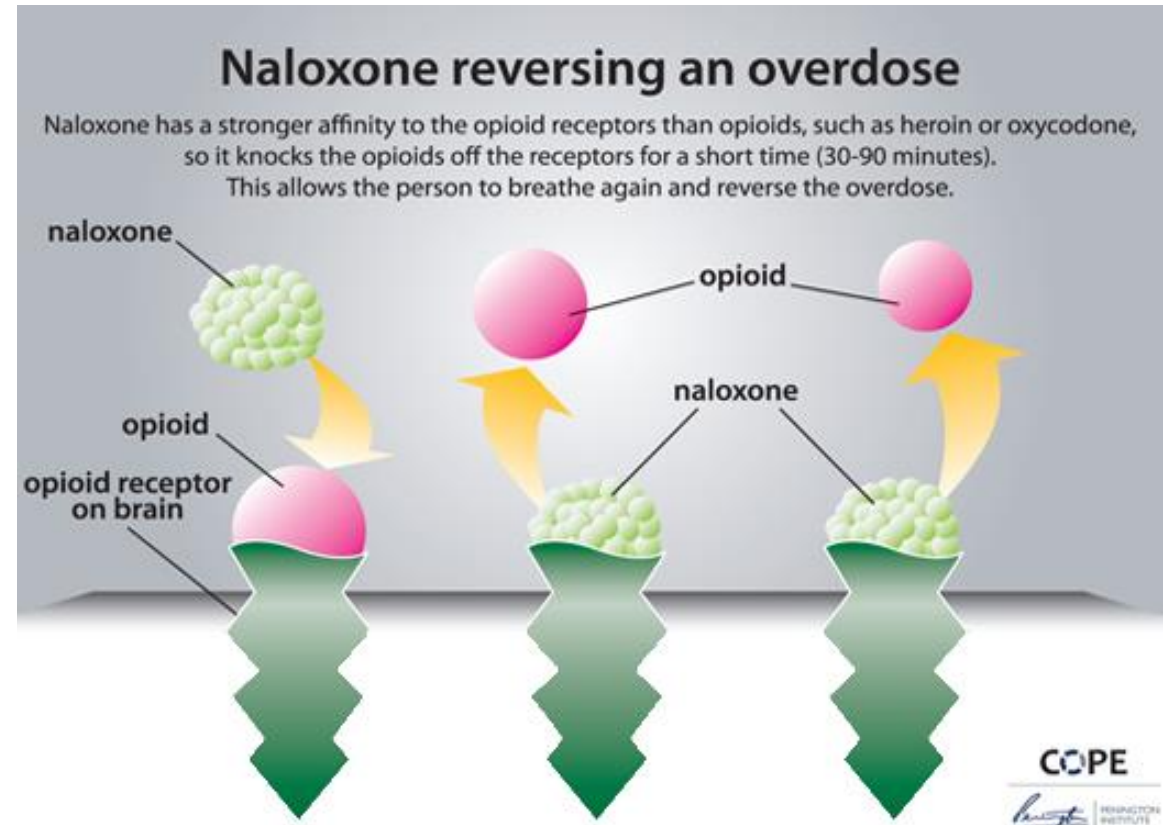
duration - 30-90 minutes

multiple doses may be needed -  
opioids can last between 4-72 hrs.

repeat administration if no/minimal  
response after 2-3 minutes

cannot die from withdrawal  
symptoms

No opioid = no effect



# Narcan How Tos

remove from plastic packaging  
grip the device but DO NOT  
prime the solution

place top of Narcan® into the  
nostril

press the bottom of the device  
to spray unit into ONE nostril

deliver full dose into one  
nostril

STORAGE - 59-77 F away from  
light



REMEMBER- If a person shows the signs and symptoms of an opioid overdose, administer naloxone regardless of what you think might have caused the overdose!

# When the Person Awakens

stay with them

naloxone duration – 30-90 min

OD symptoms reappear

administer more naloxone

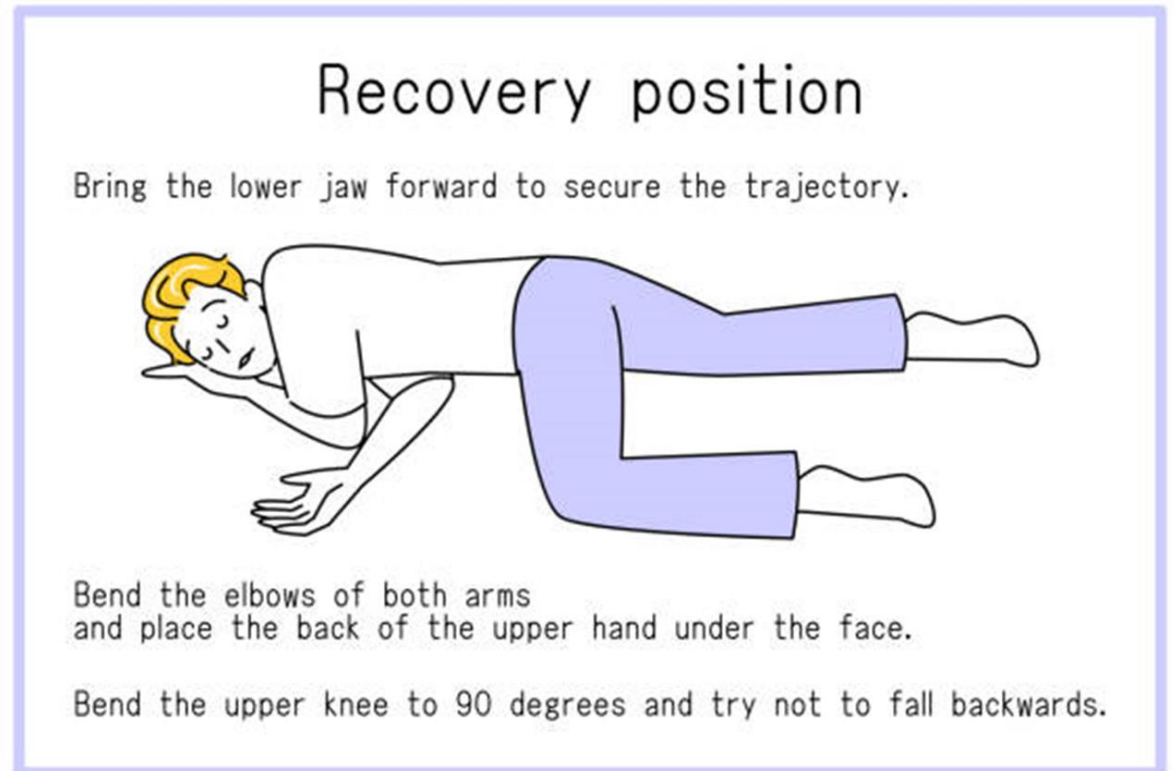
recovery position

don't let them use more drugs

let them know what happened –

be supportive

consider ED for monitoring





# Incidental Fentanyl Exposure

## **Can you overdose from touching powdered fentanyl?**

You can't overdose just by touching fentanyl. In fact, there are no confirmed cases of overdose from touching fentanyl powder or pills.

While fentanyl can be absorbed across the skin, this happens only with constant direct contact over hours and days.

## **Can you overdose from unintentionally inhaling powdered fentanyl or secondhand smoke?**

Current research shows that fentanyl use in public places does not produce enough contamination on surfaces to cause other individuals to overdose.

The risk of overdose is extremely unlikely from exposure to the smoke from someone who is smoking fentanyl. Recent research shows that fentanyl use in public places, e.g., buses and trains, does not produce enough contamination in the air to cause an overdose in passengers.



# Incidental Fentanyl Exposure

## **What about accidentally touching a fentanyl patch?**

While fentanyl can be absorbed across the skin, this happens only with constant direct contact over hours and days.

Fentanyl patches are designed to be absorbed over the course of 48-72 hours at a rate that shouldn't cause an overdose if worn for a brief period of time.

## **What about being around fentanyl smoke?**

The risk of overdose is extremely unlikely from being exposed to someone else who is smoking fentanyl. When someone smokes fentanyl or a similar drug, the concentration of leftover drug in the air is low.

Like secondhand tobacco smoke, the danger is in exposure to carbon monoxide or other byproducts of burning.

# Incidental Fentanyl Exposure

## **What If you believe that you touched or inhaled powdered fentanyl?**

If you think you may have touched fentanyl, wash your hands with (non-alcoholic) soap and water as soon as possible. Avoid touching your face, especially the eyes, nose, or mouth.

If you see powder or a crushed pill on a nearby surface, do not touch it or attempt to remove it. Do not open windows or do anything that might cause powder to get into the air. If you see fentanyl powder on your clothes, use a non-alcoholic wet wipe to remove it or wet the area of the garment before removing it and laundering.

If removing the substance is necessary, nitrile gloves provide sufficient skin protection. In exceptional circumstances where there are drug particles or droplets suspended in the air, an N95 respirator provides sufficient protection.

# Incidental Fentanyl Exposure

## **What If a child may have come into contact with inhaled or powdered fentanyl?**

Children are more sensitive to adverse effects from exposure to fentanyl pills, powder, or liquid left on surfaces.

Infants and children are at higher risk of accidental exposure to fentanyl as they explore their world by touching and tasting things within their reach.

Young children should be ***supervised closely*** because they are more likely to put their hands and things in their mouths or touch their eyes or nose.



# Resources

DOH Unintentional OD Data

<https://doh.wa.gov/data-and-statistical-reports/washington-tracking-network-wtn/opioids/unintentional-drug-overdose-data-sudors>

Stop Overdose

<https://stopoverdose.org/basics/learn-about-opioid-overdose/#naloxone-product-guide>

Rescue Agency – Laced and Lethal

<https://rescueagency.com/>



# Incidental Fentanyl Exposure Information

<https://doh.wa.gov/community-and-environment/opioids/fentanyl-exposure-public-places> (2023) Guidance from WA DOH

<https://www.cdc.gov/niosh/topics/fentanyl/risk.html> (2020?) CDC guidance for first responders. Somewhat misleading, especially re: inhalation and touching fentanyl.

<https://patch.com/washington/renton/hazmat-response-renton-city-hall-possible-fentanyl-exposure> (2020) Story from Renton about possible exposure in City Hall. Contains misleading information re: risks from touching or inhaling fentanyl.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5711758/> (2017) Guidance from the American College of Medical Toxicology regarding incidental exposure to fentanyl

<https://vimeo.com/432306286> (2020) “Fentanyl Safety Roll Call Training Video”, created by LE and others, pretty solid info, gives facts about incidental skin contact and inhalation, also signs and symptoms of opioid OD vs. panic attack

<https://www.spokesman.com/stories/2020/sep/09/two-spokane-officers-given-narcan-after-being-expo/> (2020) *Spokesman-Review* article about Spokane PD who administered naloxone to themselves in the field after believing they had been exposed to fentanyl. I spoke with one of the supervising officers with Spokane PD after this incident- to the best of his knowledge, the substance in question had not been tested and was most likely not fentanyl.

<https://www.workingpartners.com/unsuspecting-ohio-patrolman-overdoses-fentanyl-skin-contact/> (2017) Officer was given “four rounds of NARCAN” after he had dusted a “white powder from his shirt with this (sic) bare hand. Before that, he had inspected the car of two alleged drug dealers.” I found this incident cited in stores about LE and fentanyl exposure from as far away as Idaho: ([https://www.idahopress.com/news/local/amid-fear-of-fentanyl-isp-changes-how-it-conducts-roadside-drug-tests/article\\_71574911-31e2-56bf-913c-6306f69d1566.html](https://www.idahopress.com/news/local/amid-fear-of-fentanyl-isp-changes-how-it-conducts-roadside-drug-tests/article_71574911-31e2-56bf-913c-6306f69d1566.html) )

Can touch this: training to correct police officer beliefs about overdose from incidental contact with fentanyl (2021)

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8612110/>

<http://stopoverdose.org/wp-content/uploads/2023/05/LEO-fentanyl-flyer-Safe-to-Respond.pdf> (2023) University of WA in partnership with WA DOH, WA HCA and WA Poison Center, guidance for first responders concerned about incidental exposure to fentanyl

<https://publichealthinsider.com/2022/04/05/its-safe-to-give-help-questions-and-answers-about-secondhand-fentanyl-exposure/> Response from WA Poison Control

# Social Media

**| Oxycodone**

🔥 🐣 📱 🍷 🏈 🇪🇺 📄 🚗 🛒

📦 ❄️ 🛌 100 🛢️

**| Xanax®**

📄 🚗 🚌

**| Percocet®**

📄 🟦 🅑

**| Adderall®**

📄 A- 🚆

## COMMON DRUG RELATED EMOJIS

- 
**LEAF:** This emoji is used as a universal symbol for drugs
- 
**PLUG:** This emoji is used to refer to a dealer or online supplier who can provide you with drugs
- 
**ROCKET SHIP:** This emoji can be used to indicate the drug has a high potency
- 
**FIRE:** This emoji is used by dealers to indicate they have good quality drugs
- 
**NO ONE UNDER 18:** This emoji is used by dealers to indicate they will not sell to anyone under 18
- 
**MONEY BAG:** This emoji is used by dealers to indicate they have drugs for sale even if they state "no sales" elsewhere
- 
**SKULL AND CROSSBONES:** This emoji is used by dealers and users to indicate the drug is potentially deadly and they should proceed with caution
- 
**MONEY:** This emoji used in combination with a drug emoji indicates a dealer has that drug for sale
- 
**EYES:** This emoji is used in combination with other emojis by drug users to indicate they're looking for a dealer or to purchase particular drugs
- 
**MONEY WITH WINGS:** This emoji used in combination with a drug emoji indicates a dealer has that drug for sale



Thanks  
Sean Hemmerle – DOH  
Nicole Rodin, PharmD – WSU



The background of the slide is a dense field of light blue, oval-shaped pills. Some pills are in sharp focus, showing embossed markings such as 'M', '30', and '98'. The overall image has a soft, slightly blurred quality, with a light blue color cast.

# QUESTIONS

Bob Lutz – [bob.lutz@doh.wa.gov](mailto:bob.lutz@doh.wa.gov)