# THE NEUROBIOLOGY OF ADDICTION: UNDERSTANDING THE DISEASE & TREATMENT OF SUBSTANCE USE DISORDERS

Jeremy D. Hustead, M.D., FASAM

Assistant Professor, WVU Medicine

**2025 Public Defender Conference**

**June 5th, 2025**

WVU Rockefeller Neuroscience Institute / Department of Behavioral Medicine and Psychiatry


# WVU Rockefeller Neuroscience Institute™

# DISCLOSURES

- No relevant financial disclosures to any entities and no commercial or pharmaceutical interests (past, present, or future)

- Work at WVU Medicine in Morgantown, WV as an Assistant Professor doing research, seeing patients, and teaching various learners. Also serve as the president of the West Virginia Society of Addiction Medicine (WVSAM)

- Have treated thousands of substance use disorder patients in various levels of care including outpatient, inpatient, and residential centers. Currently lead the outpatient Addiction Intensive Outpatient Program (AIOP)

# SPECIAL THANKS

- Dr. Dorothy van Oppen who developed this PowerPoint with me and originally co-presented it in January 2025

- Crystal Walden, Dana Eddy, & Pam Clark for the kind invitation and coordination to speak today

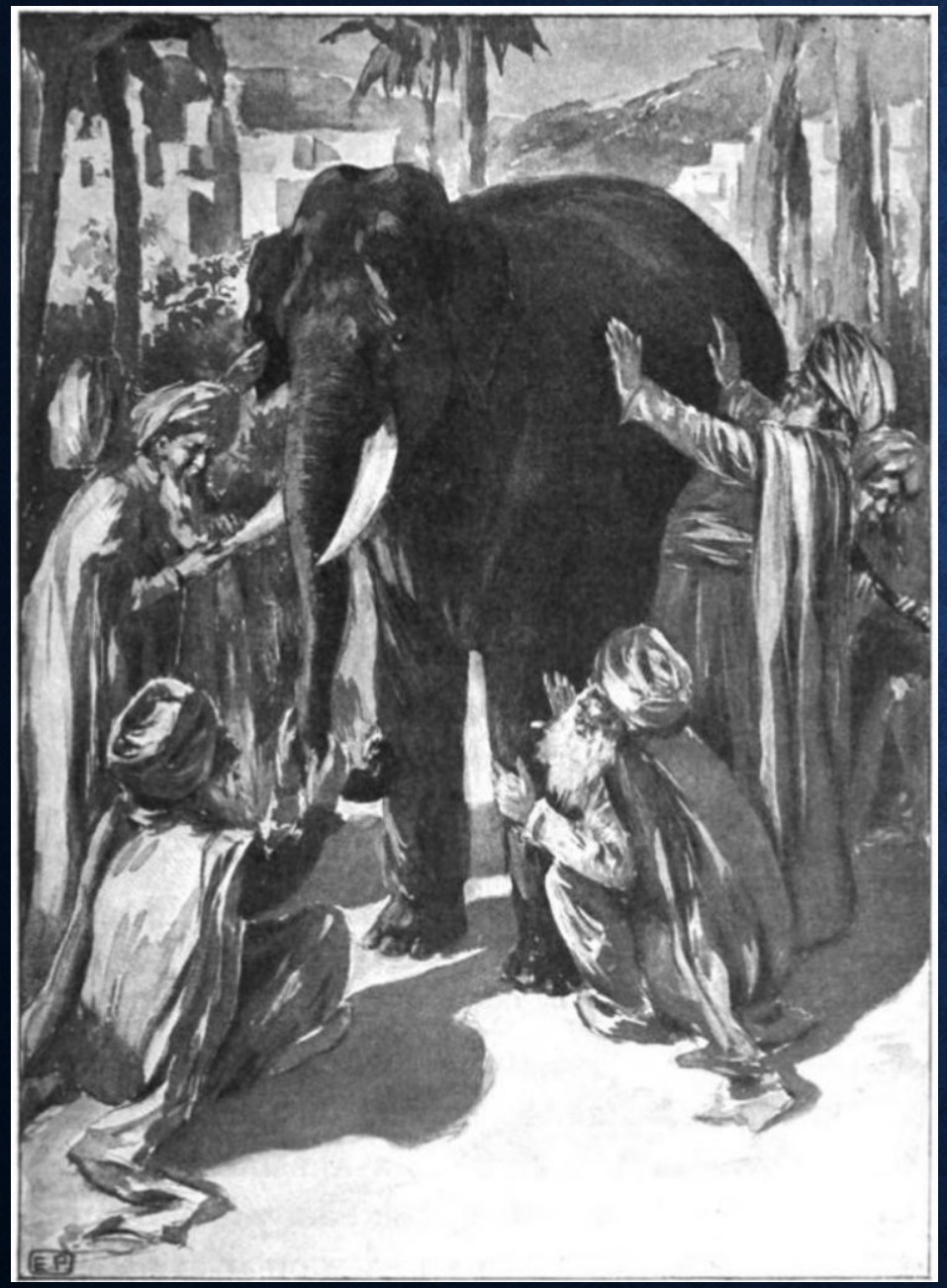
- The many substance use patients who I have had the privilege to treat

# LET'S TAKE A PAUSE …

- Any discussion on addiction treatment, specifically using medications to treat substance use disorders, can elicit strong emotions

- Everyone has their own experiences with individuals struggling with addiction and treatment. All our experiences are valid and our own. Ultimately none of us has the complete picture or understanding

- We would challenge everyone to keep an open mind today



# Blind Men and an Elephant

*"A group of blind men heard that a strange animal, called an elephant, had been brought to the town, but none of them were aware of its shape and form. Out of curiosity, they said: "We must inspect and know it by touch, of which we are capable". So, they sought it out, and when they found it they groped about it. The first person, whose hand landed on the trunk, said, "This being is like a thick snake". For another one whose hand reached its ear, it seemed like a kind of fan. As for another person, whose hand was upon its leg, said, the elephant is a pillar like a tree-trunk. The blind man who placed his hand upon its side said the elephant, "is a wall". Another who felt its tail, described it as a rope. The last felt its tusk, stating the elephant is that which is hard, smooth and like a spear."*



https://en.wikipedia.org/wiki/Blind_men_and_an_elephant

# OBJECTIVES

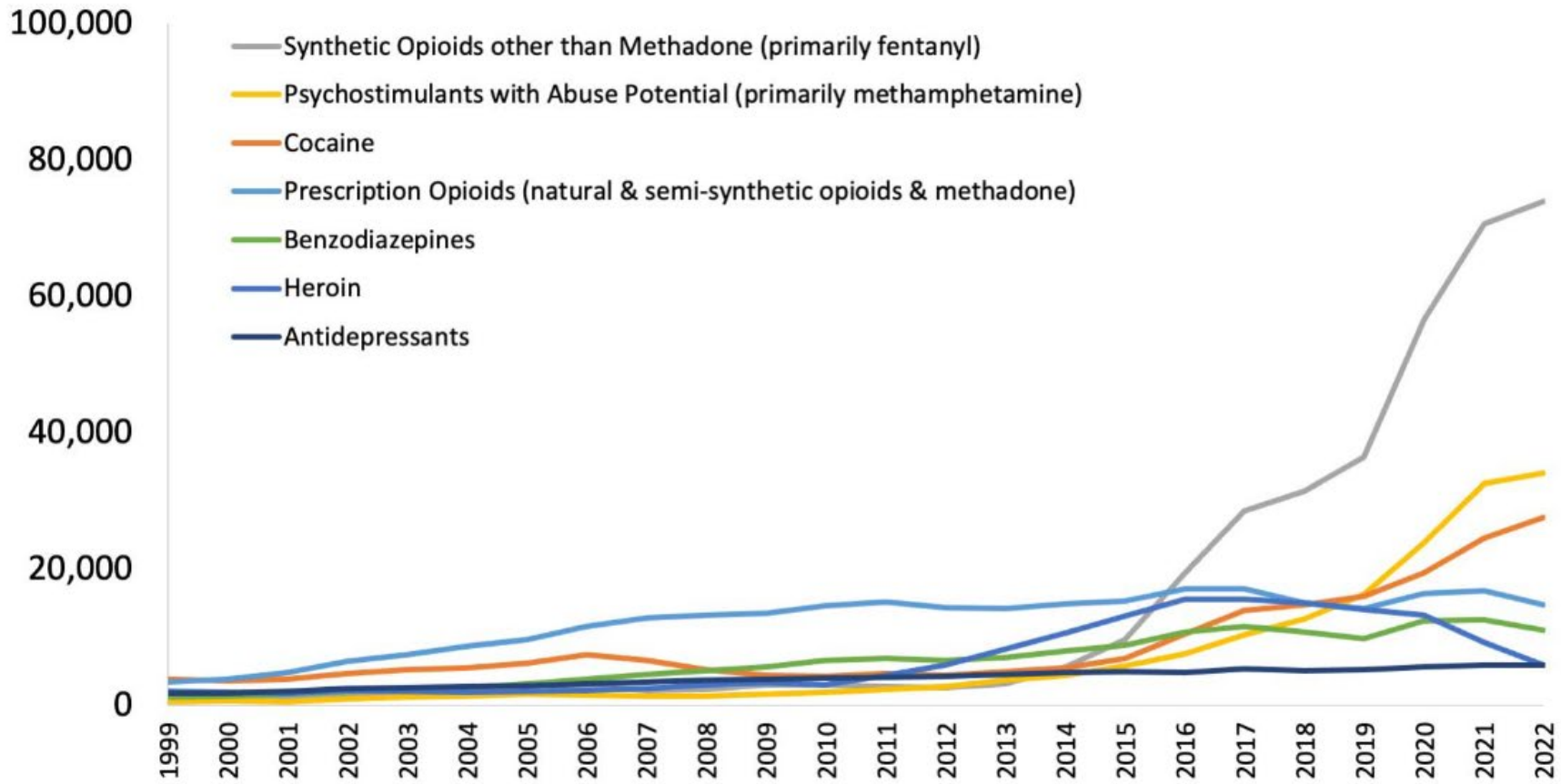
- Discuss the neurobiology of the brain disease of addiction
- Examine how approaching addiction as a treatable disease guides care
- Review some of the medications and treatments used to address substance use disorders

# SUBSTANCE USE EPIDEMIC

- From 1999-2021 more than **1 million** Americans have died of overdoses
- **70,630** Americans died in 2019 (21.6 per 100,000) -Opioids were involved in **49,860** of the deaths (70.6%), of those 72.9% were synthetic
- In 2020, 91,799 deaths (28.3 per 100,000) - Opioids were involved in 68,630 overdose deaths (74.8%) – 30% increase with COVID
- In 2021: **106,699 deaths** (32.4 per 100,000) – a further 14% increase - Opioids were involved in 80,411 overdose deaths (75.4%), of those 88% were synthetic opioid (mainly fentanyl) related
- In 2022: **107,941** (32.6 per 100,000) – only 0.2% increase
- West Virginia consistently has led the country in overdose deaths

https://www.cdc.gov/nchs/nvss/drug-overdose-deaths.htm

# Figure 2. National Drug Overdose Deaths*, Number Among All Ages, 1999-2022




*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 1999-2022 on CDC WONDER Online Database, released 4/2024.



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

# OVERDOSE DEATHS IN WEST VIRGINIA

| Year | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|---|---|
| Deaths | 725 | 884 | 974 | 856 | 870 | 1330 | 1501 | 1335 |
| Rate | 41.5 | 52 | 57.8 | 51.5 | 52.8 | 81.4 | 90.9 | 80.9 |

- Most total overdoses in 2022, California with 10,952 (WV had 1335)
- Consider that California has 40 million people and WV has only 1.8 million
- If California had our 2022 death rate, over 32,000 people would have died
- Besides overdose, significant morbidity and mortality related to Hepatitis C, Endocarditis, Osteomyelitis, Criminality, etc.

Centers for Disease Control and Prevention. (2022, March 1). *Drug overdose mortality by State*. Centers for Disease Control and Prevention.

# ADDICTION AS A NEUROLOGIC DISEASE

# ADDICTION DEFINITION

- Addiction is a **chronic medical disease** involving complex interactions among brain circuits, genetics, the environment, and an individual's life experiences.

- People with addiction use substances or engage in behaviors that become compulsive and often continue despite harmful consequences.

- Prevention efforts and treatment approaches for addiction are generally as successful as those for other chronic diseases.

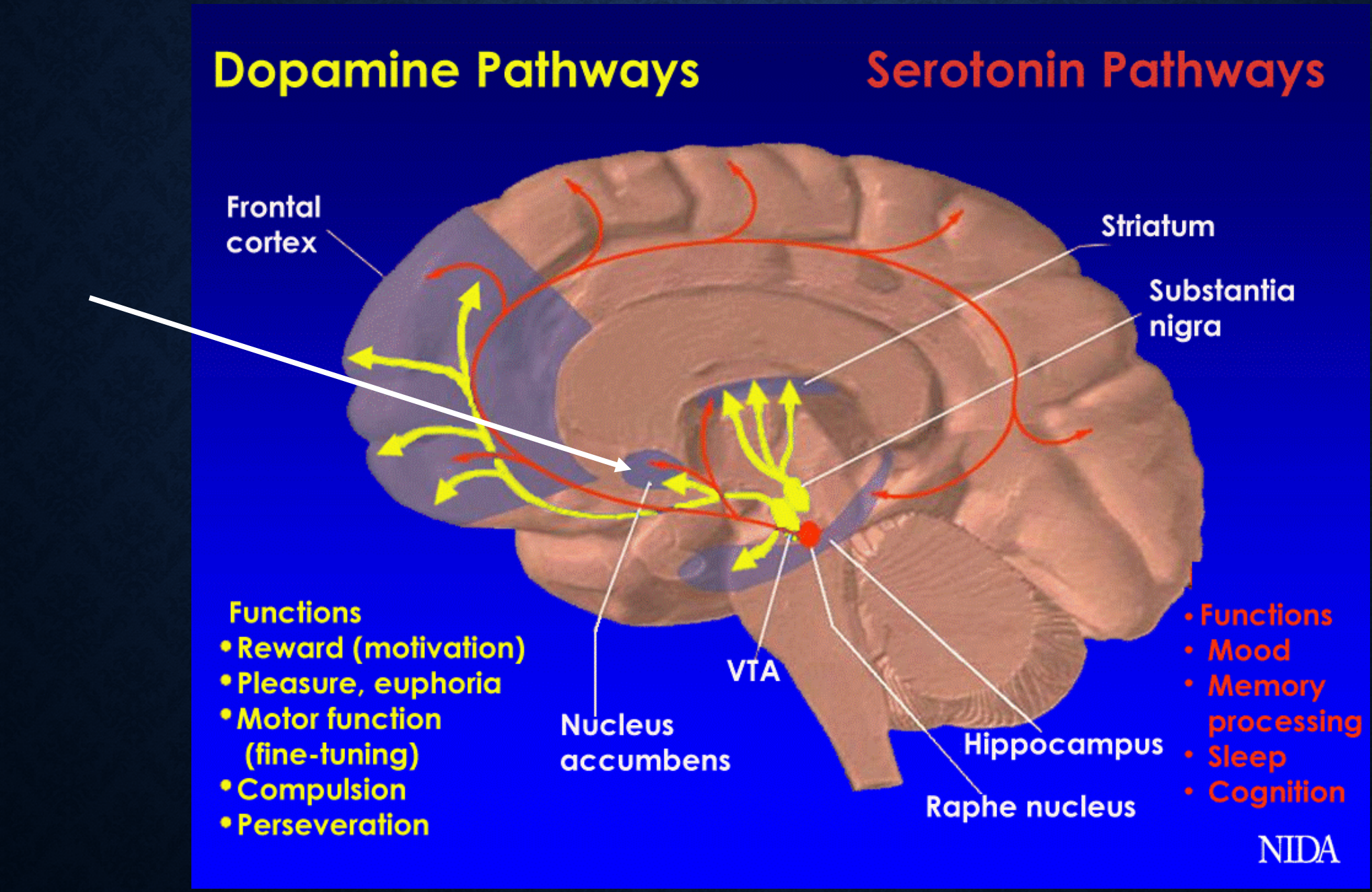
ASAM American Society of Addiction Medicine

American Society of Addiction Medicine (ASAM). 2019. https://www.asam.org/quality-care/definition-of-addiction

# ADDICTION AS A NEUROLOGIC DISEASE

- **Addiction** is characterized by one or more of the following (ABCDE):
  - Inability to consistently **Abstain**
  - Impairment in **Behavioral** control
  - **Craving**
  - **Diminished** recognition of problems
  - Dysfunctional **Emotional** response
- Addiction lives in the nucleus accumbens, a primordial area in our brain, that handles reward

ASAM Public Policy Statement


Dopamine Pathways
Serotonin Pathways
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
NIDA

# ADDICTION AS A NEUROLOGIC DISEASE

- Cycles of relapse and remission
- Addiction is often progressive and fatal
  - People die from overdose, infectious diseases, and criminality
- Contain vs. Curing the disease
  - Arguably impossible to "cure" but they are very treatable
- Goals of Treatment:
  - **Keep people alive**
  - **Increase their quality of life**

# ADDICTION AS A NEUROLOGIC DISEASE

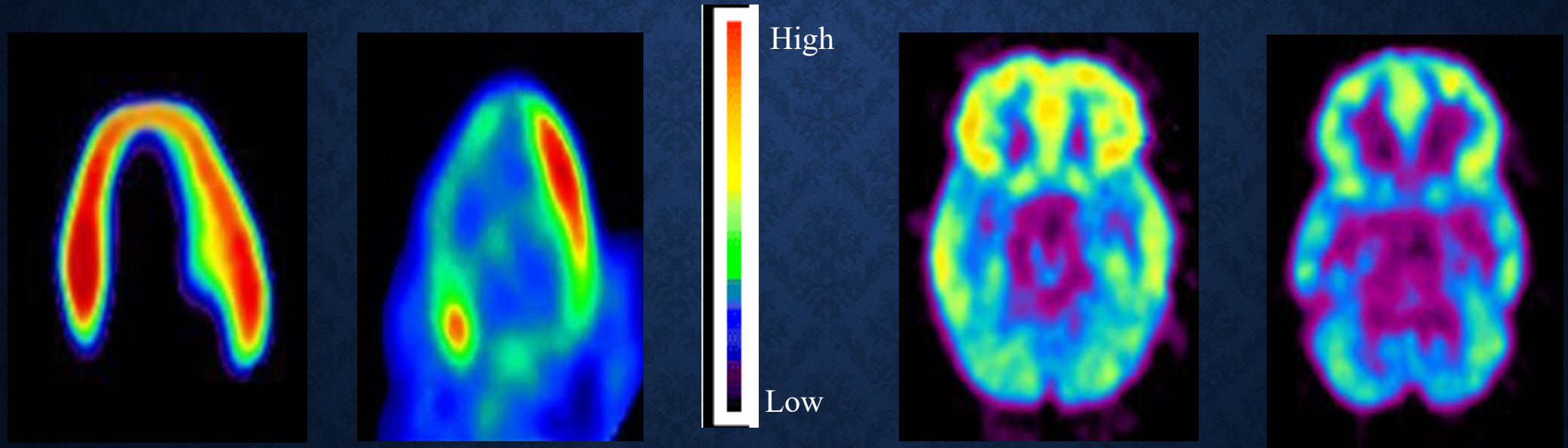
- Drug addiction constitutes a chronic central nervous system disorder, characterized by recurrent episodes of relapse in which individuals resume drug-seeking behavior, even in the face of adverse consequences and diminishing reward.

- The brain's structure and function changes with substance use and can also change when use ceases (with sobriety)

# Substance use disorder changes brain structure and function

Decreased Heart Metabolism in Coronary Artery Disease

Decreased Brain Metabolism in Substance Use Disorder



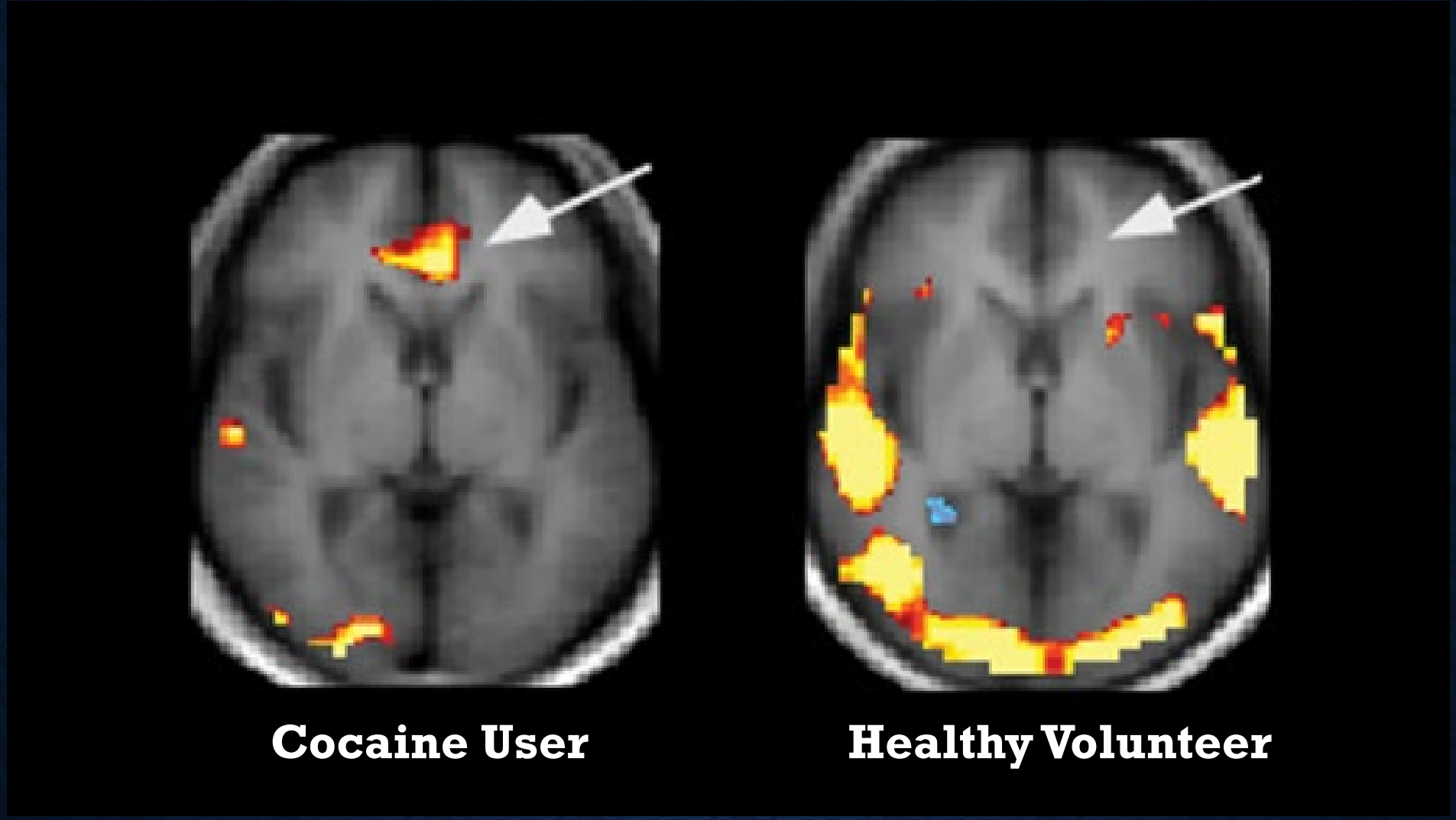

Healthy Heart

Diseased Heart

Healthy Brain

SUD Brain

NIDA Website: Drug Abuse and Addiction: One of America's Most Challenging Public Health Problems. https://archives.drugabuse.gov/publications/drug-abuse-addiction-one-americas-most-challenging-public-health-problems/addiction-chronic-disease

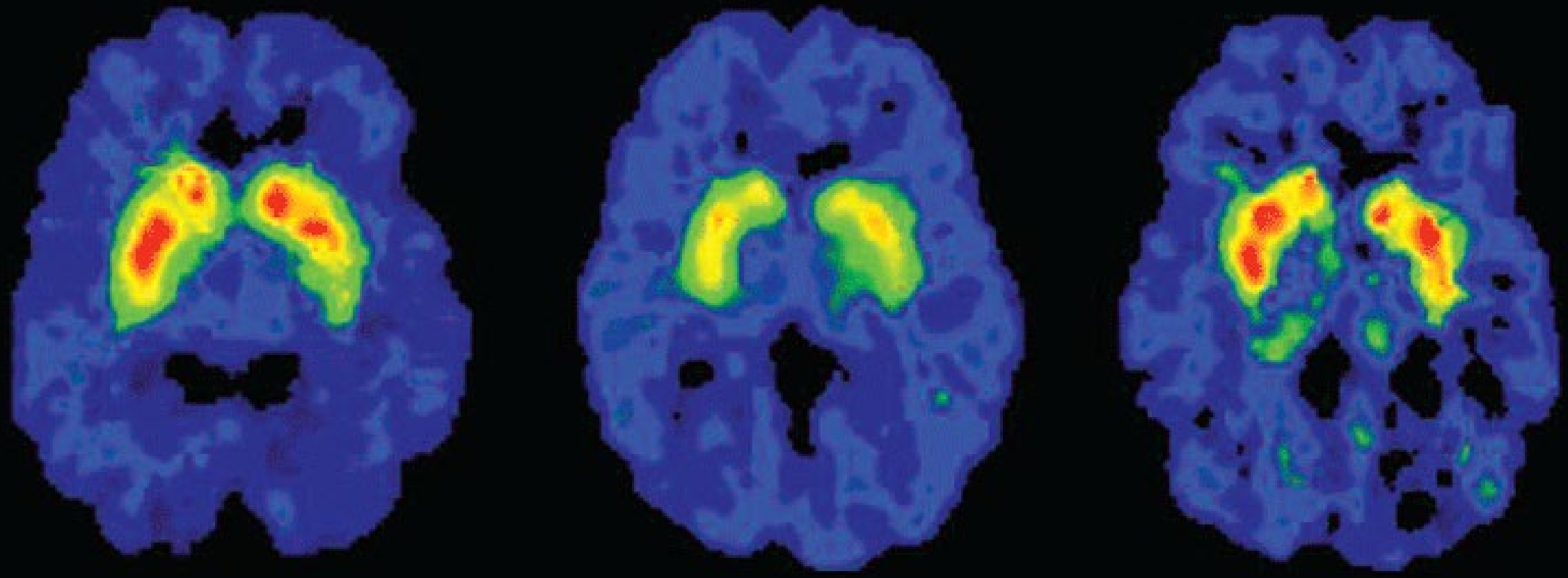



# Functional MRI: The brain's response to cocaine cues

Arrows point to the **anterior cingulate area**, which is activated (yellow) in cocaine-addicted patients (left) but not in healthy volunteers (right).

Wexler BE, et al. Functional magnetic resonance imaging of cocaine craving. American Journal of Psychiatry. 2001;158(1):86–95.

# BRAIN RECOVERY WITH PROLONGED ABSTINENCE



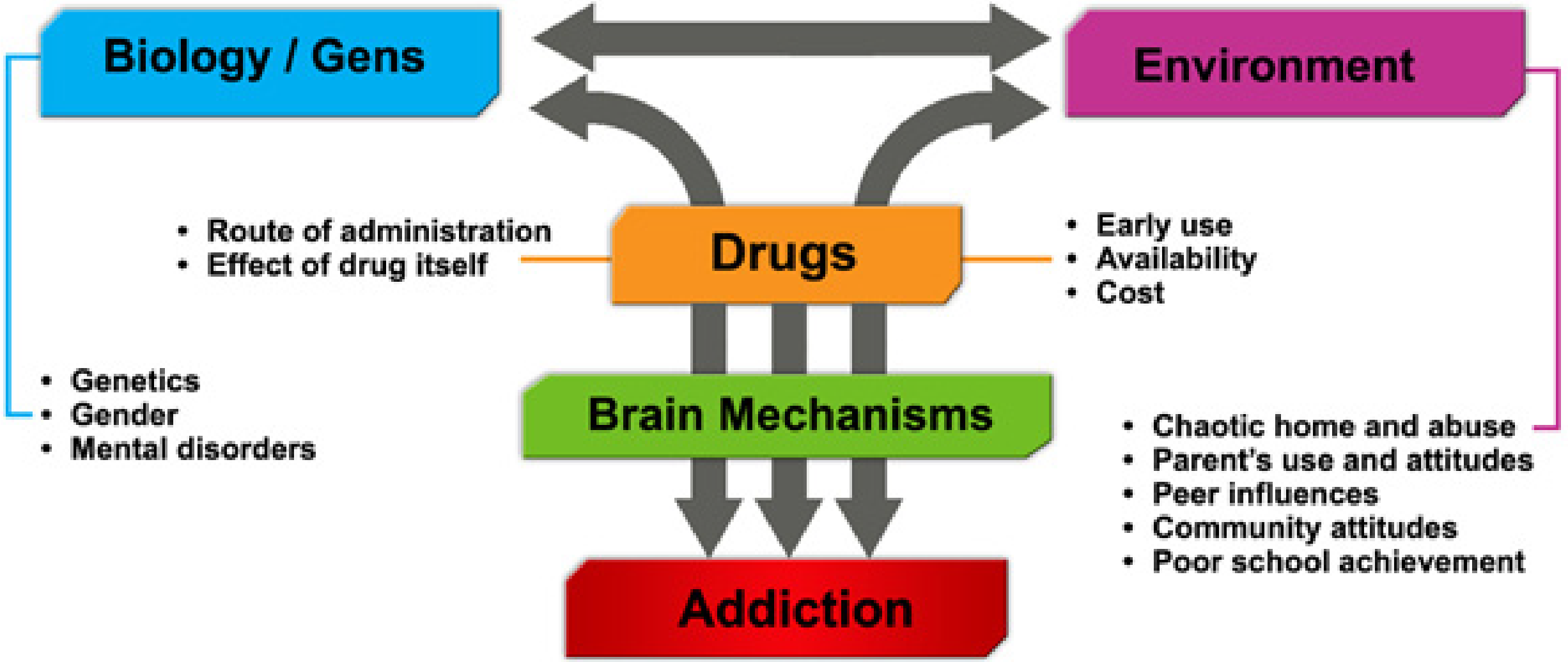
Healthy Person

methamphetamine use disorder
1 month abstinence

methamphetamine use disorder
14 months abstinence

Volkow et al. J. Neurosci., December 1, 2001, 21(23):9414–9418

# Factors Leading to Addiction




https://medicalschooledu.blogspot.com/2017/06/risk-factors-addiction.html

# NOT EVERYONE WHO TAKES A DRUG ONCE GETS ADDICTED TO IT. WHY?

- Some drugs are intrinsically more addictive than others
  - Nicotine is the most addictive substance
- Some individuals may be more genetically vulnerable
  - More impulsive by nature?
  - Have a genetically dysfunctional reward system?
- Environmental factors certainly play a role

# PROBABILITY OF BECOMING DEPENDENT WHEN PEOPLE HAVE TRIED A SUBSTANCE AT LEAST ONCE

| Substance | Percentage |
|---|---|
| Tobacco | 32% |
| Heroin | 23% |
| Cocaine | 17% |
| Alcohol | 15% |
| Stimulants | 11% |
| Anxiolytics | 9% |
| Cannabis | 9% |
| Analgesic | 8% |
| Inhalants | 4% |

Lopez-Quintero C, Pérez de los Cobos J, Hasin DS, et al. Probability and predictors of transition from first use to dependence on nicotine, alcohol, cannabis, and cocaine: results of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC). *Drug Alcohol Depend*. 2011;115(1-2):120-130. doi:10.1016/j.drugalcdep.2010.11.004

# CUMULATIVE PROBABILITY OF TRANSITION FROM USE TO DEPENDENCE

| Substance | After 10 years | Lifetime |
|---|---|---|
| Nicotine | 15.6% | 67.5% |
| Cocaine | 14.8% | 20.9% |
| Alcohol | 11.0% | 22.7% |
| Cannabis | 5.9% | 8.9% |

*(Catalina Lopez-Quintero, et al. 2011)*

# ADDICTION = SUBSTANCE USE DISORDER

- **Substance Use ≠ Substance Use Disorder**
- **Recreational Use → At Risk Use → Dependency**
- A disorder causes **clinically significant distress or impairment** in social, occupational, or other important areas of functioning
- During active use, we try to avoid diagnosing other mental health conditions that share similar symptoms, for example:
  - Methamphetamine/ PCP and Bipolar disorder
  - Synthetic marijuana/ high potency THC and Schizophrenia
  - Alcohol/ Benzodiazepines and Depression

# PAUSE ON ADDICTION AS A DISEASE

- Diagnosing someone as having a disease does not take away their responsibility for their actions
- A patient with addiction should be expected to, like any other disease:
  - Seek effective treatment
  - Stay adherent to that treatment
  - Help us to identify any other problems that exist
  - Not break the law or endanger other people
- Unfortunately, often when individuals do seek substance use treatment it is unavailable or unoffered (e.g. turned away at the hospital)

# BARRIERS TO TREATMENT

| Reason for Not Receiving Substance Use Treatment[1] | Aged 12 or Older | |
|---|---|---|
| No Health Care Coverage and Could Not Afford Cost | 24.9 | (4.89) |
| Had Health Care Coverage but Did Not Cover Treatment or Did Not Cover Full Cost | 12.0 | (3.50) |
| No Transportation/Programs Too Far Away/Hours Inconvenient | 6.1 | (1.80) |
| Did Not Find a Program That Offered the Type of Treatment Wanted | 15.8 | (3.55) |
| Not Ready to Stop Using | 36.7 | (5.15) |
| No Openings in a Program | 3.0 | (1.28) |
| Did Not Know where to Go for Treatment | 17.9 | (3.56) |
| Might Cause Neighbors/Community to Have Negative Opinion | 10.4 | (2.56) |
| Might Have Negative Effect on Job | 14.7 | (3.10) |
| Did Not Feel Need for Treatment at the Time | 9.3 | (2.91) |
| Could Handle the Problem without Treatment | 15.0 | (3.87) |
| Treatment Would Not Help | 5.5 | (2.28) |
| Did Not Have Time | 5.2 | (1.61) |
| Did Not Want Others to Find Out | 9.9 | (2.89) |
| Some Other Reason | 1.8 | (0.68) |

SAMHSA 2022.

# NEUROLOGICAL DISEASES WITH EFFECTIVE TREATMENTS

- Good treatments, often involving medications, do exist for most substances of abuse
- Many programs and levels of care are available for patients
- We wouldn't necessarily say we can "cure" the brain disease of addiction (yet) however we consider it now to be a controllable chronic disease
- Emerging treatments including deep brain stimulation and high-intensity ultrasound are opening new possibilities
- If individuals do receive treatment, they can be pressured to prematurely stop treatment by their families, the courts, and their peers

# EVIDENCE-BASED TREATMENTS OF VARIOUS SUBSTANCE USE DISORDERS

# SUBSTANCE USE TREATMENT ALGORITHM

1. Carefully triage the person to the appropriate level of initial care (inpatient, outpatient, residential treatment) – continually evaluated
2. Manage or prevent any withdrawal symptoms of the particular substance(s) of abuse and any medical complications
3. Work on relapse prevention measures and starting appropriate medications if available
4. Connect to appropriate long-term outpatient follow up – utilize therapy and peer recovery services throughout

# TOBACCO

- An extremely commonly used substance in the US and worldwide
- Prevalence in 2021: **11.5%** of adults (28.3 million): 13.1% of men, 10.1% of women – decline from 15.3% in 2015, 20.9% in 2005, 29.9% in 1985, 41.9% in 1965
- Cigarette smoking remains the leading cause of preventable death:
  - >**480,000 deaths** annually in US (1 in 5 deaths that occur)
- Nicotine serves as the main addictive substance however the numerous other chemicals in tobacco and smoking itself causes most of the deleterious effect
- West Virginia leads the nation in adults who smoke at 20.0%



CDC Fact Sheets -Smoking and Tobacco Use. https://www.cdc.gov/tobacco/stateandcommunity/state-fact-sheets/index.htm

# TOBACCO CESSATION TREATMENT

- The mainstay of tobacco treatment is **Nicotine Replacement Therapy (NRT)**
  - Nicotine Patches (21 mg patch ~ 1 PPD, 1 can snuff = 2 PPD) – don't wear to sleep!
  - Gums, Lozenges
- E-cigarettes /Vaping? – controlled in other countries, it's the wild west in the U.S.
- Behavioral therapies and counseling
- Widely available tobacco quit lines in every state including WV
- Other FDA approved medications
  - **Bupropion** – a novel antidepressant that decreases the desire to smoke through its action on the addiction center of the brain
  - **Varenicline** – a partial agonist of the brain's nicotinic receptors

# ALCOHOL

- Most commonly used ***legal*** (other then caffeine) substance in the US
- Among people aged 12 or older in 2021, **10.6%** (or about **29.5 million**) had an **alcohol use disorder (addiction)** in the past 12 months
- Alcohol is fatal in overdose and can be a deadly withdrawal (DTs, seizures)
- From 2006 – 2010, excessive alcohol use led to approx. **88,000 deaths** and 2.5 million years of potential life lost each year in the United States
- Deaths with COVID - 2019: **78,927** → 2020: **99,017** → 2021: **108,791 deaths**
- The lives of those who died were shortened by an average of 30 years.
- Fatal accidents: **10,511** alcohol-impaired driving deaths occurred in 2018
- Excessive drinking was responsible for 1 in 10 deaths among working-age adults aged 20-64 years.



CDC Fact Sheets - Alcohol Use and Your Health. https://www.cdc.gov/alcohol/about-alcohol-use/index.html

# ALCOHOL TREATMENT

- Heavy or prolonged use often requires an inpatient detox with benzodiazepines, barbiturates, and/or anti-seizure medications to control withdrawals
- Medications used in detox can show up in drug screens for a week or more
- We often will provide vitamins (thiamine) to prevent complications
- **Naltrexone** (oral or extended-release shot) -limits euphoria from and amount of drinking, acts on opioid receptors blocking rewarding effects of drinking
- **Acamprosate** -GABAergic medication, helps with cravings
- **Disulfiram** -creates sickness when alcohol is consumed by blocking the normal metabolism of the alcohol and giving a toxic hangover
- Non FDA-approved medications: Topiramate, Gabapentin, Baclofen

# CANNIBIS/MARIJUANA

- Most commonly used ***illicit*** substance – still federally banned DEA schedule I drug
  - In 2015, there were **22.2 million** current active users (use in the last month) in the US aged 12 or older
- Among people aged 12 or older in 2021, **18.7%** (or about **52.5 million**) reported using cannabis in the past 12 months
- Among people aged 12 or older in 2021, an estimated **5.8%** (or about **16.3 million**) had a **cannabis use disorder (addiction)** in the past 12 month
- In 2022, an estimated 8.3% of 8th graders, 19.5% of 10th graders, and **30.7%** of 12th graders reported using cannabis/hashish in the past 12 months.

https://www.cdc.gov/cannabis/data-research/facts-stats/index.html

What is the scope of cannabis (marijuana) use in the United States? | National Institute on Drug Abuse (NIDA) (nih.gov)

# CANNABIS EFFECTS & CONCERNS

- **Short-Term Effects**: Enhanced sensory perception and euphoria followed by relaxation, slowed reaction time, problems with balance and coordination; increased appetite, memory issues, anxiety, paranoia, and decreased pain

- Acute cannabis intoxication impairs driving ability
  - Cannabis is the illicit drug most frequently found in the blood of drivers involved in motor vehicle crashes, including fatal ones.

- **Long-Term Effects**: Worsens mental health issues, higher baseline anxiety level, chronic cough, COPD, and frequent respiratory infections

- Effects brain development in children to young adults (~25-30 y/o), increases likelihood of psychotic illnesses (e.g. Schizophrenia), and associated with higher risk of suicide

# CANNABIS TREATMENT

- Detox:
  - Typically outpatient – their drug screens can remain THC positive for weeks
  - If cannabis-induced psychosis → inpatient acute Psychiatric care
- Withdrawal symptoms:
  - Irritability, anger, or aggression, Nervousness or anxiety, Sleep difficulty (e.g., insomnia)
  - Decreased appetite or weight loss, Restlessness, Depressed mood.
  - Physical symptoms: abdominal pain, shakiness, sweating, fever, chills, or headache.
- Treatment options
  - No approved medications (I wish we had some)
  - We treat symptoms (e.g. Psychosis) with available medications (e.g. Antipsychotics)
  - **N-Acetylcysteine (NAC)** can be helpful for youth

# SEEKING HELP FOR CANNABIS USE

- Often difficult to seek help due to the perception that cannabis is safe in everyone
- Mixed messaging from clinicians given the industry's (including some certifiers) desire to profit and it being touted as a cure for all of life's problems
- If you want to sell a lot of something that is potentially addictive (e.g. tobacco, alcohol, gambling, etc.) you need to minimize the risks and focus only on potential benefits
- Industry standard: "**Advertise First, Apologize Later**" (see tobacco and opioids)
- Many non-addiction treatment physicians do not perceive cannabis as a problem
- If it has progressed to a cannabis use disorder, recommend seeking professional help as assertively as anyone struggling with opioids, stimulants, alcohol, etc.

# MEDICAL MARIJUANA ≠ "MEDICINE"

- "**Medical Marijuana**" in reality is synonymous with "**Legislated Marijuana**"
- Limited controls in place over quality and concentration – U.S. allows big business to dictate – most countries restrict to a few federally-regulated companies (1 in Canada)
- Doctors certify patients for a condition (e.g. PTSD, pain, seizures) but we do not actually prescribe or manage the use or amount of cannabinoid consumption
- There is no medically accepted use of internal combustion products (smoke) to deliver medications to the human body (inhalers/nebulizers are not smoke)
- Ideally a 1:1 ratio of Delta-9 THC to CBD produces least negative psychoactive effects
- In reality, dispensaries now mostly sell >20% THC products with <0.1% CBD

# METHAMPHETAMINE

- Powerful synthetic psychostimulant similar to cocaine but longer acting effects and generally more psychoactive (i.e. people look worse when intoxicated)
- Can be smoked, inhaled, or injected; often combined with other drugs
- Rates of use had decreased for a time in part due to Combat Methamphetamine Epidemic Act of 2005 (CMEA) which regulated the sale of the over-the-counter precursor products used to "cook" meth in small quantities
- Recently, use has increased due to mass production and importation from other countries (see Breaking Bad) –drug dealers will market as a way to stop opioids
- Clinically we are seeing many instances of insomnia and psychosis from heavy use



https://nida.nih.gov/research-topics/methamphetamine

# METHAMPHETAMINE TREATMENT

- Initial treatment: detox either outpatient vs. inpatient (especially if psychotic)
- Similar withdrawal as cocaine, not physiologically dangerous but patient can be very depressed and have resolving psychotic symptoms
  - Depression and anxiety, Irritability and physicality
  - Insomnia and exhaustion
  - Benzodiazepines and/or Antipsychotics if needed in the hospital
- Medication options (all off label)
  - **Mirtazapine** – antidepressant for cravings, also mood, sleep, and appetite
  - **Topiramate** – seizure medication to control stimulant cravings
  - **Naltrexone** (opioid blocker) + **Bupropion** (antidepressant) – cravings and mood
- Contingency Management – effective behavioral intervention which is rarely used

# OPIOIDS / OPIATES

- All share same general mechanism of action: bind to natural opioid receptors in CNS, altering pain pathways and activating reward centers in the brain
- 1900's to 1990's they were used mostly for acute pain or for cancer patients
- In the 1990's medicine deemed pain to be a "vital sign" and adopted a stance to eradicate pain from US society – highly influenced by pharmaceuticals ($$$)
- Natural (opiates), semi-synthetics, and full synthetics opioids are produced
- Often combined with other drugs intentionally or accidentally
- Opioids are responsible for the majority of the 100,000+ yearly overdose deaths

# COMPARING OUD TO ANOTHER DISEASE

## Opioid Use Disorder

- Starts with Exposure to a chemical (Opioids)
- Takes months to years to develop dependency
- Is fatal if allowed to progress (Overdose, Endocarditis, Hepatitis C, etc.)
- Is treatable with Medications
- ~ 50% recovery rate with MOUD
- **Enormous amount of Stigma**
  - **Treatment > Disease**

## Lung Cancer

- Starts with Exposure to a chemical (Tobacco)
- Takes years for cancer to grow and to Metastasize
- Is fatal if allowed to progress (from the cancer or the treatment)
- Is treatable with Medications
- ~ 50% Survival rate with treatment
- **Very little stigma with disease or its treatment (used to be Stigmatized)**

# OPIOID USE TREATMENT OPTIONS

- Someone Overdoses: Do Nothing, Let them Die = Unethical
- Send them to Detox only → Rarely works (~95% relapse rate)
- Detox + 28-day Program → Sometimes works (10-15% recovery)
- **Medication Assisted Treatment = Usually works**
  - ~ 50% No Opioid Relapses
  - ~ 75% Treatment Retention

- Bottom line: We prescribe these medications because they work

# MEDICATION ASSISTED TREATMENT / MEDICATIONS FOR OPIOID USE DISORDER

- MAT/MOUD is the **gold standard** of treatment for opioid use disorder as it represents the only efficacious and ethical medical treatment available
- Every professional addiction society recommends using these medications
- Pregnant people are **always** recommended to stay on MAT ➔ ***NEVER DETOX***
- Three medications are FDA approved, all considered first line treatment for OUD
  - **Methadone**
  - **Naltrexone**
  - **Buprenorphine**
- Primary Goals of treatment:
  - **Decrease morbidity & mortality**
  - **Increase their quality of life**

# MEDICATION COMPARISON

## Methadone

(Full Agonist)

Pros:

Long lasting

Reduces overdoses

Decades of evidence

Helps greatly with pain

Strongest treatment of OUD

Cons:

Inconvenient (OTPs)

Possible diversion

Lethal in overdose

Withdrawal

Long half life

Stigma

## Buprenorphine

(Partial Agonist)

Pros:

Reduces overdoses

Minimal risk of overdose

Rx from Doctor's office

Less risk of IV use

Helps with pain

Simple initiation

New long-acting forms

Cons:

Limited doctors who Rx

Possible diversion

Withdrawal

Stigma

## Naltrexone

(Antagonist)

Pros

Usually XR form given

Not diverted

No risk of overdose

No Dependency

Minimal stigma

Cons:

Compliance

Difficult Initiation

No Overdose reduction

Not great with pain

Cost $$$

Cravings ?

# PRINCIPLES OF EFFECTIVE OPIOID TREATMENT WITH MEDICATIONS

- Using medications to treat opioid abuse is the **gold standard of treatment**
- Choosing medications depend on many factors: patient, insurance, logistics, etc.
- **Opioid detox alone is not considered a treatment**, akin to malpractice now
- Clinical view, taking medication as prescribed for opioid abuse = **Sobriety**
- Maintaining on Buprenorphine or Methadone is **always recommended in pregnancy** to protect both the mother and her fetus
- Not treating opioid addiction in prison = **129 times more likely** to die of overdose in the two weeks following release[1] → start treating during their incarceration

Binswanger IA, Stern MF, Deyo RA, Heagerty PJ, Cheadle A, Elmore JG, et al. Release from prison--a high risk of death for former inmates. N Engl J Med. 2007;356(2):157–165. doi: 10.1056/NEJMsa064115.

# COMMON MYTHS ON OPIOIDS & TREATMENT

- 28 days, 90 days, or 180 days of residential treatment is the gold standard
- People are "cured" of their opioid addiction after a few months of sobriety
- Addiction is not a disease, it is simply all a choice
- It is easy to contract an infectious disease or overdose if you as a layperson are exposed to drugs and/or drug paraphernalia
- You will overdose if you are exposed to Fentanyl in anyway
- Fentanyl leaves the system as quickly as it enters it
- There are no substances that can give false positives (many can and do)
- No one ever gets better

# ETHICAL DRUG TESTING

- Drug testing is a powerful monitoring tool used by clinicians and law enforcement
- In clinical addiction medicine, drug testing provides us with objective information about a patient's recent use and allows feedback about their disease
- Drug testing can also unfortunately be used inappropriately, incorrectly or unethically, leading to potentially adverse outcomes in patients and system waste
- Overutilization of testing for financial gain or misinterpretation is a real concern
- Reasons to order and context to the results; **results in isolation can be misleading**
- Recently, entrepreneurial laboratories have been selling dubious testing methods (especially micro blood samples) that are unproven, expensive, and misleading

https://www.asam.org/advocacy/public-policy-statements/details/public-policy-statements/2021/08/09/public-policy-statement-on-the-ethical-use-of-drug-testing-in-the-practice-of-addiction-medicine

# DRUG SCREENS VS CONFIRMATION

- Avoid making decisions based on results from presumptive (screening) tests which have not been confirmed by the patient nor with definitive testing methods (confirmation)
- Presumptive tests have significant issues with accuracy because of **both false positives** and **false negatives** which can, but should not, affect clinical decision making
- Presumptive testing should be a routine part of initial and ongoing assessment
- Definitive (confirmation) testing may be used to detect specific substances not identified by presumptive methods and to refine the accuracy of the test results
- **Screening is good and necessary, but clinically we avoid making decisions based on screens alone unless our patients admits to use**

# FALSE POSITIVES ON SCREENS

- False positives typically occur when our point of care immunoassays confuse one substance for another showing something present when in reality it is not
- Urine drug screens remain the gold standard of testing, newer tests such as blood spot testing have less robust validation and collection concerns
- Many common over-the-counter (OTC) and prescriptions medications cause False +'s
- False positives are considered to be a worse outcome then a false negative
- A false negative will result in someone temporarily "getting away with it," a false positive potentially means someone going to prison or losing custody of a child
- For Fentanyl, meds that can cause false positive screens include Trazodone, Risperdal (risperidone), Invega (paliperidone), Fanapt (iloperidone), and Benadryl (diphenhydramine)

# MORE EXAMPLES OF FALSE POSITIVES

| Agent | Summary of Agents Potentially Contributing to False Positives[3-8] | | | | |
|---|---|---|---|---|---|
| Marijuana Metabolites | • dronabinol<br>• efavirenz | • NSAIDs*<br>• proton pump inhibitors | • hemp foods: tea, oil+ | | |
| Cocaine Metabolites | • coca leaf teas | • topical anesthetics containing cocaine | | | |
| Opioid Metabolites | • dextromethorphan<br>• fluoroquinolones | • levofloxacin<br>• ofloxacin | • poppy seeds<br>• poppy oil | • rifampin<br>• quinine | |
| Amphetamines/ Methamphetamine (High Rate of False Positives) | • amantadine<br>• benzphetamine<br>• brompheniramine<br>• bupropion<br>• chlorpromazine<br>• desipramine | • dextroamphetamine<br>• doxepin<br>• ephedrine<br>• fluoxetine<br>• isometheptene<br>• isoxsuprine | • labetalol<br>• l-methamphetamine (OTC nasal inhaler)<br>• methylphenidate<br>• MDMA<br>• phentermine | • phenylephrine<br>• phenyl-propanolamine<br>• promethazine<br>• pseudoephedrine | • ranitidine<br>• selegiline<br>• thioridazine<br>• trazodone<br>• trimethobenzamide<br>• trimipramine |
| Benzodiazepines | • oxaprozin | • sertraline | | | |
| Barbiturates | • ibuprofen | • naproxen | | | |
| Methadone | • chlorpromazine<br>• clomipramine<br>• diphenhydramine | • doxylamine<br>• ibuprofen<br>• quetiapine | • thioridazine<br>• verapamil | | |
| Alcohol | • mouthwash | • short-chain alcohols | • OTC cough products (isopropyl alcohol) | | |

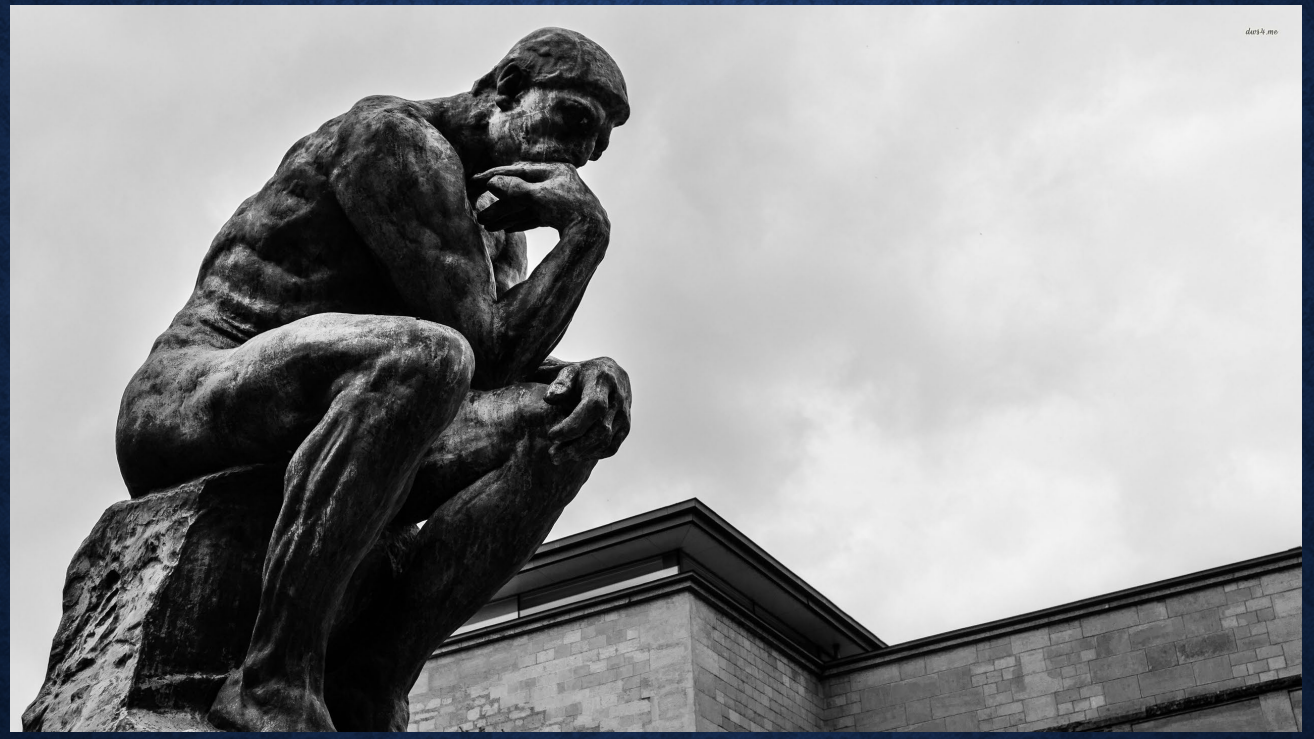
* NSAIDs resulting in false-positive for marijuana mainly consist of ibuprofen and naproxen and modern tests **do not** result in false positives; + THC concentrations in hemp products are low enough to prevent positive immunoassay results. (*unless cutoffs are set low, and/or hemp product is contaminated with excess THC*)

VA Pain Management Opioid Safety: A Quick Reference Guide (2014)
https://www.va.gov/PAINMANAGEMENT/docs/OSI_2__Quick_Reference_Guide.pdf

# CONCLUSIONS

- Substance use disorders effect many individuals in West Virginia and across the globe
- Our state has been hit the hardest by substances, so we need the best treatments and standards of care available
- Substance use disorders are considered neurobiological diseases, not simply bad choices
- Addiction is a treatable brain disease which does not diminish or excuse consequences of use
- There are some very effective medications and treatments but they are often not offered or declined on account of stigma
- The more we understand about the brain and utilize the good treatments available, the more lives we can save

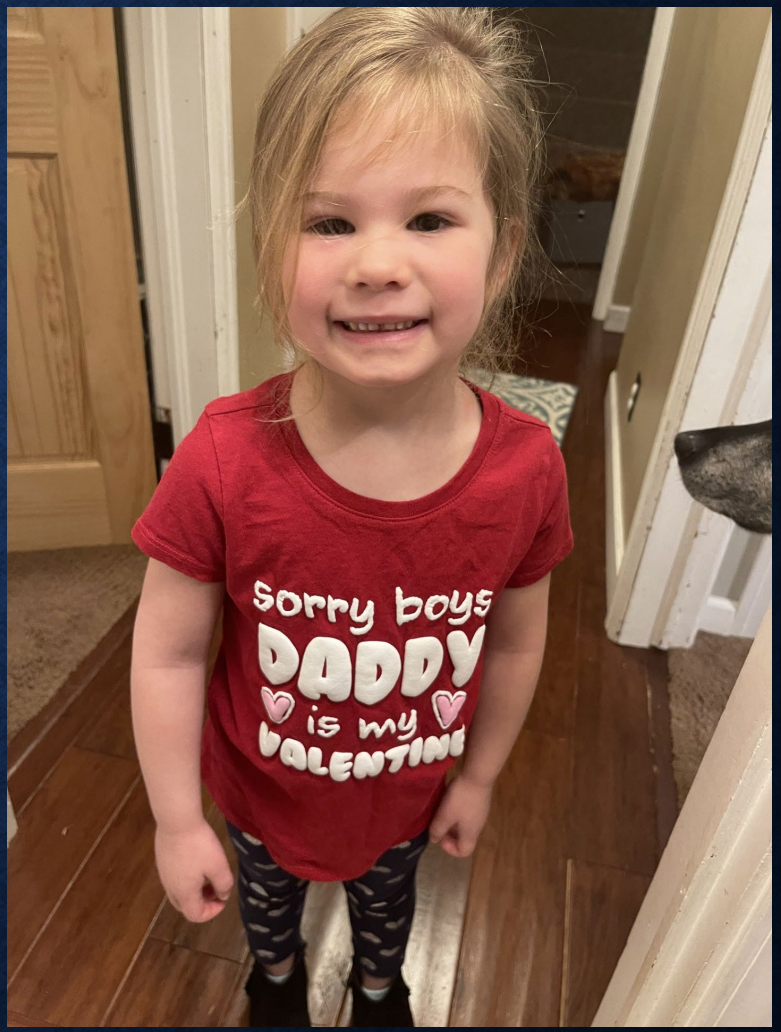
# ? QUESTIONS ?



*Always be prepared to give an answer to everyone who asks you to give the reason for the hope that you have.  But do this with gentleness and respect…*

1 Peter 3:15

# THANK YOU & STAY WELL !




Email: **jhustead@hsc.wvu.edu**
Office Phone: **304-293-5834**