



ADDICTION: WHAT IS IT AND WHY DOES IT HAPPEN?

*ELIZABETH F HOWELL, MD, MS, DLFAPA, DFASAM
ASSOCIATE PROFESSOR OF PSYCHIATRY
TRAINING DIRECTOR, ADDICTION PSYCHIATRY FELLOWSHIP
TRAINING DIRECTOR, ADDICTION MEDICINE FELLOWSHIP
UNIVERSITY OF UTAH SCHOOL OF MEDICINE*

*AUGUST 16, 2018
PROJECT ECHO—OPIOIDS, ADDICTION AND PAIN*

What is addiction?

Why do people get addicted?

What can we do about it?

CONTINUUM OF DRUG AND ALCOHOL USE

- Drug and alcohol use exist on a **continuum** from non-problematic to problematic use
 - Not everyone who drinks is an alcoholic
 - Not everyone who uses drugs is an addict
 - Focus on the **consequences** and the **harm** involved, not just the drug(s) used

ADDICTION FEATURES

- Loss of consistent **control** over use
- **Continued use** in the face of adverse consequences
- **Compulsivity**
- **Craving**
- **Distortions in thinking** (denial, minimization, rationalization)

THE ABCDE'S OF ADDICTION

Addiction is characterized by:

- Inability to consistently Abstain;
- Impairment in Behavioral control;
- Craving; or increased “hunger” for drugs or rewarding experiences;
- Diminished recognition of significant problems with one’s behaviors and interpersonal relationships; and
- A dysfunctional Emotional response.
- Addiction is a chronic, relapsing disease of the brain with multiple consequences.



<https://www.asam.org/resources/definition-of-addiction>

DSM-5 SUBSTANCE USE DISORDERS

A problematic pattern of substance use leading to clinically significant impairment or distress, as manifested by at least two of the following, occurring within a 12 month period:

1. Drug taken in larger amounts, or over longer period than intended
2. Persistent desire or unsuccessful efforts to cut down or control use
3. Great deal of time spent in activities to obtain, use or recover
4. **Craving, or a strong desire or urge to use the substance**
5. Recurrent use resulting in failure to fulfill role obligations
6. Continued use despite persistent or recurrent problems caused or exacerbated by effects of the substance
7. Important social, occupational or recreational activities given up or reduced as a result of substance use
8. Recurrent use in situations in which it is physically hazardous
9. Continued use despite knowledge of a persistent or recurrent physical or psychological problem caused or exacerbated by the substance.
10. Tolerance*, as defined by either:
 - a. Need for markedly increased drugs to achieve intoxication or desired effect
 - b. Markedly diminished effect with continue use of the same amount of drug.
11. Withdrawal*, as manifested by either:
 - a. Characteristic drug withdrawal syndrome
 - b. The drug or a closely-related substance is taken to relieve or avoid withdrawal symptoms.

* This criterion is not considered to be met for those taking the drug solely under appropriate medical supervision

DSM-5 SUBSTANCE USE DISORDER

- **Mild:** 2 or 3 out of 11 criteria met
- **Moderate:** 4 or 5 out of 11 criteria met
- **Severe:** 6 or more out of 11 criteria met

- Must have moderate or severe disorder to diagnose withdrawal as a separate diagnosis (i.e., **people with mild disorders should not have withdrawal syndromes**)

PSYCHOACTIVE SUBSTANCE CATEGORIES

DSM-IV VS. DSM-5

DSM-IV	DSM-5
Alcohol	Alcohol
Amphetamines	Stimulants
Caffeine	Caffeine
Cannabis	Cannabis
Cocaine	Stimulants
Hallucinogens	Hallucinogens
Inhalants	Inhalants
Nicotine	Tobacco
Opioids	Opioids
Sedative-hypnotic, anxiolytic	Sedatives, hypnotics or anxiolytics
PCP	Hallucinogens
Polysubstance	DELETED from DSM-5
Other/Unknown	Other/unknown

APA; www.Psych.org

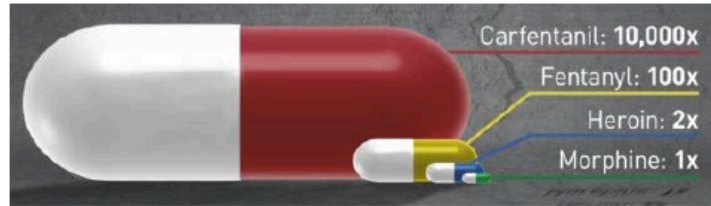
EXAMPLES OF PSYCHOACTIVE SUBSTANCES

- Alcohol: beer, wine, liquor, powdered alcohol
- Caffeine: coffee, tea, sodas, energy drinks, caffeine pills, etc.
- Cannabis: marijuana, hashish, edibles, oils, etc.
- Hallucinogens: LSD, Mushrooms, PCP, etc.
- Inhalants: Gasoline, glue, volatile solvents, air duster, whippets/nitrous oxide, etc.
- Tobacco/Nicotine: cigarettes, chewing tobacco, e-cigarettes, nicotine gum, etc.
- Opioids: Heroin, morphine, codeine, oxycodone, hydrocodone, hydromorphone, oxymorphone, **tramadol**, etc.
- Sedative-hypnotics, anxiolytics: benzodiazepines (diazepam, alprazolam, flunitrazepam, designer benzos, etc.) GHB, GBL, barbiturates (secobarbital, **butalbital** products, etc.), **carisoprodol**, **Z-drugs** (zolpidem, eszopiclone, zaleplon), etc.
- Stimulants: Cocaine, methamphetamine, methylphenidate, amphetamine, mixed amphetamine salts, MDMA, etc.
- Others: synthetic cannabinoids, synthetic stimulants, dextromethorphan, etc.

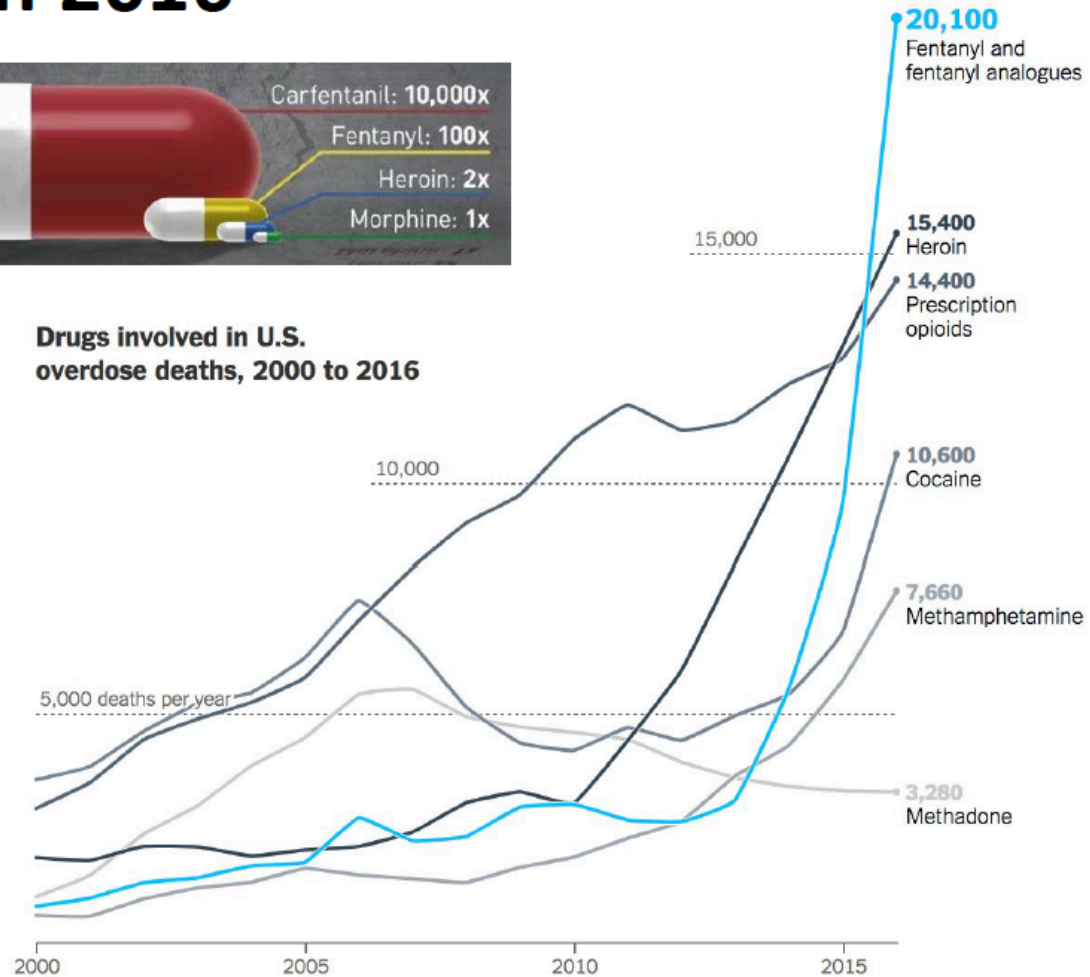
We have an addiction
epidemic, not just an opioid
epidemic!



Fentanyl-Related Deaths Surpassed Heroin or Rx Opioids in 2016



Drugs involved in U.S. overdose deaths, 2000 to 2016



Graphs from [NY Times Article](#) based on [CDC MMWR Report](#) 2017

NATURE OR NURTURE?

- Environmental factors determine initiation, experimentation, and early stages of use.
- Genetic factors take precedence in the transition from use to dependence.
- Some genetic preloading is strong enough to cause a change in brain neuro-circuitry leading to addiction with a few or even one exposure.
- On the other hand, there appear to be genetic factors that are protective against the disease of addiction.

VULNERABILITY TO ADDICTION

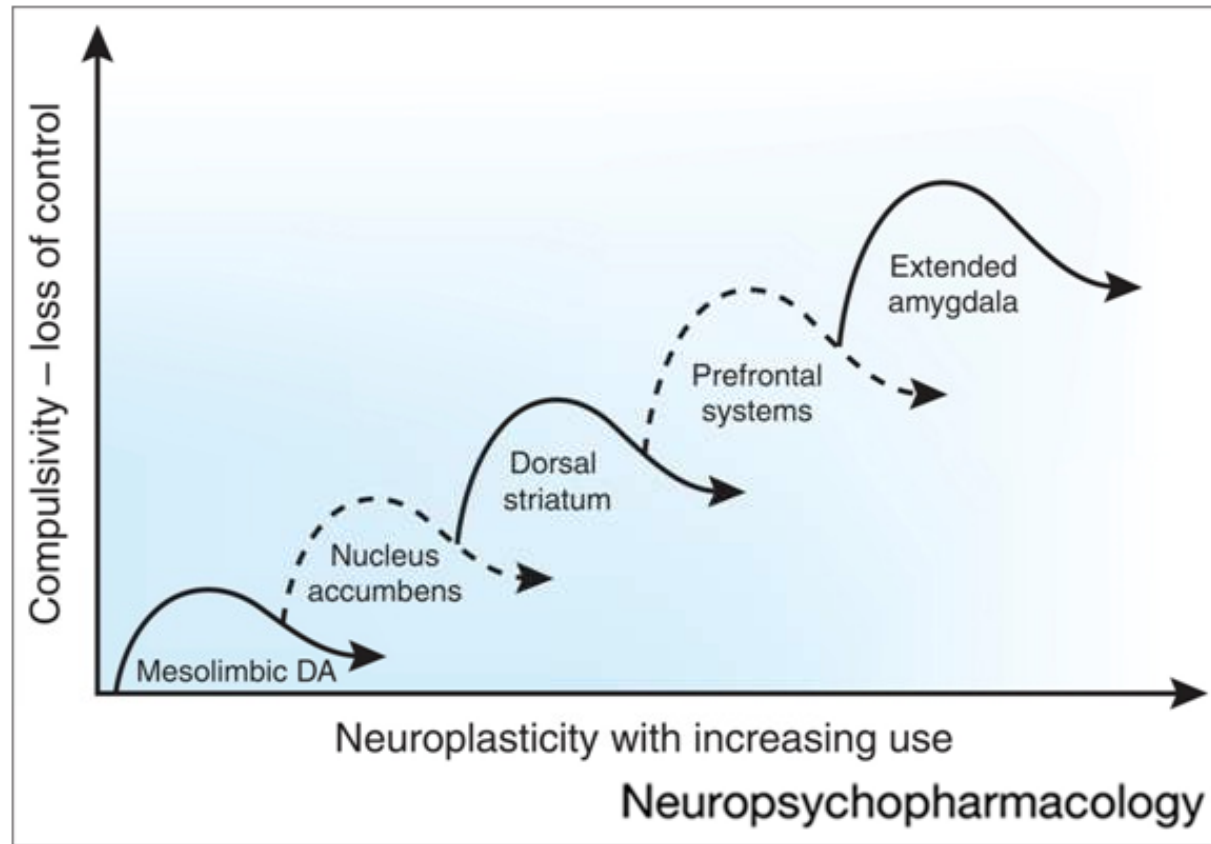
- 40 to 60% of the vulnerability for addiction is genetic
- Multifactorial
 - Drug self-administration
 - Alcohol intoxication responses
 - Alcohol withdrawal responses
 - Frontal theta oscillations
 - Interference with drug metabolism
 - And many others
- Earlier first use of drugs/ alcohol increases risk
- Environmental factors
 - Poor parental support
 - Within-peer group deviancy
 - Drug availability
 - Stress (including ACE's, abuse and trauma)
 - Social isolation in adolescence
 - Low socioeconomic/social status: Subordinate lab animals more likely to self-administer cocaine
- Co-occurring psychiatric disorders
 - 30%(+) of people with psychiatric disorders have substance use disorders
 - More risk for suicidal symptoms and completed suicide
 - Increased risk for psychosis
 - Drug use/SUDs can lead to psychiatric disorders
 - Psychiatric disorders can lead to drug use/SUDs

DEVELOPMENT OF ADDICTION

- Experimentation → euphoria / positive reinforcement (no negative consequences)
- Neuroadaptation → tolerance, increased use
- Increased use → withdrawal / negative reinforcement
- Loss of control (with negative consequences)

- An imbalance develops in the brain circuits that underlie reward and conditioning vs. those that underlie executive functioning (emotional control and decision-making)
 - **Too much “go”, not enough “stop”**
- An increase of activity in the brain’s anti-reward system

Neuroplasticity in Brain Circuits Associated with the Development of Addiction



The version of this figure that appears in the published article omitted the "Dorsal striatum" label. The error has been corrected in this downloadable figure, and an erratum accompanies the article at <http://www.nature.com/npp/journal/v35/n1/full/npp2009110a.html>.

NEUROADAPTATIONS IN ADDICTION

- Neuroadaptations in **brain reward**, **stress**, **habit formation**, and **executive function systems** drive continued alcohol/drug intake despite negative consequences

Neuroadaptation	Result
Decreased dopamine and GABA in ventral striatum	Decreased reward
Enhancement of corticotrophin-releasing factor (CRF) in the extended amygdala	Increased negative emotional state
Blunting of HPA axis	Decreased response to stress
Engagement of dorsal striatum	Solidified habitual behaviors
Prefrontal cortex damage/impairment	Poor inhibitory control and poor executive functioning, poor decision-making
Mesolimbic circuit (NAc, amygdala, hippocampus) adaptations	Enhanced saliency of drugs/drug stimuli, decreased sensitivity to natural reinforcers
Insula dysfunction	Impaired ability to evaluate internal states
Lateral habenula impairments	Compromised ability to process and learn from disappointment; disrupted mood

TREATMENT OF ADDICTION--OVERVIEW

- Addiction is a chronic disease
- Detoxification alone is not treatment
- Long-term treatments are required, just like for other chronic diseases
 - e.g., diabetes, hypertension, asthma
- Discontinuation of treatment will likely result in relapse
- Relapse does not indicate failure of treatment
- Rates of relapse and recovery for addiction are equivalent to other medical diseases

ADDICTION TREATMENT GAP

- <10% of people with Alcohol Use Disorder (AUD) receive ANY treatment
- <4% of people with AUD use an FDA-approved medication to treat their AUD
- People with AUD more often seek primary care for an alcohol related medical problem than for AUD itself

WHAT CAUSES ADDICTION RELAPSE?

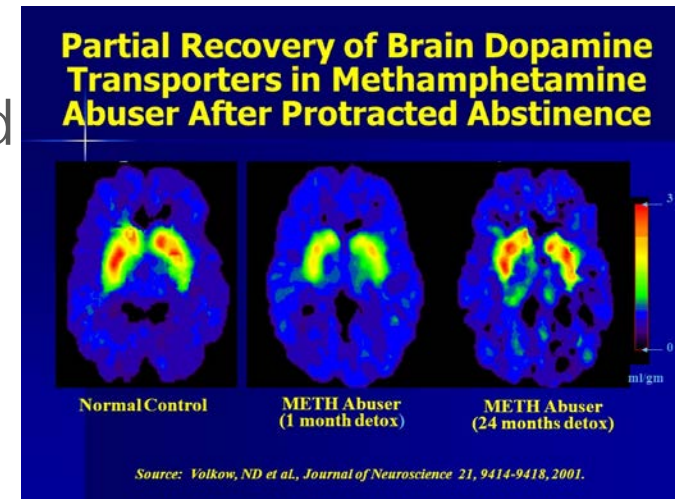
- Stress
- Cues/triggers
- Exposure to drugs

WHAT WILL HEAL THE ADDICTED BRAIN'S CHANGES AND DAMAGE?

- **STOP** using all addicting drugs
- **TIME** abstinent
- Appropriate **treatments**
- More **TIME** abstinent
- More appropriate **treatments**
- **MORE and MORE TIME**

RECOVERY TAKES A LONG TIME

- There are persistent effects of drugs and alcohol on the brain
 - post acute withdrawal, clouded thinking, memory problems, emotional blunting, psychiatric symptoms, etc.
- It can take 24 months of abstinence from drugs for brain changes to partially recover.



Some drug and alcohol effects may be permanent.

RELAPSE RATES FOR ADDICTION RESEMBLE THOSE OF OTHER CHRONIC DISEASES

Percentage of Patients Who Relapse

TYPE I DIABETES



DRUG ADDICTION



HYPERTENSION



ASTHMA



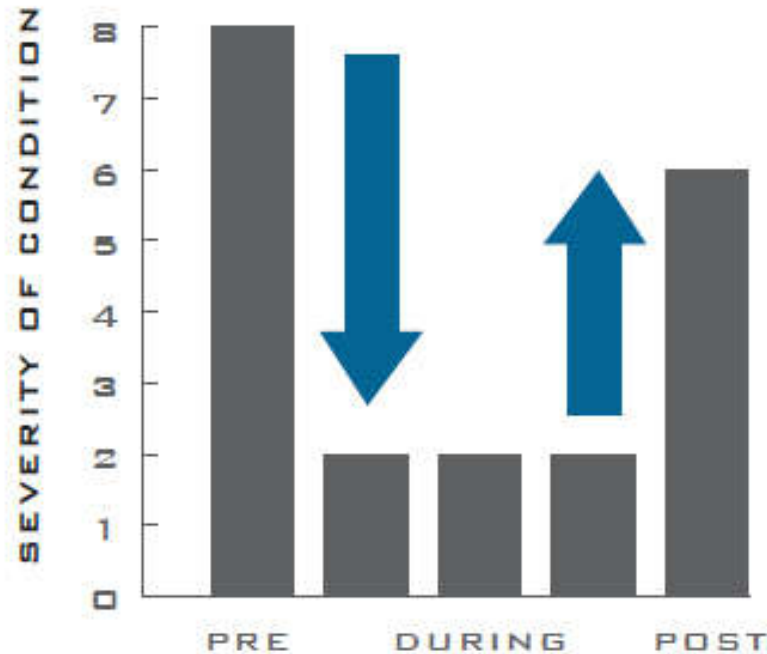
<https://www.drugabuse.gov/publications/principles-drug-addiction-treatment-research-based-guide-third-edition/frequently-asked-questions/how-effective-drug-addiction-treatment>

SUCCESSFUL TREATMENT FOR ADDICTION TYPICALLY REQUIRES CONTINUAL EVALUATION AND MODIFICATION, SIMILAR TO THE APPROACH TAKEN FOR OTHER CHRONIC DISEASES

WHY IS ADDICTION TREATMENT EVALUATED DIFFERENTLY?
BOTH REQUIRE ONGOING CARE

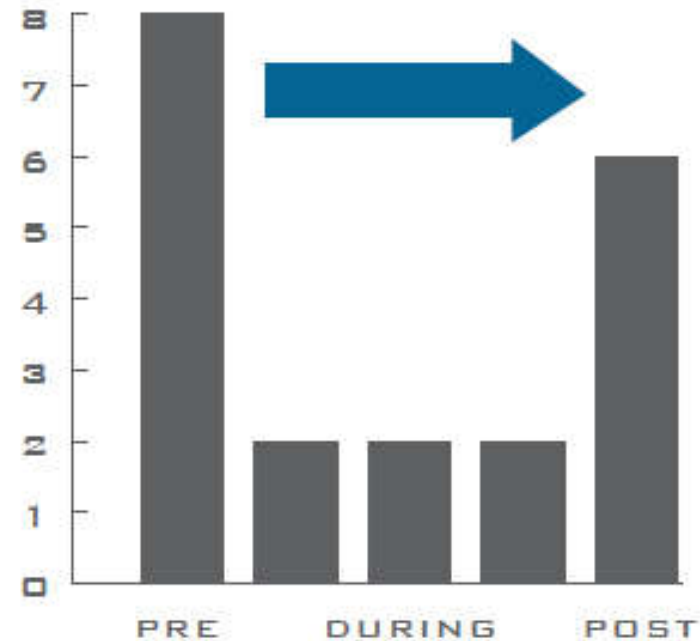
YES!!!

Hypertension Treatment



NO???

Addiction Treatment



STAGE OF TREATMENT

<https://www.drugabuse.gov/publications/principles-drug-addiction-treatment-research-based-guide-third-edition/frequently-asked-questions/how-effective-drug-addiction-treatment>

GOALS OF TREATMENT

- Safely withdraw a person from drugs
- Help the brain recover from effects of drugs
- Support a person's abstinence from alcohol and other addicting drugs
- Prevent relapse to use of alcohol and other addicting drugs
- Develop skills to prevent relapse
- Improve functioning
- Treat co-occurring medical, psychiatric problems
- Save lives

QUESTIONS?

THANK YOU!!

Resources: <https://bit.ly/2kSXFrp>

Elizabeth F Howell, M.D.

Training Director, Addiction Psychiatry Fellowship

Training Director, Addiction Medicine Fellowship

Associate Professor of Psychiatry (Clinical)

University of Utah Neuropsychiatric Institute

501 Chipeta Way

Salt Lake City, UT 84108

801-583-2500

Elizabeth.howell@hsc.utah.edu

**Treat
Addiction**

**Save
Lives**