ADDICTION: WHAT IS IT AND WHY DOES IT HAPPEN?

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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 ABC DE’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

<table>
<thead>
<tr>
<th>DSM-IV</th>
<th>DSM-5</th>
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<tbody>
<tr>
<td>Alcohol</td>
<td>Alcohol</td>
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<tr>
<td>Amphetamines</td>
<td>Stimulants</td>
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<tr>
<td>Caffeine</td>
<td>Caffeine</td>
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<tr>
<td>Cannabis</td>
<td>Cannabis</td>
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<tr>
<td>Cocaine</td>
<td>Stimulants</td>
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<tr>
<td>Hallucinogens</td>
<td>Hallucinogens</td>
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<tr>
<td>Inhalants</td>
<td>Inhalants</td>
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<tr>
<td>Nicotine</td>
<td>Tobacco</td>
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<tr>
<td>Opioids</td>
<td>Opioids</td>
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<tr>
<td>Sedative-hypnotic, anxiolytic</td>
<td>Sedatives, hypnotics or anxiolytics</td>
</tr>
<tr>
<td>PCP</td>
<td>Hallucinogens</td>
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<tr>
<td>Polysubstance</td>
<td>DELETED from DSM-5</td>
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<tr>
<td>Other/Unknown</td>
<td>Other/unknown</td>
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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.

Neuropsychopharmacology (2010) 35, 217-238;
doi:10.1038/npp.2009.110
NEUROADAPTATIONS IN ADDICTION

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

<table>
<thead>
<tr>
<th>Neuroadaptation</th>
<th>Result</th>
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<tbody>
<tr>
<td>Decreased dopamine and GABA in ventral striatum</td>
<td>Decreased reward</td>
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<tr>
<td>Enhancement of corticotrophin-releasing factor (CRF) in the extended amygdala</td>
<td>Increased negative emotional state</td>
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<tr>
<td>Blunting of HPA axis</td>
<td>Decreased response to stress</td>
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<tr>
<td>Engagement of dorsal striatum</td>
<td>Solidified habitual behaviors</td>
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<tr>
<td>Prefrontal cortex damage/impairment</td>
<td>Poor inhibitory control and poor executive functioning, poor decision-making</td>
</tr>
<tr>
<td>Mesolimbic circuit (NAc, amygdala, hippocampus) adaptations</td>
<td>Enhanced saliency of drugs/drug stimuli, decreased sensitivity to natural reinforcers</td>
</tr>
<tr>
<td>Insula dysfunction</td>
<td>Impaired ability to evaluate internal states</td>
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<tr>
<td>Lateral habenula impairments</td>
<td>Compromised ability to process and learn from disappointment; disrupted mood</td>
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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**: 30 to 50%
- **Drug Addiction**: 40 to 60%
- **Hypertension**: 50 to 70%
- **Asthma**: 50 to 70%

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

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

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