Addiction: Brain Disease, Not Moral Failing

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Learning Objectives

- Drug abuse and addiction
- Drugs and the brain
- Who is at risk
- Helpful screening tools
Explanatory Models of Addiction

- Moral → wrong
- Spiritual → empty
- Psychological → impulse control
- Behavioral → habit
- Medical → disease

Medical model of addiction

- Sick person seeking wellness
- SUDs as chronic diseases
  - Biological basis
  - Identifiable signs and symptoms
  - Predictable course and outcome
- Treatment improves outcomes
- Lack of treatment may lead to morbidity and mortality
Medical model of addiction

- A chronic relapsing disease of the brain
  - Drugs change brain structure and function
  - Brain changes can be long lasting and lead to harmful behaviors
- Characterized by compulsive drug seeking and use despite harmful consequences

Common reasons to use drugs

- To feel good
- To feel better
- To do better
- Curiosity (because others are doing it)
So…What’s the problem?

- Vulnerable individuals who use drugs are at risk for drug abuse or drug addiction
  - Adolescents and individuals with mental disorders have ↑ risk vs. general population
- No single factor determines whether a person will become addicted to drugs
- Risk vs. Protective factors

<table>
<thead>
<tr>
<th>Risk Factors</th>
<th>Protective Factors</th>
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<tbody>
<tr>
<td>Early aggressive behavior</td>
<td>Self-control</td>
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<tr>
<td>Poor social skills</td>
<td>Positive relationships</td>
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<tr>
<td>Early use of drugs</td>
<td>Parental monitoring and support</td>
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<td>Family and peer substance abuse</td>
<td>Academic competence</td>
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<tr>
<td>Lack of parental supervision</td>
<td>School anti-drug use policies</td>
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<td>Drug availability and cost</td>
<td>Strong neighborhood attachment</td>
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<td>Poverty</td>
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<td>Method of administration</td>
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<td>Genetic factors (40-60% of risk)</td>
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Risk factors interact with each other in a complex fashion

Drug Abuse vs. Drug Addiction

- Drug Abuse is a *preventable behavior*
- Drug Addiction is a *treatable disease*
The Human Brain

- Most complex organ in the body
- Brain areas affected by drugs:
  - Brain stem → critical life functions such as heart rate, breathing, sleeping, etc.
  - Limbic system → reward circuit (ability to feel pleasure), perception of emotions, motivation, etc.
  - Cerebral cortex → sensory processing, thinking, planning, solving problems, making decisions, etc.
Communication in the Brain

- Neuron = brain cell
- Neurotransmitter = chemical messenger between neurons
- Receptors = specialized site that picks up the chemical message
- Transporters = recycles neurotransmitters, shutting off signals between neurons

Drugs as Chemicals

- Tap into the brain’s communication system and interfere with normal sending, receiving, and processing of information
- Some mimic natural neurotransmitters (heroin, MJ)
- Some cause abnormally large amounts of neurotransmitters to be released (amphetamine)
- Some prevent normal recycling of neurotransmitters (cocaïne)
Drugs and Pleasure: Dopamine

- All drugs of abuse directly or indirectly flood the brain’s reward circuit with dopamine
- Dopamine has many functions
  - Regulation of movement, emotion, cognition, motivation and feelings of pleasure
- Overstimulation of the reward system produces euphoria and teaches the repetition of using behavior
Why are drugs more addictive than natural rewards?

- Amount of dopamine release
  - Depending on the drug of abuse, 2 to 10 times the amount of dopamine can be released vs. natural rewards
- Onset and duration of dopamine release
  - Can happen immediately or very quickly and can last much longer than natural rewards
- Drug abuse is something the brain learns to do very very well!
Long-term effects on the brain

- Brain must adjust to overwhelming surges in dopamine by producing less dopamine and fewer receptors
- As a result, the ability to experience any pleasure is reduced
- Now, drugs are needed in larger amounts (tolerance) to feel high
- Eventually, drugs no longer make the individual high and are needed “just to feel normal”
Your Brain After Drugs

Normal

Cocaine Abuser (10 days)

Cocaine Abuser (100 days)


Drugs Have Long-term Consequences

Photo courtesy of NIDA from research conducted by Melega WP, Raleigh MJ, Stout DB, Lucan C, Huang SC, Burke ML.
The Memory of Drugs

Addiction and Health

- Health consequences for the individual
  - Including heart disease, stroke, cancer, HIV/AIDS, Hepatitis B and C, lung disease, mental disorders, etc.

- Health consequences for others
  - Drug-exposed infants and children
  - Environmental tobacco smoke (ETS)
  - Spread of infectious diseases/STDs
Addiction and Mental Disorders

- Co-exist commonly
- Mental illness may precede addiction
- Drug abuse may trigger or exacerbate mental disorders in vulnerable individuals

Prevalence of substance use disorders in mental illness

Regier et al., JAMA, 1990
Substance abuse or dependence in SMI Adults (2002)

Psychopathology may serve as risk factor for substance abuse.
Psychiatric disorders and SUDs may affect each other’s course of illness:
- Symptom picture
- Rapidity of onset
- Response to treatment
Psychiatric symptoms may develop in the course of acute or chronic intoxication.
A complex relationship…

- SUDs and psychiatric disorders may co-occur by coincidence
- Substance use may cause or increase severity of psychiatric conditions
- Psychiatric disorders may cause or increase severity of SUDs
- Both conditions may be caused by a third condition
- Substance use and withdrawal may mimic symptoms of a psychiatric disorder

Initial Screening Questions

- How often do you drink anything containing alcohol?
- How many drinks do you have on a typical day when you are drinking?
- How often do you have four or more drinks on one occasion?
- In the last year, have you used drugs other than those required for medical reasons?
- In the last year, have you used prescription or other drugs more than you meant to?
- Which drug do you use most frequently?
Screening Tool Examples

BAC (or other medical tests such as liver function)
- AUDIT
- ASSIST
- DAST
- CAGE
- CRAFFT
- T-ACE/TWEAK
- 4 or 5 P’s

www.projectcork.org

What is a Standard Drink?

| 12 oz. of beer or cooler | 8-9 oz. of malt liquor | 3 oz. of table wine | 3-4 oz. of fortified wine | 2-3 oz. of cordial, liqueur, or aperitif | 1.5 oz. of brandy (a single jigger) | 1.5 oz. of spirits (a single jigger or 50 ml)
|---|---|---|---|---|---|---
| 12 oz. | 8.5 oz. | 3 oz. | 3.5 oz. | 2.5 oz. | 1.5 oz. | 1.5 oz.

Note: People buy many of these drinks in containers that hold multiple standard drinks. For example, malt liquor is often sold in 15-, 22-, or 40-oz. containers that hold between two and five standard drinks, and table wine is typically sold in 25 oz (750 ml) bottles that hold five standard drinks.
What is Risky Drinking?

- Women: > 2 drinks per occasion; > 7/week
- Over 65: > 2 drink per occasion; > 7/week
- Men: > 4 drinks per occasion; > 14/week
- Any use is risky when:
  - Pregnant
  - Driving
  - Taking certain medications
  - Having certain medical conditions
  - In recovery from addiction/cannot control drinking
- Hazardous: Pattern that increases risk for adverse consequences
- Harmful: Negative consequences have already occurred

DSM-IV Criteria – Substance Abuse

- A maladaptive pattern leading to significant distress or impairment with one or more of the following in a 12-month period:
  - Recurrent failure to fulfill major obligations
  - Recurrent physically hazardous behavior
  - Recurrent substance-related legal problems
  - Continued use despite social problems
- Symptoms have never met dependence criteria
DSM-IV Criteria – Substance Dependence

- Three or more of the following in a 12-month period:
  - Tolerance
  - Withdrawal
  - More ingested than intended
  - Desire or unsuccessful attempts to reduce use
  - Much time involved with substances
  - Reduced time spent on other important activities
  - Continued use despite physical or psychological problems

DSM-IV: Categories of Substances

- Alcohol
- Amphetamine or similarly acting sympathomimetics
- Caffeine
- Cannabis
- Cocaine
- Hallucinogens
- Inhalants
- Nicotine
- Opioids
- Phencyclidine or similarly acting drugs
- Sedatives/hypnotics/anxiolytics
Treatment and Recovery

- Addiction is a treatable disease
- Can be managed (not cured) similar to other chronic diseases
- Treatment involves changing deeply imbedded behaviors
- Treatment is often a combination of medications and behavioral therapies

Role of Behavioral Therapies

- Engage people in treatment
- Modify attitudes and behaviors
- Increase skills to handle cravings & triggers
- Enhance the effectiveness of medications
- Help people remain in treatment longer
Role of Medications

- Treating withdrawal symptoms
- Treating cravings, so that individual can focus on counseling and other psychotherapies
- Preventing relapse

Examples of current medications used to treat addiction

- Tobacco addiction
  - Nicotine replacement, bupropion, varenicline
- Opioid addiction
  - Methadone, buprenorphine
- Alcohol and drug addiction
  - Disulfiram, naltrexone, acamprosate
Does relapse = treatment failure?

- NO! Relapse is likely, and is a part of the chronic nature of the disease
- Relapse rates for drug addiction are similar to relapse rates in other chronic diseases
  - 40-60% relapse rate for addiction in 1 yr period
- Relapse often indicates that treatment needs to be reinstated, adjusted, or changed to an alternate form

Comparison of Addiction to Other Chronic Diseases

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<th>Med compliance</th>
<th>Required hospital stay annually</th>
<th>Follow diet &amp; behavior change</th>
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<tbody>
<tr>
<td>DM I</td>
<td>&lt;60 %</td>
<td>~40 %</td>
<td>&lt;30 %</td>
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<tr>
<td>HTN</td>
<td>&lt;40 %</td>
<td>~60 %</td>
<td>&lt;30 %</td>
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<tr>
<td>Asthma</td>
<td>&lt;40 %</td>
<td>~60 %</td>
<td>&lt;30 %</td>
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Summary

- Medical model → addiction is a chronic and treatable brain disease
- Addiction disrupts the brain reward pathway which is mediated by dopamine
- Addiction has serious effects on physical and mental health
- Treatment often combines behavioral therapy with medications

Resources


- NIDA website: www.nida.nih.gov to see several sets of teaching slides
Contact Information

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