

Substance Use Disorders: 101

Arvind Datt M.D.
Medical Director- Southwestern Behavioral Healthcare- Stepping Stone

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Objectives

- Understand substance use disorders (SUDs) as multi-faceted illnesses.
- Describe the basic neuroscience of addiction
- Describe the process from substance use to the progression of addiction
- Learn the DSM-V criteria for substance use disorders
- Describe ASAM- guided levels of treatment
- Understand indications for withdrawal medications and medication-assisted treatment (MAT)
- Understand the philosophy of long-term recovery group engagement and impact of co-occurring disorders.

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Prevalence of Addiction

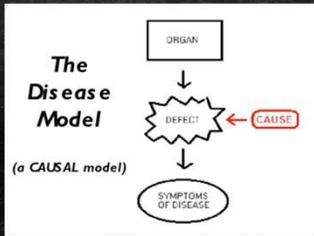
- Generally 13-15% of population
- Odds ratio higher for men and women

SUD	AUD	DUD	Chronic illness
167.3 million	134.7 million	48.5 million	HTN 119.9 million
	61.4 million (binge)	7.5 million (combined)	TII DM 38 million
	1.0 million (12-17 yoa)	2.2 million(12-17 yoa)	

• Substance Abuse and Mental Health Services Administration. (2024). 2023 Companion infographic reports: Results from the 2021, 2022, and 2023 National Surveys on Drug Use and Health (SAMHSA Publication No. PEP24-07/2020). Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration. <https://www.samhsa.gov/data/report/2021-2022-2023-nsduh-infographic>

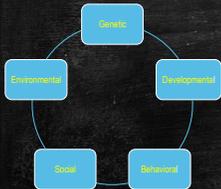
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Addiction- Is it a disease?



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The evolving understanding of substance use disorders



- Antiquated, but at times persistent belief of SUDs = "moral failure" or "character flaw" or "lack of will power"
- Evolving understanding of SUDs - chronic illnesses characterized by clinically significant impairments in health, social function, and compromised voluntary control of substance use
- Although the mechanisms differ, addiction has many similar features of other medical disorders... CA, DM, HTN are chronic, subject to relapse, and influenced by **genetic, developmental, behavioral, social, and environmental** factors. Affected individuals may have difficulty complying with prescribed treatment and may be subject to relapse.

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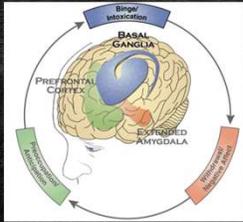
Substance use, misuse, and addiction



- **Substance use** - ingesting a chemical compound that produces an effect
- **Misuse or abuse** - intentional ingestion to the point of intoxication, incapacitation and/or may result in damages to one's health and wellbeing. Such behavior can typically be changed by education or warning.
- **Addiction** - The most severe expression of the disorder and is associated with changes in the function of brain circuits involved in pleasure learning, stress, decision making, and impulse control. In addition, the psychological and physiological dependence leads to ongoing use despite negative consequences and results in clinically significant impairment or distress manifesting in two **primary** ways:
 - 1) Amount and frequency of use exceeds intentions
 - 2) Persistent desire or unsuccessful efforts to cut down or control use
- *Additional esmarks include cravings, black outs, tolerance, & withdrawal symptoms

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The Addiction Cycle



- Binge/Intoxication:** the stage at which an individual consumes an intoxicating substance and experiences its rewarding or pleasurable effects (basal ganglia)
- Withdrawal/Negative Affect:** the stage at which an individual experiences a negative emotional state in the absence of the substance (established amygdala)
- Preoccupation/Relief-seeking:** the stage at which one seeks substances again after a period of abstinence (prefrontal cortex)

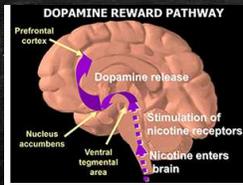
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Neuroscience



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Neuroscience

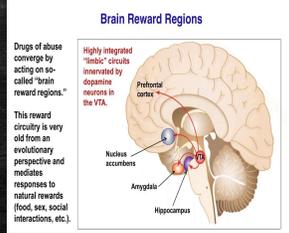


- Prefrontal cortex
- Limbic system
 - Amygdala
 - Hippocampus
- Ventral tegmental area (VTA)
- Nucleus accumbens

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Neuroscience

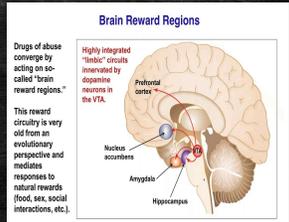
- Prefrontal cortex- part of the "higher thinking" cerebral cortex, responsible for executive function, planning, decision-making, problem-solving, self-control
- Limbic system- memory storage and retrieval, establishes emotional state, and links the conscious intellectual functions of the cerebral cortex with the unconscious, autonomic functions of the brain stem.
- Hippocampus- learning and memory
- Amygdala- is responsible for processing strong emotions, such as fear, anxiety, and aggression. Regulates "fight or flight", nausea, irritability, and anxiety signals.
- Ventral tegmental area (VTA)- contains cell bodies of dopaminergic neurons projecting to the nucleus accumbens, amygdala, hippocampus, and prefrontal cortex
- **Mesolimbic pathway**- key structure in mediating emotional and motivation processing, modulating reward and pleasure processing, and serving as key limbic motor-oriented (motivation → action) Dysregulation as it becomes over-activated by addictive substances.



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Neuroscience- Prefrontal Cortex

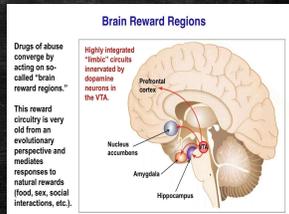
- Executive Function
 - Planning and organization
- Judgment-decision making
 - problem solving, understanding consequences
 - short- and long-term goals
- Emotional-social regulation
 - emotional: controlling emotions
 - social: understanding social situations
 - personal expression- how we act represent ourselves to others



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Neuroscience-Limbic System

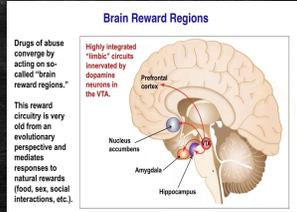
- Limbic system
 - Process emotions, memories, and motivation
- Amygdala (Emotional Memory)
- Fear, anxiety, anger in response to potential threats- → Fight or Flight
- Processing strong memories associated with strong emotions both positive and negative
- Hippocampus
 - Learning memory



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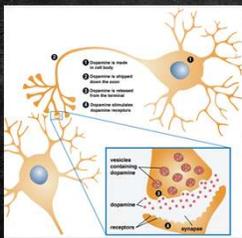
Neuroscience- VTA and NA

- **Ventral Tegmental Area**
 - Contains cell bodies of dopaminergic neurons projecting to the nucleus accumbens, amygdala, hippocampus, and prefrontal cortex
- **Nucleus Accumbens**
 - area mediating emotional and motivation processing, modulating reward and pleasure processing, and serving a key limbic-motor interface (motivation -> action)
 - Dysregulation as it becomes over-activated by addictive substances



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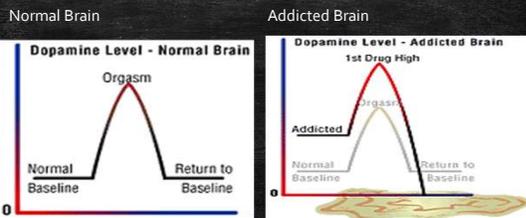
Neuroscience



- Every substance has slightly different effects on the brain, but it is believed addictive drugs produce a pleasurable surge of the neurotransmitter dopamine in a region of the brain called the nucleus accumbens
- Neurotransmitters are chemicals that transmit messages between neurons. Endorphins help relieve pain and induce feelings of pleasure or euphoria. They play an important role in the brain's reward system, which includes activities such as eating, drinking, sex, and maternal behavior. GABA...
- Dopamine in the mesolimbic pathway is known to play an important role in the rewarding effects of both drugs of abuse and foods. Addictive drugs and palatable foods activate DA-containing neurons in the ventral tegmental area, which project to the nucleus accumbens (NAc)

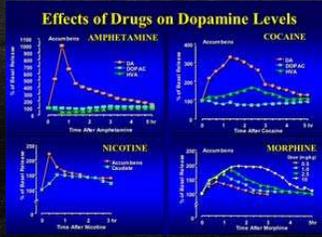
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Dopamine- Response to pleasure



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Neuroscience



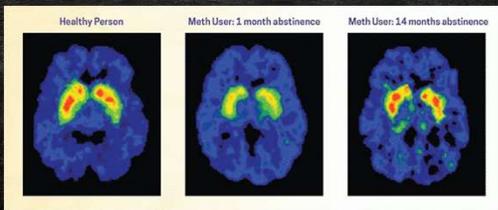
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Dopamine—"Feel good hormone"

- High levels
 - Behavioral
 - Impulse control
 - Aggressiveness
 - Anxiety, paranoia
 - Mental
 - Hallucination and delusions
 - Sleep disruption
 - Decreased motivation
 - Ex. Schizophrenia and psychosis
- Low levels
 - Behavioral
 - Depression, anxiety, sadness
 - Mental
 - Decreased concentration
 - Poor short-term memory
 - Forgetfulness
 - Sleep disturbances
 - Physical
 - Tremors, muscle tension
 - Lack of coordination
 - Ex. Parkinson's disease

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Neuroscience- Recovery is possible



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DSM-V Criteria

- Impaired control
- Social Impairment
- Risky use
- Physical dependence

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DSM-V Criteria

- Using more of a substance than intended or using it for longer than you're meant to
- Trying to cut down or stop using the substance but being unable to
- Experiencing intense cravings or urges to use the substance
- Needing more of the substance to get the desired effect — also called tolerance
- Developing withdrawal symptoms when not using the substance
- Spending more time getting and using drugs and recovering from substance use
- Neglecting responsibilities at home, work or school because of substance use
- Continuing to use even when it causes relationship problems
- Giving up important or desirable social and recreational activities due to substance use
- Using substances in risky settings that put you in danger
- Continuing to use despite the substance causing problems to your physical and mental health

- Levels of Severity**
 - 1 symptom: Risky use
 - 2-3 symptoms: Mild
 - 4-5 symptoms: Moderate
 - >6 symptoms: Severe
- Remission**
 - 3 months: Initial
 - 3-12 months: Early
 - 1-5 years: Sustained
 - >5 years: Stable

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Road to Recovery

- American Society of Addiction Medicine (ASAM)
- ASAM criteria directs level of addiction care based upon patient's individual needs.

The diagram illustrates the ASAM Road to Recovery model as a staircase with five levels, numbered 0 to 4 from top to bottom:

- 05** Early Intervention
- 1** Outpatient Treatment
- 2** Intensive Outpatient Treatment and Partial Hospitalization
- 3** Residential/Inpatient Services
- 4** Medically Managed Intensive Inpatient Services

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GLP-1 agonist



- Body
 - Mimics body's natural GLP-1
 - Regulates blood sugar
 - Decreased appetite
 - Slow gastric emptying
 - Decreases Glucagon
- Brain
 - Acts on the VTA and NA
 - Decreasing pleasure and reducing food cravings.

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Take home points

- Addiction is defined as a chronic, relapsing brain disease that is characterized by compulsive drug seeking and use, despite harmful consequences. It is considered a brain disease because drugs change the brain—they change its structure and how it works.
- Substance act on the pleasure reward system of the brain acting on Dopamine- survival neurotransmitter
- Recover is possible
- Combination of mental health and medications if appropriate
- Must focus on adolescence population – Prevention

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• Richard A. Rawson, PhD is an Adjunct Associate Professor in the Department of Psychiatry and Behavioral Sciences at the David Geffen School of Medicine, University of California at Los Angeles.

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