Introduction to addiction

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Disclosure

• None
Objectives

• By the end of this didactic, you will be able to:
  • Define the neuroanatomical basics of addiction
  • Relate substance use disorder behaviors as a result of diseased neuronal tissue
  • Propose fundamental treatment options for patients
Question#1

- Addiction is best described as:
  A. A moral weakness
  B. A deficit in will power
  C. A person’s resistance to self improve
  D. A disease state
Question#2

• Which model provides a viable explanation for addiction:
  A.  genetic
  B.  animal
  C.  Social engineering
  D.  Pure theoretical
Question#3

• Dopaminergic cell bodies include which answer(s):
A. Ventral Tegmental Area
B. Dorsal Raphe
C. Nucleus Accumbens
D. Locus Ceruleus
Importance

• Impairment in function is essential for diagnosis
• High morbidity and mortality
• Pervasive nature of addiction
• Crosses all socioeconomic statuses
Met criteria for use d/o
In past year 2012

- Marijuana: 4,304
- Pain Relievers: 2,056
- Cocaine: 1,119
- Tranquilizers: 629
- Stimulants: 535
- Heroin: 467
- Hallucinogens: 331
- Inhalants: 164
- Sedatives: 135
Importance (cont...)

- Patients with substance use disorders did not chose this path. The impact is global:
  - Biological
  - Spiritual
  - Social
  - Financial
  - Familial
Importance (cont...)

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Reward

• Primary Reward:
  • Eating salty and fried foods, sweets
  • Having sex

• Secondary Reward:
  • Monetary, artistic, altruistic, religious
So close...
Neuronal circuitry

• Addiction or “reward pathway”
• Mesolimbic tracts
• Mesocortical tracts
• Dopamine and many other neurotransmitters are involved
The Mesolimbic Pathway

• Milner’s rats in 1954
Pleasure Reward Pathway

- Nucleus accumbens
- Substantia nigra
- Ventral tegmental area
Substance interactions with DA system

• Direct-amphetamine, cocaine, meth

• Indirect-nicotine, Etoh, opiate, thc, caffeine, toluene
Crack cocaine inhaled into lungs

Blood carries cocaine to the brain in seconds

NORMAL
- Transmitter cell
- Dopamine transporter
- Dopamine recycled
- Dopamine receptor site
- Receiver cell

COCAINE HIGH
- Cocaine blocks transporter
- Dopamine not recycled
Effects of Drugs on Dopamine Release

Amphetamine

Cocaine

Nicotine

Morphine

Di Chiara and Imperato, PNAS, 1988
Maladaptation of the system

• Behavioral Addiction-gambling, food, pathological internet use
• Substances of Abuse

• They share the same core features emanating from malfunctioning mesocorticolimbic pathways
Maladaptation of the system (cont...)

• Increased extracellular DA in Nac underlies drug addiction

• Chronic changes to supraphysiologic perturbations in DA system make them more responsive to high dopamine concentrations and less responsive to DA concentrations from natural reinforcers
Behavior

- Lose control of substance intake
- Aberrant behavior starts to blossom
- Social function reduces
- Family, personal, work relationships
- Financial patterns change
Maladaptive patterns of addiction

• Use changes essence and spirals into uncontrolled use in a 3 stage cycle:
  1. Binge/intoxication
  2. Withdrawal/ negative emotional state
  3. Preoccupation/anticipation

• Shift from impulsive to compulsive behavior occurs as disease advances
Addiction

Preoccupation with obtaining Persistent physical/psychological problems

Preoccupation Anticipation

Persistent desire Larger amounts taken than expected

Tolerance Withdrawal
Compromised social, occupational, or recreational activities

Withdrawal Negative affect

Binge Intoxication
Treatment

• A patient needs to be treated according to their current state
• A patient does not have to be ready to quit in order to start treatment
20.2 Million Needing But Not Receiving Treatment for Illicit Drug or Alcohol Use
Treatment

• Interdisciplinary treatment is the best approach
• Modality needs to be paired to patient’s style
• Treatment length is patient specific
Treatment

• Intoxication
• Detoxification and Withdrawal
• Early remission
• Sustained remission
Therapeutic modalities

• Brief interventions
• CBT
• MI
• MET
• AA, NA, GA, TSF, self help resources
• CRA
• Hypnosis, Acupuncture, Spiritual Based Group
Pharmacotherapeutic options

- Methadone, Suboxone, Vivitrol
- Disulfiram, Naltrexone, Acamprosate
- NRT, Wellbutrin, Chantix
- Topiramate, Gabapentin, Baclofen, Zofran
- Narcan rescue kits
Co morbid conditions

- You have to treat the underlying condition

Examples:
- Dual diagnosis
- Cognitive distortions
- Chronic pain
- OSA
- Sexual dysfunction
Summary

• Basic reward pathway
• Maladaptive Nature of Disease
• Changes involved in Addiction progression
• Recognition addiction emanates from diseased neuronal tissue
• Treatment needs to be patient specific