Medical Basis of Addiction

Health and Human Services Committee

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Clinical Definition

• A chronic, relapsing brain disease that is characterized by compulsive drug seeking and use, despite harmful consequences

• The initial decision to take illegal drugs is typically voluntary

• With continued use, a person’s ability to exert self-control can become seriously impaired; it is the hallmark of addiction
Natural Course

- Followed heroin addicts identified by criminal justice longitudinally for 33 years ($n = 481$)

Nature

• Genetic factors account for between 40 and 60 percent of a person’s vulnerability to addiction
  - Altered response to the drug
  - Changes in drug metabolism

• Multiple genes rather than individual ones
  - Dopamine: DRD2
  - Opioid: OPRM1, OPRD1
  - Neurotrophic factors: BDNF

Brain Stimulation Reward

• In 1953, Olds and Mills discovered that electrodes in certain areas of rat brain served as operant reinforcers
  - Nucleus accumbens
  - Ventral tegmental area
  - Medial forebrain bundle

• In 1970, Heath demonstrated stimulation in humans is reinforcing
  - Self-stimulated ~1,200 times each 3 hour session (once every 3 seconds)
  - Protested at end of sessions, pleading to continue for just “a few more times”

Addiction as a Brain Disease

Nucleus accumbens

Medial forebrain bundle

Ventral tegmental area
Addiction as a Brain Disease

- Nucleus accumbens
- Frontal lobe
- Medial forebrain bundle
- Amygdala & hippocampus
- Ventral tegmental area
Addiction as a Brain Disease

- **Brain imaging** studies

  - People with addiction show **physical changes** in areas of the brain that are critical to **judgment**, **decision making**, **learning and memory**, and **behavior control**

  - Just as people with heart disease show changes in heart muscle
Nurture

• Social context during development (in animals)
  
  - **Predispose** to addiction:
    
    » Maternal separation
    
    » Isolate-housing
    
    » Social stress
  
  - **Protect** against addiction:
    
    » Environmental enrichment


Nurture

• Substance initiation
  - **Adverse childhood experiences** (ACE) increase likelihood of early initiation into illicit drug use by 2-to 4-fold
  - Peer influences
  - Availability
  - Prescription?

Use to Addiction Assured?

• Opioids have **legitimate** uses in medicine
  
  - Progression to opioid use disorder with use is infrequent
    
    » **Tolerance** and **withdrawal** will develop
  
  - **Acute pain is protective** against addiction when opioids are used
    
    » Pain provides a natural **counterbalance** to opioid-induced reward and tolerance

Addiction can be treated

Partial recovery with protracted abstinence
Multi-Faceted Response Required

Supply and Demand: Education

Supply: Prescribing

Demand: Treatment

Community Support Services

Supply: Law Enforcement

Provider

Patient
Aligning Patient Need with Appropriate Treatment Setting

**Opioid dependent**
- Taking high levels of opioids as prescribed.

**Addicted to Prescribed Opioids** –
- Up to 35% of patients prescribed high levels of opioids may need MAT.

**Misusing Prescribed Medications and/or Using Street Drugs (heroin and/or pills)**

- Taper with Prescribing Physician
- PCP
- IMAT
- Hub/IOP
- Methadone

MaineHealth