Topic 19 - Mind & Addiction

What is Mind?
Chemistry of the Brain: drugs and love
Neurons (nerve cells)

Cell body (soma): processes incoming info, sends out signals
Axon: long thin fibers, conduct signal from cell body to other nerve cells (longest cells in your body, 3 ft!)
Dendrite: branched fiber, receive signals
Synapse: site where neurons communicate (don’t touch)
Nerve cells communicate
  within neuron: electrical signals
  between neurons: chemical signals
Neurotransmitter
Chemical that assists in communication in the brain
Serotonin: activity depends on location
activate or dampen neural activity
Dopamine: released during excitement
Normal: Dopamine released (excited)
Serotonin dampens activity
Serotonin is reabsorbed
Not enough serotonin? Activity cannot be controlled, release of anger and aggression
Addiction: Brain Reward Center

Ventral Tegmental Area (VTA): communicates with NA and Frontal Cortex
Target for Cocaine, Methamphetamine
Nucleus Accumbens (NA)
Frontal Cortex
Amygdala

Sensation of pleasure
Natural:
Food, Sex
Artificial:
Electrical stimulation
Drugs
Addiction

Olds study: rats and electrified floor cross it to receive electrical stimulation of the pleasure center of the brain; never satiate

Dopamine: Neurotransmitter

- Schizophrenia
  - Excessive production in frontal lobe
- ADHD
  - Inadequate production
- Cocaine
  - Block uptake of dopamine
- Methamphetamine/Amphetamine
  - Increase dopamine release, block uptake
Neurobiology of Sex

Nucleus accumbens
Pleasure center of the brain
Sexual pleasure
Dopamine is the neurotransmitter (addiction)
Electrode implantation confirmed the neurological basis of pleasure
Prior to this pleasure thought to be psychological
Cocaine

Derived from coca plant

Binds to dopamine transporters

Blocks transporter

Inhibits uptake of dopamine

High levels of dopamine in synapse build up

Stimulate neurons

Effect diminishes over time ("Chasing the high")

Varied side effects (increased heart rate, mood swings, paranoia, weight loss, heart attack, seizures, breathing issues, impotence)
Amphetamines

Meth:
US: 1.5 million addicts
Worldwide – exceeds cocaine and heroine combined
Pseudoephedrine – “Sudafed”, OTC decongestant

Stimulate release of dopamine and serotonin
AND
Blocks re-uptake

WWII: German troops
Powerful pleasure experience (1st time addict)
  Euphoria, high risk behaviors, hypersexual
“Chasing the high”
Side effects: appetite suppression, too numerous to note
“Meth mouth”: rapid and severe tooth decay
  (dry mouth, decreased oral hygiene, teeth grinding, high calorie drinks)
Love Chemicals

Falling in love increases release of:

- Dopamine
- Norepinephrine
  - Production of adrenaline: Flushed cheeks, sweaty palms, racing heart rate
- Phenylethylamine
  - Ingredient of chocolate

Limbic system (hippocampus, amygdala, others)

- Love is functions without cerebral cortex
  - “Love makes you stupid”

Effects are similar to drugs and don’t last

Effects help bond individuals together in the short term

Long term?
Attachment chemicals

Oxytocin: Chemical for long term attachment and parental care

Love and sex cause the NA to produce dopamine, stimulates Oxytocin release

In females: uterine contractions & milk secretion

Affects limbic system: set of structures emotions smell