Drugs
- Drug
  - chemical substance that can alter structure and function of body
- Psychoactive drugs
  - alters behavior, thought, or perceptions
  - affect nervous system
  - most cross blood-brain barrier

Properties of Drugs
1. Tolerance
2. Withdrawal
3. Addiction

1. Tolerance
Begin using...
- continue with same dose
- increase dose to get same effect
- decrease effect with same dose

2. Withdrawal
- Physical response when not taking drug
  - smokers get "edgy" and anxious
  - caffeine headaches
  - alcohol WD can be fatal
- use drug to reduce/prevent

3. Dependence
(From DSM-IV)
- 3 or more in 12 month period:
  - Tolerance
  - Withdrawal symptoms
  - Substance taken in larger amount and for longer period than intended

3. Dependence
- Ongoing desire or unsuccessful attempts to quit
- Much time to obtain, use, recover
- Important activities given up or reduced
- Use continues despite knowledge of negative consequences

3. Dependence
Physical vs. Psychological
- physical often seen as worse due to withdrawal
  - Not necessarily!

Dependence vs. Abuse
(From DSM-IV)
- 1 or more in 12 month period:
  - Repeated use resulting in failure to fulfill major obligations
  - Repeated use in physically hazardous situations

Dependence vs. Abuse
- Repeated substance related legal problems
- Continued use despite ongoing social problems caused or made worse by substance
How do drugs affect the brain?

Neurons (nerve cells)

- Drugs change the way neurons communicate

Psychoactive Drugs
- Three effects
  1. quicker release of neurotransmitters (NTs)
  2. longer effects of NTs
  3. copy effects of NTs

Natural Rewards
- Food
- Water
- Sex
- Nurturing

The Reward Pathway and Addiction
Categories of Psychoactive Drugs
- Depressants
- Stimulants
- Hallucinogens

Psychoactive Drugs
1. Depressants
   - relax and calm a user
   - induce sleep at higher doses
   - depress brain activity
   - examples:
     - alcohol
     - opiates

Depressants
- Active ingredient = ethanol
- Which drink has most alcohol?

Alcohol
- Which drink has most alcohol?

Each = one standard drink

Alcohol's Effects
- arousal
- inhibitions
- reaction time

Blood Alcohol Content (BAC)
- mg alcohol per 100 mg blood
- .10 = .1% of bloodstream is alcohol
- Average person eliminates one standard drink per hour

Factors Affecting Blood Alcohol Content
1. Body weight and muscle mass
2. Food consumption
   - Slows down, doesn't prevent
3. Gender
   - Women have lower enzyme activity and less muscle mass

The Biphasic Effect of Alcohol
- Effects of alcohol have 2 phases
- Phase 1: excitement, euphoria
- Phase 2: depressant effects
- Most people start to feel negative effects at a BAC of .05-.06

Drinking Levels
- Moderate
  - Women 1 per day; men 2 per day
- Binge drinking
  - Bringing BAC to 0.08%
  - 5 for men, 4 for women in 2 hours
Alcohol: Biological Effects
- Self-control, decision making
- Breathing, heartbeat
- Vision
- Balance, coordination

Alcohol: Changes in the Brain
- Tolerance
  - chronic use ⇒ more liver enzymes to break it down
  - Effect on BAC?
- Physical dependence
- Withdrawal
  - Delirium tremens ("the DTs")
  - Severe cravings

Alcohol: Biological Effects
- Withdrawal
  - Delirium tremens ("the DTs")
    - shaking
    - hallucinations
    - seizures

Alcohol-Related Diseases
- Heart disease
- Cancer: mouth, throat, etc.
- Liver diseases: cirrhosis, hepatitis

Opiates (Narcotics)
- From opium poppy

Examples
- Natural
  - opium, morphine, codeine
- Semi-synthetic
  - heroin, OxyContin, Vicodin

Opiates
- In brain, occupy endorphin receptors...
  - Chemicals in brain
  - Natural pain relievers
  - When used for...
    - pain relief → addiction
    - pleasure → less likely "euphoria"
      - tolerance, addiction

History of Opium
- Native to many regions
  - Middle East
  - Laos, Thailand, Afghanistan
  - Mexico & Colombia
- Use dates back 6000 years to Sumerians
- Egyptians used it medically 3500 years ago
- Common in Islamic world for medical & recreational purposes
**Collision of cultures**
- Chinese building railroad
- 1875 - San Francisco outlawed opium dens & opium smoking
  - Laws targeted not at opium (laudanum legal), but at Chinese
- Federal laws prohibiting opium smoking followed

**19th century opium-based medicines**

**Morphine**
- 1803 - morphine separated from opium
- 1856 - development of hypodermic needle
  - Use became widespread
  - Doctors began injecting opium solutions
  - Used during Civil War for injuries (dependence known as "soldier’s disease")

**Heroin**
- Heroin
  - 1874 - first made
  - 1898 - sold as cough medicine
  - Why "heroin"?

**Heroin Products**
- An asthma medicine

**Heroin**
- Injected, smoked, snorted
- Often "cut" with other substances

**Heroin**
- Short-term effects
  - Euphoria, flushing of skin
- Long-term effects
  - Addiction
  - Collapsed veins
  - Organ damage

**Stimulants**
- mood
- alertness
- blood pressure
- fatigue
- appetite
- heart rate
### Stimulants

**Caffeine**
- Found in coffee, tea, soft drinks, chocolate, some nuts, and some medicines
- 90% use every day
- 6 hour half life
- Blocks adenosine (drowsiness)
- Increases dopamine (pleasure)

**Caffeine**
- 500-600 mg/day probably OK
- Excess → anxiety, restlessness, palpitations
- Linked with osteoporosis, miscarriage

### 2. Stimulants

**Nicotine**
- Active ingredient in tobacco
- In U.S., 20.6% of adults smoke (2009)
- 29% use tobacco products

**Nicotine**
- Tobacco products
  - "Dip"
  - Chewing tobacco
  - Snus
  - Cigarettes, cigars, pipes

### Chemicals in Cigarettes

- More than 4000 chemicals in smoke
- Where do they come from?
  - tobacco plant
  - soil and environment
  - manufacturing process
  - additives
  - burning the tobacco
Cancer Causing Chemicals Identified in Cigarettes

- Acetaldehyde
- Tetrachloroethylene
- Ethylene oxide
- Formaldehyde
- Dibenz
- Lead
- p,p
- N
- EMPHYSEMA
- 3
- Styrene
- Polonium

"Quitting smoking is easy...I've done it a thousand times."
- Mark Twain

Smoking: Psychological Effects

- Increased alertness
- Feelings of pleasure
- Teen smokers have higher rates of:
  - anxiety disorders
  - depression

Smoking: Health Effects

- 1 in 5 deaths in U.S. (20%)
- Pay up to double for life insurance
- Die average of 13-14 years earlier than non-smokers

Smoking-Related Diseases (A Partial List)

- Lip Cancer
- Oral Cavity Cancer
- Tongue Cancer
- Pharyngeal Cancer
- Esophageal Cancer
- Stomach Cancer
- Pancreatic Cancer
- Laryngeal Cancer
- Throat Cancer
- Lung Cancer
- Kidney Cancer
- Urinary Bladder Cancer
- Central Cancer
- Acute Myeloid Leukemia
- Peripheral vascular disease
- Coronary Heart Disease
- Ischemic Heart Disease
- Cardiomyopathic Disease
- Atherosclerosis
- Anorexia

Smoking: Health Effects

- Foreign warning labels

Nicotine: Quitting Smoking

- Fewer than 1 in 10 trying to quit succeed on first try
- Hardest = starting before age 21 (80-90% start in teens)
  - Nicotine replacement
    - Gum, lozenge, patch
  - Medication
### Stimulants

**Cocaine**
- Coca plant
- Mid-1800s
  - Used as an anesthetic
  - Common ingredient
- Snorted, smoked, injected
- Street names: blow, snow, nose candy

**Short-term effects**
- Intense euphoria
- Very fast-acting
- Effects short-lived ⇒ urge to use more
- Long-term effects
  - Heart disease
  - Damaged septum

**Amphetamines**
- Benzedrine®, Ritalin®, Adderall®
- Increases alertness
- Decreases appetite
- Dependence & tolerance
- Altered thoughts
  - Paranoia
  - Similar to schizophrenia

**Methamphetamine**
- Similar to amphetamines, but stronger
- Made in home labs
- Pills, injected, snorted, smoked
- Street names: speed, ice, meth, crystal meth

### Hallucinogens

**A. Psychoactive Drugs**
- Affect mood, thought, memory, judgment, and perception
- Sometimes called *psychedelic drugs*
- Alter perception and produce vivid imagery
- Their impact varies widely depending on the user and the particular drug

**Marijuana**
- Most widely used illegal drug
- Reactions vary widely
- Affects judgment and coordination
- Possible psychological dependence in some

**3. Hallucinogens**
3. Psychedelic Drugs
   b. LSD
      –Lysergic acid diethylamide
      –Produces altered visual and auditory perception
      –Sometimes causes changes in time and distance perception

3. Hallucinogens
   c. Ecstasy
      –Methylenedioxymethamphetamine (MDMA)
      –Causes massive release of serotonin in the brain
      • May lead to prolonged problems regulating serotonin levels
      • May contribute to depression and memory problems