Chapter 3

Substance Misuse, Dependence, & the Body
Drug Categories

Depressants

Stimulants

Hallucinogens

Narcotics

Designer

Inhalants
Depressants

- Alcohol*
- Barbiturates
- Anti-anxiety (benzodiazepine)
  - Valium
  - Xanax
  - Librium
  - Klonopine
- “Downers”
- Sleeping Pills

- Slurred Speech
- Lethargic
- Mood Swings
- Poor Co-ordination
- Poor Judgment
- Slowed Reaction Time
- Constricted Pupils
Alcohol involvement:

- **39%** Prison for violence
- **39%** Traffic fatalities
- **67%** Domestic violence
- **40%** Rape
- **72%** Date rape
- **50%** Child abuse & neglect
- **23%** Suicide
Alcohol

Youth
– 3rd leading cause of death
– 21 years old highest alcohol use
  • Unintentional
    – Drowning
    – Vehicle accidents
  • Suicide
  • Homicide

Adults
• Liver disease
• Pancreatitis
• Alcohol poisoning
• Diabetes
Which has more alcohol?

5 oz wine  12 oz beer  1 shot liquor
All contain approximately 1 oz alcohol

5 oz wine = 12 oz beer = 1 shot liquor
How do you sober up?
How do you sober up?

- Time and Liver
- One hour for every once of alcohol

What does not work:
- Showers
- Coffee
- Exercise
Alcohol and Driving

- Slowed reaction time
- Poor co-ordination
- Poor judgment

BAC
- .08 – Buzzed (impaired vision)
- .15 – Really buzzed (stagger; gross motor decreases)
- .20 – Wasted (poor motor skills; unconscious)
- .30 – Danger (impaired breathing; decreased heart)
- .40 – Death (comatose)

BAC peak 30 – 45 minutes after consumption
## Should you drive?

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<thead>
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<th>Number of Drinks Per Hours</th>
<th>100 lbs</th>
<th>120 lbs</th>
<th>140 lbs</th>
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</table>
Metabolism & Alcohol

Liver:
- organ that metabolizes alcohol
- alcohol circulates in the bloodstream (every cell) until metabolized
- Alcohol = acetaldehyde = acetic acid = carbon dioxide & water (poison)

Alcohol absorbed through
- stomach and 80% small intestine

People metabolize approx. 1 oz. / hour
- 5 oz glass of wine
- 12 oz glass of beer
- 1 shot
Metabolism & Alcohol

- Men have special enzymes help.
- Women metabolize ½ the rate of men
- Flushing in Asians
- Synergy -.
  - Multiplying effect of 2 drugs  $2 + 2 = 10$
  - One drug to come down from another
- Tylenol plus Alcohol > liver failure.
Alcohol continued

Health effects
- heart
- liver
- pancreas
- diabetes

7-10% of drinkers get addicted
- Youth addicted in 2 years
- Adults addicted in 7 years

Tolerance
- woman with .26 BAC
- 0.4 B.A.C. may be comatose

Tolerance reversal
- Liver shot so handle less

Cross tolerance
- High tolerance for drugs in same category
Alcohol

Withdrawal (tremors, nausea)

- 24 hours to 3 to 4 days
- Hangover

Blackouts:

- Common at 0.3 BAC
- Chemical induced amnesia

Alcohol interferes with the ability to form new memories. Large amounts of alcohol, particularly if consumed rapidly, can produce partial or complete blackouts, which are periods of memory loss for events that transpired while a person was drinking.
Medical Consequences: Alcohol

Brain
- Shrinkage of brain
- Poison of brain cells
- Damage to nervous system
2 Stages of Wet Brain Syndrome

Severe thiamine deficiency

1) *Wernicke's encephalopathy (syndrome)*
   - If treated w/ thiamine can be completely reversed
   - Sudden onset
     - Malnutrition
     - Involuntary eye movements or paralysis eye muscles
     - Poor balance or unsteadiness
     - Disorientation / confusion

2) *Korsakoff's psychosis* (if untreated)
   - Not reversible can be improved somewhat w/Tx
   - Gradual onset
     - Short term memory loss
       » Difficulty in acquiring new info or learning new skills
     - Confabulation – invents events to fill the gaps in memory
     - Lack of insight – not realize loss of memory
Medical Consequences

- Peripheral neuropathy - lack of Vitamin B
- Malnutrition
- Liver Damage (removes toxins from body)
  - Alcoholic hepatitis (2nd stage liver damage)
  - Cirrhosis
- Yellow skin tone
  - Immune system breakdown
Fetal Alcohol Syndrome:

Small head circumference
Low nasal bridge
Short face

In the Young Child

Discriminating Features
- short palpebral fissures
- flat midface
- short nose
- indistinct philtrum
- thin upper lip

Associated Features
- epicanthal folds
- low nasal bridge
- minor ear anomalies
- micrognathia
Fetal Alcohol Syndrome
Stimulants

- Cocaine*
  - Sense of arousal
  - Bloody nose
- Methamphetamine *
- Amphetamines
- Nicotine* / Caffeine
- “Speed” / “uppers”
- Ritalin
- Diet Pills

Increased Heart Rate
Lack of appetite
Sense of well being
Heart Attack
Increased Movement
Increased Speech
Fidgety – “Hyper”
Aggressive
Dilated Pupil

1800 grams of cocaine
Stimulants

Cocaine
- Cocaine- crack and powder
  - in urine 3 days
  - Chew, snort or smoke
  - smoked for faster high
- Crack
  - H₂O, ammonia & baking soda
- Freebasing
  - Mix with combustibles
  - Richard Prior
- Brain blocks reuptake of dopamine
  - Addicted rats die
  - Heart attack
  - Dehydration
  - Starvation
- Cocaine/nicotine easiest to get addicted

Meth
- Snort, inject, smoke
- Ephedrine / psudoephedrine
- Developed for soldiers
- Tooth decay
- leading cause of emergency room visits for illicit drugs

Anhedonia-
- inability to feel pleasure due to drug-induced brain injury

Paranoia / delusions
The Brain and Addiction
Cocaine in the Brain

Slides are from the National Institute on Drug Abuse (NIDA) (www.nida.nih.gov)
Depletion following cocaine use. (Nicotine)

The loss of red areas in the right scan indicates that the brain is using less glucose
----less active.
----reduction in activity results in disruption of many brain functions.
Whitney Huston

BEFORE

AFTER
Nicotine

- Can both stimulate and relax
- Natural insecticide
- 90% lung cancer deaths
- 3,000 die from secondhand smoke
- 80-90% emphysema
  - chronic lung disease
- 80-95% of alcoholics smoke
  - reduces alcohol effects.
  - Smokers 10 x more likely to become alcoholic (which can first)
- Nicotine decreases BAC levels
- Nicotine and cocaine easiest to get addicted
Narcotics

- **Morphine**
  - Extract from opium

- **Codeine**

- **Opium**
  - from opium poppy

- **Vicodin**

- **Heroin**
  - Synthesized from morphine
  - Smoked, snorted or injected
  - Treated: methadone clinic
  - “Trainspotting”
  - “Requiem for a Dream”

- **Oxycontin**
  - For cancer patients
  - Long lasting

**Opioids**

- Pain killers
- Slow heart rate
- Slow blood pressure

- Prescribed or illicit

- Needle Marks

- Flu – like symptoms
Hallucinogens

- Marijuana *
- Lysergic Acid Diethylamide (LSD)
  - Acid / Microdot
  - Blotter / Windowpane
- Psilocybin Mushrooms
  - “Magic” / “shrooms”
- Peyote Cactus
  - Mescaline
  - “Buttons”
- Phencyclidine “PCP”
  - Sense of indestructibility
  - Combative
  - Lack of Pain
  - Blank Stare
- Bufotinine Toad

- See / hear things
- Anxiety / Paranoia
- Slurred Speech
- Flashbacks
Cannabis

Marijuana
- Weed
- Pot
- Smoke
- Grass

Hash
- Made from resin

THC - the psychoactive ingredient
- Delta 9 Tetrahydocannabinol
  - lowers blood glucose
  - gaiety, laughter
  - increases appetite
  - stored in fat cells
  - long term use possibly associated with apathy

10 + times more potent than “back in the day” (60s-70s)
**Synthetic Cannabis (Designer Drug)**

**Physical Signs**
- Loss of control
- Lack of pain
- Seizures
- Vomiting
- Profuse sweating
- Elevated heart rate
- Brain bleeds

**Short-term effects:**
- Dysphoria
- Paranoia
- Delusions / Hallucinations
- Increased agitation

**Long-term effects:**
- Unknown

**Spice / K2**
- JWH-018 “JWH”
- Blaze
- Bliss
- Black Mamba
- Bombay Blue
- Genie

**Onset** – 3-5 minutes

**Length of duration** – 1-8 hours
Designer Drugs

Ecstasy*
- MDMA methylenedioxymethamphetamine
- Once used to treat trauma patients
1. Hallucinogen & Stimulant
   - Confidence
   - Sense of arousal
2. Dehydrate
   - Dry / sore mouth & throat
3. High Blood Pressure
4. Body Temp. 110*

Date Rape
- Unconscious
- Odorless / colorless
- Rohypnol “Roofies”
  Gamma-hydroxybutyrate “GHB”

Party Drugs
- Rave Parties
- Basement Lab
- Synthetic
- 1990’s

Bath Salts*

K2 - Spice
Long Term Effects of Ecstasy

- Liver damage
- Anxiety disorders
- Irregular heartbeats
- Brain damage
- Depression
- Confusion
- Paranoia
Bath Salts

- Method of use
  - Smoked
  - Inhaled
  - Injected
- Speed of onset – 15 minutes
- Length of high – 4-6 hours

- Stimulant
- Suicidal thoughts
- Agitation
- Combative / Violent behavior
- Extreme paranoia
  - Harm to self and others
- Confusion
- Hallucinations/delusions
- Increased heart rate
- Hypertension
- Chest Pain
- Death or serious injury

- Long term effects
  - Unknown
**Bath Salts**

Snorted, Smoked or Injected

- Extreme Agitation
- Hallucinations & Delusions
- Chest Pain
- Suicidal Thoughts
- High Blood Pressure
- Acute Toxicity
- Hyperthermia
- Delirium
- Violent Behavior
- Foaming at the Mouth
- Extreme Paranoia
- Delusional Paracitosis
- Parkinson-Type Limb Twitching
- Paranoia
- Severe Insomnia
**Inhalants**

House Hold Items

1. Glue
2. White Out
3. Paint
4. Thinner
5. Solvents
6. Aerosols

- Varied Effects
- Increase Heart Rate
- Decrease Heart Rate
- Headache
- Dizziness
- Loss of Sense of Smell
- Paint at Nose/Mouth
- Lung Collapse
- Confusion
The Brain

- Adaptation
- Addicted brain
  - Different due to chemical changes from use
  - Cravings
  - Drug rush
  - Memory of past euphoria
    - Euphoric recall
  - Use to alleviate withdrawal
**How Neurons Communicate**

- Synapse – site where transmission of nerve impulse from one nerve cell to another occurs;
  - axon terminal
  - synaptic cleft
  - receptor sites in membrane of receiving cells
How Neurons Communicate

Action potential — brief change in electrical voltage that occurs between the inside/outside of an axon when a neuron is stimulated; produces an electrical impulse

Neurotransmitter — chemical substance that is released by transmitting neuron at the synapse & alters the activity of a receiving neuron
Neurotransmission / Synapse

1- Neuron at rest (- inside + outside)

2 - Neural impulses move down axon;
gate opens; +Na enters cell
voltage changes from (-) to (+)

3- When impulse reach button tip;
must get across synaptic cleft (gap);
synaptic vesicle release neurotransmitter

4- When reaches the other side;
briefly bond w/ receptor sites
(lock & key)

5- Receiving membrane will change;
excite – increase firing (+ voltage)
inhibit – decrease firing (- voltage)

6- Neuron returns to resting state (- voltage)

*Action potential - a sequence of gates opening down length of the cell (as 2nd gate opens 1st closes)*

-multiple +/- messages sent; take average
1) Neurotransmitters (affected by drug use)

- **Serotonin** — sleep; pain suppression; mood
  adult male; alcohol & decreased serotonin = suicide

- **Dopamine** — learning; memory; emotion;
  *pleasure or reward* “feel good” neurotransmitter
  cocaine use – depletion = crash

- **GABA** - (gamma-aminobutyric acid) major inhibitory neurotransmitter in brain
  alcohol

- **Acetylcholine** - muscle action; cognitive functioning; memory; emotion

- **Norepinephrine** - ^ heart rate; slow intestinal activity during stress;
  learning, memory; dream; wake from sleep; emotion

- **Glutamate** – major excitatory neurotransmitter in brain; 90% of neurons

**Nervous System Chemicals**
Why do People do Drugs?
The Brain and Addiction
### Addictive Substances ^ Dopamine

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<thead>
<tr>
<th>Substance / Activity</th>
<th>Peak Dopamine Release</th>
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<tbody>
<tr>
<td>Food / Sex</td>
<td>50 – 100%</td>
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<tr>
<td>Cannabis</td>
<td>125 – 175%</td>
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<td>Ethanol</td>
<td>125 – 200 %</td>
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<td>Nicotine</td>
<td>224%</td>
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<td>Heroin / Morphine</td>
<td>150- 300%</td>
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<td>Cocaine</td>
<td>400%</td>
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<tr>
<td>Amphetamines</td>
<td>1000%</td>
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Memory and Craving

Addict never gets original high—brain has changed

Addiction is a brain disease

Cues can trigger memory……. activates certain areas of the brain
  – Seeing of drug of choice
  – Smell
  – Person
  – Place
  – Time of day
  – Season

Prozac reduces craving by regulating serotonin levels

Medications to reduce cravings
  – Antabuse (old) made you sick if drank alcohol (mouthwash)
  – Campral (new) reduce cravings and reduce relapse length
Genetics and Alcoholism

- 4 times more likely if parent alcoholic
- 5 risk genes (so far)
- 1 protective gene; ALDH (flushing ability)
- Addition very heritable….40-65%
- Orbitofrontal & Dorsolateral Functioning
  (Satiety) (Inhibition)
Biology Based Intervention
Why Biology Based Intervention

- Brain chemistry changes due to use
- Brain disease
- Help with cravings
  - Began w/ meds = sick w/ alcohol
    - Antabuse
    - Apomorphine or Emetine
- Evolved to looking at reducing high
  - Naltrexone
  - Campral
3 Types of Interventions

1. Pharmaceutical

2. Behavioral – conditioning
   – Aversion therapy

3. Motivational
Chemical Aversion Therapy

- Conditioning or aversion therapy
  - B.F. Skinner’s operant conditioning
    - If alcohol = rewarding = drinking continues
    - If alcohol = punishment = drinking with stop
  - Immediate vs. year of use; job loss; bankruptcy
  - Soon alcohol itself induced vomiting
Behavioral Therapies
Chemical Aversion Therapy

Schick Shadel
- Seattle: only tx center licensed for use of Apomorphine or Emetine
- Addiction is physiological
- Those with medical problems were given Electric Shock Treatment
  - Heart condition
  - High blood pressure
  - Bulimic patients
- No pregnant women

Started with alcohol treatment now; meth, cocaine and nicotine
- Premise that addiction is physiological, affecting brain
- must change memories from good “euphoric recall”
- use of truth serum

Problems
- High death rates among elderly
- Ethical questions related to:
  - administering pain, nausea, sickness & electric shock
- Overall high dropout rate
Here is an experiment in aversion therapy.

I rounded up all these psychology students who had posted way too many educational but unfunny cartoons, and put them in big pots of boiling hot water.

They all agreed to stop making bad cartoons! Conclusion: aversion therapy works!
Behavioral Therapies

Aversion

- Covert Sensitization
  - Use of guided imagery
  - Imagine physical discomfort

- Study of 70 inpatient cocaine users
  - Following 8 sessions
    - complete reduction in craving
  - Use of covert sensitization and aversion therapy
    • successful by 8th session
Changing Brain Chemistry

Brain Lock (Schwartz)

- Neuroplasticity –
  - brain’s ability to change structure
  - & function due to experience

- Cognitive treatment
  - Change dopamine and serotonin levels in brain
  - OCD
    - “healthy” self talk to replace “unhealthy”
    - 10 sessions; change in brain chemistry
  - Self-directed neuroplasticity
  - “rewire the brain”
Mental Health (MI) & Substance Abuse (SA)

Terminology
- MISA (coined in Tinley Park, IL)
- Co-occurring disorders
- Dual diagnosis

Issues
- Symptoms of one exacerbate the other
- Some psychiatrists refuse to treat MI of still using
- If client is working on issues but still using
- If client is working on issues and not getting better
Pharmaceutical Interventions

- Serotonin - role in mood and compulsive behavior
  - Prevent lows or block highs

- SSRI – select serotonin reuptake inhibitors
  - Prozac
  - Zoloft
  - Paxil

- Treat
  - depression
  - Binge drinking & eating
  - OCD
  - Autism
  - Panic attacks
  - Schizophrenia
  - Uncontrolled aggressions

- GABA
  - Treatment for depression and alcoholism
Pharmaceutical Interventions Alcohol

Naltrexone - 1995
- Block blood-brain interaction that produce high
- Take the fun out of drinking
- Reduce effect of cues – smell, sight of alc

- Naltrexone and behavioral therapy
- Vivitrol – extended release; injected

Problem
- Low motivation to take medications

Ondansetron
- Curb nausea in chemotherapy patients
- decreases craving
- Block serotonin receptors

Combine Naltreone and Odansetron

Topamax
- Over eating
- Alcohol
Pharmaceutical Interventions Nicotine

- 400,00 die each year
- 3,000 die from second hand smoke
- **Zyban**
  - Block dopamine reuptake & target receptors
- **Chantix**
  - produce more dopamine
- **Nicotine maintenance**
  - Gum
  - Patch
  - Nasal spray
- **Naltrexone** – block reward system
  - Blocks the high
- **Wellbutrin**

**Alcoholism and tobacco link**
- Stopping causes depression and irritability
Pharmaceutical Interventions
Cocaine and Methamphetamine

- GABA
- GVG – Gamma vinyl –GABA
- Blocks dopamine production in conjunction with use
Methadone (synthetic form of heroin)

- Methadone maintenance
- Highly addictive
- Occupies the opiate receptors
  - 50% abstain with methadone
  - 20% abstain without

- Problems for clients and clinicians
Pharmaceutical Interventions: Heroin

Problems for clients
- Daily dose
- Dose may be inadequate – heroin purer & less expensive now
- Resistance to program

Problems for clinicians
- High burnout
- Recommendation
  - Few on caseload
  - Not be disciplinarian
    - do the urine analysis (UAs)
  - Treatment decentralized to doctor’s office
    - Client – avoid drug ridden atmosphere
    - Clinician – less face time
2) Suboxone

Buprenorphine and Naloxone

- Opioid receptor management
- Narcotic
- Weekly dose vs daily
- Can be prescribed by GP’s
- Less addictive
- “Ceiling effect”
  - reduces likelihood of overdose
Heroin Users Then & Now

Then
  – Heroin loyal

Now
  – Poly Substance users

Then & Now
  – Start with snorting progress to injecting (shooting)
  – HIV & Hepatitis C

New in Treatment
  – Those in “good standing” receive script for meds
Pharmaceutical Interventions: 
Eating Disorders & Behavioral Addictions

🌟 Eating disorders
– Anorexia nervosa – related to anxiety
  • Dopamine
  • reduced dopamine binding

– Bulimics—related to depression
  • Serotonin
    – Linked with substance abuse
    – Must be “on the mend”
      » SSRIs not work due to depletion of amino acid from starvation
  • Luvox
    – Decreases binges
    – Similar to Prozac and Paxil
Pharmaceutical Interventions: Eating Disorders & Behavioral Addictions

🌟 Compulsive shopping
  - Luvox
  - More depression
  - Cognitive therapy preferred

🌟 Compulsive Gamblers & Kleptomaniacs
  - Naltrexone
  - SSRI
Holistic Treatments

– Treat entire person to restore to natural state
  • Herbal remedies
  • St. John’s wort
  • Hypnosis
  • Acupuncture from China
    – Calm
    – Reduce cravings
  • Massage therapy
    – Physical and emotional - yoga
      » Anorexia
      » Bulimia
      » Smoking
Holistic Treatments

• Physical exercise to reduce tension
  – Release endorphins
• Nutrition
  – Alcoholics
    » Vitamin C
    » Melatonin
• Pet therapy
• Biofeedback
  – Mind over matter
  – relaxation