Don’t Stop Till You Get Enough?
Drugs and Their Modifying Effects on the Human Body

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BioS 10
Bioscience in the 21st Century
October 2017
Outline

I. Overview of Drugs
   I. Classification
   II. Facts and Figures
   III. Systems Affected

II. Cocaine
   I. How it works
   II. Side effects

III. Amphetamines
   I. How it works
   II. Side effects

IV. Heroin
   I. How it Works
   II. Side effects

V. Popular Drugs of the 21st Century
What is a Drug?

- **Drug** --- A chemical substance that, when taken into the body, alters the structure or functioning of the body in some way.
### Four Categories of Drug-Taking Behaviors, Derived From The Combination of Goal and Legal Status

<table>
<thead>
<tr>
<th>Goal</th>
<th>Licit</th>
<th>Illicit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Instrumental Use</strong></td>
<td>Taking Valium with a prescription to relieve anxiety</td>
<td>Taking amphetamines without a prescription to stay awake the night before a test</td>
</tr>
<tr>
<td><strong>Recreational Use</strong></td>
<td>Taking No Doz to stay awake on a long trip</td>
<td>Taking morphine without a prescription to relieve pain</td>
</tr>
<tr>
<td></td>
<td>Having an alcoholic drink to relax before dinner</td>
<td>Smoking marijuana to get high</td>
</tr>
<tr>
<td></td>
<td>Smoking a cigarette or a cigar for enjoyment</td>
<td>Taking LSD for the hallucinogenic effects</td>
</tr>
</tbody>
</table>
Illicit Drug Use Prevalence Rates

After Marijuana, Prescription and Over-the-Counter Medications¹ Account for Most of the Commonly Abused Drugs Among High School Seniors²

Source: https://www.drugabuse.gov
U.S. Deaths per Year From Tobacco, Alcohol, and Illicit Drug Use
The Brain
Synaptic Transmission
# Drugs and the CNS

## Table 3.1

<table>
<thead>
<tr>
<th>Drug</th>
<th>Result</th>
<th>Mechanism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amphetamines</td>
<td>CNS stimulation</td>
<td>Mimicking of norepinephrine at its receptor sites</td>
</tr>
<tr>
<td>Antianxiety drugs in general</td>
<td>Reduction in anxiety and stress</td>
<td>Stimulation of GABA receptors in the brain</td>
</tr>
<tr>
<td>Antidepressant drugs, MAO-inhibitor type</td>
<td>Reduction in depressive symptoms</td>
<td>Inhibition of enzymes that metabolize norepinephrine and serotonin</td>
</tr>
<tr>
<td>Antidepressant drugs, tricyclic type</td>
<td>Reduction in depressive symptoms</td>
<td>Slowing down of reuptake of norepinephrine and serotonin at their receptor sites</td>
</tr>
<tr>
<td>Antipsychotic drugs, typical type</td>
<td>Reduction in schizophrenic symptoms</td>
<td>Dopamine blocked from entering receptor sites in the brain</td>
</tr>
<tr>
<td>Caffeine</td>
<td>CNS stimulation</td>
<td>Adenosine (an inhibitory neurotransmitter) blocked from entering its receptor sites</td>
</tr>
<tr>
<td>Cocaine</td>
<td>CNS stimulation and local anesthesia</td>
<td>Blocking the reuptake of norepinephrine and dopamine at their receptor sites</td>
</tr>
<tr>
<td>LSD</td>
<td>Visual hallucinations and disordered thinking</td>
<td>Stimulation of receptor sites sensitive to serotonin</td>
</tr>
<tr>
<td>Morphine, heroin, and codeine</td>
<td>Pain relief and euphoria</td>
<td>Stimulation of endorphins at their receptors in the spinal cord and brain</td>
</tr>
</tbody>
</table>

The Major Stimulants: Cocaine
The Major Stimulants: Cocaine

In the late 1800s in the United States, cocaine was an ingredient in over-the-counter medications.
The Major Stimulants: Cocaine

**Side Effects**
- Powerful burst of energy
- General sense of well-being
- Heart rate and respiration are increased
- Appetite is diminished
- Blood vessels constrict and blood pressure is increased
- Pupils are dilated
- Continuously stuffy or runny nose
- Hallucinations (cocaine psychosis)
The Major Stimulants: Cocaine
The Major Stimulants: Amphetamines
The Major Stimulants: Amphetamines

- Euphoria
- Insomnia
- Increased heart rate
- Increased blood pressure
- Dilated pupils
- Parkinson's-like symptoms
- Tremors
- Convulsion
- Paranoia
- Hallucinations
- Strokes
- Cardiovascular collapse, death
The Major Stimulants: Amphetamines
The Opioids: Heroin

Side Effects
- Intense euphoria
- Subsequent tranquil drowsiness
- Elevated body temperature

Withdrawal
- Increased blood pressure
- Tearing, runny nose
- Diarrhea
- Spontaneous ejaculations
- Restlessness
- Involuntary kicking movements
- Pain and irritability
- Depression and anxiety
The Opioids: Heroin
HEROIN AND OPIOID AWARENESS WEEK
Prevention • Enforcement • Treatment

NATIONAL Rx DRUG ABUSE & HEROIN SUMMIT
The Opioids: In the News and On the Rise

![Graph showing national overdose deaths from prescription opioid pain relievers from 2001 to 2014.](image)

Source: National Center for Health Statistics, CDC Wonder
Misuse of Prescription Drugs
Misuse of Prescription Drugs
Misuse of Prescription Drugs

Diprivan
Performance-Enhancing Drugs
Performance-Enhancing Drugs

- Androgenic - acting to promote masculinizing changes in the body

- Anabolic - acting to promote growth and muscular development

- Anabolic-androgenic steroids *(anabolic steroids)* - a group of drugs patterned after the testosterone molecule, producing anabolic and androgenic effects
Performance-Enhancing Drugs

- Shrunken testicles
- Diminished sperm count
- Enlarged breasts
- Frequent, sustained, painful penile erections
- Acne on shoulders and back
- Increased facial hair, accelerated balding
Performance-Enhancing Drugs

- Lower voice
- Increased facial hair
- Enlarged clitoris
- Increased aggressiveness
- Increased appetite and decreased body fat
- Diminished menstruation
- Decreased breast size
- Increased body hair
- Increased loss of scalp hair