Controlled Substances: Drugs
Chapter 5
Introduction
DEA Drug Fact Sheet

You hear about drugs on TV and in the movies, on the radio, in books and magazines, on the Internet, and in daily conversation with friends and peers. Some of the information is accurate, but a lot of it is not.

Here are a few realities to consider:

• You can’t predict the effect that a drug can have on you—especially if it’s the first time you try it, and even if it’s a small amount or dose. Everyone’s brain and body chemistry are different. Everyone’s tolerance for drugs is different.

• Using drugs can lead to abuse, addiction, serious health problems, and even death.

• Drugs that are legal—prescription and over-the-counter (OTC) medications—can be just as dangerous as illegal drugs.

Find out as much as you can about illegal and legal drugs and their effects on your body and brain. The more informed you are, the more confidently you can make the right decision about drugs. Read DEA’s Drug Fact Sheets for the latest information.
What are drugs?

- A **drug** can be defined as a natural or synthetic substance that is used to produce physiological or psychological effects in humans or other higher order animals.
  - Includes both prescription and illicit (street) drugs
  - An illicit drug is an illegal substance
  - **Controlled substances** are those administered only with a doctor’s prescription

75% of evidence evaluated in crime labs is drug related.
Drug Abuse

Drug abuse cuts across all social and ethnic classes of society.

- 23 million people in the U.S. use illicit (street) drugs
- ½ million heroin addicts
- 6 million cocaine users
- 90 million Americans regularly drink alcohol while 10 million abuse it
Drug-Induced Deaths Second Only to Motor Vehicle Fatalities, 1999–2007

**Psychological Dependence:** The conditioned use of a drug caused by underlying emotional needs.

- Dependency arises due to personal and/or social factors
  - To create a sense of well-being
  - To escape from reality, such as personal problems
  - To sustain an improved level of performance

- Dependency varies from drug to drug
  - Alcohol, heroin, amphetamines, barbiturates, and cocaine are more likely to cause psychological dependence than others
  - Marijuana and codeine have a lower potential
  - Also varies from person to person
**Physical Dependence:** *Physiological need for a drug brought about by its regular use and characterized by withdrawal sickness when administration of the drug abruptly stops.*

- Withdrawal will cause severe illness:
  - Body chills
  - Stomach cramps and vomiting
  - Convulsions
  - Insomnia
  - Pain
  - Hallucinations

- User has trouble stopping use for fear of sickness

- Drugs such as alcohol, heroin, and barbiturates can result in physical dependence
Societal Aspects of Drug Use:

- Drug satisfies the user’s needs
- Personal health, economic relationships and family obligations suffer
- May lead to behavior that has serious implications for public’s safety, health and welfare
- Has to be a balance between individual desires and needs vs. society’s concerns for consequences of drug abuse
Types of Drugs
Narcotics:

- A drug that induces sleep and depresses vital body functions such as blood pressure, pulse rate, and breathing rate

Examples:

- **Opiates**: Opiates come from the Asian poppy
  - Includes heroin, morphine, and codeine
  - Considered analgesics (substances that lessen or eliminate pain)

- **Synthetic opiates**: are not derived from opium but have the same physiological effects on the body
  - Methadone, Oxycontin
Hallucinogens:

- Drugs that can cause marked alterations in normal thought processes, perceptions, and moods
- Examples:
  - Marijuana
    - The most widely used illicit drug in the U.S.
    - Derived from the cannabis plant
    - Leaves, flowers, stems, and seeds are mixed in varying proportions
    - Contains tetrahydrocannabinol (THC)
  - Other hallucinogens
    - Psilocybin (mushrooms)
    - LSD (lysergic acid)
    - PCP (phencyclidine)
Depressants:

- Drugs that slow, or depress, the central nervous system (CNS)

  - Alcohol
    - With more production and more consumers, alcohol is unquestionably the most widely used and abused drug.
    - Effects range from inhibited judgment and concentration in low doses to extreme irritability, or even coma, and possibly death in extreme doses.

  - Barbiturates
    - Commonly known as “downers” because they relax the user and may produce sleep.
    - Some examples that are commonly used in medicinal practices are:
      - Amobarbital, Secobarbital, Phenobarbital

  - Methaqualone (Quaalude) is an illicit non-barbiturate depressant.
Depressants (continued)

- Antipsychotics and anti-anxiety drugs
  - Produce tranquility without altering higher level thinking faculties
  - Some examples that are commonly prescribed to deal with everyday tensions are
    - Meprobamate (Miltown)
    - Chlordiazepoxide (Librium)
    - Diazepam (Valium)

- Huffing/Inhalants
  - Sniffing volatile solvents such as model cement, glues, and cleaners
  - Inhaling aerosol propellants such as spray paint and refrigerant
  - Produce feelings of exhilaration and euphoria, then drowsiness and stupor
Stimulants:

- Refers to a range of drugs that stimulate, or speed up, the central nervous system
  - **Amphetamines**: synthetic stimulants commonly referred to as “uppers” or “speed”
    - Can be taken orally or via intravenous injection
    - Provide a feeling of well-being and increased alertness followed by a decrease in fatigue and loss of appetite
    - These effects are accompanied by restlessness, instability, and when they wear off, depression
    - Most dangerous form is injected methamphetamine
  - **Cocaine**: stimulant extracted from the leaves of *Erythroxylon coca* plant
    - Produces a feeling of euphoria by stimulating the pleasure center in the base of the brain, leading to an increase in energy level, more mental alertness, and really feeling good
    - “Crack” is freebase cocaine and when smoked gives a greater feeling of euphoria much sooner; however, euphoria fades quickly and the user feels depressed, anxious, pleasureless
    - Produces the strongest psychological compulsions for continued use and very difficult to overcome addiction
“Club drugs” refers to synthetic drugs that are often used at nightclubs, bars, and raves

Examples:

- GHB and Rohypnol (“Roofies”) are CNS depressants that are often connected with drug-induced sexual assault, rape, and robbery
  - **GHB** effects include dizziness, sedation, headache, and nausea; recreational users report euphoria, relaxation, disinhibition and increased libido (sex drive)
  - **“Roofies”** cause muscle relaxation, loss of consciousness, and an inability to remember what happened for a few hours; of particular concern because sexual assault victims are unable to fight back or remember what happened
  - Easily slipped into drinks: odorless, colorless and tasteless
Club drugs, cont’d.

- Examples, cont’d.
  - **Methylenedioxymethamphetamine** (MDMA or Ecstasy)
    - A mind-altering drug that exhibits hallucinogenic and amphetamine-like effects
    - Originally patented as an appetite suppressant; later discovered to induce feelings of happiness and relaxation
    - Chronic use can cause body system breakdown, severe brain damage, memory loss, and seizures
  - **Ketamine** (Special K)
    - An animal anesthetic used by veterinarians
    - When used by humans, it causes feelings of euphoria, visual hallucinations, impaired motor function, and amnesia
    - Can also cause impaired motor function, high blood pressure, amnesia and mild respiratory distress
Anabolic steroids

- Synthetic compounds that are chemically related to the male sex hormone testosterone, which develops secondary male characteristics (androgenic effects) and accelerates muscle growth (anabolic effects).

- Side effects include unpredictable moods and personality, depression, diminished sex drive, halting bone growth, masculinizing effects in females, and liver malfunction and cancer.

- Often used by athletes, from amateur to professional.
Drug- Control Laws
Drug-Control Laws

- There are varying levels and penalties based on manufacture, distribution, possession, or use of a drug, as well as the drug’s weight, type, and concentration.

- The Controlled Substances Act - This federal law establishes five schedules of classification for controlled dangerous substances on the basis of a drug’s
  - potential for abuse
  - potential for physical and psychological dependence
  - medical value

- The U.S. Attorney General has the authority to add, delete, or reschedule a drug as needed under the Controlled Substances Act.
Controlled Substances Act: Schedules of Classification

- **Schedule I**
  - High potential for abuse and no currently accepted medical use in the U.S.
  - Examples: heroin, marijuana, methaqualone, LSD

- **Schedule II**
  - High potential for abuse, currently accepted medical use with severe restrictions, potential for severe physiological and psychological dependence
  - Examples: opium and its derivatives, cocaine, methadone, PCP, most amphetamine preparations, most barbiturate preparations, and dronabinol (the synthetic equivalent of marijuana, prescribed for medical use)
Schedule III

- Less potential for abuse, currently accepted medical use, potential for low to moderate physiological and high psychological dependence
- All barbiturates not included in Schedule II, such as codeine preparations and anabolic steroids (added in 1991)

Schedule IV

- Low potential for abuse, current medical use, limited dependence related to Schedule III
- Examples: tranquilizers, such as Valium and phenolbarbitol

Schedule V

- Low abuse, medical use, less potential for dependence than Schedule IV
- Non-narcotic medicinal ingredients and some opiate drug mixtures
Criminal Penalties Under the Act

- Criminal penalties for unauthorized manufacture, sale or possession of controlled dangerous substances related to schedules
- The most severe penalties are associated with Schedule I and II
- The Controlled Substance Act controls substances such as analogs and designer drugs that are chemically similar or related to controlled substances
- Regulates the manufacture and distribution of precursors which are the chemical compounds used by clandestine labs to synthesize drugs
Penalties under the Texas Controlled Substances Act

<table>
<thead>
<tr>
<th>Schedule</th>
<th>Maximum prison time</th>
<th>Maximum fine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schedule I - Class B Felony - Heroin, LSD, other hallucinogens, others</td>
<td>10 years</td>
<td>$100,000</td>
</tr>
<tr>
<td>Schedule II - Class C Felony - Methadone, morphine, amphetamine, cocaine, PCP</td>
<td>5 years</td>
<td>$100,000</td>
</tr>
<tr>
<td>Schedule III - Class A Misdemeanor - Non-amphetamine stimulants, some depressants</td>
<td>1 year</td>
<td>$2,500</td>
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<tr>
<td>Schedule IV - Class C Misdemeanor - Valium-type tranquilizers, some less potent depressants</td>
<td>30 days</td>
<td>$500</td>
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<tr>
<td>Schedule V - Violation - Dilute mixtures, compounds with small amounts of controlled drugs</td>
<td>None</td>
<td>$1,000</td>
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</tbody>
</table>
Enforcing Drug Control Laws

The DEA, or Drug Enforcement Administration, was formally established on July 1, 1973.

- Created to provide for a Federal agency designed to enforce the Federal drug laws and coordinate the Government’s drug control and regulation policies and actions.
- The DEA has become one of the main agencies involved in the classification of drugs and controlled substances under the Control Substances Act along with the Food and Drug Administration (FDA).
- Both agencies would be involved in the research and studies involved in appropriately placing controlled substances in the Drug Scheduling system.
Forensic Drug Analysis
Screening and Confirmation:

- **Screening test** - a preliminary test used to reduce the number of possible identities of an unknown substance
  - Often accomplished by subjecting the material to a series of color tests that produce characteristic colors for more common illicit drugs

- **Confirmatory test** - a single test that specifically identifies a substance to the exclusion of all other known chemical substances
**Color tests** - drugs yield characteristic colors when mixed with certain chemicals

<table>
<thead>
<tr>
<th>NAME OF TEST</th>
<th>CHARACTERISTIC COLOR</th>
<th>DRUG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marquis</td>
<td>Purple</td>
<td>Heroin, morphine, most opium derivatives</td>
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<tr>
<td></td>
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<tr>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Orange/brown</td>
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<td>***********************************</td>
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<tr>
<td></td>
<td></td>
<td>***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Amphetamines, methamphetamines</td>
</tr>
<tr>
<td>Dillie-Koppanyi</td>
<td>Violet-blue</td>
<td>Barbiturates</td>
</tr>
<tr>
<td>Duquenoin-Levine</td>
<td>Purple</td>
<td>Marijuana (with chloroform)</td>
</tr>
<tr>
<td>Van Urk</td>
<td>Blue-purple</td>
<td>LSD</td>
</tr>
<tr>
<td>Scott</td>
<td>Blue</td>
<td>cocaine</td>
</tr>
</tbody>
</table>
Screening and confirmation, cont’d

- **Microcrystalline Test**
  - More specific than a color test
  - Identifies a substance based on the color and shape of crystals formed when the substance is mixed with specific reagents
  - Rapid and often do not require the isolation of a drug from its diluents
Screening and confirmation, cont’d

**Chromatography**

- Separates complex mixtures into specific components by an attraction to a stationary phase while being propelled by a moving phase

- **Thin Layer Chromatography** uses a solid stationary phase and a moving liquid phase;
  - can be used to compare an unknown sample with known samples
  - cannot alone provide absolute identification

- **Gas Chromatography** separates mixtures based on their distribution between a stationary liquid phase and a moving gas phase
  - Extremely sensitive; can detect and quantify materials at the nanogram level
Mass Spectrometry

- Gas chromatography is one of the most important measurements in a crime lab, but it cannot always produce specific identification. However, when it is coupled with mass spectrometry, the problem is overcome.
- A mixture’s components are first separated with gas chromatography.
- It is sensitive to minute amounts.
- With data obtained from gas chromatography/mass spectrometry, an analyst can separate components of a complex drug mixture and then identify each substance present.
Spectrophotometry exposes substances to electromagnetic radiation

- **UV and Visible Spectrophotometry** measures and records absorbance of UV and visible light as a function of wavelength or frequency

- **Infrared Spectrophotometry** is similar to UV, but because absorption bands are so numerous, it is far more capable of identifying a substance specifically

- Typically *infrared spectrophotometry* or *gas chromatography-mass spectrometry* is used to specifically identify a drug substance.
Confirmation

- Once this preliminary analysis is completed, a confirmational determination is pursued.

- Forensic chemists will employ a specific test to identify a drug substance to the exclusion of all other known chemical substances.

  - For example: Marijuana unlike other drugs can be identified by its plant features. The Duquenois-Levine color test is not totally specific for marijuana, but when combined with microscopic examination of the leaves, the results constitute a specific identification for marijuana.
Collection and Preservation of Drug Evidence
Collection and Preservation

- The field investigator has the responsibility of ensuring that the evidence is properly packaged and labeled for the laboratory.

- Generally common sense is the best guide, keeping in mind that the package must prevent the loss of the contents and/or cross-contamination.

- If it is a volatile solvent (glue sniffing compounds), it must be in an airtight container to prevent evaporation.

- Often the original container in which the drug was seized will suffice.

- All packages must be marked with information that is sufficient to ensure identification by the officer in the future and establish the chain of custody.