Controlled Substances

Forensic Science

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Drug Dependence

- A drug is a natural or synthetic substance that is used to produce physiological or psychological effects
- An illicit drug is an illegal substance
- Controlled substances are those administered only with a doctor's prescription

Drug Dependence (continued)

- Psychological Dependence
  - The conditional use of a drug caused by underlying emotional and/or psychological needs
  - Psychological needs can come from numerous social and personal factors that increase an individual's desire to escape from reality and/or for a sense of well-being
  - The intensity of dependence depends upon the nature of the drug used
  - The desire for emotional well-being is the main motive leading to repeated use and intensive drug abuse

Drug Dependence (continued)

- Physical Dependence
  - Physiological need for a drug is
    - Caused by its regular use
    - Characterized by withdrawal sickness when administration of the drug suddenly stops
  - Some of the more widely used drugs have little potential for physiological dependence
  - Physiological dependence develops when the user has a regular schedule of drug intake

Drug Dependence (continued)

- Social Aspects of Dependence
  - The more occupied users becomes in their daily lives with using, the more they will neglect their individual and social responsibilities, such as personal hygiene or maintaining a job

Types of Drugs

- Narcotics
  - Drugs that induce sleep and depresses vital body functions such as blood pressure, pulse, and breathing
  - Society inappropriately classifies narcotics as any drugs that are socially unacceptable
  - Opiates come from the Asian poppy
    - Includes heroin, morphine, and codeine
    - Considered analgesics (substances that lessen or eliminate pain)

Types of Drugs (continued)

- Narcotics (continued)
  - Synthetic Opiates
    - Not naturally derived from opium, but with similar effects
    - Methadone
      - Pharmacologically related to heroin
      - Administered to heroin addicts when it was found to eliminate the addict's desire for heroin with minimal side effects
    - Oxycodone
      - Closely related to morphine and heroin
      - Prescribed by doctors for chronic pain

Types of Drugs (continued)

- Hallucinogens
  - Drugs that can cause alterations in normal thought processes, perceptions, and moods
  - 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)

Types of Drugs (continued)

- Hallucinogens (continued)
  - Marijuana (continued)
    - Has potential medical uses
      - Reduces eye pressure in glaucoma patients
      - Lessens nausea caused by anticancer drugs
  - Other hallucinogens
    - Psilocybin (mushrooms)
    - LSD (lysergic acid)
    - PCP (phencyclidine)

Types of Drugs (continued)

- 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

Types of Drugs (continued)

- Depressants (continued)
  - 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 is an illicit barbiturate

Types of Drugs (continued)

- 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
      - Chlordiazepoxide
      - Diazepam

Types of Drugs (continued)

- Depressants (continued)
  - 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

Types of Drugs (continued)

- Stimulants
  - Stimulate, or speed up, the CNS
  - Amphetamines
    - Known as “uppers,” or speed
    - Produce increased alertness and feelings of well-being followed by a decrease in fatigue and loss of appetite. These are accompanied by restlessness, instability, and many times depression

Types of Drugs (continued)

- Stimulants (continued)
  - Cocaine
    - Comes from the "coca" plant in tropical Asia and South America
    - Has effects similar to amphetamines
    - Found in powder form or "cooked" to its freebase form, known as crack
    - It is very difficult to overcome addiction to this drug

Types of Drugs (continued)

- Club Drugs
  - Synthetic drugs that are often used at nightclubs, raves (all night dance parties), and bars; they are used as a way to stimulate the "rave" experience
  - GHB and Flunitrazepam (aka "Roofies") are CNS depressants often associated with drug-facilitated sexual assaults, rapes, and robberies
    - GHB can produce dizziness, sedation, muscle relaxation, and increased libido
    - Flunitrazepam can produce loss of consciousness and inability to remember what happened during the hours after ingesting

Types of Drugs (continued)

- Club Drugs (continued)
  - Methylenedioxymethamphetamine (aka MDMA or Ecstasy)
    - Is a mind altering drug that has hallucinogenic effects
    - Chronic use can cause body system breakdown, severe brain damage, memory loss, and seizures
  - Ketamine (aka Special K)
    - Is an animal anesthetic used by veterinarians
    - However, when it is used on humans, it causes feelings of euphoria, visual hallucinations, impaired motor function, and amnesia

Types of Drugs (continued)

- Anabolic Steroids
  - Chemically related to the male sex hormone testosterone that develops secondary male characteristics (androgenic effects) and accelerates muscle growth (anabolic effects)
  - Often used by athletes, from amateur to professional
  - Side effects include liver malfunction, cancer, masculinizing effects in females, diminished sex drive in males, unpredictable moods, personality changes, and depression

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 – the federal law that establishes five classifications of controlled dangerous substances on the basis of a drug's potential abuse, potential for physical and psychological dependence, and medical value; the U.S. Attorney General has the authority to add, delete, or reschedule a drug as needed

Drug Control Laws (continued)

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

Drug Control Laws (continued)

- 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)

Drug Control Laws (continued)

- 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

Drug Control Laws (continued)

- Schedule IV
  - Low potential for abuse, current medical use, limited dependence related to Schedule III
  - Examples: tranquilizers
- Schedule V
  - Low abuse, medical use, less potential for dependence than Schedule IV
  - Non-narcotic medicinal ingredients and some opiate drug mixtures

Drug Control Laws (continued)

- Criminal Penalties Under the Act
  - 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

Forensic Drug Analysis: Screening and Confirmation

- Screening test – a preliminary test used to reduce the number of possible identities of an unknown substance
- Confirmatory test – a single test that specifically identifies a substance
- Color test – drugs yield characteristic colors when mixed with certain chemicals

Forensic Drug Analysis: Screening and Confirmation (continued)

- Color test – drugs yield characteristic colors when mixed with certain chemicals

NAME OF TEST	CHARACTERISTIC COLOR	DRUG
Marquis	Purple ********** Orange/brown	Heroin, morphine, most opium derivatives ********** Amphetamines, methamphetamines
Dillie-Koppanyi	Violet-blue	Barbiturates
Duquenoin-Levine	Purple	Marijuana (with chloroform)
Van Urk	Blue-purple	LSD
Scott	Blue	cocaine

Forensic Drug Analysis: Screening and Confirmation (continued)

- 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

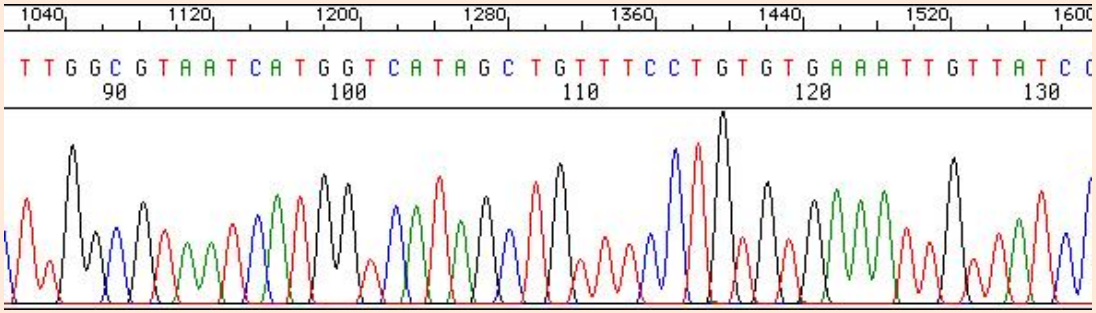
Forensic Drug Analysis: Screening and Confirmation (continued)

- 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

Forensic Drug Analysis: Screening and Confirmation (continued)

- Gas Chromatography uses a stationary liquid phase and a moving gas phase (called a carrier gas) which flows through a stainless steel or glass column
  - Components separate by moving through the column at different rates
  - The retention time is how long it takes for a component to emerge from the column; the retention times of known and unknown substances can be compared

- This is an example of a chromatogram where each color would represent a different sample



Forensic Drug Analysis: Screening and Confirmation (continued)

- 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

Forensic Drug Analysis: Screening and Confirmation (continued)

- 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

Collection and Preservation of Drug Evidence

- Packages must prevent loss and cross-contamination of evidence
- If it is a volatile solvent (glue sniffing compounds), it must be in an airtight container to prevent evaporation
- Mark with information to ensure identification by the officer and maintain a chain of custody
- The investigator should provide any background information of the drug's identification, such as the screening tests, to the lab analyst

Resources

- Saferstein, Richard. *Forensic Science: An Introduction.* New Jersey: Pearson Prentice Hall, 2008
- Saferstein, Richard. *Forensic Science: An Introduction.* 2nd ed. New Jersey: Pearson Prentice Hall, 2011
- Saferstein, Richard. *Criminalistics: An Introduction to Forensic Science.* 8th ed. Upper Saddle River, NJ; Pearson Prentice Hall, 2004
- Do an Internet search for the following: DEA Announces Emergency Ban on 'Bath Salts'