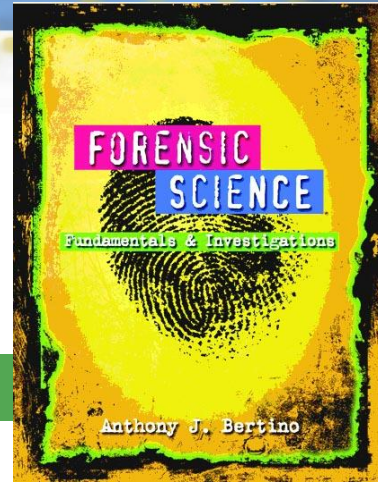


## Chapter 9

# ***Drug Identification and Toxicology***

By the end of this chapter you will be able to:



- Identify the five types of controlled substances
- Relate signs and symptoms of overdose with a specific class of drugs or toxins
- Describe the role of various types of toxins in causing death
- Discuss agents that may be used in bioterrorism
- Define and describe the goals and practice of toxicology

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# Introduction

**Forensic toxicology** helps determine cause-and-effect relationships between:

- Exposure to a drug or other substance
- Toxic or lethal effects from that exposure



# Introduction

People can be exposed to toxic substances:

- Intentionally—by treating illness or relieving pain
- Accidentally—by harmful combinations or overdoses
- Deliberately—by harming or killing others, or by suicide



# *Poison—Murder, Accidental Overdoses, and Drug Offences*

- Poisoning causes less than ½ of 1% of all homicides
- Accidental drug overdoses are more common
- Drug offenders
  - More than 50% of the federal prison population
  - About 20% of the population in state prisons



# Forensic Files - Season 7, Ep 18: A Bitter Pill to Swallow



# Controlled Substances

1. Hallucinogens
2. Narcotics
3. Stimulants
4. Anabolic steroids
5. Depressants

# *Controlled Substances –Hallucinogens*



- Often derived from plants
- The effect and intensity of response to these drugs varies from person to person.
- Affects the user's perceptions, thinking, self-awareness, and emotions

<b>Drug</b>	<b>Characteristics of Drug Overdose</b>
<b>MDMA</b> (ecstasy)	Increased heart rate and blood pressure, muscle cramps, panic attacks, seizures, loss of consciousness, stroke, kidney failure, death
<b>Mescaline</b>	Hallucinations, euphoria, dizziness, vomiting, increased heart rate, dilated pupils, diarrhea, headaches, anxiety, irrationality of thoughts
<b>LSD</b>	Dilated pupils, loss of appetite, sleeplessness, increase in body temperature, increased heart rate and blood pressure, sweating, dry mouth, tremors, confusion, distortion of reality, and hallucinations
<b>PCP</b>	Increased heart rate and blood pressure, convulsions, sweating, dizziness, numbness, and possibly death from heart failure. Drowsiness, which can lead to accidents. Users sometimes exhibit psychosis (completely losing touch with reality (that can last for weeks.)

**Notice any common overdoses symptom(s)?**



# *Controlled Substances –Hallucinogens*



- Affects of an overdose often include
  - Increased heart rate
  - Increased blood pressure
  - Panic attacks, anxiety, or psychosis

# *Controlled Substances*

## *–Narcotics*



- o Reduce pain by suppressing pain receptors in the central nervous system
- o Often referred to as pain killers



# Controlled Substances –Narcotics

Drug	Characteristics of Drug Overdose
Opium	Difficulty breathing, low blood pressure, weakness, dizziness, confusion, loss of consciousness, coma, cold clammy skin, small pupils
Heroin Codeine Morphine	Difficulty breathing, low blood pressure, coma, spasms of the stomach or intestines, constipation, nausea, vomiting, sleepiness, blue fingernails and lips, death
Methadone	Difficulty breathing, drowsiness, coma, low blood pressure, muscle twitches, blue fingernails and lips
Oxycodone	Slow, difficult breathing, seizures, dizziness, weakness, loss of consciousness, coma, confusion, tiredness, cold clammy skin and small pupils

# *Controlled Substances*

## *–Stimulants*



- Increases feelings of energy and alertness
- Suppresses appetite
- Afterwards, depression often results
- Overdose affects include high blood pressure, agitation, confusion, seizures
- Stimulants tend to be highly addictive



# *Controlled Substances* *–Stimulants*

<b>Drug</b>	<b>Characteristics of Drug Overdose</b>
<b>Amphetamines (speed)</b>	High blood pressure, rapid heart rate, agitation, irregular heartbeats, stroke, seizures, coma, death
<b>Cocaine/ crack cocaine</b>	Dangerous rise in body temperature, sweating, tremors, seizures, irregular heartbeats, stroke, confusion, heart attack, bleeding in the brain, death
<b>Methamphetamines</b>	Dangerous rise in body temperature, profuse sweating, confusion, rapid breathing, increased heart rate, dilated pupils, high blood pressure, kidney failure, bleeding in the brain, death

# *Controlled Substances*

## *–Anabolic Steroids*



- A chemical structure similar to testosterone
- Promote cell and tissue growth increasing bone mass and body muscle.
- Popular with weightlifters, bodybuilders, and other athletes
- What are some of the negative side effects?

# *Controlled Substances*

## *–Depressants*



- Affects the central nervous system by increasing the activity of the neurotransmitter GABA
- Increased GABA causes drowsiness and slowed brain activity
- Relieves anxiety and produces sleep
- Side effects include slurred speech and loss of coordination
- Mixing depressants with alcohol and other drugs increases potency and health risks

# *Controlled Substances*

## *–Alcohols*



- What are the classic symptoms of a hangover?
- What is the effect of alcohol on the central nervous system?
- What can chronic alcohol abuse cause?





# *Controlled Substances –Pesticides and Heavy Metals*

<b>Drug</b>	<b>Characteristics of Drug Overdose</b>
<b>Pesticides</b> (e.g., DDT, aldrin, dieldrin)	Interferes with the movement of nerve impulses and muscular contractions; anxiety, seizures, twitching, rapid heart beat, muscle weakness, sweating salivation, darrhea, tearing, coma, and death
<b>Lead</b>	Nausea, abdominal pain, insomnia, headache, weight loss, constipation, anemia, kidney problem, vomiting, blue discoloration along the gum line, seizure, coma, and death
<b>Mercury</b>	Acute poisoning from inhalation causes flu-like symptoms, muschle aces, and stomach upset; chronic poisoning causes irritability, personality changes, headache, memory and balance problems, abdominal pain, nausea and vomiting, damage to the gums, nouth, and teeth. Long-term exposure can cause death.



# *Controlled Substances –Pesticides and Heavy Metals*

<b>Drug</b>	<b>Characteristics of Drug Overdose</b>
<b>Arsenic</b>	Within 30 minutes of ingestion produces abdominal pain, severe nausea, vomiting, diarrhea, muscle cramps, convulsions, kidney failure, delirium, and death. Chronic exposure produces skin lesions, headache, personality changes, nausea, vomiting, diarrhea, convulsions, and coma.
<b>Cyanide</b>	Overdose can be fatal 6-8 minutes after ingestion. Rapidly causes weakness, confusion, coma, and pink skin from high blood oxygen saturation. Produces an almond-like odor.
<b>Strychnine</b>	Enters the body by inhalation or absorption through eyes or mouth. Produces, within minutes, body spasms, temperature rises, violent convulsions, and death.

# *Controlled Substances –Bioterrorism Agents*



## **Ricin**

- A poisonous protein in the castor bean
- Lethal in extremely small amounts
- Enters the body in various ways:
  - inhaled as a mist or a powder
  - ingested as food or drink
  - injected into the body
- Causes death within a few hours

# *Controlled Substances–Bioterrorism Agents*



## **Anthrax**

- Bacillus anthracis, which forms endospores
- Spreads to humans from infected animals
- Enters the human body through:
  - Inhalation; causing breathing problems that usually result in death
  - Ingestion; becoming fatal in 25% to 60% of cases
  - Absorption via the skin; leading to death in about 20% of untreated cases