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Unit 11: Drugs & Toxicology

By the end of the unit, you will be able to:

- Describe the difference between intoxicants and poisons
- Discuss the different types of poison/intoxicants
- Discuss how to collect valuable evidence
- Describe the different tests used to identify various poisons/intoxicants

Unit Vocabulary:

- Toxicology:
  _____
- LD_{50}:
  _____
- Intoxicant:
  _____
- Poison:
  _____
- Biotransformation:
  _____
- BAC:
  _____
- Presumptive tests:
  _____
- Confirmatory tests:
  _____
- Gas chromatography:
  _____

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What is toxicology?

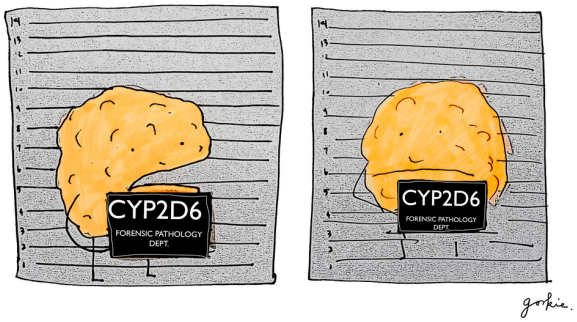
- Toxicology is the study of the combination of _____ and _____ that deals with _____ _____ and how these substances effect _____
- Types:
  - Environment: air, water, soil
  - Consumer: foods, cosmetics, drugs
  - Medical
  - Clinical
  - Forensic

What is a toxicologist?

- A toxicologist is a person responsible for detecting and identifying the presence of _____

Toxicology Used to Prove a Case

- Prove a crime was committed
- _____
- _____
- Access to _____
- Access to _____
- Death was _____
- Death was caused by poison



Forensic Toxicology

- _____: medical examiner or coroner
- _____ - motor vehicle accidents (MVA)
- _____ – drug testing
- _____ – humans and animals
- _____ – industrial, catastrophic, terrorism

How much is too much?

- The degree of toxicity of any substance depends on how much enters your body and over a period of time it does so

Aspects of Toxicology

- _____
- Chemical or physical _____ of the substance
- _____into the body
- Body weight and physiological conditions of victim (including age and gender)
- The time period of exposure
- _____in the body or in the dose

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What is a lethal dose?

- _____ refers to the dose of a substance that kills _____ _____ usually within _____
- Testing is usually done on _____ that compare well to the _____ of humans
- Expressed in _____ of substance per _____ of body weight

Toxicity Classification

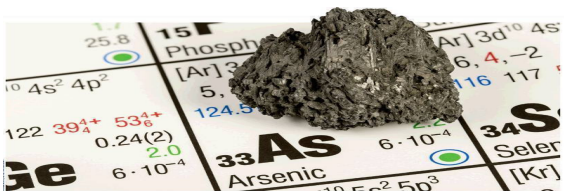
LD_{50} (rat, oral)	**Correlation to Ingestion by 150-lb Adult Human**	**Toxicity**
<1 mg/kg	A taste to a drop	Extreme
1-50 mg/kg	To a teaspoon	High
50-500 mg/kg	To an ounce	Moderate
500-5,000 mg/kg	To a pint	Slight
5-15 g/kg	To a quart	Practically nontoxic
Over 15 g/kg	More than 1 quart	Relatively harmless

Intoxicant vs. Poison

- _____:
  - Requires a _____ amount to be ingested to be lethal
    - Example: _____
- _____:
  - Requires a _____amount to be ingested to be lethal
    - Example: _____

The Father of Toxicology

- Mathieu Orfila
- Studied mostly _____ (the poison of choice in the 1800's)
- Found in _____– favorite murder method of the poor



The Marsh Test

- A test developed in _____ by James Marsh that was very sensitive for detecting _____
- Not used much anymore because of technological advancements

Looking for Poison?

- Most poisons _____the body
- The _____won't notice poisoning is most cases until _____ _____ in the lab

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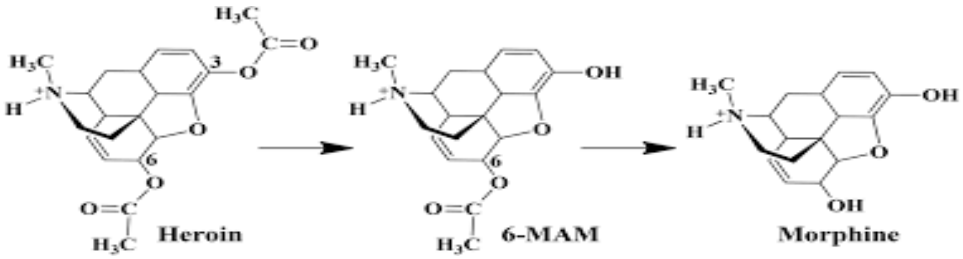
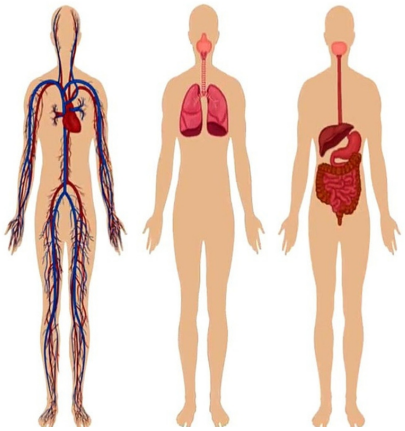
Biotransformation

- The _____ of chemicals by the body in order to _____ it
- Example: _____
- If you look for heroin in the body…good luck finding it
- Heroin is broken down by the body into _____
- If you find morphine, you found signs of heroin use
- The products are called _____



Where should the samples be collected from?

- Where the chemicals _____
- Where the chemical _____
- Along the _____

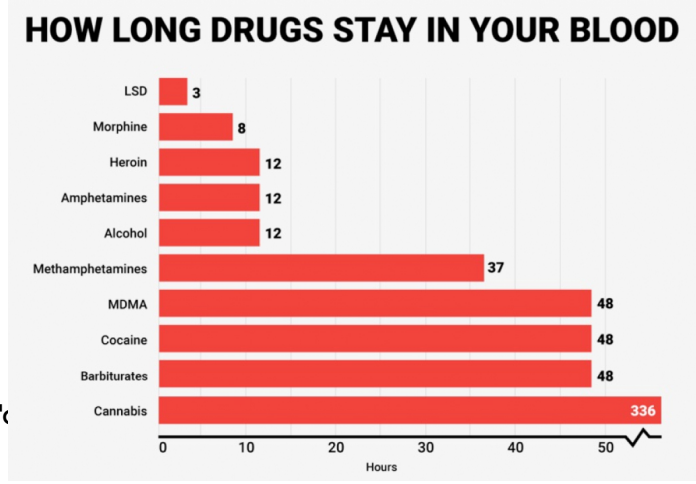


Where do the toxins go?

- _____ : Appear in the stomach, intestines, or liver
- _____: concentrated in the lungs
- _____: concentrated around the injection site
- _____: high concentrations in bloodstream and low concentrations in stomach and liver
- The drugs _____as they are directly absorbed into the blood

What is the best sample to search for poisons?

- _____
  - Most useful tool
  - Shows _____ and _____
  - Blood levels show what was going on at the _____



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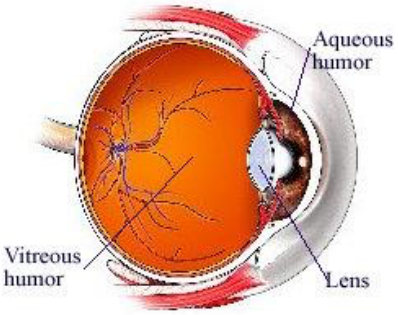
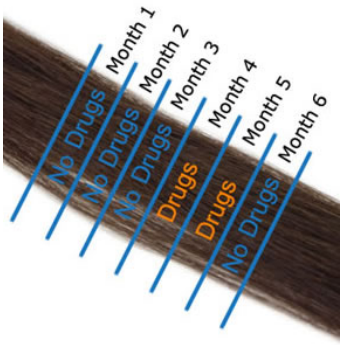
- _____
  - _____ to obtain
  - _____ concentrations
  - _____ are along the _____
- _____
  - Digestions stops at the _____ _____
- _____
  - The _____of your body
  - Can reflect level of toxins that even the _____ may not reveal
- _____
  - _____
  - Very slow to decay so it will retain toxins even longer than most other organs
- _____
  - Chemicals take about _____to show up in the core of the hair shaft
  - _____
- _____
  - Toxins can accumulate in the bodies of insects that feed off _____





Determining Manner and Cause of Death

- _____:
  - ex: heart attack
- _____:
  - ex: children eating random things, mixing dangerous chemicals
- _____:
  - ex: CO poisoning, overdose
- _____:
  - ex: purposeful tampering, weapons

Symptoms of Poisoning

- _____
  - Characteristic burns around the lips and mouth of victim
- _____
  - Red or pink patches on the chest and thigh
- _____
  - Black vomit
- _____
  - Greenish-brown vomit
- _____
  - Seizures, burnt almond odor
- _____
  - Diarrhea, vomiting, blood in the urine, cramping muscles, stomach pain, and convulsions
- _____

- Nausea and vomiting, unconsciousness possibly blindness

Alcohol

- One of the _____abused drug
- _____- are directly proportional to the degree of intoxication
- Expressed in _____(# grams of alcohol/100 mL blood)
- Acts on _____favoring the brain
- Blood carries alcohol to all cells in the body, but mostly the _____ of your body

Alcohol Absorption

- Alcohol is absorbed through the _____
- The _____ of absorption depends on
  - Total time to _____
  - Alcoholic _____
  - _____ consumed
  - Body _____
  - Stomach _____

Presumptive Test – Alcohol

- _____
- _____
- Nystagmus
- Pupil dilation
- Walk and turn (heel to toe)
- One leg standing (and counting)
- Finger to nose
- Each which listening to instructions

Alcohol and the Law

- You may think that giving into a breathalyzer test violates your Fifth Amendment but you are not testifying against yourself.
- Giving physical evidence such as blood samples, physical measurements, photographs and fingerprints are not viewed as self-incriminating.

Other Common Poisons

- _____
  - One of the most lethal chemicals known
  - Used for execution
  - Causes a bright cherry red blood
- _____
  - Rat poisons
  - Causes so much pain that it is rarely used in suicide
- _____
  - Antifreeze - a favorite (deadly) beverage among alcoholics when they can't get ethanol

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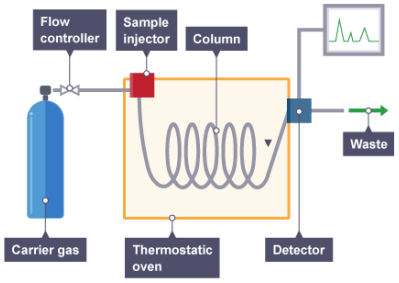
- _____
  - Arsenic, mercury and lead
- _____
  - lifesaving for diabetics but deadly overdoses
- _____
  - Strong alkalis (lye…NaOH) (bases)
  - Acids (HCl, H_2SO_4)
    - burn the mouth, esophagus, and stomach

Presumptive Tests for Poisons and Intoxicants

- _____– opium and derivatives
- _____– Marijuana (THC)
- _____– LSD
- _____– Cocaine
- _____– Barbituates
- *** These are all color changing tests for detection.

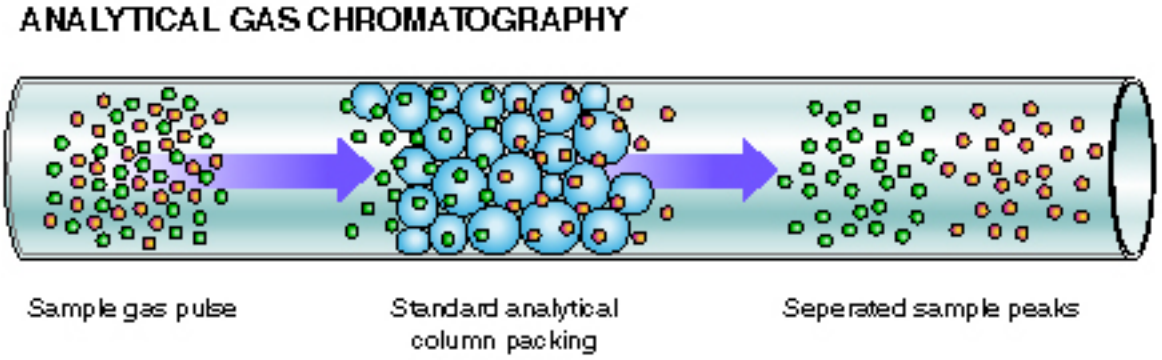


The Confirmatory Tests

- _____is by far the _____ for toxins and poisons.
- _____is next

Gas Chromatography

- The GC separates the sample into its components, while the MS represents a unique "fingerprint" pattern that can be used for identification.
- Once the drug is extracted and identified, the toxicologist may be required to provide an opinion on the drug's effect on an individual's natural performance or physical state.



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Daily YOYO Sheet

Week of: _____

Directions: Write the answer to the YOYO in the correct box below.

Date:_____
Date:_____
Date:_____
Date:_____
Date:_____

Name: _____ Per: _____ Date: _____

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