

# Understanding The Testing Procedure Toxicology Part4

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# Introduction

- Literally thousands of drugs and chemicals are harmful, addictive, or lethal – what a headache for the forensic toxicologist!
- An understanding of the circumstances surrounding a death is of utmost importance to determine how and why it happened.
- Clues at the crime scene often point to a particular drug or poison.



# Introduction Continued

- For Example:
- Finding a young girl on her bed at home with an empty pill bottle at her side would lead to one avenue of testing, and finding a long term addict in an alley with fresh needle marks would point to another path.
- The more clues that the circumstances of the death can supply, the narrower the field of possibilities the toxicologist must consider.





# Testing

- When testing for drugs, toxins, or poisons, the toxicologist typically follows a two-tiered approach:
- Presumptive Tests: are used for the initial screening and typically are easier and cheaper to perform. When negative, they indicate the drug or toxins in questions are not present, and the toxicologist does not need to perform further testing for it.
- Confirmatory Tests: are used only after presumptive tests find the possible presence of a drug or toxin. They're more expensive and time consuming but they establish the identity of the specific drug present.



# Presuming The Results

- Screening or presumptive testing, comes in many varieties. Common toxicological screening tests include the following:
- Color Tests: are chemical tests in which reagents is added to a substance being tested. The color change results from a chemical reaction between the drug and the reagent mixture. These tests are cheap, easy, and quick, and they determine whether a specific chemical or class is present in the materials being tested.





# Immunoassays

- Immunoassays involve an antigen-antibody reaction. The substance being sought is the antigen, and the testing reagent is the antibody.
- An antibody reacts only with the antigens that it recognizes and ignores all others.
- In this test, the toxicologist adds an antibody that can specifically identify the suspected substance to the sample.
- For example, if blood is to be tested for amphetamines, the toxicologist adds an antibody specific to amphetamines to a sample of the blood. A reaction gives him a positive result.



# Confirming The Results

- A good confirmatory test is sensitive and specific, recognizes the chemical in question and can identify it to the exclusion of others.
- After a chemical has undergone a screening test and the toxicologist has established a presumptive identity of the unknown substance.
- The most important confirmatory test used by the toxicologist is Mass Spectrometry (MS).
- In the Forensic Science Laboratory, MS usually is use in concert with gas chromatography, often referred to (GC/MS).
- In GC/MS, the GC separates the test sample into components, and MS identifies each of those components.
- Infrared Spectroscopy also determines the chemical fingerprint of the substance being tested but exposes the substance to infrared light instead of electrons. When exposing to infrared light, each compound transmits, absorbs, and reflects the light in its own unique pattern. These unique patterns determine which compounds are present and thus identify the chemical substance being tested.





# Interpreting The Results

- After testing reveals the presence and concentration of a chemical substance the hard work starts.
- The toxicologist must determine the route of each chemical, determine the concentration of the drugs and the impact each of the drugs had in the physiology and behavior or death.
- The route of entry of a toxin is very important.
- If the drug was injected into a person who had no means of injecting it or into a sire that makes self-administration unlikely, homicide may be a stronger consideration.
- In general, the concentration of these drugs or poisons is greatest at the sight where it was administered.





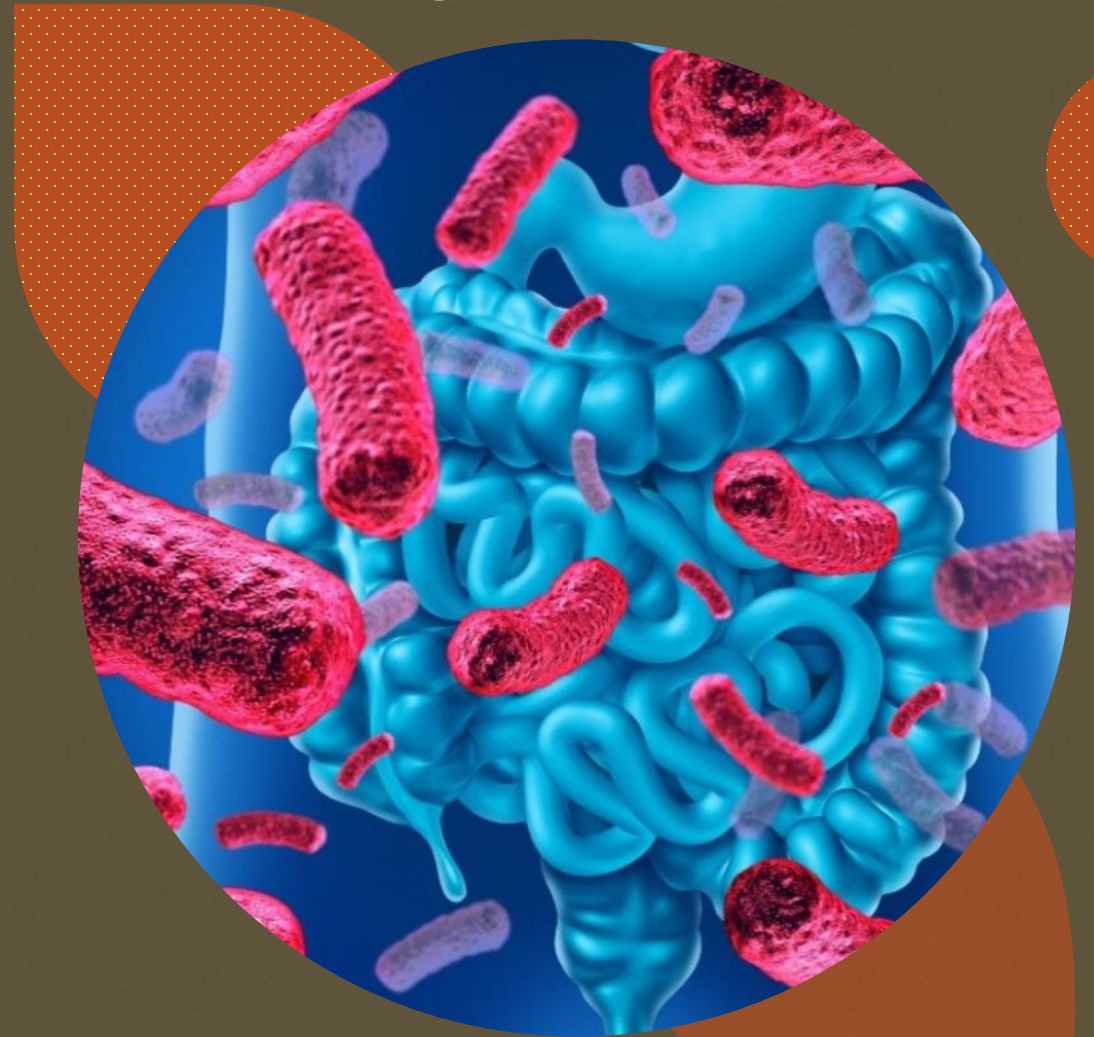
# Administration Sites

- Ingested toxins show up in the stomach, intestines and liver.
- Inhaled gases are concentrated in the lungs.
- Toxins that are injected intramuscularly linger in the tissues around the injection site. Drugs injected into the muscle are slowly picked up by the blood and transported through out the body.
- Drugs that are given intravenously bypass the stomach and liver, entering the blood stream directly. Thus they're quickly distributed throughout the body, and none remains at the injection site. You would expect to find high concentrations in the blood and in multiple tissues of the body but little or nothing in the stomach and liver.



# Administration Sites Continued

- Finding a large amount of a toxin in the stomach of a victim does not necessarily mean that the drug was the cause of death; it may not yet have been absorbed into the blood and distributed to the body.
- Thus, the concentration of toxins in the blood is more important than the amount in the stomach.
- The toxicologist must see evidence that the drug was absorbed before he can attribute harm or death to the drug.
- After determining a blood level of a certain chemical, the toxicologist assigns the level one of these broad categories.





# Levels

- Normal: This level is the one that is expected in the general population under normal circumstances.
- Therapeutic: This is the level that your doctor wants you to reach when you are taking a prescription drug.
- Toxic: A toxic level is one that may cause harm, - nausea, vomiting or drastic change in the hearts rhythm, for example – or death.
- Lethal: This is the level at which the drug in question consistently causes death. In toxicology, the term LD50 describe the chemical's lethal potential.





Thank You For  
Your Attention!

