1.16.13

Bellwork: Objectives

- Why are white blood cells not useful in determining blood type?
- I will...
- Describe how to screen for the presence of human blood.
- Compare and contrast presumptive tests and confirmatory tests for blood.

Blood typing through Questions

- Turn in homework—pass them to the front

Forensic Characterization of Bloodstains

Three questions that must be answered by the forensic investigator:

1) Is it blood? Use presumptive tests:
   - Kastle-Meyer
   - Luminol
   - Hemastix
2) Is it human blood?
   - Precipitin Test
3) Can it be associated with an individual?
   - DNA & A-B-O Blood Typing

Is It Blood? Presumptive Tests for Blood

Presumptive tests rely on hemoglobin’s ability to catalyze the oxidation of certain reagents, usually resulting in a color change. Oxidizing agent is usually H₂O₂.

**What is a presumptive test??**

- a test that shows if it is or is not blood.

Presumptive tests for Visible Stains

- **Kastle Myer (K-M):** solution of phenolphthalein is applied to suspected blood stain, followed by hydrogen peroxide. A bright pink color indicates the presence of blood.

Kastle Myer Test Components

- **1- alcohol:** Ethyl Alcohol is used to increase sensitivity to the test. “Cleans up” the area in and around the bloodstain to better expose the hemoglobin
- **2- Phenolphthalein:** An indicator solution, which when exposed to Oxygen will turn pink.
- **3- Hydrogen Peroxide:** H₂O₂ (water with an extra O), is a chemical oxidant
Presumptive tests for Visible Stains

- Hemastix: rub the Hemastix on a moistened stain or across a swab that has a suspected dried blood sample on it. The reagent coated tip will turn a shade of green if hemoglobin is detected. If the reaction is positive, take a photograph of the strip by the substance to document the reaction and retain the strip as evidence.

Presumptive test for Invisible Stains

- **Luminol**: alkaline solution containing luminol & hydrogen peroxide is sprayed onto area. If blood is present, it will glow. Must be viewed in darkness and photographed quickly.

Luminol

- Red blood cells contain hemoglobin (Hb) – the protein responsible for transporting oxygen
- Each Hb contains four iron (Fe) containing hemes

Do not copy

False Positives

Blood is not the only material that will cause reagents to change color.

- Horse radish & potatoes can also give positive results (these are unlikely to be at a crime scene, though).
- Luminol can give false positive results when exposed to household bleach, some metals, and some vegetables.

Results must be confirmed with Precipitin Test.

Confirmatory Tests

Once a presumptive test indicates a stain may be blood, the serologist must confirm that it is human blood.

**Precipitin test** identifies the presence of proteins that are found only in human blood.

**Precipitin Test Procedure**
- animal (usually a rat or rabbit) is injected with human blood
- animal’s blood forms antibodies
- antibodies are harvested from animal’s blood serum (“antiserum”)
- in a test tube, an extract from the suspected bloodstain is added to the antiserum
- if a precipitate forms where the two meet, it is human blood
Why is it important to determine if a suspected bloodstain is blood at all?