

Forensic Science Midterm

- Homicide –occur by the hand of someone other than the dead person
- Suicide –caused by the dead person’s own hand
- *Undetermined

Forensic Pathology-The study of disease & tissue injury by scientific methods

Duties of a forensic pathologist:

- Reviewing Medical History
- Reviewing Witness Statements
- Scene Examination
- Autopsy Examination - Macro and Micro
- Photography - usually by police
- Report Preparation and Testimony
- Obtaining of appropriate specimens - toxicology, trace, DNA

The term "autopsy" derives from the Greek word “to see for oneself”. "Necropsy" is from the Greek for "seeing a dead body". There are two types of autopsies:

Forensic: This is done for medical-legal purposes and is the one that is normally seen on T.V. or in the news

Clinical: This is usually performed in hospitals to determine a cause of death for research & study purposes.

The body is received at Pathology Unit or hospital in a body bag or evidence sheet. If the autopsy is not performed immediately, the body will be refrigerated in the morgue until the examination. After the body is received, it is first photographed. The examiner then notes the kind of clothes and their position on the body before they are removed. Next, any evidence such as residue, flakes of paint or other material is collected from the external surfaces of the body. Ultraviolet light may also be used to search body surfaces for any evidence not easily visible to the naked eye. Samples of hair, nails etc. are taken and the body may also be X-rayed.

At this point, a general description of the body is made. All identifying features are noted including: Race, sex, hair color and length, eye color, approximate age, any identifying features (scars, tattoos, birthmarks, etc.) *the deceased must first be identified:

External Examination:

- Bruises - injuries that do not break the skin; show discoloration of the skin
- Abrasions - the rubbing away of skin by friction
- Stab Wounds
- Lacerations - a torn ragged wound
- “Clean Cuts”
- Sharp Force Injuries
- Gunshot Wounds - entry wound (small circular wound) and exit wound (large with intermingled tissue)
- Strangulation - abnormalities in trachea
- Fractures – simple and compound

TIME OF DEATH

- Rigor mortis (the stiffness of death) refers to the state of a body after death, in which the muscles become stiff. It commences after around 4 hours, and gradually dissipates until

Polygraph Procedure

Pretest – A short interview between the examiner & examinee, where the two individuals get to learn about each other. This may last about 1 hour. It acquaints the subjects with the effectiveness of the technique (less nervousness). It assesses the suitability of the subject (i.e. physical ailments, low intelligence, and use of medication). It helps the interviewer formulate test questions for the in-test.

Design questions - The examiner designs questions that are specific to the issue under investigation and reviews these questions with the subject.

In-test - The actual exam is given. The examiner asks 10 or 11 questions, only three of four of which are relevant to the issue or crime being investigated.

Post-test - The examiner analyzes the data of physiological responses and makes a determination regarding whether the person has been deceptive.

LINES of Questioning:

Originally, lies were “detected” using a procedure termed the R/I (Relevant/Irrelevant) procedure. This procedure involved asking the suspect a set of questions that included some that were relevant to the investigation (“Did you kill professor Mustard?”) & some that were irrelevant (“Did you ever have a dog?”). The notion was that guilty or lying subjects would show much stronger emotional reactions to relevant than to irrelevant questions, whereas innocent suspects should not. The problem was a high false positive rate due to the fact that the machine cannot discriminate one negative emotion (fear/nervousness) from another (guilt/ deception).

Polygraph procedures were revised in the 1940s as the result of a man named John Reid, & his Control Question Test (CQT)

- Uses control questions that are designed as a stimulus for the truthful subject. Generally, the truthful subject will react greater to these questions than the relevant ones because they pose a greater threat.

The GKT (Guilty Knowledge Test)

- Important knowledge has not been disclosed to the public and only the perpetrator would know about it and would react to it.

Problems with the tests:

- With respect to the guilty knowledge test, it is only useful when information about the crime is highly protected and, even then, it only shows the person possesses the knowledge, not that they actually did the crime (they may know the criminal).
- In all cases, the reading of polygraph results is still more of an art than a science, and different experts may differ in their analyses.
- Finally, this all rests on the notion that a guilty person will show an emotional response to these questions ... some may either not feel bad about their crime, or they may learn not to respond to it.

Common Countermeasures:

Often, people who are being given a polygraph exam will employ certain countermeasures in an attempt to beat the instrument. There are Web sites and books that instruct you on how to fool the polygraph. Examples include: Sedatives, Antiperspirant on fingertips, Tacks placed in the shoe, & Biting tongue, lip or cheek.

The idea of countermeasures is to cause (or curtail) a certain reaction that will skew the test's result. A subject may attempt to have the same reaction to every question so that the examiner cannot pick out the deceptive responses.

2. Illicit Drugs or Drugs of Abuse - are licit drugs with desirable psychoactive effects or side effects that are abused OR are naturally occurring or semi-synthetic substances that have pleasurable psychoactive effects that are abused.

- E.g. Oxycontin, heroin, LSD, Cannabis

3. Poisons - compounds with harmful or toxic effects

- E.g. carbon monoxide, cyanide

PHARMACOLOGY- is the study of drug action

- Pharmacokinetics: is the study of how drugs move into and out of the body.
- There are 4 processes:
 - ABSORPTION-how drugs are introduced into the body. Can be through gastrointestinal tract (oral), intramuscular, intravenous, rectal, topical (thru skin), subcutaneous (under the skin) and lungs (inhalation).
 - Effects can be rapid or prolonged depending upon the route of absorption and the how the drug is formulated (i.e. some are sustained release)
 - DISTRIBUTION- Involves the mechanisms by which drugs get to their site of action. Mostly through the bloodstream.
 - METABOLISM-The process whereby a drug or other substance is chemically changed to a different form, called a metabolite. Metabolism may have different purposes: the primary purpose is to create a compound (s) that may be more water soluble, and therefore easier to eliminate
 - ELIMINATION-the ways that drugs are removed from the body, usually by excretion in the urine and feces. Other forms of elimination include respiration and perspiration.
- "Pharmacodynamics: is the study of the physiological effect of drugs on the body or what the "drug does to the body"
 - ABUSE- drug abuse occurs when people take drugs for purposes other than for which they are intended.
 - DEPENDENCE: Addiction & Withdrawal-physical dependence results in a withdrawal syndrome if the substance used is stopped. It includes high temperature, physical discomfort and could be fatal.
 - TOLERANCE-a phenomenon whereby the body's organ systems adapt to a drug. Therefore, increasing doses are necessary to achieve an equivalent psychoactive effect.
 - SYNERGISM: the total effect on the body of two or more drugs taken together is greater than the effects would be if the drugs were taken separately. Drugs work together to magnify effects or create effects that would not have occurred otherwise. An example would be alcohol and Valium

Forensic Toxicology: What type of samples do we work with?

- Most common fluids heart blood, femoral blood and urine
- Less common samples Vitreous fluid, Liver tissue, Stomach contents
- The samples come from medical/legal autopsies

How do we analyze biological fluids for drugs and alcohol?

- For drugs:
 - Extract the drugs from the biological samples using some form of solvent extraction
 - E.g. toluene, methanol, methylene chloride, water
 - Instrumental analysis: Gas chromatograph (GC), Mass spectrometer (MS), Liquid chromatograph (LC), and LC-MS/MS