Unit #3

Time of Death

What is death?

- No breathing
- No blood flow to heart
- No pulse
- No brain activity
death = cessation (end) of life
   - "irreversible cessation of circulation of blood"
   - cessation of brain activity

-no oxygen to cells = body begins to fail, cells die
Manner of death:

4 ways to die:
  a. natural death
  b. accidental death
  c. suicidal death
  d. homicidal death
  *e. undetermined
Natural Death:

cause = interrupted and failure of body functions due to age or disease

Ex. heart failure
  stroke
  kidney failure

*most common method
Accidental Death:

Cause- unplanned event causes death

Ex. car accident
drowning
electrocution
falling from a roof
Suicidal Death:

Cause - person purposefully kills themselves

Ex. overdose
  gunshot
  hanging
  jump in front of train
Homicidal Death:

Cause - one person kills another

Ex. stabbing
gunshot
strangulation
*Unknown or Undetermined

medical examiner determines death doesn't fit into other categories based on what they find
Cause of Death:
- reason someone dies

Ex. causes of death by homicide:
  bludgeoning
  shooting
  burning
  drowning
Proximate cause of death:
refers to underlying cause

Ex. exposure to radiation leads to cancer

Proximate cause = radiation
cause of death = cancer
Mechanism of death:

-specific change in body that brought about death

Ex. if a hanging (cause of death)
mechanism = suffocation, broken neck

Cause and mechanism may be listed by coroner

Ex. "massive trauma to the body leading to pulmonary arrest"
How do forensic examiners determine time of death?
Livor Mortis = "death color"

- after death, body decomposes

- blood seeps out of tissues and due to gravity, settles to lower body parts

- Hemoglobin turns purple - purple color where blood pools
- begins within 2 hours after death

- permanent after 8 hours

- If skin discolored, but turns white if touched, lividity is not complete, body dead between 2-6 hours

Dual lividity - if body moved after death
Livor mortis

What position was the body in?
Rigor Mortis: Stiffness of death

-not all cells die at the same time

-muscle cells respire by anaerobic fermentation
  - forms lactic acid
  - cells that contract release calcium
  - calcium binds to actin binding sites
  - allows myosin protein heads to attach to actin protein
  - if person dies, calcium gets stuck in binding position and myosin will not release
Stages of Rigor mortis:

**Onset**: 2 hours after death
begins in eyelids, face and neck

**Peak rigor**: 12 hours after death

**Loss of rigor**: between 12-36 hours

**No rigor**: after 36 hours
What factors do you think might affect rigor mortis?

- temperature
- body build
- calcium deficiencies
Factors affecting rigor:

1. ambient temperature
   cooler air then the slower the onset
   warmer air then the faster the onset
2. Clothed body = faster rigor
3. if person exercising prior to death, onset is faster due to lactic acid in muscles already there
4. person's weight - body fat slows rigor mortis
   -fat has extra oxygen
5. Illness: if person has a temperature, rigor is faster

6. Sun exposure: body exposed to sunlight, rigor is faster
Algor Mortis: Temperature of death

- insert thermometer into liver

- loss of body temp. = 1.4 degrees F/hour for first 12 hours

Ex. 1.4 degrees/hr × 12 hrs. = 16.8 degrees lost in first 12 hours

\[ 98.6^\circ F - 16.8^\circ F = 81.4^\circ F \]

So what would the body temperature be?
After first 12 hours = body cools at rate of 0.7 degrees F/hr.

If body has been dead for 16 hours, what would you expect the body temperature to be?

\[
\begin{align*}
98.6^\circ F - 16.8^\circ F &= 81.4^\circ F \\
0.7^\circ F/hr \times 4\ hrs &= 2.8^\circ F \\
\hline
78.6^\circ F
\end{align*}
\]
What factors do you think affect heat loss?
Factors that affect heat loss:

1. cooler air temp, body loses heat faster
2. warmer air temp, body losses heat slower
3. If body clothed, heat loss is slower
4. If body overweight, heat loss slowed
5. If body thin or very small, heat loss is accelerated
6. In water, body cools faster than as on land
Stomach contents:

- digestive tract is examined during autopsy
- if known when person last ate - can estimate time of death

-Stomach -
food present 4-6 hours after consumption
-Sm. Intestine - food present at least 12 nrs.

Ex. If food in intestine
- was in stomach for 4-6 hrs. + 12 hours in intestine = 16 hours
-Large intestine - food is totally processed after 24-48 hrs. after meal ingested

Variables: amount of food eaten
temperature of food
type of food
  (fats = longer to digest)
activity level of person
Changes in eyes

- Surface of eye dries out
- If open, thin film within 2-3 hrs.
- If closed, thin film within 24 hrs.
- Potassium accumulates in the vitreous humor of eye
- Can also use this for time of death (still experimental)