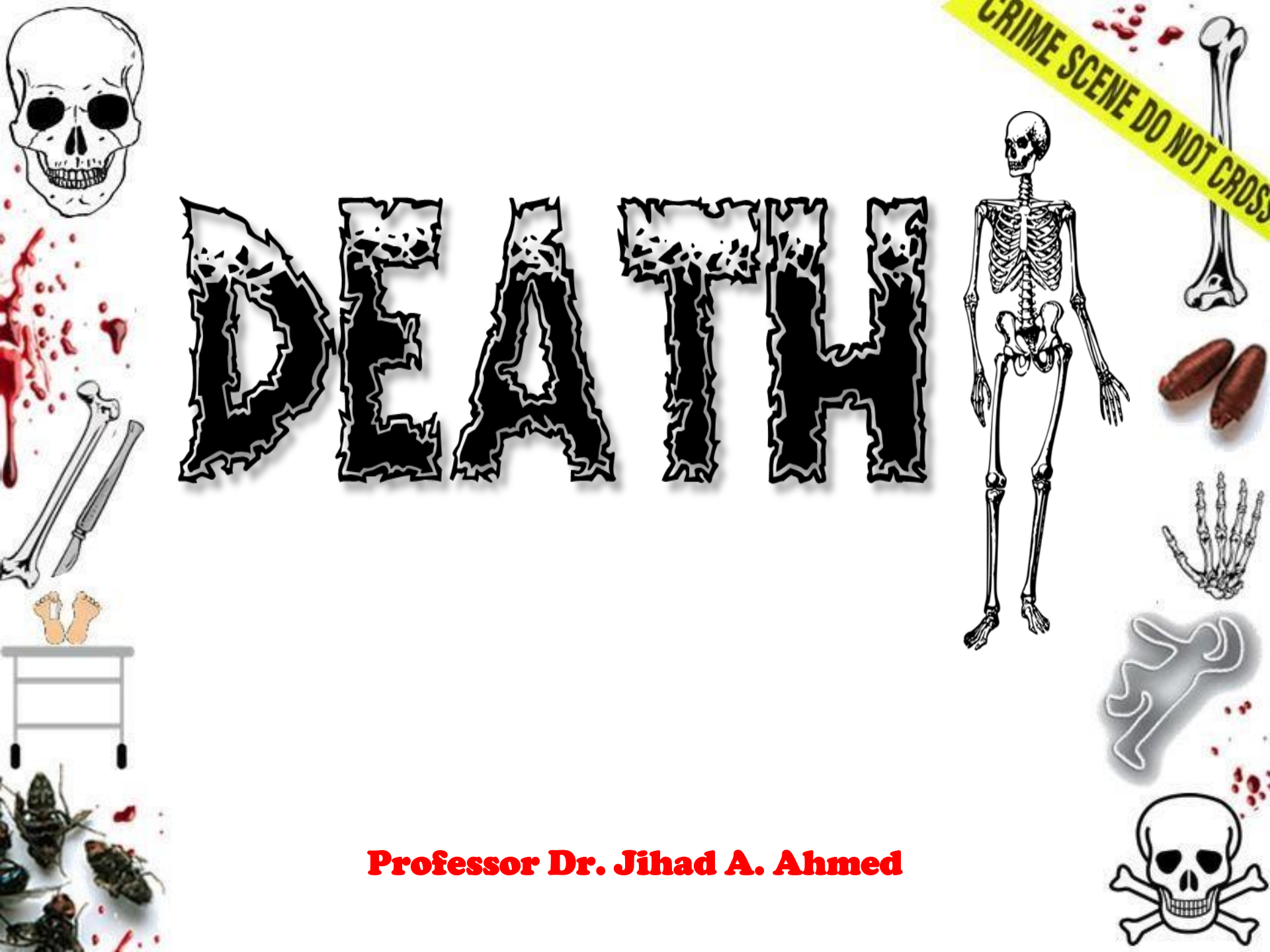



Professor Dr. Jihad A. Ahmed

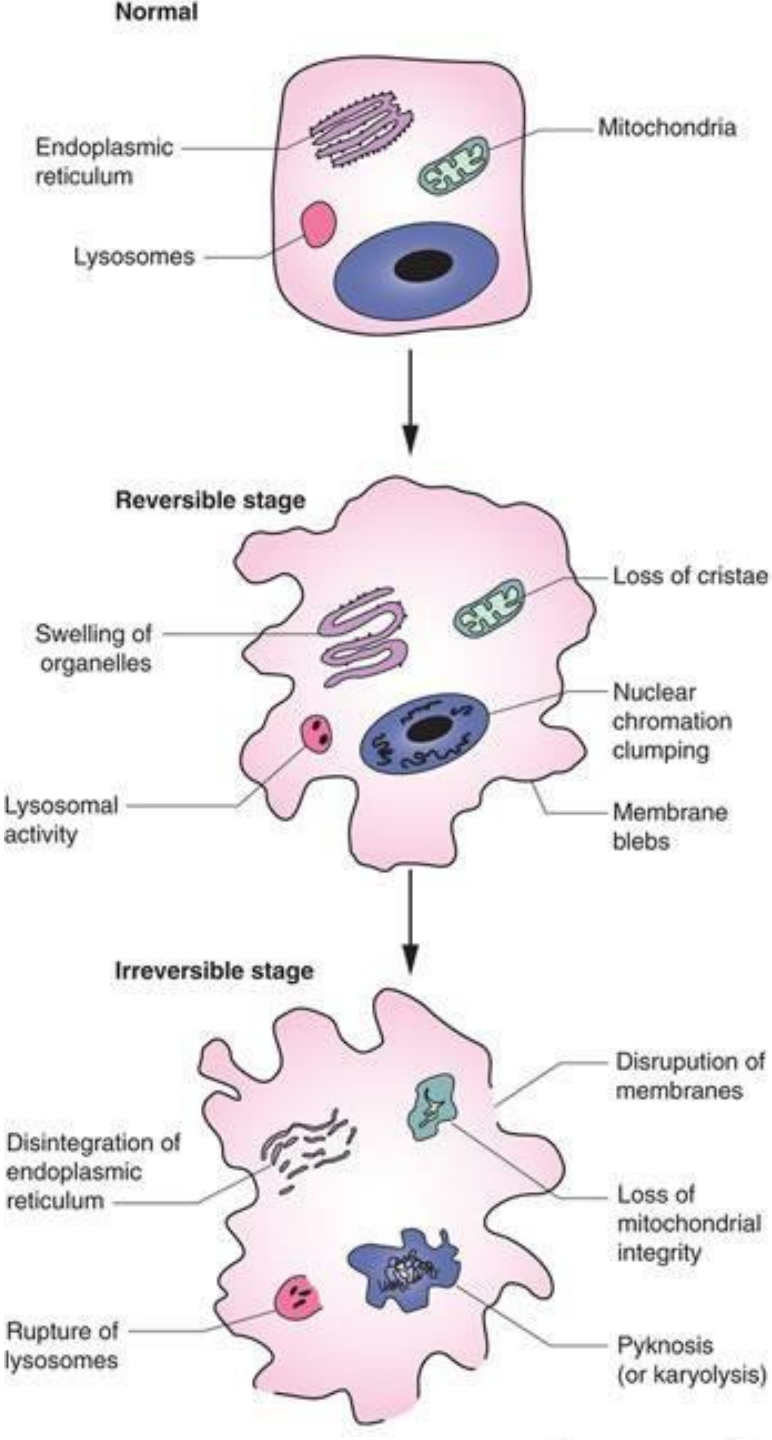
# Death

a. Death is the **cessation** or **end** of life.

b. It is characterized by **irreversible** stopping of blood **circulation** and **brain** activity.

c. When the heart stops beating, **oxygen** is deprived from body cells and they begin to die, a process known as **autolysis**.

   i. Once enough cells die and begin to break down, life cannot be restarted.



# Autopsy

In cases of suspicious or unnatural death, a pathologist conducts post-mortem examination, called an **autopsy**

i. Autopsies are conducted to determine the:

1. **Manner** of death- means by which they died
2. **Cause** of death- the reason they died
3. **Mechanism** of death- specific body failure
4. **Time** of death- when they died

# Manner of Death

Five categories of manner of death can appear on death certificates:

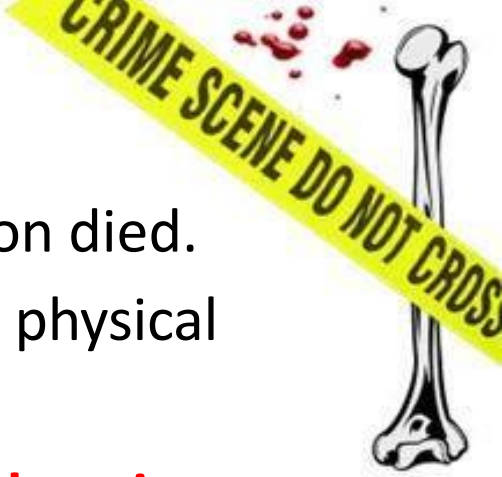
i. Natural
ii. Accidental
iii. Suicidal
iv. Homicidal
v. Undetermined

# Cause and Mechanism

a. Cause of death (COD) is the **reason** a person died.
   i. **Natural** causes include disease, cancer, physical injury, stroke, heart attack etc.
   ii. Homicidal and suicidal causes include **shooting**, **burning**, poisoning, hanging, drowning, suffocation, etc.

b. '**Proximate** cause of death' refers to an **underlying** cause of death, as opposed to the final cause.
   i. For example, if someone is exposed to large amount of radiation then develops **cancer**, the proximate cause of death is exposure to radiation.

c. Mechanism of death describes the specific **change** in the body that brought about the cessation of life.




# Mechanism of Death Examples:

i. If someone has been shot, they may die from **loss** of blood, called exsanguination (**bleeding** to death).

ii. If someone has a heart attack, they may die from **pulmonary** arrest (heart stopping).

iii. If someone is strangled, they may die from asphyxiation (lack of **oxygen**).

# Time of Death


a. During an autopsy, the forensic examiner wants to determine **when** the person died.

b. A time of death helps forensic detectives include or **exclude** suspects based on their **alibis** or location at that time.

* Much information goes into figuring out the time of death

# Types of Mortis

- ***Livor mortis***
  - Death color – pooling of blood in tissues after death (*lividity*)
- ***Rigor mortis***
  - Death stiffness – stiffening of skeletal muscles after death
- ***Algor mortis***
  - Death heat – cooling of body after death









# Livor Mortis
## "death color"

As body decomposition begins, blood **settles** in the lower parts of the victim's body. Red blood cells break and release **hemoglobin**, which turn **purple** as they spill out of cells. Wherever these **pools** of blood settle, the skin takes on the purple coloring.

a. The pooling of blood is known as **lividity**.

i. Begin **2 hours** after death.
ii. Between 2-8 hours after death, the color will disappear when the skin is pressed on.
iii. After 8 hours, the discoloration becomes **permanent**.



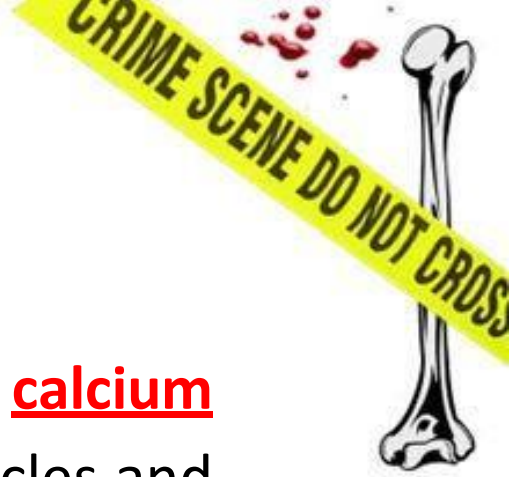


1. Livor mortis not only helps approximate time of death, but also indicates the **positioning** of the body during the first 8 hours of death.
    a. For example, if all discoloration is on the front of the body, it indicated the person was lying face **down**.
    b. Discoloration on many parts of the body can show that a body was **moved** from one location/position to another.




# Rigor Mortis

## "death stiffness"



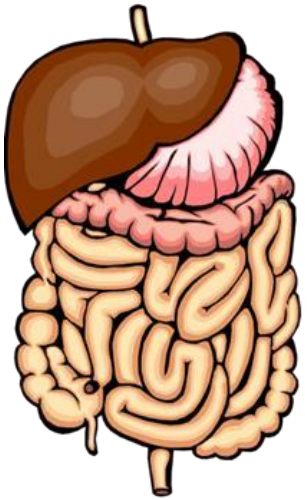

- It is caused by lack of oxygen to cells and **calcium** buildup in the **muscles**, causing stiff muscles and joints.
- Rigor mortis begins in the head about **2 hours** after death, and slowly works down the body and legs.
  - Stiffness peaks at about **12** hours.
  - As the cells **dissolve** during autolysis, the stiffness will slowly disappear.
  - Stiffness completely disappears around **36** hours.
- A dead body that is not stiff has probably been dead less than 2 hours or more than **48** hours.

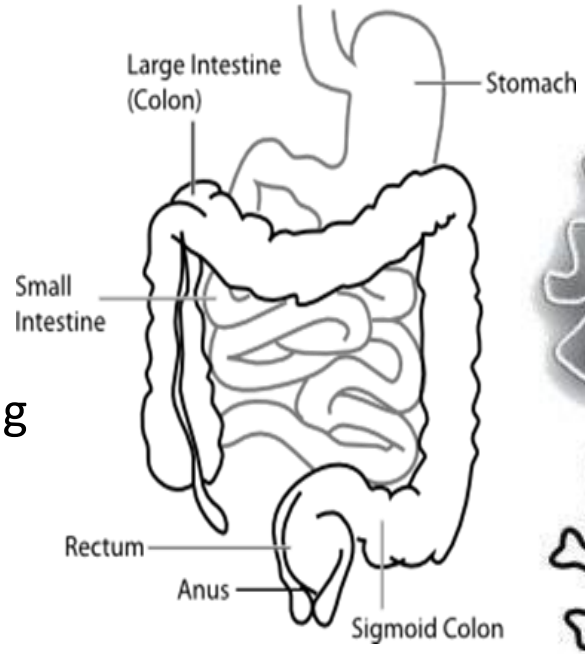
# Algor Mortis
## "death heat"

1. Describes a body's temperature **loss** after death.
2. When a person is alive, the body maintains **homeostasis** and regulates a **constant** temperature.
3. After death, the body no longer can maintain its heat and it begins to cool down.
4. To record the temperature of a corpse, forensic investigators insert a thermometer into the **liver**.
5. A body cools at a rate of about **1.4** degrees per hour immediately after death, then slows to **0.7** degrees per hour after about 12 hours, until it reaches the **same** temperature as the environment.

# Stomach and Intestinal Contents

1. Time of death can also be estimated by looking at the digestive tract and its contents.
2. It takes about:
   a. 4–6 hours for the **stomach** to empty its contents into the small intestine
   **b. 12** hours for the food to leave the small intestine.
   c. 24 hours from the time a meal is eaten until all undigested food is released from the **large** intestines
2. The location of food in the digestive tract helps scientists estimate how long after a person **ate**, that they died.





# Changes in the Eye

1. Following death, the surface of the eyes **dry out**.
2. If the eyes were open at death, a thin **film** will appear on the eyes in 2-3 hours. If the eyes are closed, it takes about **24** hours for this film to appear.

Post-mortem changes in the eye: "tache noire".

If the eyes remain open after death, the areas of the sclera exposed to the air dry out, which results in a first yellowish, then brownish-blackish band like discoloration zone called TACHE NOIRE.
It is generally seen 3 to 7 to hours after death and can disappear altogether a day or so later.

# Stages of Decomposition

Bodies begin to decompose shortly after death and do so in five predictable stages:

i. **Fresh**
ii. **Bloat** or Putrefaction
iii. **Active Decay** or Black Putrefaction
iv. **Advanced Decay**
v. **Dry Remains** or Skeletonization





# FRESH

1. Begins almost **instantly** after death.
2. Livor, rigor, and algor **mortis** occur.
3. Autolysis, or self-**digestion**, begins as lysosomes break down and release their digestive **enzymes** into the cell.
4. Visible changes caused by decomposition are limited during the fresh stage, although autolysis may cause **blisters** to appear at the surface of the skin.

# BLOAT Putrefaction

1. This stage of death is mostly due to the activities of **microorganisms**; first intestinal flora, then saprophytic bacteria and fungi.
2. Characterized by the production of **gases** which gives rise to the **bloated** appearance of the decomposing body and strong **odor**.
3. Skin turns a **greenish** color as blood decomposes.
4. Skin may break apart and **fluids** can flow out from the openings.

# ACTIVE DECAY

1. This stage is recognizable by a great loss in **mass**, due largely to feedings by **maggots** and other insects. Parts of flesh may be **black** and corpse gives off an even stronger odor.
2. As gases escape and the body leaks decomposition fluids, the body may **collapse**.
3. The end of this stage is marked by the **dispersal** of the maggots from the body.

**6-10 Days**

# ADVANCED DECAY

1. The body begins to **dry** and preserve itself; most of the **flesh** is gone.
2. Odor and insect activity **decrease**.
3. Body may form a **wax** layer known as the **adipocere**.

# DRY REMAINS

Final stage. Recognizable by a loss of everything on the body but dried up **bone**.

# Speed of Decomposition depends on many factors:

**i. Age**

- Young decompose faster than elderly.

**ii. Size** of body

- Overweight people decompose faster than average.

**iii. Clothing**

- Naked decompose faster than clothed.

**iv. Health**

- Sick decompose faster than healthy.

**v. Environmental** Conditions

- Bodies decompose fastest in **70**-**99** $^{o}$F










# Thanks for your attention