FORENSIC SCIENCE
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Putrefaction occurs at different rate in various body tissues and depends up on their moisture content. Three main changes are noticed during putrefaction as:

1. **Change in color**
2. **Liberation of gases**
3. **Liquefaction of tissues**

• **Colour changes –** colour changes is due to hemolysis of red blood cells. The liberated hemoglobin is converted into sulpmethemoglobin by hydrogen sulfide gas and imparts greenish discolouration.

• **Liberation of gases** – during the process of decomposition, the proteins and carbohydrates are split into simpler compounds. As a result, numbers of gases are liberated (vide supra). The offensive odour emitting from the dead body is due to formation of hydrogen sulfide gas and mercaptans.

The gases are collected in the intestine within 12 to 18 hours in summer and 18 to 24 hours in winter.

- **Liquefaction of tissues** – with advancement in decomposition, the organs are converted into thick semi-fluid matter.

Decomposition Changes External Signs

Putrefaction is the most absolute sign of death.

Externally, the first sign of putrefaction (decomposition) is a **greenish discoloration** of right side of abdomen over right caecal area.

Gradually the color spreads over the whole abdomen, thence on the chest and by this time a **putrid odour** becomes apparent.

The contents of caecum are more fluid and full of bacteria therefore putrefaction develops earlier. Since the caecum is close proximity with abdominal wall, the right lower abdomen stains first.

Similarly, the surface of liver in contact with caecum also shows greenish discolouration. The greenish discolouration is due to formation of **sulphmethemoglobin.**

In summer, the colour usually develops at about 12 to 18 hours and in winter it takes about 18-24 hours.

There is formation of **multiple blisters** containing air with denuded skin at places.

The features puff up due to liberating gases and become unrecognizable; the whole body becomes **bloated** and the tissues sodden with fluid and eventually liquefy and disintegrate.

The **marbling** of skin becomes prominent by 24 hours in summer whereas it is manifested at about 36 to 48 hours in winter.

The blood vessels are invaded by microorganisms. The formation of sulphmethemoglobin causes greenish-brown staining of the inner walls of the blood vessels.

The staining of blood vessel makes these vessels more prominent. The phenomenon gives rise to marbled appearance to the skin. Postmortem red coloration of teeth (pink teeth) – red coloration is due to hemolysis after exudation of hemoglobin derivatives through the dentine tubules.

As the decomposition process progresses, the peculiar odour emitted by body **attracts flying** insects, especially flies (vide infra).

After invasion of the bodies by flies, they lay eggs in 18 to 36 hours depending on environmental conditions.

They usually lay eggs near orifices. The eggs hatch within 12 to 24 hours to larvae. The larvae are also called as maggots .Maggots are voracious eaters. Moreover, maggot secrets **proteolytic enzymes** that causes more destruction and may cause difficulty in interpreting the surface injury.

Internal signs

Decomposition of internal organs depends on multiple factors such as

1. Firmness of organ

2. Moisture content of organ

3. Density of organ

4. Quantity of blood in organ

Therefore, the order of tissue decomposition in internal organ is as follows:

1. Soft tissues

2. Firm tissues

3. Hard tissues

• **Brain** – with onset of decomposition, brain becomes discoloured, soft and pinkish-grey and then it becomes pasty. Finally brain liquefies.

• **Larynx, trachea** – mucosa becomes soft and changes its colour to brownish and later to green to black.

Colliquative putrefaction – here the soft tissues and organs become entirely liquefi ed. The wall of abdomen becomes soft and burst open due to which the abdominal content protrudes out. It takes place in India in 5 to 10 days.

External Factors

1. Temperature – between 21°C to 43°C is favorable for decomposition. Decomposition is arrested below 0°C and above 50°C. Thus exposure to high temperature and low humidity accelerates the early decomposition.

2. Moisture – moisture is essential for the process of decomposition because microorganism-causing decomposition requires moisture and optimum temperature for their growth. Therefore organs containing more water decompose earlier than dry ones.

3. Air – presence of air promotes decomposition by diminishing evaporation.

4. Manner of burial – decomposition begins early in bodies buried in shallow grave. Casper's dictum is useful for a rough assessment of the rate of decomposition. It is eight times slower under soil and two times slower under water compared to air (1:2:8).

Table 7.19: Conditions that accelerate or retards decomposition

Conditions
Accelerates decomposition
- Septicemia
- Rhabdomyolysis
- Cocaine overdose
- edematous area
Retards decomposition
- Dehydration
- Massive blood loss
- Cold environment
- Embalming

Internal Factors

1. Age – bodies of children decomposes rapidly than adults. The bodies of old people do not decompose rapidly, probably owing to less amount of moisture.

2. Sex – as such sex do not have any influence on decomposition however, a female in early postpartum period may decomposes rapidly if such death is associated with septicemia.

3. Condition of body – fat and flabby bodies decomposes earlier than thin and emaciated ones.
4. Cause of death

5. Scars – the rate of decomposition is retarded in scarred areas (at scars) as these areas are devoid of blood vessels.

Medicolegal Importance of Decomposition

1. It is sign of death

2. Time since death can be estimated

3. Bloating of features due to decomposition poses difficulty in identification

4. Advanced decomposition may obliterate the cause of death.