

A. POSTMORTAL CHANGES

1. PHYSICAL CHANGES

POSTMORTAL COOLING (*algor mortis*)

- process by which the body cools as heat production stops and body heat is lost to the environment (by convection, conduction, evaporation, radiation).
- develops due to temperature equalization between the body and the environment.
- factors affecting cooling: surrounding temperature, air movement, humidity, body temperature, clothing, body location, clothing, ratio of the surface area to body mass.

POSTMORTAL PALENESS (*pallor mortis*)

- due to cessation of capillary circulation blood drains from small vessels in the skin (can be observed 15-25 minutes after death)

POSTMORTAL STAINS (*livores mortis*)

- purple-red discoloration seen on skin, due to settling of blood in the lowest parts of the body under the force of gravity (therefore usually on the back part of the body, with exception of areas compressed by the base, eg. scapular region).
- appears 30 minutes to 2 hours after death.
- first 12 hours livores blanch (fade) under pressure, next 12 hours blanch with forceful pressure, eventually they don't blanch but are fixed (due to extravasation of red cells from vessels into surrounding tissues and disintegration of red cells).

POSTMORTAL HYPOSTASIS

- accumulation of blood in the lowest parts of the organs due to gravity (eg. paravertebral areas of the lungs).

POSTMORTAL DIFFUSION OF LIQUIDS

- in tissues that are in contact with fluid. Tissues appear softer, edematous and later can partially come apart – *maceration* (skin of fetus in missed abortion, drowning victims – scaling of skin / mucosa of urinary bladder in a cadaver – scaling of mucosa, turbid urine / diffusion of bile in the wall of gallbladder).

POSTMORTAL DIFFUSION OF GASES

- diffusion of hydrogen sulfide through the bowel wall causes conversion of haemoglobin (red) to verdohaemoglobin (green) – this causes greyish green discoloration of the abdominal organs and parietal peritoneum – *pseudomelanism*.

POSTMORTAL DRYING

- drying of outer surfaces of body due to evaporation of fluids from outer tissues
- mucosa (mouth, labia minora), skin (bruises, scrotum), sclera (horizontal darkening along opened eyelids)
- tissues are brown to dark red-brown color, tougher consistency

2. CHEMICAL CHANGES

POSTMORTAL STIFFNESS (rigor mortis)

- develops due to depletion of ATP (needed for separation of actin and myosin and relaxation of the muscle)
- first appears 1-2 hours after death, starts in small muscle groups (masticatory and facial muscles), moves downward (upper, lower extremities). Is fully developed after 12 hours.
- after 1-2 days starts to fade away, after 2-3 days disappears in the same order in which it appeared (due to muscle tissue break down).
- once rigor is artificially broken by manipulation, it cannot be restored

AUTOLYSIS

- postmortal self-digestion caused by enzymes
- first develops in tissues with high concentration of proteolytic enzymes (stomach, oesophagus, intestinal mucosa, pancreatic tissue)
- enzymes are present in all tissues but in much lower concentration (mainly in parenchymatous organs- liver, kidneys)
- presents by discoloration, softening of the affected tissues, loss of structure

POSTMORTAL COAGULATION OF BLOOD

- caused by denaturation of proteins in cells, release of tissue thrombokinase and loss of antithrombotic effect of endothelial lining of the vessels
- postmortal blood clot is elastic, smooth and can be easily removed from the vessel, can be red or light-yellow color (coagulated plasma - seen mainly in heart)
- intravital blood clot - thrombus - is more firm, friable, mat and sticks to the vessel wall

3. BIOLOGICAL (BACTERIAL) CHANGES

DECAY (PUTREFACTION)

- caused by the action of bacteria (primarily intestinal) as the bacterial flora disseminates throughout the body
- green discoloration of abdomen after 24-36 hours (starts in right lower quadrant)
- purge fluid: foul smelling, red-brown fluid that may exude from the oral, nasal passages and other body cavities as decomposition progresses
- formation of gas in organs and subcutaneous tissues as well as body cavities
- Factors accelerating decomposition include sepsis, heat (e.g, environmental heat and body temperature), and processes that promote heat retention.

B. MACROSCOPIC DESCRIPTION OF ORGANS AND TISSUES

- description should be eloquent and short at the same time
- the findings must be photographed
- autopsy protocol contains description, not diagnoses (these are an outcome of macroscopic and microscopic findings)

- in **parenchymatous organs** or solid pathological conditions (infarction, tumor, inflammatory process) we describe: location, size, weight, form (shape), surface or demarcation, consistency, color, structure and appearance of the cut surface, material which can be pushed out from the cut surface or can be scraped off the cut surface by an instrument (knife), smell.

- in **dull organs and cavities** we always have to describe: diameter or circumference, surface and its qualities (color...), wall (thickness, consistency...), mucosa and its qualities, content and its qualities.

1. LOCATION of an organ – anatomically correct or displaced (in inborn diseases, transplantation)

2. WEIGHT and SIZE – in g, in mm or cm

3. FORM (SHAPE) – we describe an organ or its parts, its margins and pathological processes

4. SURFACE OR DEMARCATION – serous membranes are smooth, thin and glistening. Surface can be smooth / granular / rough / bumpy and uneven / lobular / invaginated / covered with coating, masses or membranes. Demarcation – well / poorly circumscribed (defined)

5. CONSISTENCY – hard / tough / firm / elastic / meat-like / soft / mushy / friable...

6. COLOR – we use 1, more often combination of 2, sometimes 3 colors. In fluids, we also describe if the fluid is clear / turbid.

7. MATERIAL WHICH CAN BE PUSHED OUT OR SCRAPED OFF THE CUT SECTION – we describe amount of the material, color, appearance (clear / turbid / foamy), density (thin / dense, thick).

8. STRUCTURE AND APPEARANCE OF THE CUT SECTION – can be clear and normal / less apparent