

Postmortem changes

Postmortem changes are divided into physical, chemical and bacterial-putrefactive changes **according to the nature of their occurrence** . They can also be divided **according to the time horizon** into early and late.

Division according to the nature of the origin

Physical changes

1. **Cold** (algor mortis):
 - Changes in the internal organs, the lowest parts of which are more filled with blood (e.g. paravertebral areas of the lungs).
2. **Pallor** (pallor mortis) and **postmortem spots** (livores mortis):
 - Circulation stops and blood vessels contract, due to gravity the **blood falls** and post-mortem spots (depending on the position of the dying person) of **bluish to red-purple color** appear on the skin approximately 1 hour after death (venous blood , because the surviving organs have consumed oxygen).
 - In the lowest parts of the body (depending on the position of the dying person, usually on the back between the shoulder blades and on the buttocks, they can be squeezed out within 24 hours after death - there are no pads in places that are directly exposed to pressure).
3. **Hypostasis** :
 - The lowest parts of the organs are more filled with blood.
4. **Postmortem Fluid Diffusion** :
 - Seepage of tissues exposed to fluids, which is manifested by the loosening of tissue structures up to **maceration** , when the skin is loosened and peels off in cracks (e.g. in intrauterine death of the fetus - fetus maceratus, in drowned).
 - In the bladder, the peeling of the mucous membrane manifests itself in the turbidity of the urine (as if there were pus in it), the diffusion of bile into the mucous membrane of the gallbladder , the leakage of blood dye from the blood vessels - post-mortem translucency of the vessels.
5. **Postmortem diffusion of gases** :
 - Intestinal bacteria form H_2S , which diffuses into the environment and acts on hemoglobin to form **green verdohemoglobin** , which is the cause of the **greenish-gray coloring** of the abdominal wall (*pseudomelanosis*) and organs.
6. **Drying** especially in places where the skin is broken.

Chemical changes

1. **Rigor mortis**
 - It begins about 2 hours after death in **the craniocaudal** direction , lasts for **2-3 days** (until autolysis of muscle fibers occurs) and then recedes also in the craniocaudal direction.
 - It is caused by depletion of ATP , which is necessary for the dissociation of actin-myosin complexes.
2. **Post-mortem blood clotting**:
 - As a result of damage to the endothelium , release of tissue thromboplastin .
 - Postmortem blood clots are referred to as cruores **mortis** - they are shiny, pliable, do not adhere firmly to the vessel wall (in contrast to a thrombus that forms intra vitam - it is hard, matte and adheres firmly to the wall).
3. **Postmortem self-digestion (autolysis)**:
 - It is caused by released lysosomal enzymes.
 - Macroscopically, it is manifested by the peeling of the mucous membranes, the softening of the organs and the erasure of their structure.
 - Microscopically, it is most visible on the nucleus - *pyknosis* (wrinkling and darkening of the nuclei), *karyolysis* , *mural hyperchromatosis* (chromatin clumps on the inner side of the nuclear membrane), *karyorhexis* (*disintegration of the nucleus into fragments, the term karyorhexis is also used*), *RNA-splitting ribonucleases* decolorize the originally basophilic cytoplasm, *glycogenases* are the cause of the disappearance of glycogen grains from cells.
 - Later, the cells break down.
4. **Adipocere**
 - transformation of tissues into a whitish, waxy or goeey substance

Bacterial-putrefactive changes

- **Putrefaction** is the participation of microorganisms in postmortem autolysis .
- **Gas-producing putrefactive bacteria** are especially important - gas accumulates in the tissues, cavities are formed, the tissue becomes brittle and falls apart.
- Bacteria in blood vessels can be demonstrated microscopically .

Division by time horizon

Early

Early postmortem changes can be considered changes that developed usually **within 72 hours** of death. Includes:

- chemical - autolysis, stiffness
- physical - paleness, spots, cooling, diffusion of liquids and gases, drying up

Late

Late changes occur **over days, weeks or months** . Includes:

- Chemical - adipociria
- Physical - mummification
- Rot
- Skeletonization

Links

Related articles

- Death
- Body cooling
- Examination of the deceased
- Sudden death

Resources

- PASTOR, Jan. *Langenbeck's medical web page* [online]. [feeling. 2010]. < <http://langenbeck.webs.com> >.
- PILIN, Alexander. *Forensic medicine*. - issue. Charles University in Prague, Karolinum Press, 2022. 480 pp. ISBN 9788024650135 .