Estimation of Time Since Death

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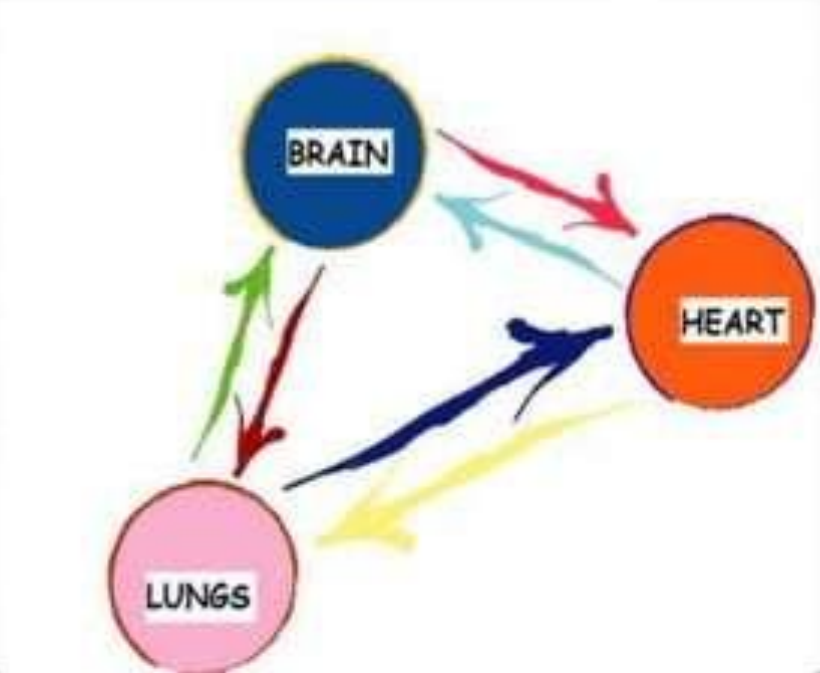
What is death?

- Death is permanent and irreversible cessation of all vital systems of body - **The Tripod of Life.**

- Death can be classified as Somatic and Molecular.



Time of death

- A recurring problem in forensic medicine is the need to fix the time of death within the limits of probability.
- The longer the interval of time between death and the examination of the body, the wider will be the limits of probability.

Post Mortem Interval

- One must realize the possibility that the post mortem interval(the time elapsed from death until discovery and medical examination of the body) may be preceded by a significant survival period(the time from injury or onset of the terminal illness to death).

- The survival interval is best established by evaluating the types, severity and number of injuries present and the deceased's response to them, taking into account pre-existing natural disease.

Importance of time since death

- Establishing the times of an assault and death has a direct bearing on the legal questions of alibi and opportunity.
- If the suspect is able to prove that he was at some other place when the fatal injury occured then he has an alibi and his innocence is implicit.
- Conversely, if the time of a lethal assault coincides with the time when the suspect was known to be in the vicinity of the victim, then the suspect clearly had an opportunity to commit the crime.

- In cases of infanticide, it is necessary for the prosecution to establish that the child was born alive and was killed afterwards.
  - In the absence of proof that death occurred after a live birth, there can be no prosecution for infanticide
- Similarly, in bodies recovered from fires, it is critical to establish whether death occurred before or during the fire and this is important in establishing the manner of death.

Signs of death/changes after death

- The signs of death or changes after death or the methods of estimating time since death may traditionally be studied under the following heads:
- IMMEDIATE

  Insensibility and absence of EEG rythm

  Cessation of respiration

  Cessation of circulation
- EARLY

  Facial pallor & changes in the skin

  Changes in the eye

  Algor mortis

  Livor mortis (Postmortem Hypostasis)

  Rigor mortis

- LATE

  Putrefaction/Decomposition

  Mummification

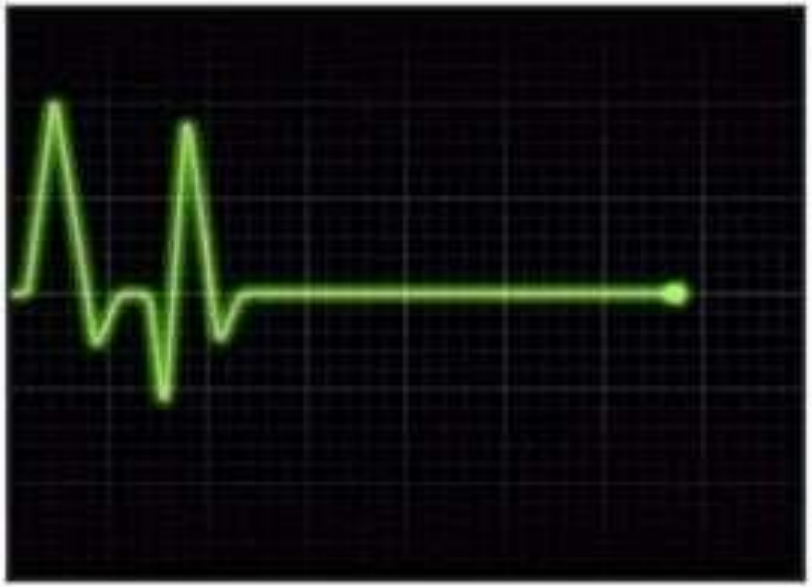
  Adipocere formation

  Possible timings of postmortem interval by entomology

Immediate signs of death

- Cessation of respiration & circulation: Ordinarily these signs are considered sufficient to determine that death has taken place, but these alone shouldn't be relied on as absolute signs to avoid premature burial or cremation.

- A flat EEG for a continous period of 5 to 10minutes is accepted as an evidence of death



Early changes

Facial pallor & changes in the skin: Due to stoppage of circulation after death, blood drains out of the small vessels to big ones & thereby face usually appears pale.

Changes in the eyes

- Dilated pupils,
- Loss of corneal reflex
- Retinal vessel segmentation
- Taches noire
- Intraoccular tension decreases

Algor Mortis

- Postmortem Cooling
- **Most useful single indicator of the time of death during the first 24 hours post mortem.**
- Useful only in cold and temperate regions.
- Body temperature - 98.4°F

  Rectal temperature - 99°F

  Axillary temperature – 97°F
- Life is not possible below 27°C
- Not useful in tropical countries

Algor mortis

Factors influencing Algor

- Clothing and coverings.
- Temperature of body at the time of death
- Temperature difference between body and environment.
- Body built
- Air currents and humidity

Livor Mortis

- Lividity is a dark purple discoloration of the skin resulting from the gravitational pooling of blood in the veins and capillary beds of the dependent parts of the body following cessation of the circulation.
- The process begins immediately after the circulation stops, and in a person dying slowly with circulatory failure, it may be pronounced very shortly after death.

Livor mortis

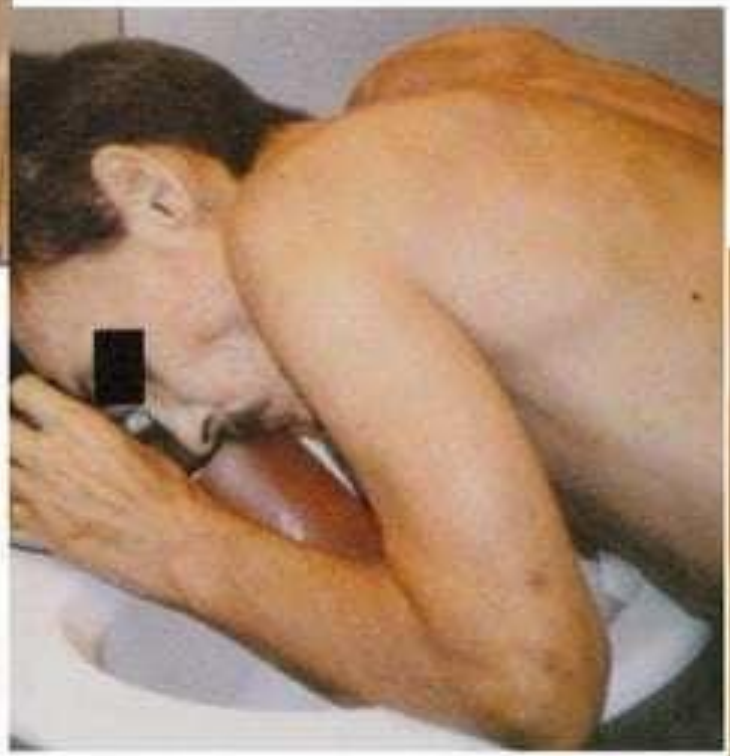
- Lividity is first apparent about 20-30 minutes after death as dull red patches or blotches which deepen in intensity and coalesce over the succeeding hours to form extensive areas of reddish-purple discoloration.
- Slight Lividity may appear shortly before death in individuals with terminal circulatory failure.
- Conversely, the development of Lividity may be delayed in persons with chronic anemia or massive terminal hemorrhage.
- After about 10-12 hours the Lividity becomes "fixed"

Rigor Mortis

- *Rigor mortis* is the state a body reaches when the oxygen supply to the muscles ceases but the cells continue to respire anaerobically .
- This causes lactic acid to build up, which affects the muscles causing stiffening - *rigor mortis*.
- Bodies become stiff after about three hours and remain that way for around 36 hours (this is affected by environmental and intrinsic changes).
- *Rigor mortis* ceases as the body cells die, enzymes are released and the cells decompose.

- If the body feels warm and flaccid, the body has been dead less than 3 hours
- If the body feels warm and stiff it has been dead 3-8 hours
- If the body feels cold and stiff, it has been dead 8-36 hours
- If the body feels cold and flaccid it has been dead for more than 36 hours.

Livor & Rigor

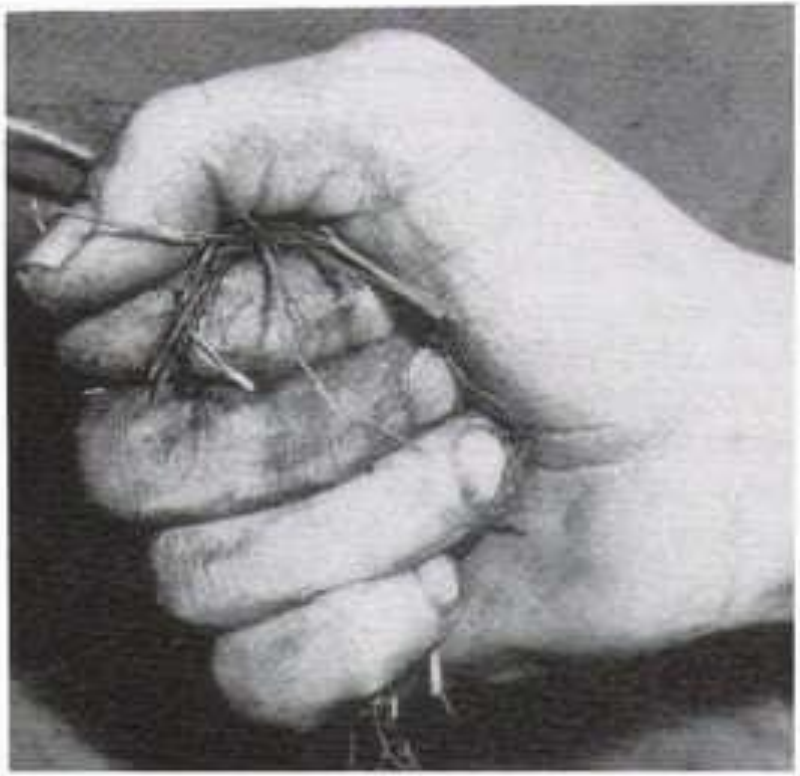


Cadaveric spasm

- Cadaveric spasm is a rare form of virtually instantaneous rigor that develops at the time of death with no period of post mortem flaccidity.
- Muscles exhibit stiffening at the moment of death.

Cadaveric spasm

A victim of a drowning case. The victim was recovered within a short time, had grass twigs or vegetation from the river bank firmly grasped in the hand.



Late changes

- **Postmortem decomposition** : Also known as Putrefaction
- Putrefaction is the post mortem destruction of the soft tissues of the body by the action of bacteria and enzymes (both bacterial and endogenous).
- Tissue breakdown resulting from the action of endogenous enzymes alone is known as autolysis.
- Putrefaction results in the gradual dissolution of the tissues into gases, liquids and salts.
  - The main changes which can be recognized in the tissues undergoing putrefaction are changes in color, the evolution of gases, and fluids.

4- 10 Days

Advanced Decomposition

Adipocere formation

- Saponification or adipocere formation is a modification of putrefaction characterized by the transformation of fatty tissues into a soft, yellowish-white, greasy, (but friable when dry), wax-like substance, with a sweetish odor.
- It is first seen over areas of high subcutaneous fat.
- It floats on water, and dissolves in alcohol and ether. When heated it melts and then burns with a yellow flame.
- Ordinarily it will remain unchanged for years.

Adipocere formation

- The medico-legal importance of adipocere lies not in establishing time of death but rather in its ability to preserve the body to an extent which can aid in personal identification and the recognition of injuries.

- The presence of adipocere indicates that the post mortem interval is at least weeks and probably several months.

Mummification

- Mummification is a modification of putrefaction characterized by the dehydration or desiccation of the tissues.
- The body shrivels and skin becomes dry ,leathery and looks blackish brown,clinging to the body frame.
- The internal organs also get dried and shrivelled up.
- As the skin contracts some of the fat cells in subcutaneous tissues are broken and liquid fat smears in the dermis ,which becomes translucent.
- A mumified body is practically odourless.

Mummification

- The forensic importance of mummification lies primarily in the preservation of tissues which aids in personal identification and the recognition of injuries.

- The time required for complete mummification of a body cannot be precisely stated, but in ideal conditions mummification may be well advanced by the end of a few weeks.

Affects of climate on decomposition

Forensic Entomology

- It is the study of insects and other arthropods for the purpose of criminal justice.

- Flies and maggots also provide an approximate time of death, very useful for cases where the body has been long dead. Only certain insects will feed and lay eggs on a dead corpse and forensic entomologists study these insects, their larvae cycles and thereafter can determine whether a body has been dead for just one day or up to 3 or 4 weeks.

Forensic Entomology

References

- Modi's: Medical Jurisprudence & Toxicology; M. M. Trirathi Press Ltd. Allahabad, 1988.
- Vij Krishan (2001): Textbook Of Forensic Medicine And Toxicology; B. I. Churchill Livingstone Pvt Ltd. New Delhi.
- Simpson, Keith: Forensic Medicine; The English Book Society and Edward Arnold (Publishers) Ltd.
- Encyclopedia Of Forensic Science; Vol 3.
- library.thinkquest.org/04oct/00206/ta_time_since_death.htm
- www.scribd.com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