



Round : Forensic Medicine

Group no : A4

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Death

* the brain dies first then gradually other tissues will be dead

Death is also the absence of the 7 life processes:

1. Movement.
2. Reproduction.
3. Growth.
4. Respiration.
5. Nutrition.
6. Excretion.
7. Sensitivity.

Red = time

Dark Blue = الدكتور مكي

Types of Death



1. **Somatic Death**: The permanent, irreversible death of an organism as a whole (loss of consciousness)

2. **Clinical Death**: preceded with the heartbeat cessation/lasts for about four minutes/the interval in which life can be brought back through CPR/ (loosing of the body functions)

3. **Cellular Death**: tissues and their constituent cells are dead/cerebral cortex being vulnerable to only a few minutes of anoxia/connective tissues and even muscle survive for many hours, even days after the cessation of the circulation.

4. **Brain Death**: actual number of minutes for which total anoxia will cause cortical damage / 7 or 9 minutes/brain cannot be brought back to life by any means available today.

ما عني بس مش واعي عااa

* higher levels of cerebral activity (above tentorium) are selectively lost the victim will exist in a "vegetative state"

Here brainstem survives and thats why he can breath without life support machines

Brain stem death

* **Brainstem**= vital centres+ ascending reticular activating system (if damaged patient will be comatosed+need machines)= patient is "dead" in the somatic sense+alive in cellular sense=here we can use his organs for other peoples (cadaver donor transplant surgery have been made)

من مبدأ

- **Apparent Death**: A state of suspended animation that mimics death; it occurs in electrocution, hypothermia, sun stroke, drowning, drug overdose (eg, barbiturates), and head injury. Suspended animation is the slowing of life processes by external means without termination. We can know if it is true death only by ECG and EEG.

دبي بالصحة الكهربائية، circulation
توقف بين مكي قلوب CPR
رسم عذبة الـ ECG
نجرها عادي.. 7

Difference Between Cause, Mode, And Manner

1. Cause of Death: Any injury or disease that produces a physiological derangement in the body that results in the death of the individual. Examples: a gunshot wound to the head, a stab wound to the chest, adenocarcinoma of the lung , and coronary atherosclerosis.

سبب الوفاة

Cause of Death = The underlying disease or injury (e.g., gunshot wound, stroke, cancer).

Mode of Death = The specific process that caused the body to stop functioning (e.g., hemorrhage, cardiac arrest, coma).

2. Mode/Mechanism of Death: An abnormal physiological state that pertained at the time of death "produced by the cause". Examples: coma, congestive cardiac failure, cardiac arrest and pulmonary oedema.- These offer no information as to the underlying pathological condition and should not be used as the definitive cause of death unless further qualified by the more fundamental etiological process.

العملية التي

ضلت الجسم بحياة

3. Manner of Death : Manner refers to the circumstantial events and is a legal categorization : natural, accident, homicide, suicide, undetermined (2-5%), or pending investigation.

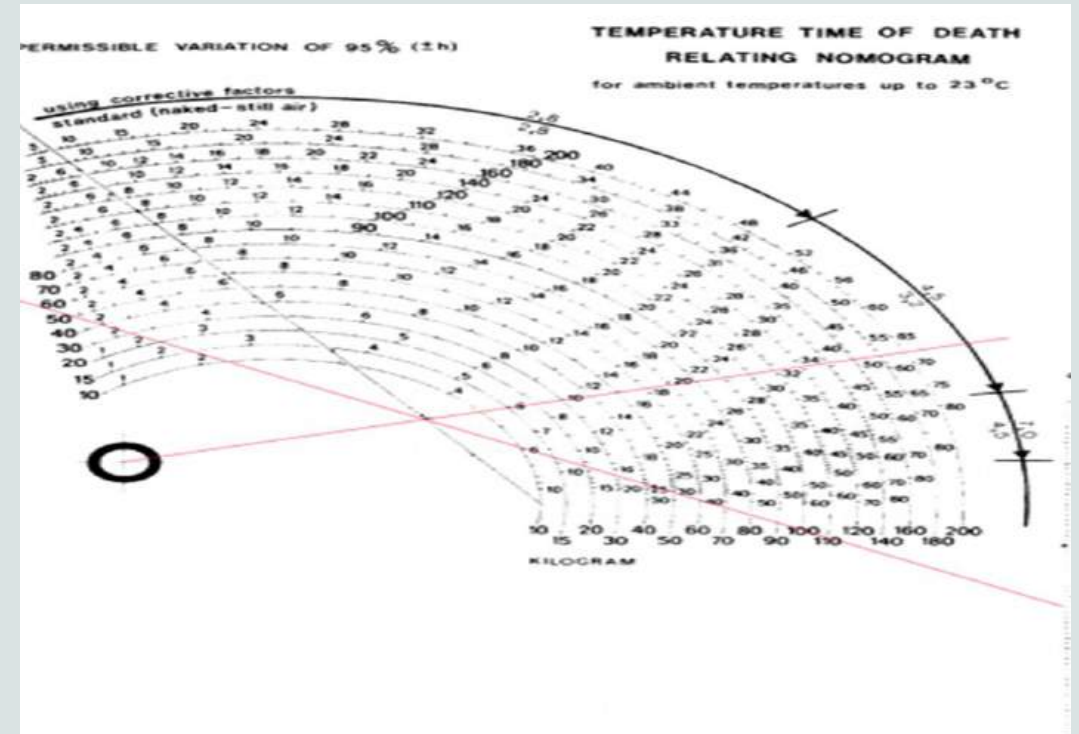
نوع الوفاة

انتحار مثلاً

Henssge's Nomogram

-THE MOST USEFUL
METHOD OF ESTIMATING
THE TIME OF DEATH:

1. BODY WEIGHT.
2. BODY TEMPERATURE.
3. AMBIENT TEMPERATURE



Post-mortem signs of death can be roughly estimated by:



1. Immediately: Loss of reflexes, permanent cessation of respiration

and heart.

2. Early: Eyes, pale skin, muscles (primary flaccidity), gastric relaxation

of LES and regurgitation.

3. Late: Algor mortis, livor mortis, rigor mortis.

4. Very late: Decomposition.

Early, eyelids: Eyelids are usually closed incompletely.

sure sign of death

- Tache noire: where the sclera remains exposed to air, two black triangular spots appear at each side of the cornea (due to drying).

2. Early, skin:

- The fall in blood pressure and cessation of circulation of the blood usually render the skin, conjunctivae and mucous membranes pale.
- The hair follicles die at the same time as the rest of the skin and there is no truth in the belief that hair continues to grow after death, although the beard may appear more prominent against a pale skin.
- The skin of the face and the lips may remain red or blue in color in hypoxic/congestive deaths.

2. Early, stomach:

- Gastric contents are identified in the mouth or airways in up to 25 % of all autopsies.
- Regurgitation is a very common feature of terminal collapse, and it is a common complication of resuscitation.
- The presence of this material cannot be used to indicate that inhalation was the cause of death unless it is supported by eyewitness accounts or by the microscopic identification of food debris in the peripheral airways.

2. Early, eyes:

- Loss of corneal and light reflexes.
- Mid-dilated pupils.
- Irregular size and shape of the pupils (anisocoria).
- Loss of intraocular tension.
- The retinal vessels show the breakup or fragmentation of the columns of blood, which is called "trucking" or "shunting".

2. Early, muscles:

- The muscles rapidly become flaccid (primary flaccidity), with complete loss of tone, but they may retain their reactivity and may respond to touch and other forms of stimulation for some hours after cardiac arrest.
- Discharges of the dying motor neurons may stimulate small groups of muscle cells and lead to focal twitching, although these decrease with time.
- Loss of muscle tone in the sphincters after death often leads to voiding of urine, a common postmortem phenomenon. This relaxation of urinary sphincters is utilised in estimating the postmortem interval, contributing to forensic investigations.

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الغور بارد

1. Algor Mortis: Body Cooling

sure sign of Death

rectal temperature falls below 24 C it is indicative of death /and below 21 C it is a **sure sign of death**.

- Time since death = $37^{\circ}\text{C} - \text{Rectal temperature (C)} + 3$

- Time since death = $(98.6^{\circ}\text{F} - \text{Rectal temperature (F)}) / 1.5$.

2. Livor Mortis: hypostasis(circulation)= bluish red discoloration on skin at gravity area

safe sign of Death

Hypostasis starts from 1/2 an hour to many hour after death

In summer hypostasis remain 24-36 hr.

- In winter it remains about 48 hrs or more./- In snow it remains much more.

Colour	Cause	Hypostasis	Bruises
Dark blue-pink	Cyanide poisoning	Dependent area	Anywhere
Brown	Methemoglobinemia	Well-defined edges	Ill-defined edges
Cherry pink	CO poisoning (carboxyhemoglobinemia / cold temperatures)	Blood is retained in intact capillaries	Blood escapes through ruptured capillaries
Pale	Anaemia, hemorrhage (or normal in extremes of age).	Same level on surface	Raised
		Pale over pressure areas	Red
		Incision: blood flows from the cut vessel (washable)	Incision: blood coagulates in tissue

3. Rigor Mortis: stiffness of limbs

↑ الجدول مع

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Death -> Cessation of respiration -> Oxygen depletion -> Reduced ATP -> Secondary anoxic process -> Lactic acid buildup -> Acidic cytoplasm, low ATP -> Actin and myosin binding, forming a gel -> Inability to release coupling -> Perpetual muscular contraction -> Digestive enzymes break down muscle tissue during decomposition.

* RM is initiated when the ATP concentration falls to **85% of normal**

* starts to develop about 2-3 hrs after death. —> peaks in the next 6-12 hrs. —> concludes around 36-48 hrs after death

Cold and wet -> onset slow, duration longer remain 36-48 h

hot and dry -> onset fast, duration shorter remain 24-36 hr

(Cold slows chemical reactions and ATP depletion, delaying rigor mortis.)

قاعدة ١٢-١٢-١٥ => هذا خلال أول ١٢ ساعة بوصول ال Peak لتصله الجثة بعدما بضل بالموتى هذا ل ١٢ ساعة و بعدها بيلش يفك خلال آخر ١٢ ساعة بسبب تحلل الجثة

* Rigor mortis may be delayed or be very weak in emaciated individuals => Rigor mortis primarily affects muscles, and with less muscle mass in emaciated individuals, there may be less muscle tissue to undergo the stiffening process

* onset may also be very rapid in infants. => Higher metabolic Rate => consume ATP => fast ATP depletion

* Poisons, such as **strychnine**, that produce convulsions can accelerate the development of rigor mortis.

Estimated time of death:

Body Temperature	Muscles Tone	ETD
Warm	Flaccid	<3hours
Warm	Stiff	3-8hours
Cold	Stiff	8-36hours
Cold	Flaccid	>36hours

- **RM in iris:** May affect the eyes unequal, making the pupils unequal.
- **RM in the heart:** Contracted, stiff LV may be mistaken for LV hypertrophy.
- **RM in dartos muscle of scrotum:** Rigor in dartos -> constricts testes and epididymis expulsion of semen.
- **RM in erector pilli muscles attached to hair follicles:** Goose bumps, hair stands up.

* Conditions mistaken as rigor mortis:

1. **Heat stiffness:** Exposure of a body to intense heat (burning, high voltage electrocution, etc) -> coagulation of muscular proteins (Actin and Myosin) → muscular shortening because the muscles contract then become rigid
2. **Cold stiffness:** Exposure of the body to extreme cold ($< -5^{\circ}\text{C}$) -> solidification of subcutaneous fat and muscles, freezing of synovial fluid in joints.

Rigor Mortis	Cadaveric Spasm cataleptic rigidity.
Onset delayed after death (2-3 hrs); duration up to 36hrs	Onset is instantaneous ; duration is a few hours, until it is replaced by rigor mortis
Intensity comparatively moderate	Intensity comparatively very strong
Mechanism of formation: breakdown of ATP below critical level	Mechanism of formation unknown ,but predisposing factors : emotions and contraction of muscles at time of death
All muscles of the body are Affected gradually.	Selected muscles , which were in a state of contraction at the time of death ,area ffected.

* Types of decomposition:

1. Putrefaction. تعفن
2. Adipocere.
3. Mummification.
4. Skeletization.

* **1. Putrefaction:** The normal final sign of death; starts immediately after death at the cellular level and becomes visible in 48-72 hrs.

* **Two phenomena for putrefaction:**

a. Autolysis: Organs rich in enzymes will undergo autolysis faster than organs with lesser amounts of enzyme. Thus, the pancreas autolysis before the heart

B. Bacterial action: Bacterial action and fermentation (liquefaction) of the soft tissues over a period of time The **1st visible sign of putrefaction is green or greenish red discolouration of the skin** of the anterior abdominal wall, normally starts in the right iliac fossa. It usually occurs in the **first 24-36 hours with generalized bloating in 60-72 hours.**

* The decomposition of hemoglobin in the superficial vessels results in linear branching patterns of brown discoloration of the skin that is called "**marbling**".

* gas formation is common



* The increased internal pressure causes the eyes and tongue to protrude and forces bloody fluid up from the lungs and it will often leak out of the mouth and nose as "**purge**".

* **Brain and epithelial tissues** are the first to be affected by putrefaction.

* **Heart, uterus & prostate** may survive for longer periods.

^{adipose tissue}
* **2. (Adipocere):** Chemical change in the body fat, which is hydrolysed to a waxy compound similar to soap / ^{needs a wet-warm environment}
- It needs months to occur, and occurs partially.

3. MUMMIFICATION: The drying out and preservation of the body due to environmental conditions that prevent the usual breakdown of tissues / ^{Dry and warm environment}

* **Medico-legal importance of mummification:**

a. Cause of death.

b. Can detect abnormal pathology in deep tissues.

^{सुखत B १ बॉयलर ग्रुब}

4.SKELETONIZATION: it is the final stage of human decomposition where all soft tissues, such as skin, muscles, and internal organs, are removed, leaving behind the bones.

12-18 months: soft tissues will be absent

after 3 years: the bones will be bare and disarticulated

After 40-50 years: bone surface becomes dry and brittle and the marrow cavity will be empty.

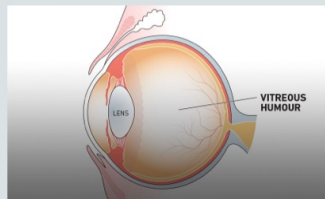
Determination Of Time Of Death

1. CORE BODY TEMPERATURE : The best and the most commonly used.

2. RIGOR MORTIS.

3. HYPOSTASIS: Complete after 6 hrs.

4. CHEMICAL CHANGES IN VITREOUS.



5. EYE PRESSURE : Eyeballs become softer ,and less fluid pressure in the first 3hrs.

6. GASTRIC EMPTYING : Depend on type of meal and emotional status.

7. THE ENTOMOLOGY OF DEAD : Studying insects & their maggots which infest the dead body for estimating the probable time of death. Different types of insects infest the dead body at different stages after death occurs.

8. SCENE MARKERS : Though unscientific , it is often more accurate than determinations made by scientific means.

Determination Of Time Of Death

8. SCENE MARKERS :

- Uncollected mail or newspapers.
- Whether the lights are on or off.
- How the individual is dressed.
- Any food that is out or dirty dishes in the sink.
- Sales receipts or dated slips of paper in the deceased's pockets.
- When the neighbors last saw the individual or observed a change in his habits.