عدد الاسئلة عليه قليلة

اغلب الاسئلة عليه

DEATH AND POSTMORTEM CHANGES

By :

Jana Tarawneh
Lujain Tarawneh
Yaqeen Tarawneh
Renad Tarawneh
Karam Al Salman
Ammar Qatawneh
Abdullah Al Zaben
Zaid Marwan

التبيض : لون احمر

مواضع الاسئلة الي حددها الدكتور احمر : m.c.q

ملاحظات مني انا كتبتها وانا بدرس

OUTLINES

1. Definition of death
2. Somatic and clinical death
3. Brain death
4. Brain stem death
5. Cellular death and supravital period
6. causes , mode and manner

DEATH

Thanatology: deals with all aspect of death and death is the end of daying

Definition : irreversible cessation of all integrated functioning of the human organism as a whole, mental or physical .

another definition : The absence of the 7 vital life -Nutrition processes! which is : Movement , Reproduction , Growth , Respiration, Nutrition ,Excretion and Sensitivity .

It is a process rather than an event except in the exceptionally rare situations where death may be almost instantaneous such as in case of crushing of the brain in a vehicular accident .

- * process means not all cells death together (brain die first then gradually other tissues will be dead).

cells → Regeneration : liver, GI
cells → permanent : Heart → fibrosis , Brain → liquefactive necrosis

Stages and categories of death

Stages

-Somatic (clinical or systemic)

- Molecular or cellular

*brain death

*supravital period

Categories:

- violent deaths (accidents, suicide and homicides)
- suspicious deaths
- unexpected deaths
- deaths without a physician attendance
- deaths in an institution

SOMATIC DEATH

Definition : irreversible cessation of function of 3 systems: CNS, RS, CVS (the“tripod” of life) when there is cessation of vital processes of the body. This is referred to as somatic death (systemic or clinical death), which is followed by progressive disintegration of body tissues and is called as cellular or molecular death.

Brain : 5 min
musuls : (3-4) h
hair+Nain: Days

*Before the 1960’s, death was diagnosed only by cardiopulmonary criteria: CNS criteria are new to the list.

Charctars : 1. the person irreversibly loses there sentient personality, being unconscious, unable to be aware of (or to communicate with) its environment, and unable to appreciate any sensory stimuli or to initiate any voluntary movement

2. Tissues and cells continue to survive for variable period of time , depending upon their oxygen requirements .

cellular stage الـ cell بتموت في

SOMATIC DEATH

بنحكي مع اهله انه مستوى ال Brain Dameg of Death لل irreversible

فبنقنعهم عشان اشيل الاجهزه واخذ اعضاءه الحيويه → liver, Heart, Kidney

* القرنيات : post-mortem

3. After somatic death :

-the tissues and cells can respond to chemical and electrical stimuli

-the pupil also dilate and constrict

4. Organs can be removed during this " physiological gap " from the cavedars for the transplantation .

يوقفوا ال ٣ سيستمات

How to diagnose ? the death is diagnosed by establishing the following facts :

1. Cessation of heart beating :

- Absent of heart sound for 5 minutes
- Flat ECG

SOMATIC DEATH

2. Cessation of breathing

3. Cessation of brain activity :

- Dilated fixed pupil and absence of pupillary and corneal reflexes

- Flat Electroencephalogram ما بنستخدمه : EEG

Clinical death : From the point of view of medicine, is preceded with the heart beat cessation. Visible signs of the state of failure of the living organism actions such as heart beating, respiratory function or blood circulation. It lasts for about four minutes, and it is the interval in which life can be brought back through CPR. (+mouth -mouth Breathing) After a short few minutes, death is permanent, because the state of the body has gone from clinical death to...

clinical Death: الفترة اللي ممكن اعمل للمريض فيها CPR, Breath وممكن يرجع للحياه (4 min)

BRAIN DEATH

BRAIN DEATH

The actual number of minutes for which total anoxia will cause cortical damage is controversial; it was formerly held that 3 minutes was sufficient, , but this time has been extended to 7 or 9 minutes.

After few minutes, the brain can’t be brought back to life by any means available today

BRAIN DEATH

Brain stem: بحطه ع monitor وبقدر انقل اعضاء
cortical
Whole Brain

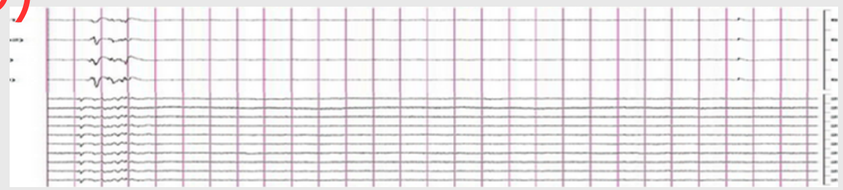
- **A three criteria for determining permanent non-function of the brain:**

I. Unreceptivity and unresponsivity

II. No movements or breathing

III. No reflexes

And an added confirmatory test proposed was ‘a flat’ or isoelectric electroencephalogram(EEG)



BRAIN DEATH

Currently, brain-stem has been the focus of attention where vital centers are situated because various strata of brain behave differently in their response to oxygen deprivation.

• Therefore, circumstances may be there, where cortex has been damaged but the lower brain including brain-stem is still functioning

. In such a state, the victim will exist in a 'vegetative state', the so-called 'living cadaver'. The victim can remain in deep coma for a considerable period; may be for years. But they are not on life-support machines.

• A cadaver is a dead human body used in scientific or medical research. Cadaver comes from the Latin verb, which means "to fall."

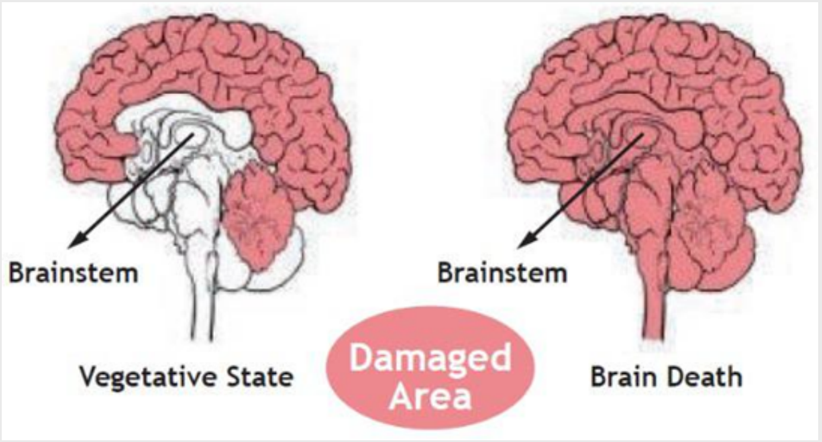
BRAIN DEATH

Vegetative state

- Destruction of cortex and hemispheres
- Intact ascending reticular activating substance

Brain stem death

- Irreversible damage to brain stem



BRAIN DEATH

Somatic Death: Damg up and lower the tentorum
cellular Death
clinical Death : *Damgen the cortex only
*above the tentorium

However, when brain death spreads below the tentorium, i.e. when base of the brain including
midbrain, pons and medulla suffer damage,loss of vital centers and consciousness will cause
the victim not only to be irreversibly comatose but also to be incapable of spontaneous breathing
Without medical intervention, the cardiac arrest invariably follows within minutes and then the usual process of ‘cellular death’ progresses

Once irreversible damage to the brain-stem has been established, the victim is dead in the somatic sense, though not yet dead in the cellular sense.

The loss of the 'vital centers' that control respiration, and of the ascending reticular activating system that sustains consciousness, cause the victim not only to be irreversibly comatose, but also to be incapable of spontaneous breathing and the heart stops. Need life support machines

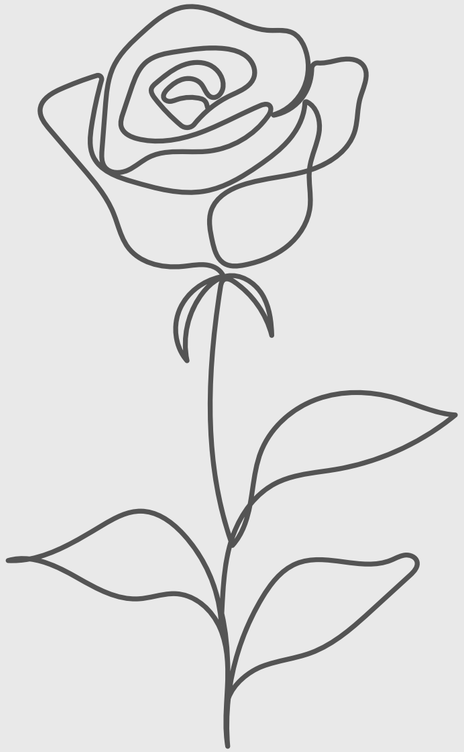
cellular و الـ somatic بين الـ
mechanicalventilator جهاز تنفسي
organ transplantation عشان يكون مناسب لـ
مهم M.C.Q

It is through this ‘physiological gap’ that the advances in removing the organs from the cadavers for the transplantation purposes have broken through. **not yet dead in the cellular sense**

monitor ملاحظة: ممكن احط المريض على
وتنقل اعضاء المريض بهذا الوقت
supravital periods بس ما استثنى

BRAINSTEM DEATH

- Brainstem death is **clinical syndrome defined by the absence of reflex with pathways through the brainstem**-the stalk of brain which connect the spinal cord to the mid-brain, cerebellum and cerebral hemisphere- in a deeply comatose, ventilator dependent patient. M.C.Q



Brain death

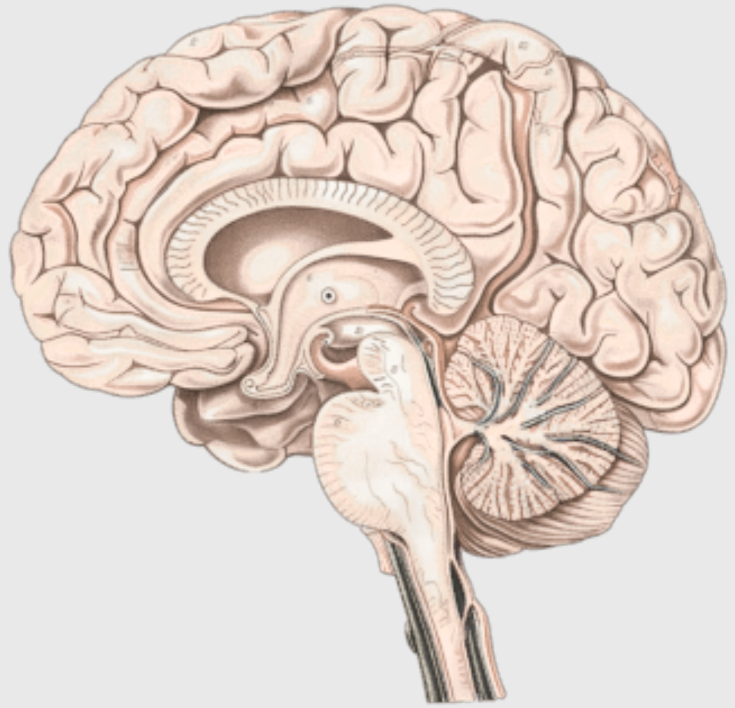
Brainstem death

fuction of Brain Stem	Death
1_ Reticular activating system → مسؤول عن اليقظة	coma
2_ reticular formation → RS والـ vital sign مسؤول	• No spontaneous Breathing • ventilation required
3_ reflexes (involuntary) →	No inoluntary movement No response to cranial nerve stimuli

Corticle death

- cortex ☒
- Brain Stem ☑
- 'living cadaver'.
- 'vegetative state'
- involuntary reflex فقط
- No voluntary: لأن ال cortex هي اللي مسؤوله عنه

Whole



خربان ↑ فوقها
lesion
شغال ↓ تحتها

No Abnormal Decorticate or Decerebrate postures should be present.

تستحضر المعلومه ← اذا شفت شخص مار اله Trauma, تتشكل بهيك وضعيه بنتطمّن انه ال Brain stem شغال.

Decorticate
posture is an abnormal posturing in which a person is stiff with bent arms, clenched fists, and legs held out straight. The arms are bent in toward the body and the wrists and fingers are bent and held on the chest.

Decerebrate
posture is an abnormal body posture that involves the arms and legs being held straight out, the toes being pointed downward, and the head and neck being arched backwards.The muscles are tightened and held rigidly. This type of posturing usually means there has been severe damage to the brain

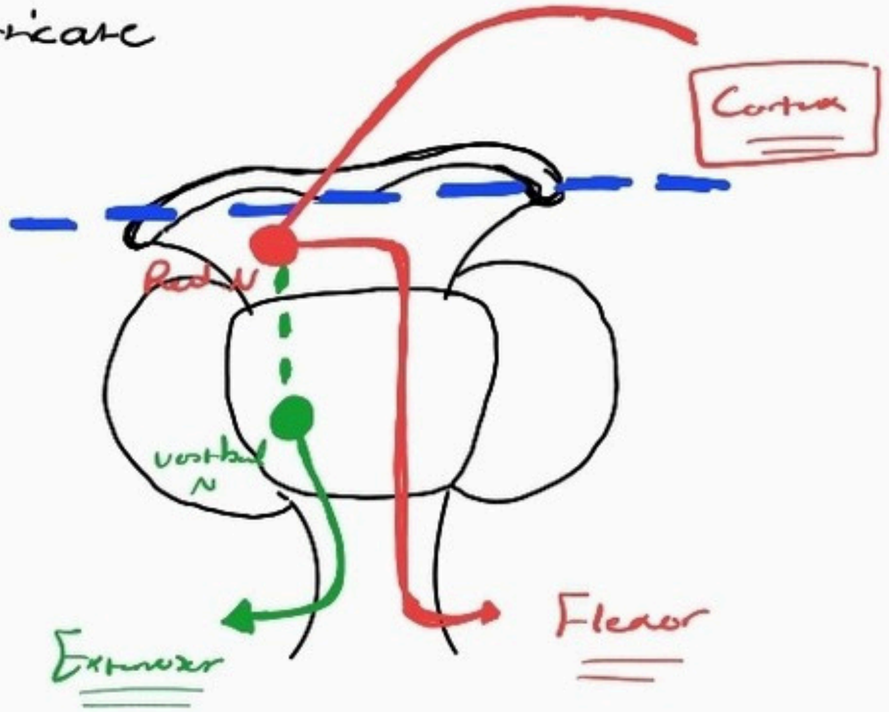
* سببهم: advanced Severe Trauma

① De - Cortikate

Red nucleus لـ فوق الـ

flexor → upper

extensor → lower



up / low

up only

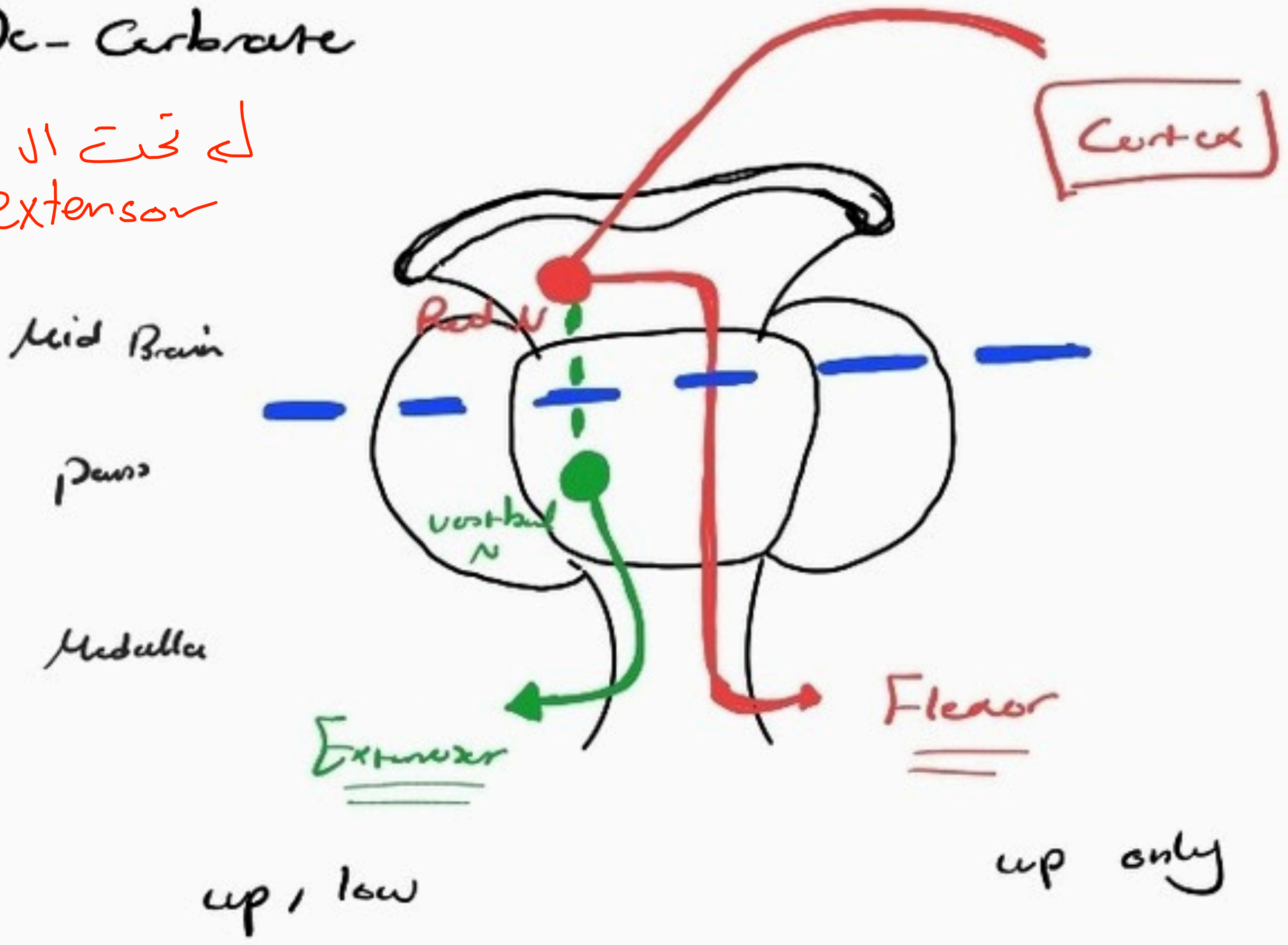
طبيعي Red nucleus

- flexor → upper limb
- extensor → lower limb

Decorticate: upper limbs flex, lower limbs extend

(2) De- Carbrate

ل تحت ال Red Nucleus
extensor في كل الاطراف



لو اجاني مريض ميت بهيك وضع بعرف انه عنده اصابه بالدماغ Brain بسبب trauma

فكانفتح ال skul شو ممكن نشوف ؟

مثل

→ Brain hemorg ك مستوى معين و بيضغط ك مكان معين بال Brain

↳ sub Arachnoid , Duramater

→ Brain concusion

بعمل contusion ك الجهة المقابله مع ال cortex (كدمة)

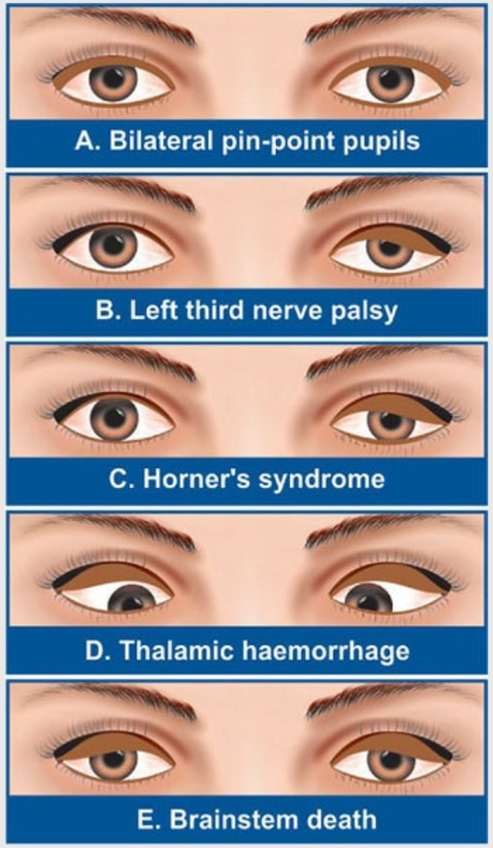
بعمل للمريض CT scan لانه افضل شيء في هذي الحالات بشوف section

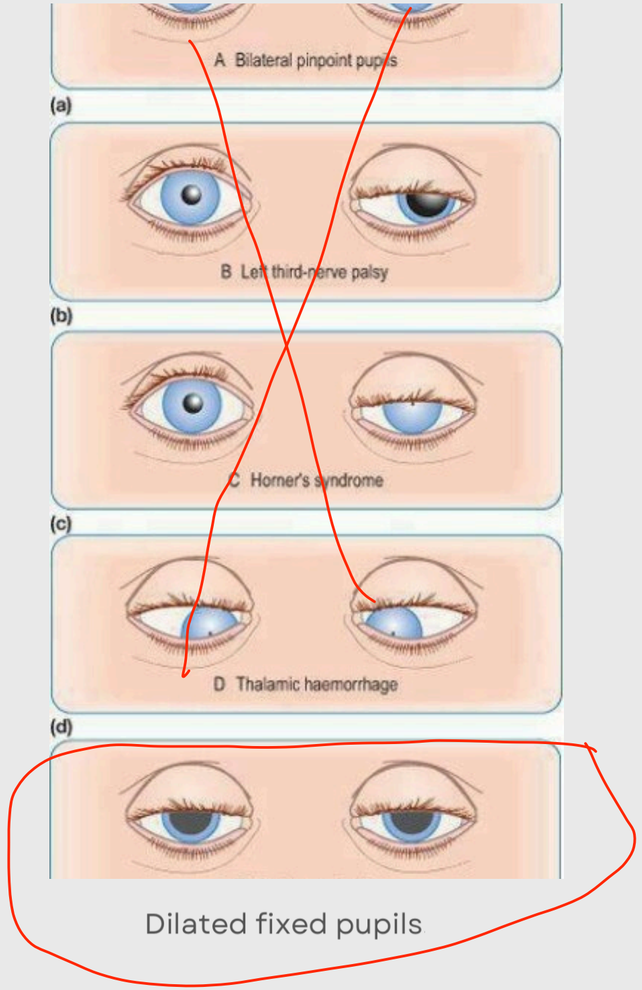
a

Decerebrate: upper and lower limbs extend

The structural and functional damage of brain- stem may be diagnosed depending upon the following observations:

- Absence of spontaneous breathing
- Dilated fixed pupils, not responding to sharp changes intensity of light
- Absence of motor responses within the cranial nerve
- distribution on painful stimulation
- Absence of corneal reflexes.
- Absence of gag reflex or reflex response to bronchial stimulation by a suction-catheter passed down the trachea.
- Absent of the oculo-cephalic reflex and vestibulo-cocleuar

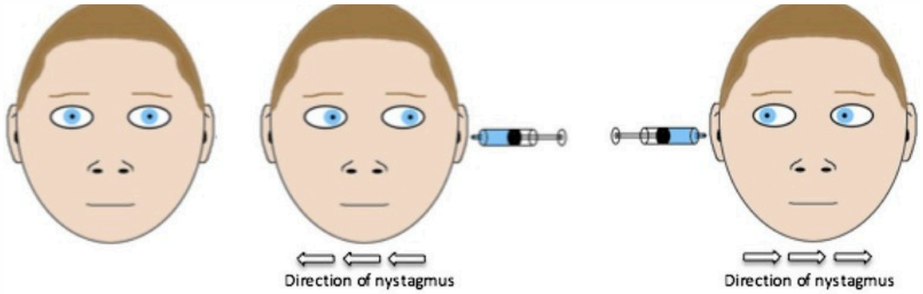


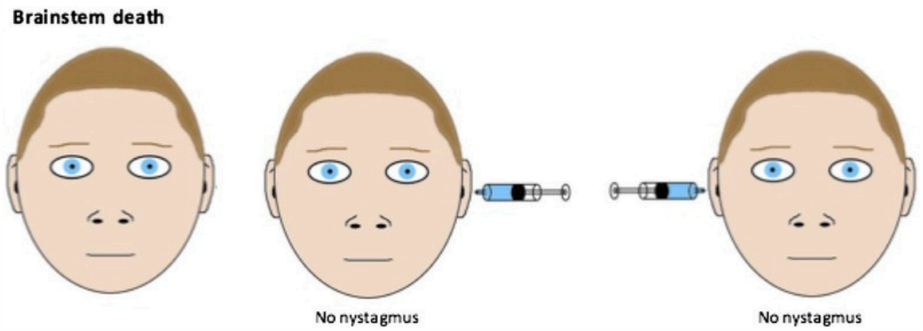


Dilated fixed pupils

Caloric test

for vestibulo-ocular





Doll eyes

Oculocephalic

حش هزوي نعلمهم كلهم

دكتور باطني اعصاب (مش جراح)

هو اللي بعمل الفحوصات

Brain Death
Brain stem Death

مين لازم يكون موجود بفحص موت الـ Brain Death

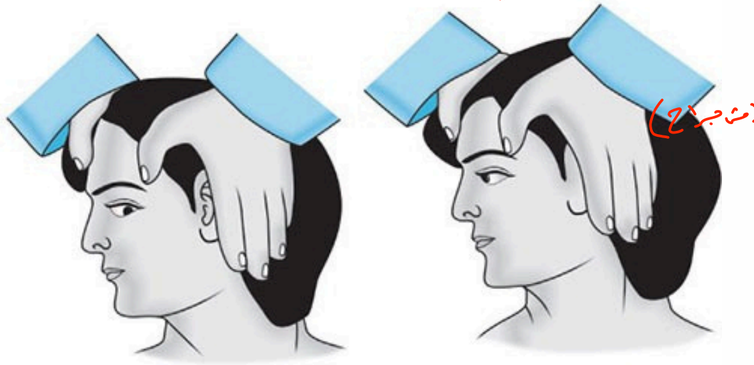
١- امر من المدعي العام

٢- دكتور شرعي

٣- دكتور باطني اعصاب (مش جراح)

٤- دكتور باطني عام

٥- دكتور تخدير



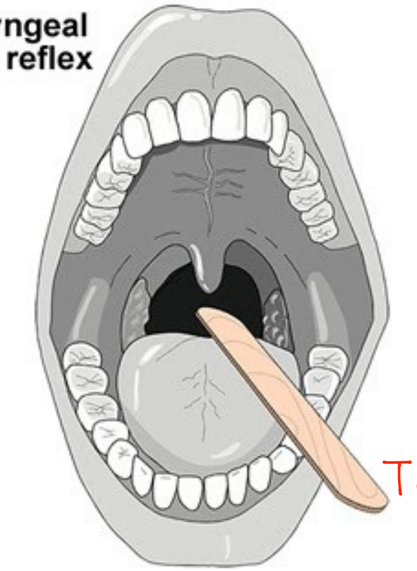
انا بحاول الف راسها على اتجاه وهي بتحاول تثبت نظرها بالاتجاه الاول

حكم نقل الاعضاء

بنتقل المريض مع جهاز التنفس

اول عملية نقل وزراعة قلب في الاردن في الثمانينات

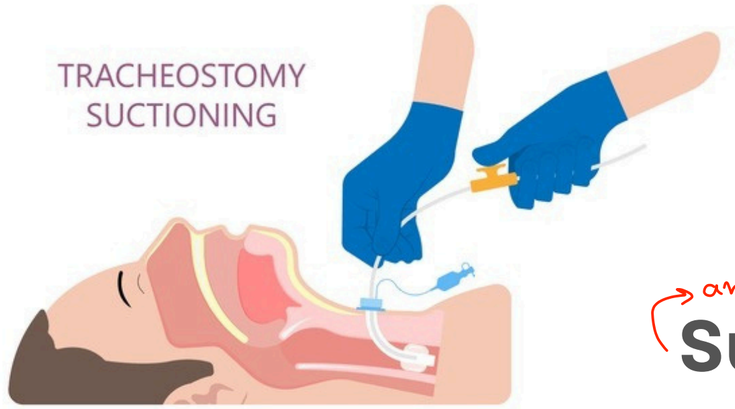
اول متبرع اخو موسى حجازين



Nausea + vomiting

Tongue Depressor

Gag reflex



angio tube

Suction catheter

Bronchial Resptor

Apnea test

PREREQUISITES → EXAMINATION → APNEA TESTING → ANCILLARY TESTING → DECLARE BRAIN DEATH

1. Must be stable & preoxygenated
2. Completely remove from ventilator for a period of time
   - ↳ $CO_2 \geq 60$
   - ↳ $CO_2 > 20$ + starting CO_2

Ensure NO respiratory activity when the ventilator is removed

اذا اجاني مريض بحطه على احتياج ventelator

١- بعطي المريض O_2 بنسبة ١٠٠٪

٢- بشيل عنه الاوكسجين مدة ١٠ دقائق فقط
حتى يترفع الـ CO_2
note: "main stimulus of respiratory center" هو الـ CO_2

اذا تنفس المريض عنده BrainStem شغال

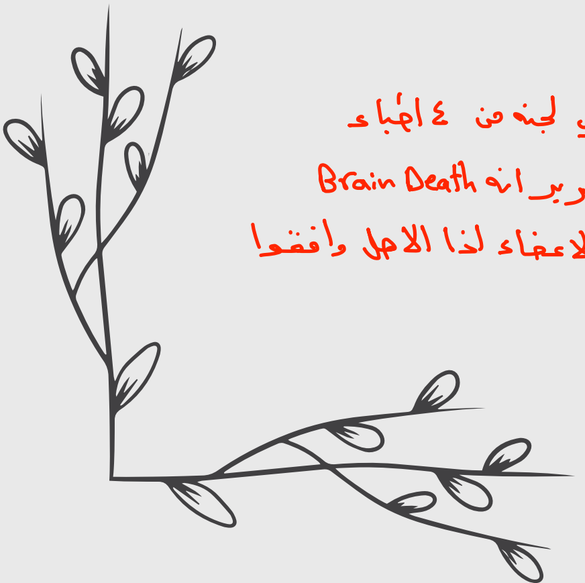
اذا ما تنفس عنده الـ Brain stem خربان

بس برضو ما بعتمد عليه
لازم اشوف الـ reflexes

Diagnosis of brain stem death

M.C.Q

1. Coma
2. Absent brain stem reflex
3. Absent of any respiratory drive response: spontaneous X Breath
- Two elevation separated by 6 to 8 hrs
- Confirmatory test
- Flat EEG doesn't maen brain stem death
- Absence of reversable cause
  - large Dose of Barbiturates
  - Anesthesia
  - Hypothermia



افراشي بتجي لجنة من ٤ اطباء
بكتبوا تقرير انه Brain Death
وبعدين نقل الاعضاء لذا الاهل وافقوا

كذلك تكون موجوده شان
اقدر اجزم انه Brain Death

CELLULAR DEATH

what is
THE CELLULAR DEATH?

- ischemia from trauma
- GIT تشرب شي ساخن
- necrosis
- destruction RBC in spleen بس بتغير شكلها

Cellular death (molecular death) is the death of cells and tissues individually, in which they are no longer functioning after the stoppage of vital functions (somatic death).

Brain stem death بس بعبر

How to diagnose
CELLULAR DEATH?

- **Microscopically**
- **Microchemically** by detecting the concentration of different chemical constituents inside the cell.
- **Physically**

'marker for MI'

- مثلاً في حالات MI بس تبلش ischemia بتغير troponin له منتظر بعد شي 6 ساعات في الدم

- فبس بيجي مريض chest pain بدك تحليله عندك فترة المراقبة 24 ساعات حتى تحل الغرض وتتأكد "حسب تقييمك والهستري"

when does it OCCUR?

- Tissues vary in their response to anoxia. The cerebral cortex cells -for example- die within a few minutes, while connective tissue cells, like bone and skin, and even muscles, survive for many hours
- It's a slow process that begins after the complete stoppage of vital functions (somatic death), typically starting 1-2 hours later, or it could start immediately.

cellular and somatic death
COMPARISON

Somatic Death	Cellular Death
The cessation of function of the three interlinked vital systems of the body (nervous, circulatory, and respiratory)	The death of individual cells, tissues, or organs
Caused by lack of oxygen to the entire body	Caused by lack of oxygen to specific cells, tissues, or organs
Leads to shutdown of the entire body	Can lead to somatic death if organs affected are vital to the body

SUPRAVITAL PERIOD

molecular life

death is a process

not an event!!!

clinical death

a phenomenon in which the pulse rate and the beating of heart stop

supravital period

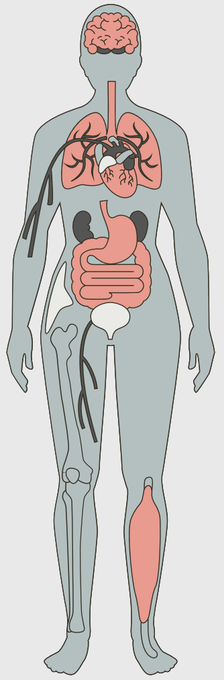
biological death

Occurs due to the degeneration of tissue or cells. In such a type of death, organs become dead and thus are not used for transplantation

what is the SUPRAVITAL PERIOD?

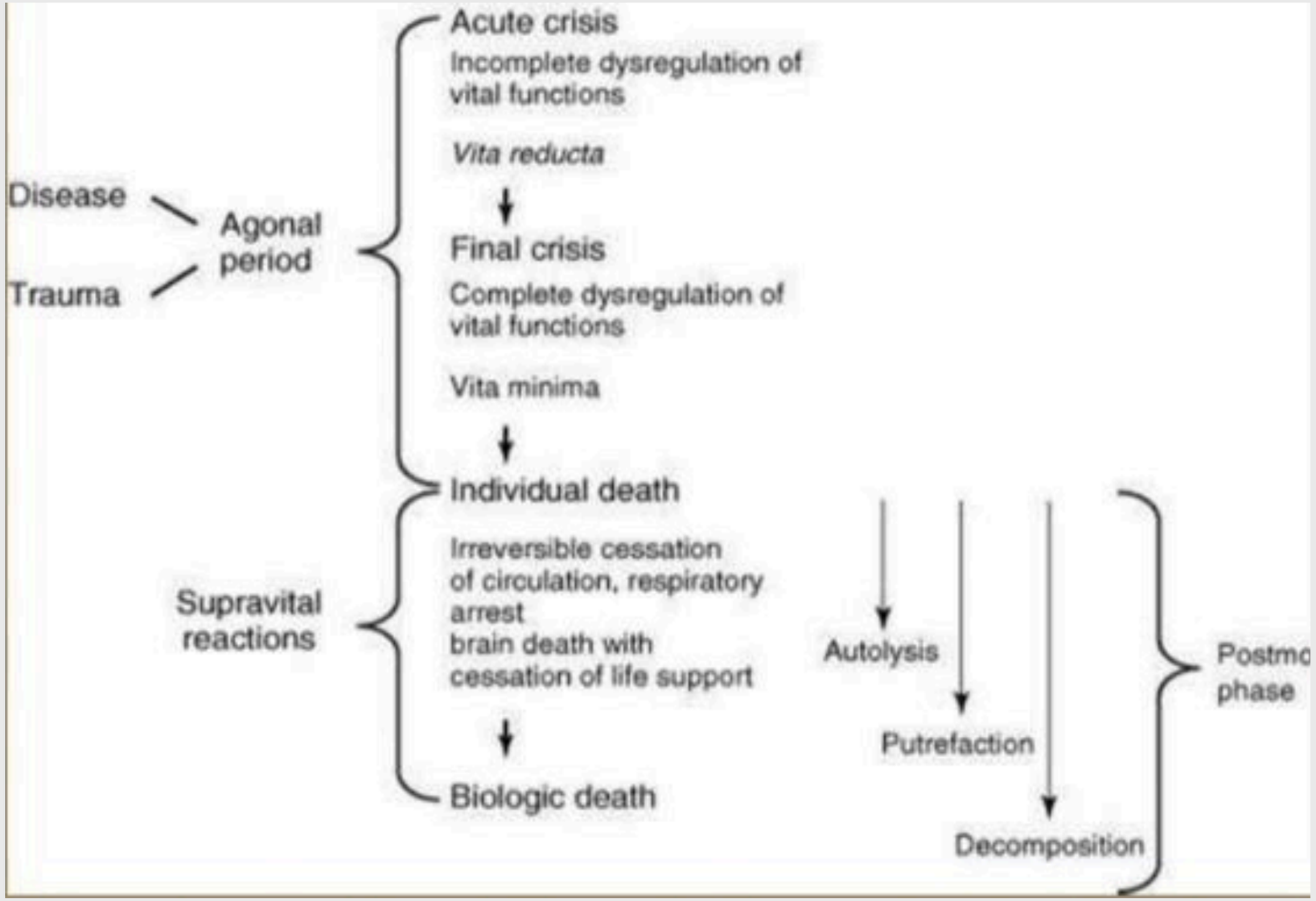
- **Supravital period (molecular life)** is the period between clinical death and biological death, in which there are some surviving tissues after the arrest of circulation. And it is a critical period in the case of organ transplantation.

between Somatic + biology



SUPRAVITAL PERIOD

- This gap between the somatic and molecular death is important for two reasons:
- **Disposal of the body**: In rare cases, the spontaneous movements of muscle may occur after somatic death, and if such movements are witnessed or perceived by laypersons, the event may give rise to apprehension that the person was not actually dead but was prematurely disposed of.
- **Transplantation purpose**: after somatic death, molecular death occurs. In this period between somatic and molecular death, organs from a dead body can be retrieved for transplantation in another person.


Acute crisis
Incomplete dysregulation of vital functions
Vita reducta
Disease
Agonal period
Trauma
Final crisis
Complete dysregulation of vital functions
Vita minima
Individual death
Irreversible cessation of circulation, respiratory arrest
brain death with cessation of life support
Supravital reactions
Autolysis
Putrefaction
Decomposition
Postmo
phase
Biologic death

" أكثر شيء مضحك في الدنيا هو الموت "

د. حسن الهواري

DiagnosingDeath Medico-LegalImportance

Why is diagnosing death considered a medico-legal necessity?

diagnosing death is not only a medical step but a medico-legal necessity.

Reasons include:

- To detect the cause of death.
- To determine the time of death.
- For social and legal purposes.
- For organ donation.
- For recognizing apparent death.
- For statistical health data.
- For heritage reasons.

Apparent Death

What is apparent death

near to death

CPR

A state where vital functions are so depressed that life signs are minimal, mimicking true death.

- True death can only be confirmed by the absence of electrical activity on both ECG and EEG

Causes of apparent death

- Electrocution
- Hypothermia
  (sometimes induced artificially during operations)
- Sun stroke
- Drowning
- Drug overdose
  (e.g., barbiturates)
- Head injury
- Newborn infant
  (may not show obvious signs of life, yet prompt resuscitation can revive them)
- Voluntary act
  (“death trance” in yoga practitioners)

The cause and the mode of death

The cause of the death

The specific injury, disease, or combination of both that starts a chain of physiological disturbances (brief or prolonged) leading to death.

Examples:

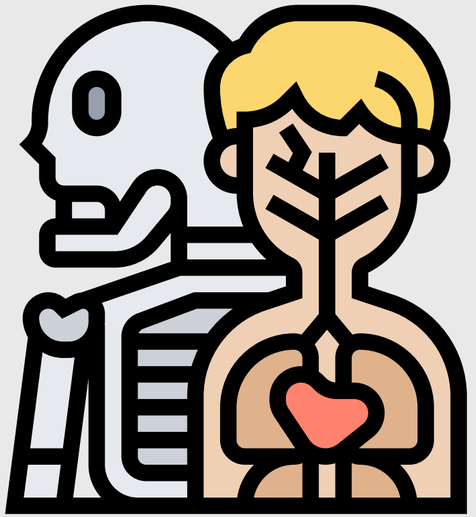
- Gunshot wound to the heart
- Myocardial infarction
- Severe infection (sepsis)

The mode of the death

The abnormal physiological state produced by the cause of death.

Main modes include:

- **Coma** - failure of brain functions
- **Syncope** - failure of cardiac functions
- **Asphyxia** - failure of respiratory system

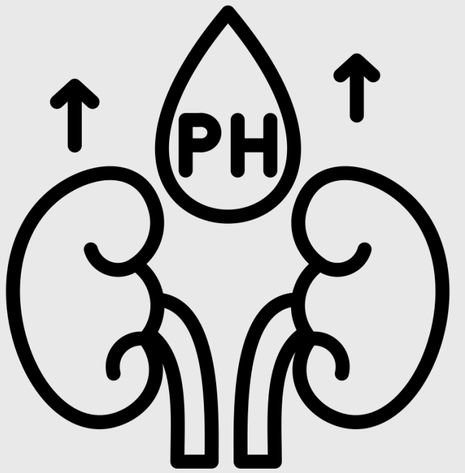


Mechanism of Death

the physiological derangement or biochemical disturbance in relation to death.

Examples:

- Metabolic acidosis
- Alkalosis
- Sepsis
- Toxaemia
- Paralysis



Manner of Death

Unlike cause or mode, the manner of death refers to the circumstantial events and is a legal classification.

Types include:

1. *Natural - due to disease*
2. *unnatural - due to injury* - هواي بنص طيب - السرعي

- Accident - unintentional injury
- Homicide - death caused by another person
- Suicide - intentional self-inflicted death
- Undetermined (2-5%)

Cause, Mechanism, and Manner of Death

Example

An individual can die of massive hemorrhage **(the mechanism of death)** due to a gunshot wound to the heart (**the cause of death**), with **the manner of death** being:

- Homicide (someone else shot the individual)
- Suicide (the individual shot themselves)
- Accident (the weapon fell and discharged accidentally)
- Undetermined (it is unclear what exactly happened)

Body changes after death

What happens to the body after the cessation of the heart and breathing ?

the body undergoes two parallel processes:

- **Autolysis**: enzymatic breakdown of cells starting immediately on the biochemical level.
- **Putrefaction**: bacterial activity (mostly from intestinal flora) producing gases and decomposition by products.

These two processes cause the visible signs that are used to estimate the post-mortem interval

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

- Immediate changes
- early changes
- late changes

Immediate Signs of Death

- Loss of sensation and voluntary power.
- Cessation of respiration.
- Cessation of circulation.

These are clinical signs, but not sufficient alone to confirm death in resuscitation settings.

Early Signs of Death

- Changes in the eye
- Changes in the stomach
- Facial pallor and changes in the skin
- Primary flaccidity of the muscles
- Algor mortis (postmortem cooling)
- Livor mortis (postmortem hypostasis)
- Rigor mortis (postmortem stiffening)

Late Signs of Death

- Puterfaction or decomposition
- Adepocere
- Mummification

Early changes

Eye changes

1. Loss of corneal and light reflexes
2. Corneal opacity (clouding)
3. Pupils: usually mid-dilated
4. Anisocoria (unequal pupil size due to rigor mortis)

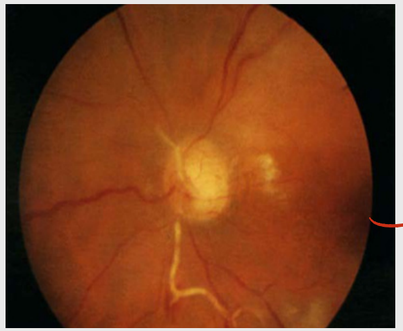
Eye changes

5. Loss of intraocular tension (depends on blood pressure)

6. Retinal “trucking” or “shunting” (fragmentation of blood columns) and it’s the earliest positive sign of death

7. Incomplete eyelid closure (due to primary flaccidity)

8. Tache noire: two triangular black patches on sclera if exposed to air (drying effect)



Stomach

- Regurgitation is a very common feature of terminal collapse and it is a common complication of resuscitation.
- Gastric contents are identified in the mouth or airways in up to 25 % of all autopsies.
- 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 .

Skin changes

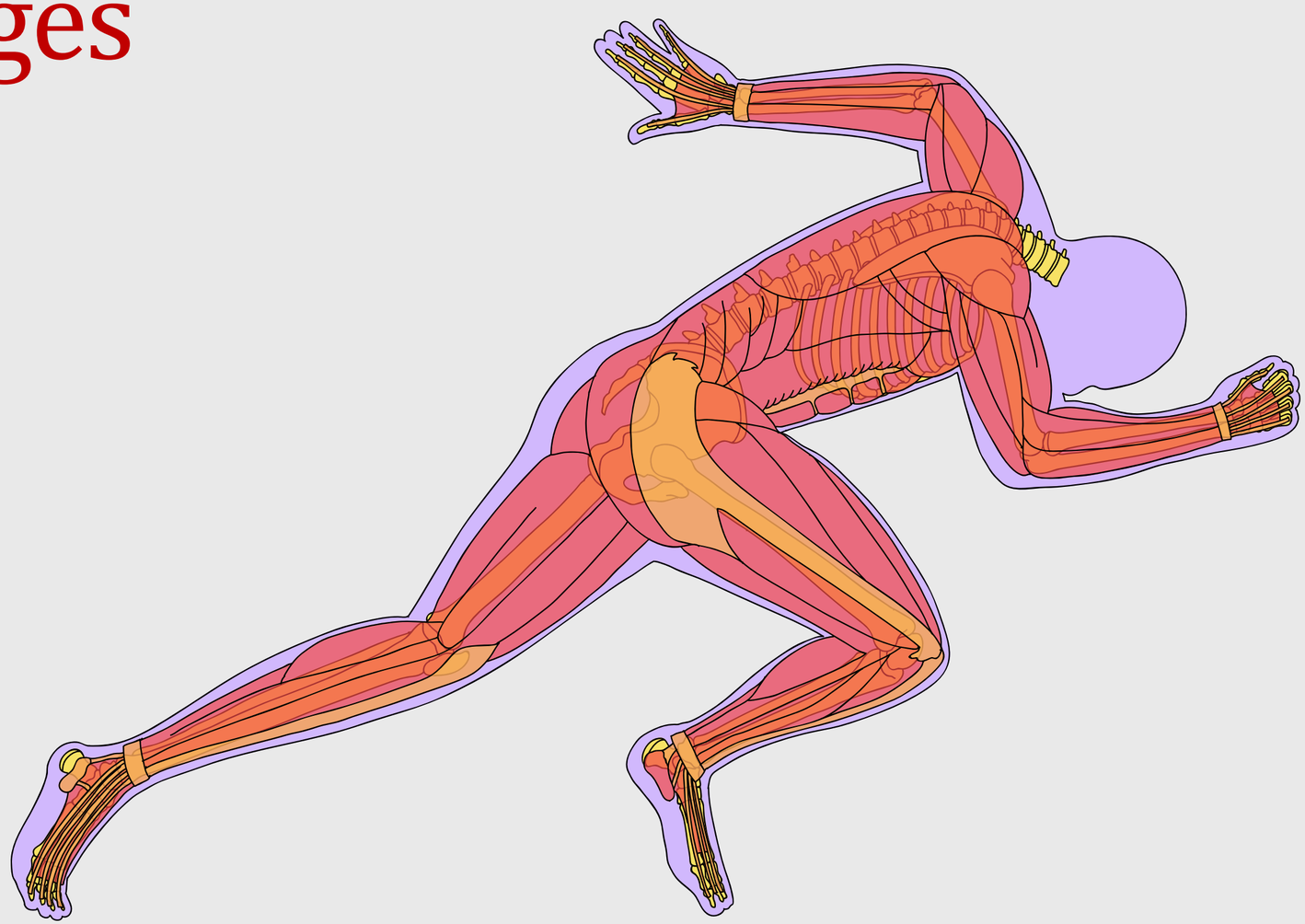
- The **fall in blood pressure** and cessation of circulation of the blood usually render the skin, conjunctivae and mucous membranes **pale**.
- The skin of the face and the lips may remain red or blue in colour in hypoxic/congestive deaths.
- The **hair follicles die at the same time** as the rest 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.

Muscles changes

Primary flaccidity

~~**Rigor mortis**~~

~~**Secondary flaccidity**~~



Primary Flaccidity

📌 Definition

Primary muscular flaccidity is the immediate state of the muscles after death, before any postmortem changes like **(rigor mortis or secondary flaccidity)** set in.

It represents the loss of muscle tone and contractility due to cessation of brain function, circulation, and oxygen supply. In this stage, all muscles of the body — voluntary and involuntary — become soft, flabby, and relaxed.

Primary Flaccidity

📌 Time of Occurrence

بغض النظر وين كان

Begins **immediately after death** and lasts for about 1–2 hours on average (sometimes longer depending on conditions).

It precedes rigor mortis (the stiffening of muscles).

بأثر فيه metabolism // تتأثر في درجات الحرارة

Duration is influenced by:

Cause of death (e.g., longer in sudden deaths like anesthesia overdose, shorter in exhausting diseases).

Environmental temperature (cool → longer duration, hot → shorter).

Primary Flaccidity

📌 Mechanism

1. Cessation of cerebral control → no neural input to muscles.

2. Circulatory arrest → no oxygen, no ATP generation.

3. Complete relaxation → joints are mobile, body is flexible.

Primary Flaccidity

📌 Forensic Importance

1. Indicator of recent death → if a body is in primary flaccidity, death likely occurred within the last 1–2 hours.

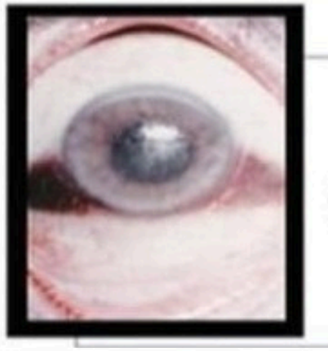
2. Practical implications:

- Eyes: Eyelids remain open, pupils dilated, cornea soft.
- Jaws: Fall open due to relaxation of muscles.
- Sphincters: Relax → may cause passage of urine, feces, or seminal fluid.
- Limb position: Arms and legs are freely movable.

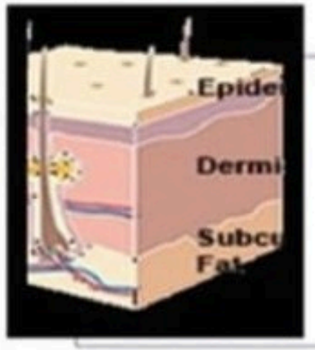
📌 Example

A body discovered in bed, jaw dropped open, eyes half-open, arms freely movable, suggests early postmortem interval (still in primary flaccidity).

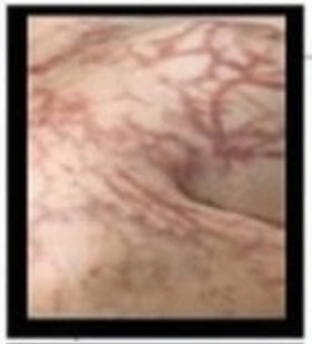
Early changes



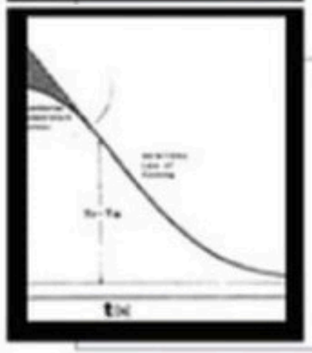
Changes in the Eye



Changes in the Skin



Changes in the Muscles



Cooling of Body

Body Cooling (Algor Mortis)

• The term Algor Mortis comes from Latin meaning “cold death”, and it describes the progressive drop in body temperature after death.

• Once death occurs, the body no longer produces or regulates heat, so it gradually equilibrates with the surrounding (ambient) temperature.

• Normal body temperature:
• Rectal temperature in life is usually 36–37.2 °C (96.7–99 °F).
• After death, when rectal temperature falls below 22 °C (75 °F), death is strongly indicated, and below 21 °C (70 °F) it is considered a sure sign of death.

Rate of Cooling:

- Summer: about 1 °C per hour.
- Winter: about 1.5 °C per hour.
- Usually, body temperature remains stable for about 1 hour postmortem , then begins to decline.

Simple Formulas for Estimating Time Since Death:

1. Time since death ≈ (37 °C – Rectal temperature °C) + 3
2. Time since death ≈ (98.6 °F – Rectal temperature °F) ÷ 1.5

⚠ Limitations of these formulas:

- They assume the body temperature at death was normal.

- They assume cooling follows a regular progressive pattern — which is often not the case.

Factors Affecting Postmortem Body Temperature:

1)Low temperature before death:

- Cholera
- Severe collapse/shock
- Congestive heart failure
- Prolonged exposure to cold

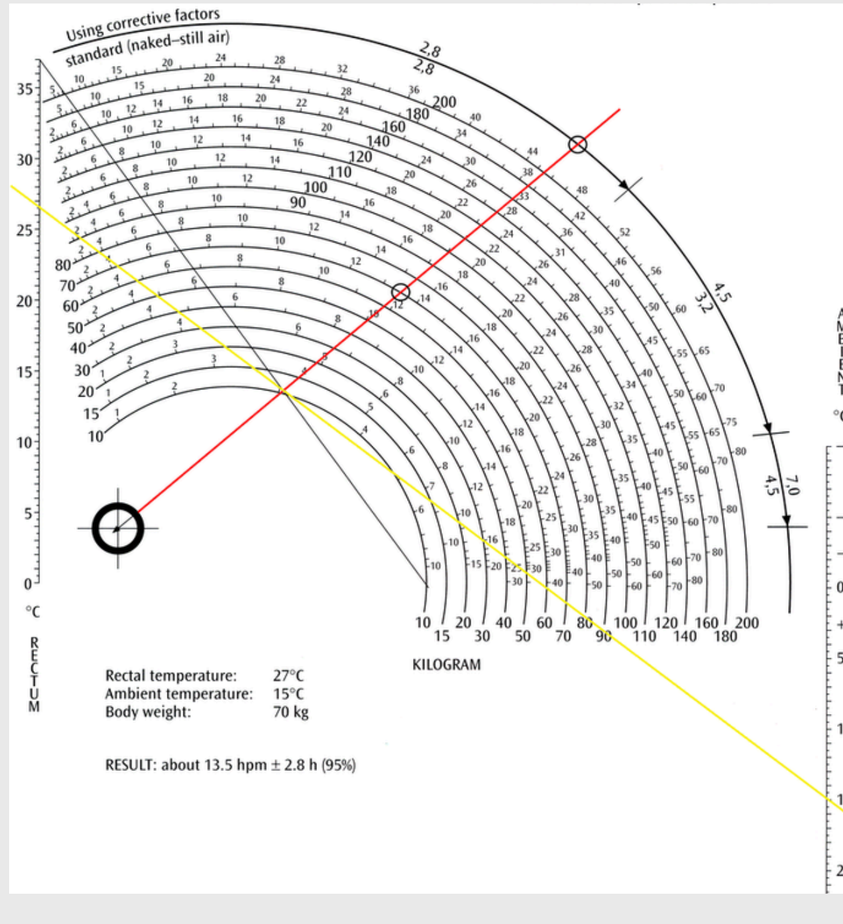
2)High temperature before death:

- Carbon monoxide poisoning
- Coronary thrombosis / myocardial infarction
- Ruptured aortic aneurysm
- Heat stroke
- Pontine hemorrhage
- Severe infections
- Asphyxia
- Intense exercise shortly before death

Henssge's Nomogram:

- Considered the most accurate and practical method
for estimating the postmortem interval (PMI).
- Relies on three main parameters:

1. Body temperature (rectal, liver, or tympanic)
2. Ambient temperature
3. Body weight



How it Works

• The nomogram graphically represents cooling curves of the human body under different conditions.

• By aligning the values of body temperature, ambient temperature, and body mass, an estimated time since death can be read from the chart.

• Correction factors are then applied depending on:

• Clothing (naked vs dressed).

• Air movement (still air vs windy).

• Body position (submerged, buried, indoors, outdoors).

Advantages:

- More reliable than simple formulas because it accounts for body mass and environment.
- Widely used in forensic medicine for PMI estimation.

Limitations:

- Accuracy decreases if:
- Death occurred in abnormal thermal conditions.
- There was fever, hypothermia, or poisoning affecting body temperature before death.
- The body was moved after death.

Factors Affecting Algor Mortis (Cooling of the Body After Death):

1. Initial Body Temperature

• A higher body temperature at the moment of death (e.g., due to fever, exercise, or infection) slows down cooling.

• Conversely, if the person was already cold, the body cools faster.

2. Temperature Gradient (Body vs. Environment)

• The greater the difference between body temperature and the surrounding environment, the faster the cooling process.

• Example: a body in freezing air cools much faster than in a warm room.

3. Air Movement and Humidity

• Air circulation enhances heat loss. Moving air (like wind or a fan) removes heat quickly.

• Humidity also matters: higher humidity allows faster cooling, especially when combined with air movement.

4. Clothing and Coverings

• Clothes, blankets, or burial materials insulate the body and slow down heat loss.

• Naked or lightly clothed bodies lose heat much

5. Body Build (Size and Surface Area)

• Slim bodies with a large surface-to-mass ratio cool quickly.
• Obese or muscular bodies (higher BMI) cool more slowly because fat acts as insulation.

6. Special Conditions That Alter Cooling

• Postmortem Caloricity: In some cases, the body temperature actually rises for a short time after death.
• This happens due to postmortem glycogen breakdown (glycogenolysis), which can produce about 140 calories and raise body temperature by ~2°C.
• Fulminating Infections (e.g., Septicemia): In severe infections, body temperature may continue to rise for a few hours after death before cooling begins.
• Edema: Excess fluid in tissues slows the cooling process

7. Body Posture

- The position of the body can influence cooling.

For example, a curled-up posture retains heat.

THANK YOU