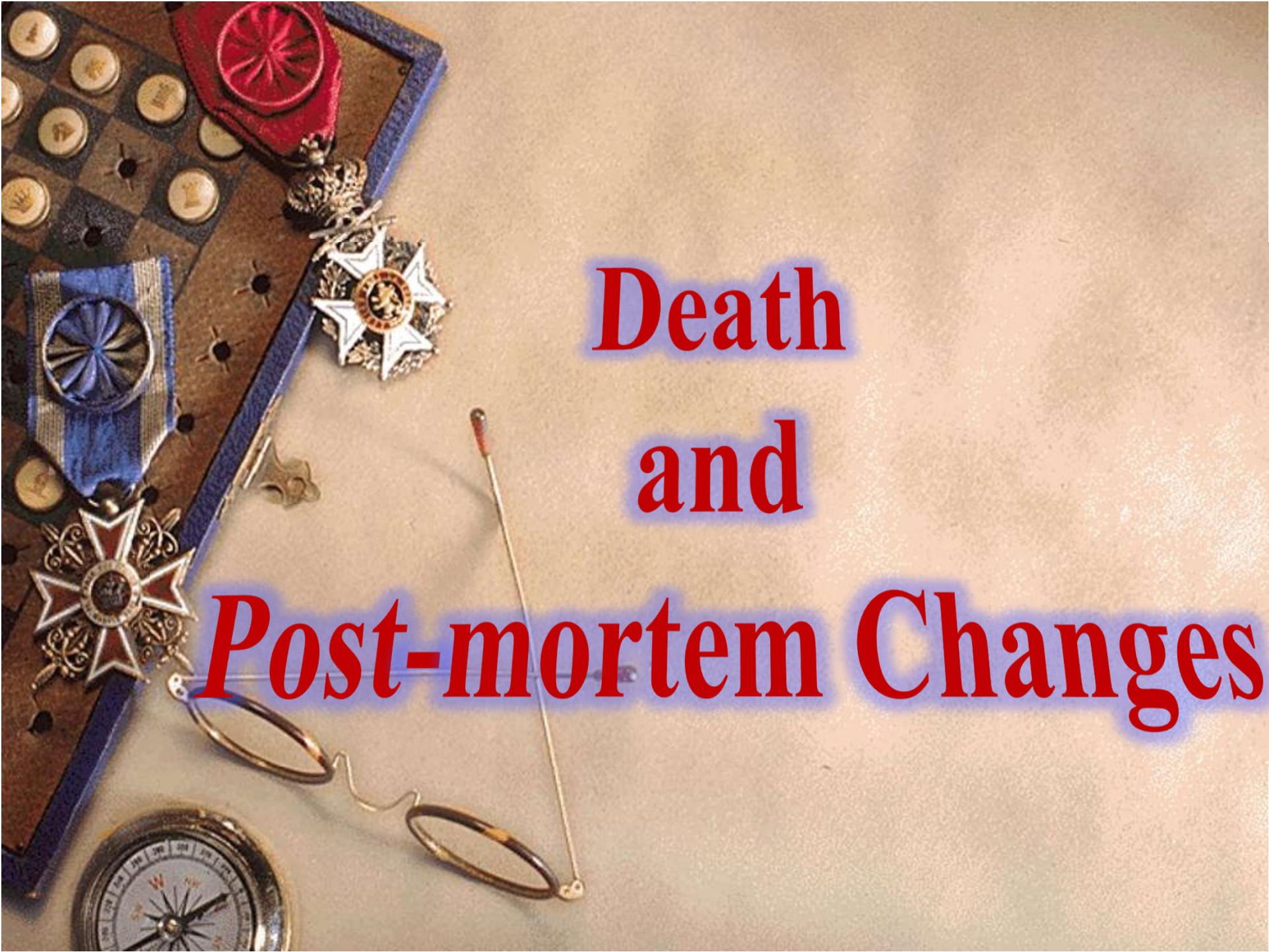


A collection of historical artifacts is arranged on a light-colored, textured surface. In the upper left, a wooden chessboard with a blue and brown checkered pattern is partially visible, featuring several small, round, light-colored chess pieces. A red ribbon with a circular, sunburst-like medallion is positioned near the top. Below it, a blue ribbon with a similar medallion is visible. Two ornate, star-shaped medals with intricate designs and circular centers are placed on the chessboard. A pair of round, gold-rimmed glasses with thin temples lies diagonally across the lower left. In the bottom left corner, a circular compass with a white face and black markings is visible. A small, ornate key lies near the center. The text "Death and Post-mortem Changes" is overlaid in a large, red, serif font with a blue glow effect, positioned on the right side of the image.

Death and *Post-mortem* Changes



Nature and Definition of Death:

- ◆ **Death is the cessation of life in a previously viable organism. A dead person is an individual who has sustained either:**
 - ◆ **1- Irreversible cessation of circulatory and respiratory functions or**
 - ◆ **2- Irreversible cessation of all functions of the entire brain, including the brain-stem.**



Phases of death:

1) Somatic death or clinical death

2) Cellular or molecular death:

“period of warm ischemia” or

“period of molecular life”



Diagnosis of somatic death

- 1. Cessation of circulation**
- 2. Cessation of respiration**
- 3. Cessation of brain function**



Early diagnosis of death: **(Signs of somatic death)**

- 1- Unconsciousness, loss of all reflexes, and complete lack of response to painful stimuli.**
- 2- Complete and irreversible cessation of heart beat and respiratory movements.**
- 3- Muscular flaccidity.**
 - ◆ **Primary: due to loss of tone.**
 - ◆ **Contact flattening: due to loss of elasticity.**



4-Ocular signs:

a-Failure of the pupils to react to light, though they respond to drugs such as atropine for many hours.

b-Loss of corneal reflex.

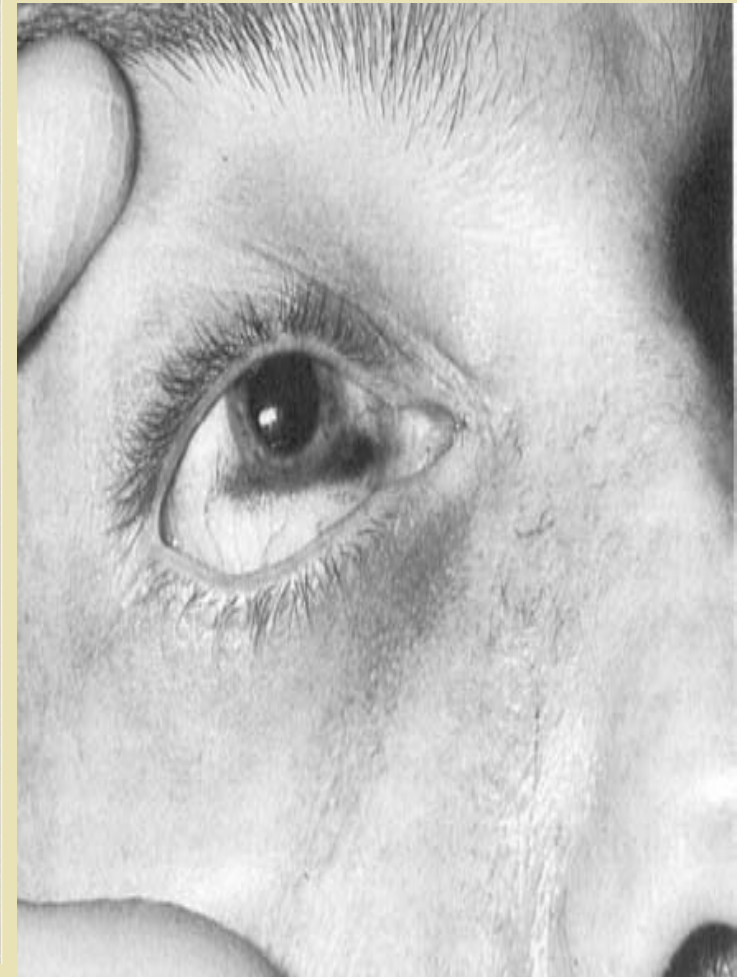
c-The eyeballs become soft due to rapid decrease in the intraocular tension, as it depends upon arterial pressure for its maintenance.



4-Ocular signs:

d-The cornea loses its normal glistening reflectivity due to laxity and failure of lacrimal moistening.

e-The columns of blood in the vessels may be broken up into segments called “trucking”, similar to trucks in railway train.



Taches Noires

Brownish discolouration of the sclera due to cellular debris and dust



Suspended Animation

It is a condition in which the vital functions of the body are at such a low level that they cannot be appreciated by clinical examination

Apparent death

This may last few seconds to minutes.

Voluntary- by yogis

Involuntary – drowning, electrocution, heat stroke, typhoid fever etc.



Medico-legal importance of early diagnosis of death:

- 1. The earliest determination of death for prompt taking of organs for transplantation purposes.**
- 2. The legality of discontinuation of life-supporting equipments.**
- 3. The determination of the time of death in criminal and civil problems.**



Medico-legal importance of early diagnosis of death:

4. Early determination of death at time of epidemics is desirable.

5. Differentiation between death and suspended animation (death-like state), to prevent premature burial: involuntarily, voluntarily.



Brain death:

- ◆ **Cortical death**
- ◆ **Brain stem death**



Vegetative state

Def:

is a condition of patients with severe **brain damage** who were in a deep coma with persistence of spontaneous breathing and cardiac function.

It is classified as a **Permanent Vegetative State** (PVS) after approximately 1 year of being in a **Persistent Vegetative State** which is called so after 4 weeks in a Vegetative State (VS).



Criteria of brain stem death:

- **The patient must be in a deep coma (depressant drugs, metabolic or endocrine disorders or hypothermia must be excluded).**
- **The patient must be on mechanical ventilation (neuromuscular blocking agents and curare like drugs must be excluded).**
- **No sever metabolic or endocrine disturbance.**



- ❖ **Firm diagnosis of the cause of death, has been persistent for at least 6 hours.**
- ❖ **Absence of motor response to painful stimulation.**
- ❖ **Absence of brain-stem reflexes: these tests should be done in the following order, if any of these reflexes are preserved, no need to proceed any further.**



diagnosis of brain stem death:

Exclusions

- a) The patient should not be under the effect of drugs.**
- b) The core temp. should not be below 35°C .**
- c) The patient should not be suffering from severe metabolic or endocrine disturbance.**



personnel

- ◆ The tests should be performed by two medical practitioners each separately .
- ◆ The doctors involved should be experts in this field.....**No transplant surgeons.**
- ◆ At least one of the doctors should be a consult not junior
- ◆ Each doctor should perform twice separately with an interval 6 hours at least.

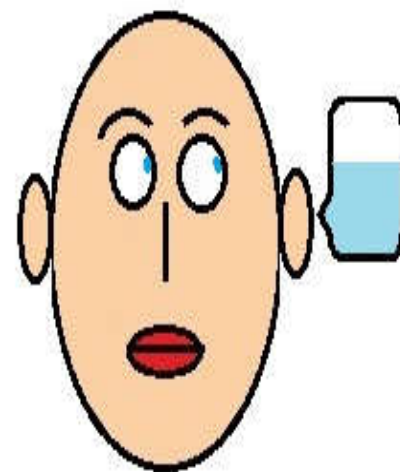
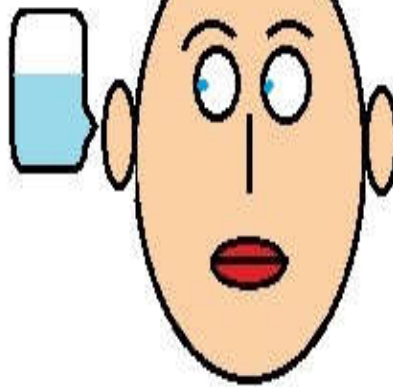
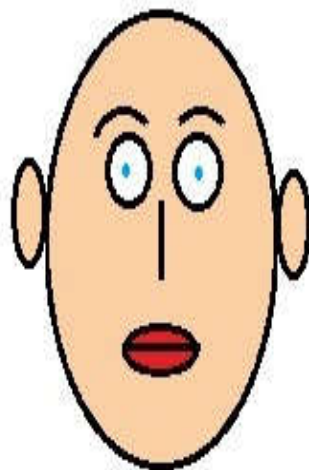


Tests:

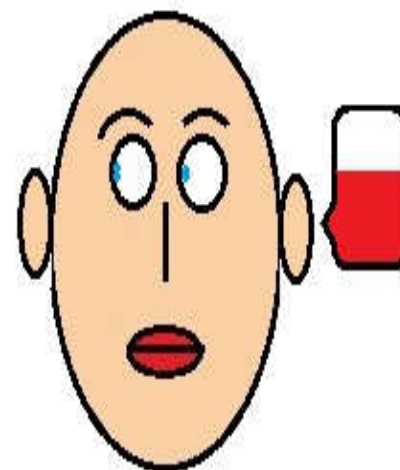
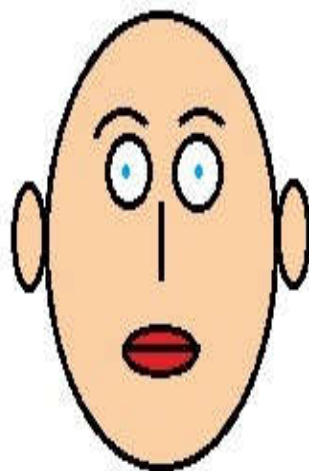
- **Absent papillary response to light.**
- **Absent corneal reflex.**
- **Oculocephalic reflex (doll's eye) is absent.**
- **Vestibulo-ocular reflex is negative when ice-water is introduced into the ears.**
- **Pharyngeal and tracheal reflexes are absent (gagging and coughing).**

Vestibulo-ocular Reflex

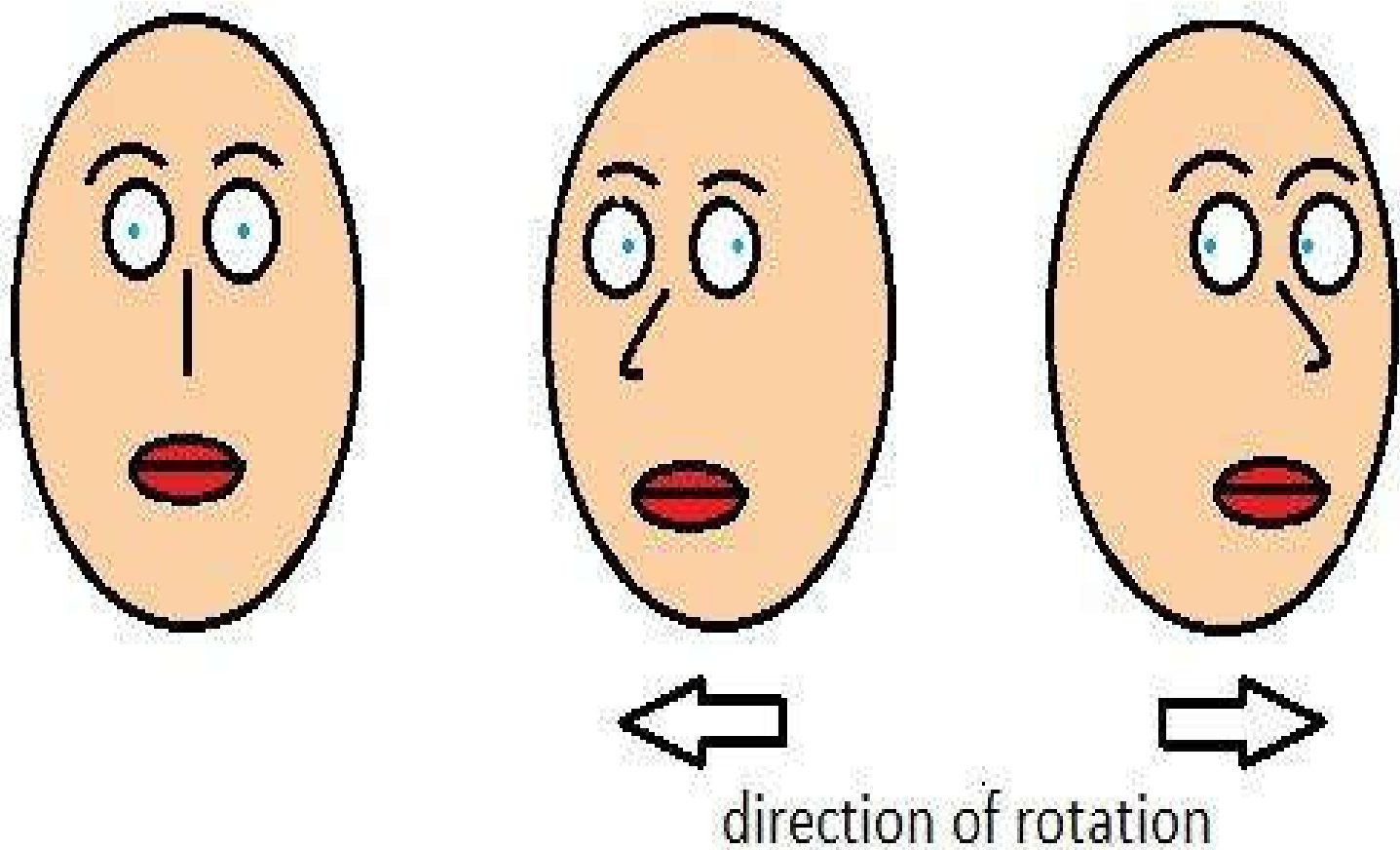
Cold water:



Warm water:

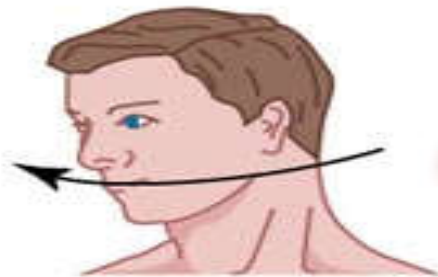


Positive Oculo-cephalic Reflex

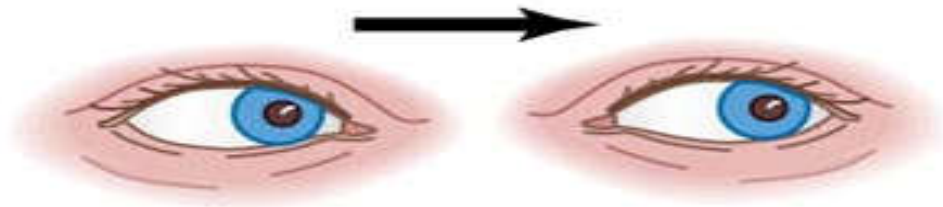


Doll's eye sign

Normal (reflex present)

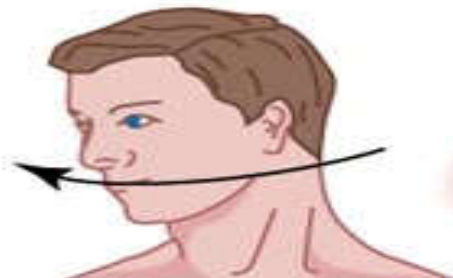


Head rotated
to the right

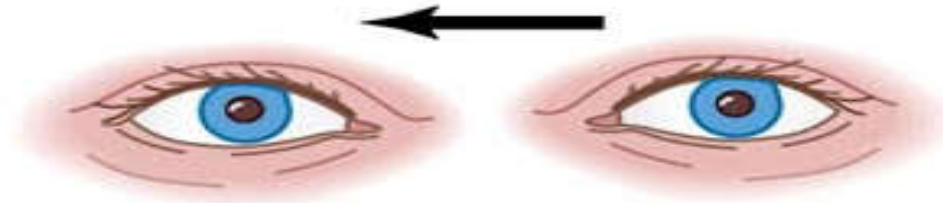


Eyes move to the left

Abnormal (reflex absent)



Head rotated
to the right



Eyes follow



- **Testing for apnea (failure of spontaneous respiration)**
- **if all previous clinical tests are lost, an apnea test should be done.**



N.B.:

- **Testing must be carried out with a core temperature not less than 35°C to avoid hypothermia.**
- **The tests should be repeated at least once.**



Death Certification:

This is provided by the doctor where death is known or believed to be due to natural disease and where there are no suspicious or unusual circumstances.

The medical cause of death is divided into two parts:

Part I: Conditions which led directly to death:

Part II: Other conditions, not related to part I, but also contributed to death.

Mode of death:

The mode of death refers to the abnormal physiological state that pertained at the time of death e.g.: Coma, cerebral hemorrhage, hypertension, congestive cardiac failure, cardiac arrest, pulmonary edema, syncope, and cardio-respiratory failure.



المستشفيات الجامعية

تقرير عن وفاة

عدد المرفقات:

يد طبيب/

أو السيد عمدة:

على أحكام القانون رقم ٢٦٠ لسنة ١٩٦٠ المعدل بالقانون ١١ لسنة ١٩٦٥ في شأن التبليغ عن الوفيات أبلغكم بالوفاة التالية:

١- بيانات المتوفى

الاسم	اسم الأب	الجد أو الثقب	النوع ذكر أو أنثى	إسم الأم بالكامل	الديانة	المهنة	الجنسية	محل الوفاة

الدقيقة	الساعة	اليوم	تاريخ اليوم	الشهر	السنة	تاريخ الميلاد	محل الميلاد	سن المتوفى	الحالة العائلية (الزواجية)	عنوان محل الإقامة بالتفصيل

القرية	القسم أو المركز	المدينة	المحافظة	الرقم	البطاقة: شخصية عائلية	التاريخ	المدنية أو القرية	الحى أو الشاخنة	الرقم	مكتب السجل المدنى	ملاحظات

٢- بيانات المبلغ

الاسم	إسم الأب	الجد أو الثقب	الرقم	جهة صدورها	التاريخ	عنوان محل الإقامة بالتفصيل	علاقته بالمتوفى

على مسئوليتى بأن جميع بيانات هذا التبليغ صحيحة ،،، توقيع المبلغ: / / ١٩

٣- شهادة الوفاة الطبية

١- السبب المباشر للوفاة (أ)	أحوال مرضية إن وجدت (ب) تسبب عن
نشأ عنها السبب المباشر للوفاة (ج) تسبب عن	أحوال مرضية أخرى "إن وجدت" ساعدت
على الوفاة ولا صلة لها بالمرض الأصلي	
توقيع الطبيب:	التوقيع: / / ١٩

تحت رقم: / / ١٩ بتاريخ:

إعتماد الطبيب

رد التبليغ مستوفى وقيد بالدفتري الصحى بجهة:

توقيع كاتب الصحة أو العمدة

تم قيد الواقعة بسجل واقعات الوفاة بتاريخ / / ١٩

تحت رقم: / / ١٩

إسم الموظف المخصص:



Death Certification:

A male patient aged 45 years was admitted to ICU following severe hematemesis . Antishock measures together with blood transfusion were given , patient was diagnosed as bilharzial hepatic fibrosis, ascitis and bleeding esophageal varices. Few hours later the patient passed into coma and died . **Write the death certificate.**



- أ السبب المباشر للوفاه : توقف بالدورة الدموية و القلب
- ب تسبب عن : تليف الكبد ادى الى فشل بوظائف الكبد و
دوالى بالمرىء ادى انفجارها الى قىء دموى
- ج تسبب عن : الاصابة بالبلهارسيا
- احوال مرضية ساعدت :-----



Death Certification:

A female patient had cancer breast and was treated surgically. After 3 years bone scanning revealed bone metastasis, radiotherapy started. a month later she developed dysnea and hemorrhagic pleural effusion . Tomography revealed pulmonary metastasis. The dysnea get worse and the patient died .Write the death certificate.



Postmortem Changes



1-Cooling of the Body After Death:

algor mortis

Imbalance between heat production and heat loss.

Loss of heat of body by means of evaporation, conduction convection and radiation, till it balances with the temperature of surroundings.

Rate of cooling is fast during first few hours and later slows.



Factors affecting rate of cooling:

- 1. The temperature gradient between the body and the environment.**
- 2. The initial body temperature.**



- 3. Body insulators.**
- 4. Active air currents.**
- 5. The medium around the body.**
- 6. The surface area of the body in relation to its weight.**
- 7. Posture.**



2-Hypostasis or Postmortem Lividity:

Definition:

Postmortem hypostasis is bluish-red discoloration in the dependent areas of the deceased skin, tissues and internal organs.



Hypostasis or Postmortem Lividity:

Mechanism:

It is due to cessation of circulation and settling of blood by gravitational forces within dilated toneless capillaries and venous bed.





Factors affect the amount and extent of hypostasis:

- a. The amount of blood left in the circulation after death.**
- b. The period of fluidity of this blood in the body.**





4-Appearance and disappearance:

Timing of hypostasis

Variable (30-60m)

Completed (6-12 h)

Fixation



5- Distribution of hypostasis:

***Posture of body**

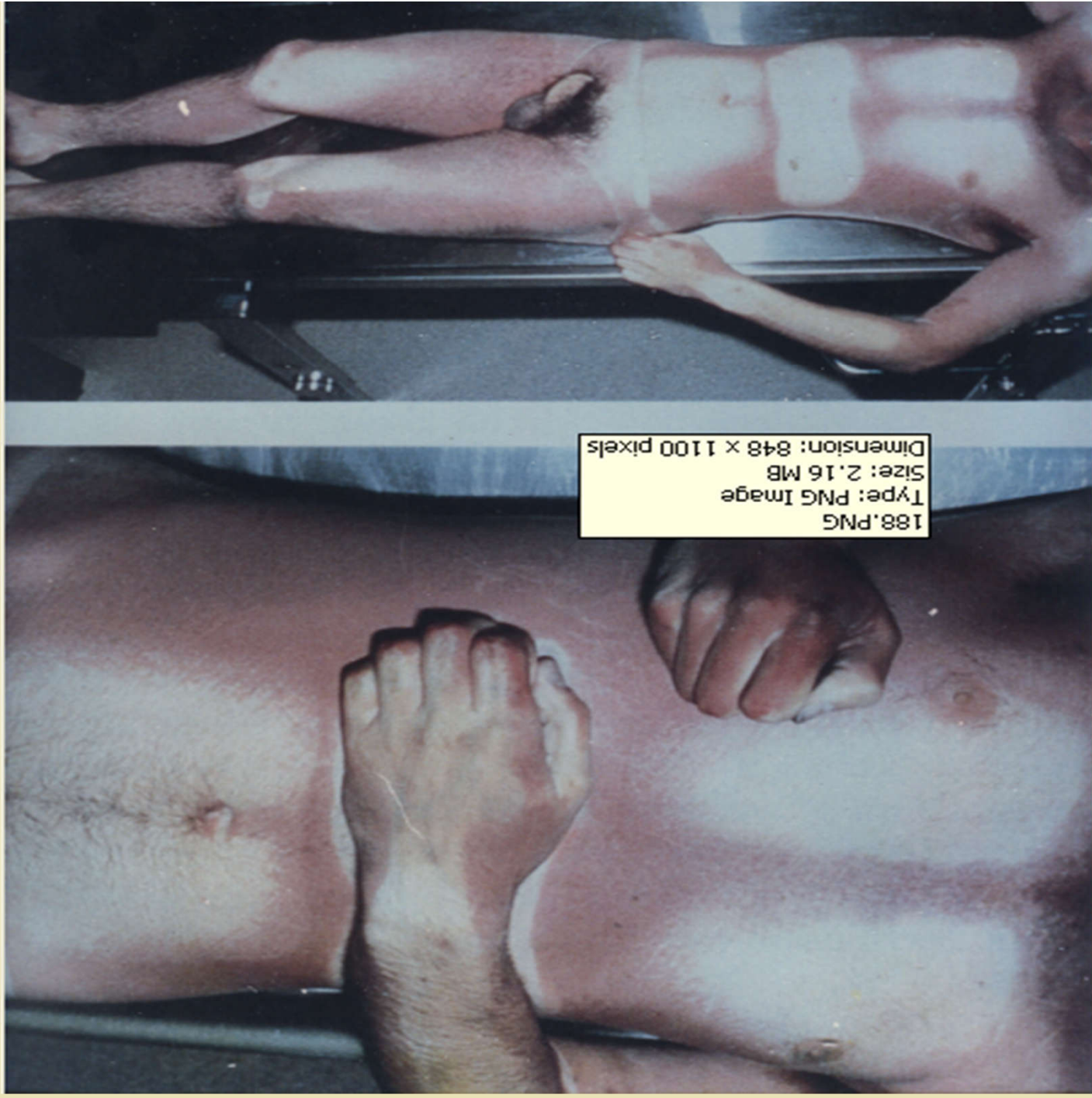
***Supine**

***Prone**

***Hanging**

***Drowning**

***Internal organs**



188.PNG
Type: PNG Image
Size: 2.16 MB
Dimension: 848 x 1100 pixels



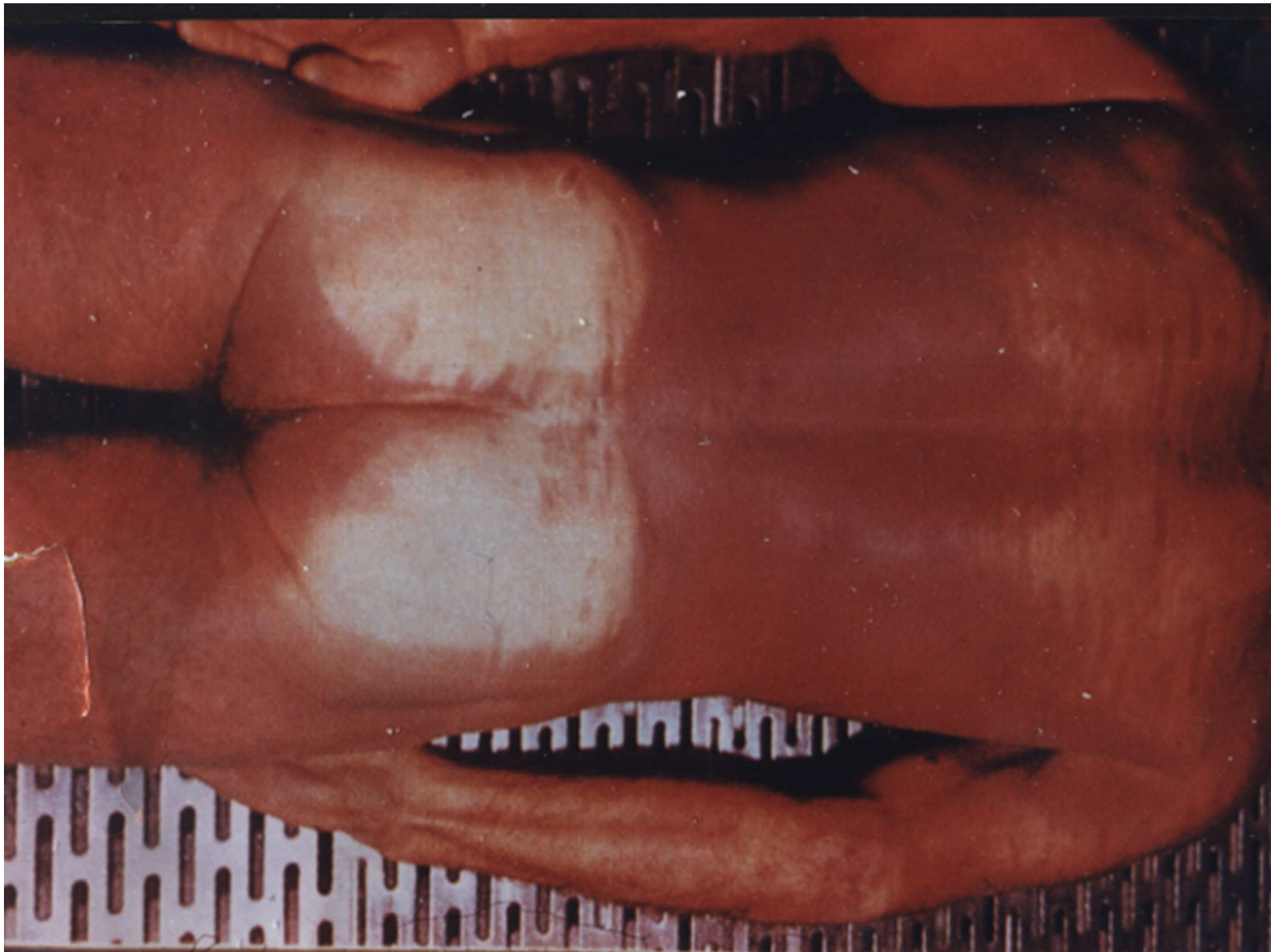


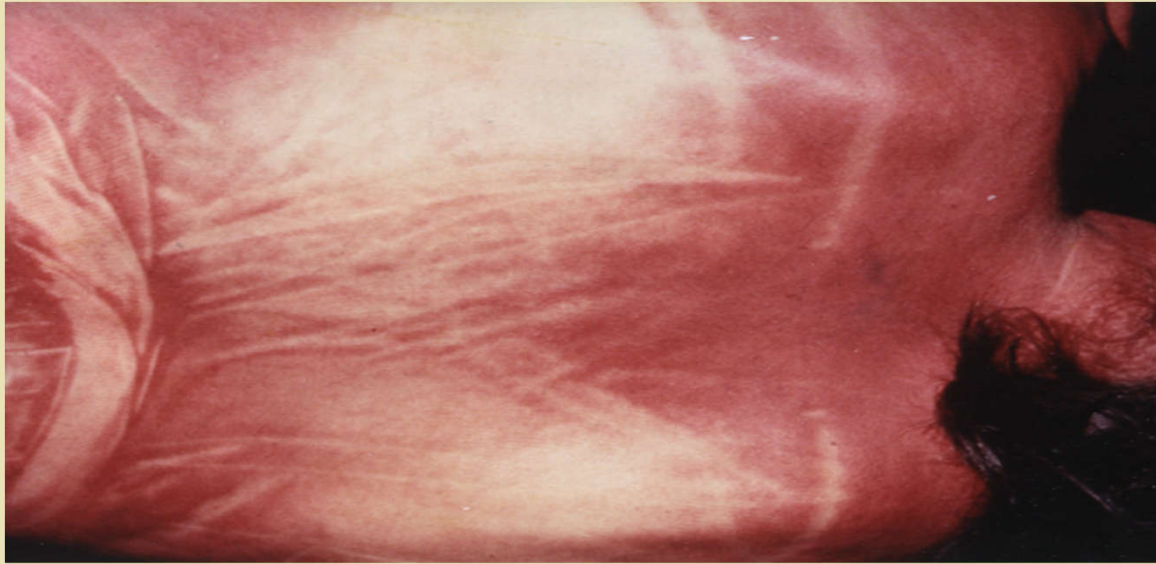
6- Colour of hypostasis:

***red hypostasis**

***Brown**

***bronze**







Rigor mortis:

Definition:

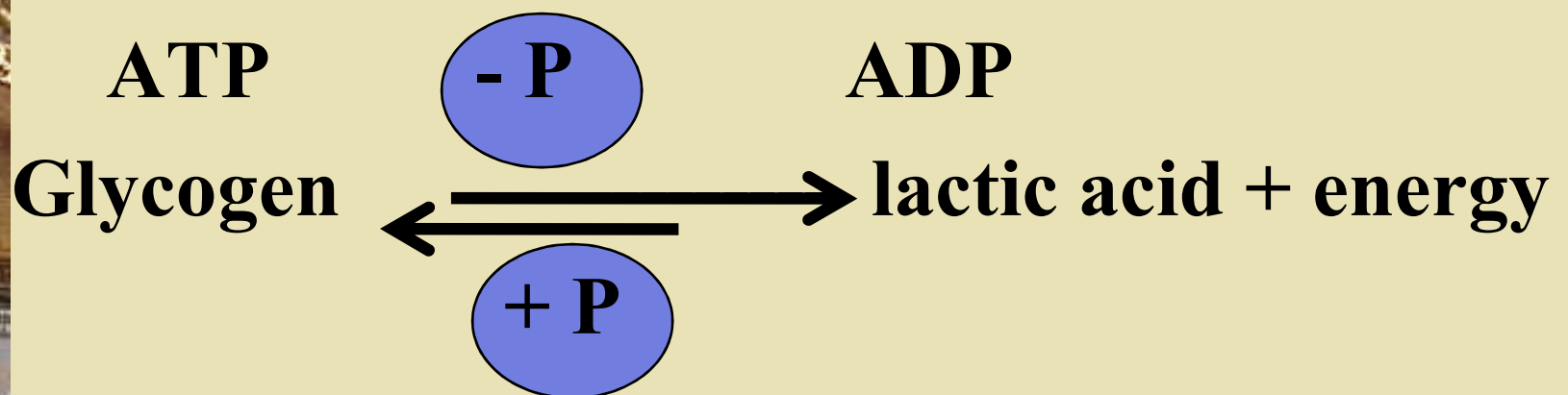
It is a state of stiffening that affects most of dead bodies at a variable time after death, then, passes off to allow secondary flaccidity. It affects skeletal, cardiac and involuntary muscles.

Physicochemical basis of rigor mortis

(Mechanism):

It is due to an irreversible combination of actin and myosin within the muscle fibers.

During life.



After death:





Estimation of time since death from rigor mortis:

- ◆ Rigor may be first detectable within 1-4 hours in the face and within 4-6 hours in the limbs, increases progressively to a maximum within twelve hours, remains 'for about twelve hours and then progressively disappears within 12 hours.
- ◆ Secondary flaccidity becomes apparent from 24 to 50 hours after death.

Rigor Mortis

**Body warm
hours**

not stiff

less than 3

Body warm

stiff

3-8 hours

Body cool

stiff

8-36 hours

Body cool

not stiff

more than 36 hours





Factors affecting rigor mortis:

- 1. Temperature.**
- 2. Muscular activity.**
- 3. Muscular development.**



Broken rigor



Conditions simulating rigor mortis

- ◆ Cadaveric spasm.
- ◆ Heat stiffening.
- ◆ Cold Stiffening.

Cadaveric spasm





Differentiation between rigor mortis and cadaveric spasm:

	Rigor mortis	Cadaveric spasm
Type of death.	Nearly all types.	Death accompanied by fear, excitement or severe pain.
Time since death.	Takes some time to develop.	Instantaneous.
Muscles affected.	Voluntary, involuntary and cardiac.	Some voluntary muscles only.
Nature	Physicochemical process.	Partially neurogenic

Heat stiffening



Boxer or pugilistic





DD between heat stiffness and cold stiffness



Post-mortem decomposition:

The disintegration of body tissues after death is known as decomposition. It follows the arrest of biochemical processes, which preserve the integrity of tissues. This decomposition is brought about by chemical processes (mostly enzymatic), bacterial and fungal attack and predation by many varieties of animal life.

Putrefaction

**This is the usual course of decomposition
(moist degeneration)**

- **Greenish discoloration of the skin of the right iliac fossa.**
- **Marbling Appearance**











-At the end of the first week will be:

1-Generalised discoloration of the skin.

2-Swelling of the body.

3- Bloating of face.

4-Protrusion of the tongue and eyes.

5-Blood-stained froth.

6-Expulsion of the contents of the intestine and gravid uterus.

-Formation of large bullae and blisters.



- At the end of the second week:

1-Skin of the hands and legs sheds in glove-like fashion, a stocking-like pattern.

2-Hair becomes loose.

3-The body cavities burst.

4-The tissues progressively liquefy.



5- Destruction by maggots

- * Disappearance the liquefied soft tissues leaving the cartilage, tendons and ligaments attached to the skeleton in one or two years: (bare-bone skeleton)**





Factors affecting the rate of putrefaction:

All conditions which help **invasion of the body by micro-organisms, or their growth and multiplication affect putrefaction.**

- ◆ 1. Temperature.
- ◆ 2. Humidity.
- ◆ 3. Medium.
- ◆ 4. Causes of death.
- ◆ 5. Age and state of the body.



Adipocere formation:

Adipocere formation is alternative to putrefaction. It is a chemical change of the body fat which converts it by hydrolysis and hydrogenation to a waxy compound.

Requirements:

- * Wet conditions**
- * Some warmth? occurs even in deep graves and cold water.**



Characters of Adipocere:

- In early stages: adipocere is greasy, resembling pale rancid butter having a ‘disagreeable smell.
- After some years: it becomes grayish white and brittle and the smell becomes less evident.

hydrolysis & hydrogenation

body fat -----> adipocere formation

lecithinase enzyme





2-Mummification:

A) Natural mummification:

It is a post-mortem change where tissues may desiccate instead of undergoing moist degeneration.

Requirements:

- a) Dry environment, with a moving air current.**
- b) Hot weather? can occur in cold weather.**

Characters: The mummified tissue is dry, leathery and brown in color. The tissues are dehydrated and the skin stiffened and stretched over the face like a mask.





B) Artificial mummification (Embalming):

It is the artificial preservation of the dead body to prevent its decomposition.

- **Embalming procedure usually includes:**
- **The application of cosmetic cream to the face and hands of the deceased.**
- **Covering of the eyes under the eyelids.**
- **Fixation or wiring of the jaws.**
- **Injection of embalming fluids in the neck (carotid), axilla (axillary) and groin (iliac and femoral) arteries.**



- ◆ **Embalming fluids contain various mixtures of formaldehyde, glutaraldehyde, alcohols and other preservatives (e.g. hexylresorcinol, phenol, methylsalicylate, sodium benzoate and EDTA).**

Drawbacks of embalming.



Medico-legal importance of mummification

- 1. It gives an idea about the place in which the body has been found (dry places).**
- 2. It helps in personal identification.**
- 3. It gives information about the cause of death (as in adipocere formation).**
- 4. It indicates the time passed since death.**



3-Maceration:

◆ **Maceration is an autolytic process (self-disintegration)**

◆ **The macerated fetus is characterized by:**

- ◆ ● Reddish-brown coloration of the skin which is changed to greenish-brown.
- ◆ ● Peeling of the skin.
- ◆ ● Flaccidity, separation and overlapping of the cranial bones.
- ◆ ● Dislocation of the tempromandibular joints
- ◆ ● Accumulation of haemolyzed blood and fluid in the body cavities.
- ◆ ● Spalding sign.



Cremation.

disposal of the dead body by burning. It is done in some parts of the world, such as India, only in natural undoubtful causes of death.



Exhumation:

Getting a previously buried body out of its grave for post-mortem examination to declare the actual cause of death. It is usually applied to a body buried in a legitimate fashion when there are new information.



Estimation of the Time Passed Since Death

The postmortem interval

I— Postmortem changes:

Response of the muscles to electric stimulation.

Ocular changes

Rate of cooling.

Extent of hypostasis.

Extent of rigor mortis.

Extent of putrefaction.

Adipocere formation,

Mummification.



2- Entomology of the dead body:

3- Biochemical changes :



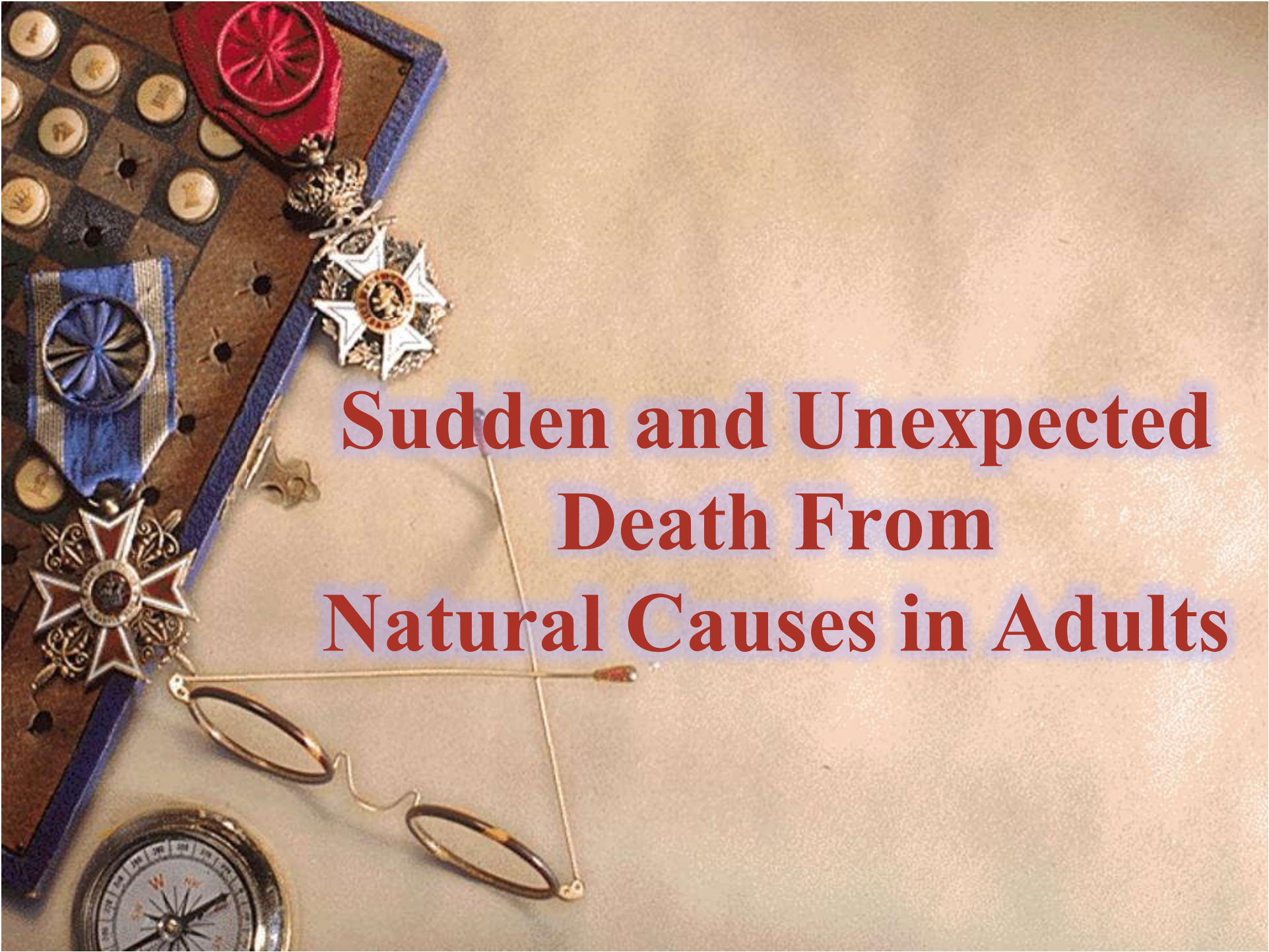
4- Physiological changes

5- Histological changes:



6- Gastric and intestinal content (Time since last meal):

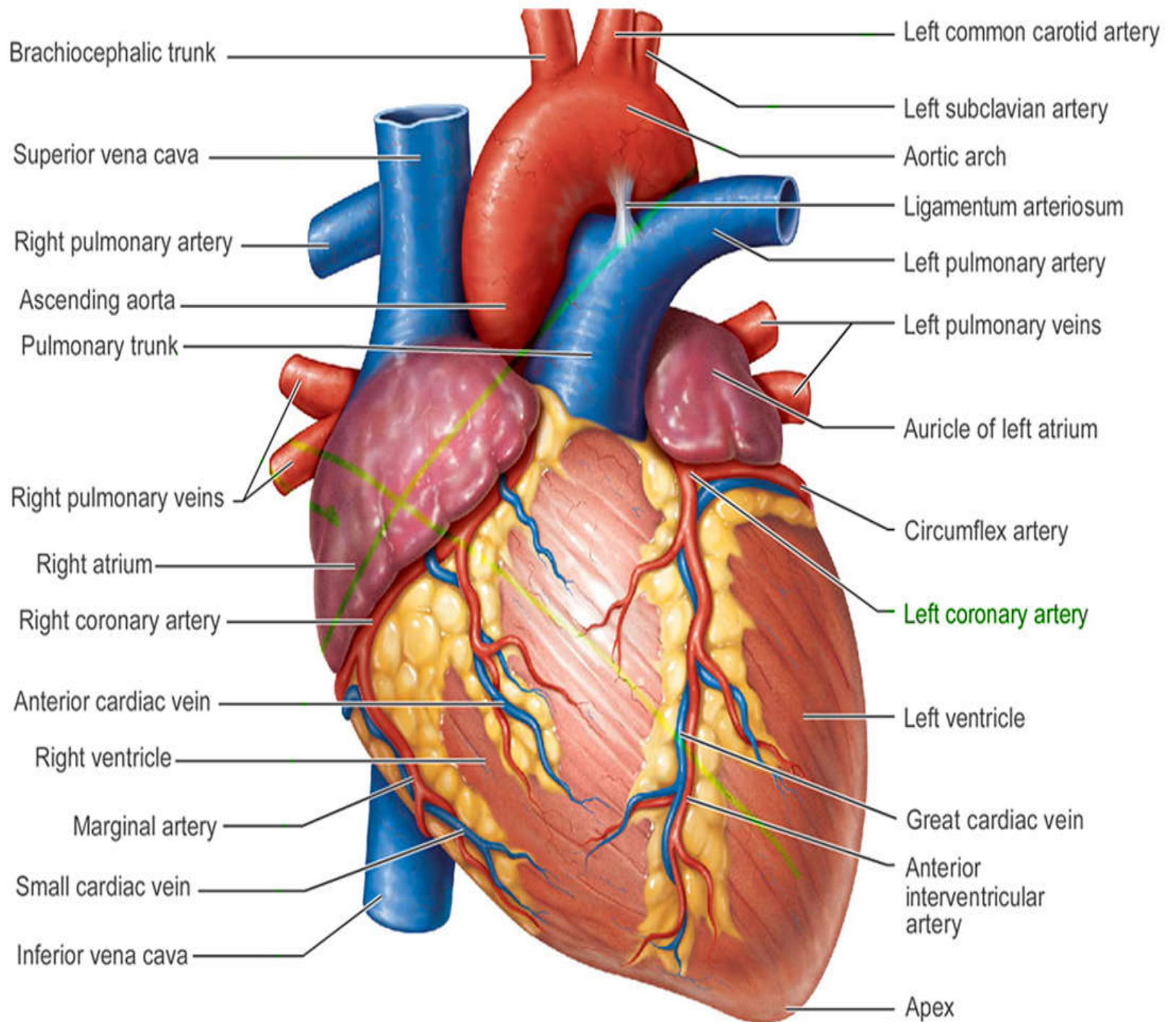
- Type of the ingested meal**
- The gastric tone**
- The pyloric function**
- The psychological condition**
- Stomach: 2 to 4 hours.**
- Hepatic flexure: 6 hours.**
- The splenic flexure: 9 to 12 hours.**
- The pelvic colon: 12 to 18 hours.**

A collection of military medals and a compass are arranged on a wooden surface. In the top left, there is a red ribbon with a circular medal. Below it is a blue ribbon with a circular medal. To the right of these is a silver star-shaped medal. In the bottom left, there is a silver star-shaped medal with a red center. A pair of glasses with thin metal frames lies across the center. A circular compass is visible in the bottom left corner. The background is a light-colored wooden surface.

Sudden and Unexpected Death From Natural Causes in Adults



**The WHO definition of a sudden death
is someone who dies within twenty
four hours of symptoms appearing.
Causes of sudden and unexpected
death.**





1-Sequelae of coronary occlusion:

- a) Coronary insufficiency
- b) Complications of atheroma
 - i) Rupture of ulcerative atheromatous plaques.
 - ii) Sub-intimal hemorrhage.
 - iii) Mural thrombus.



2- Hypertensive heart disease

3- Aortic stenosis

4- Myocardial disease:

Primary myocardial disease:

- Myocarditis.
- Myocarditis of unknown aetiology

5- Diseases of arteries



II- Causes in the C.N.S.:

- 1- Intracranial hemorrhage ‘apoplexy’.
- 2- Fulminating infection.
- 3- Tumors or abscess.
- 4- Epilepsy.



III- Causes in respiratory system:

- ◆ 1- Pulmonary embolism.
- ◆ 2- Acute oedema.
- ◆ 3- Acute fulminating infection.
- ◆ 4- Bronchial asthma.



IV)– *Causes in gastro–intestinal tract.*

- ◆ Acute hemorrhagic pancreatitis, biliary or intestinal obstruction, acute appendicitis, rupture gut, hemorrhage due to carcinoma or varices.

V)– *Causes in uro–genital system.*

- ◆ Ruptured ectopic gestation, twisted ovarian cyst, uremia and eclampsia.

VI) *Miscellaneous causes.*

- ◆ Metabolic disorders, fevers, blood diseases.

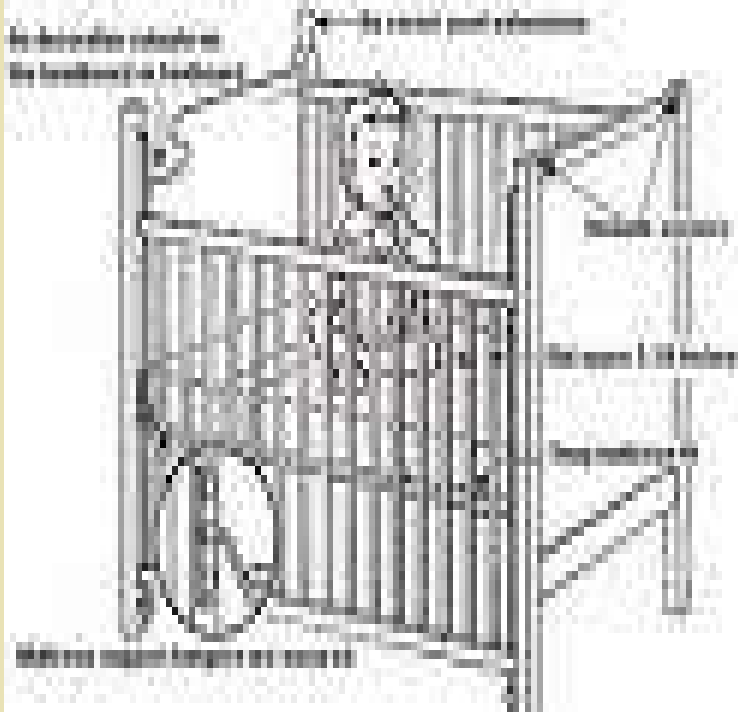
Sudden Infant Death Syndrome (SIDS)





Definition:

Sudden infant death syndrome ‘SIDS’ is defined as, the sudden death of an infant which is unexpected by history and in whom a thorough autopsy fails to reveal an adequate cause of death. ‘Cot death’ or ‘Crib death’.





- 1-The accepted age range is between 2 weeks and 2 years.
- 2-More common in males.
- 3-The incidence is markedly greater in one of a twin pair, whether identical or not.
- 4-‘SIDS’ is far more common in the colder and wetter months.
- 5-A higher incidence occurs in low socioeconomic classes.
- 6- The great majority of these infants are found dead between midnight and 6 a.m.



Theories:

- Allergy to cows milk or house-mites.
- Prolonged sleep apnea.
- Botulism.
- Spinal hemorrhages.
- Muscle hypotonia.
- Liver enzyme, selenium or vitamin E deficiencies.
- Carbon monoxide or dioxide poisoning.
- Hyperthermia or hypothermia.
- Various metabolic defects and many others.

A collection of military medals, a chessboard, a pair of glasses, and a compass on a light-colored surface. The medals include a red ribbon with a circular emblem, a blue ribbon with a circular emblem, and a silver star-shaped medal. The chessboard is made of wood and has several pieces on it. The glasses are made of metal and have a simple design. The compass is round and has a needle pointing towards the top.

**THANK
YOU**