

**DEATH AND ITS MEDICO-LEGAL ASPECTS****Dr. Ranjeeta Singh Deo\*<sup>1</sup> and Prafulla<sup>2</sup>**<sup>1</sup>M.D (Scholar) final Yr., Rani Dullaiya Smriti P. G. Ayurved College Evam Chikitsalaya, Bhopal, M.P, India.<sup>2</sup>Reader, Dept. of Agad Tantra Evam Vidhi Vaidayak Rani Dullaiya Smriti P.G. Ayurved College Evam Chikitsalaya, Bhopal, M.P, India.**\*Corresponding Author: Dr. Ranjeeta Singh Deo**

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**ABSTRACT**

Death particularly the death of humans-has commonly been considered a sad or unpleasant occasion due to the affection of the being that has died and the termination of social and familial bond with the deceased. Human body consist approximately 60 trillion cells. The brain contains 20 billion cells and the brain stem contains about 2 billion cells. These may take some time to die.

**KEYWORDS:** Thanatology, Post mortem interval etc.**INTRODUCTION**

Historically till 19<sup>th</sup> century, death was defined by the presence of putrefaction, failure to respond to painful stimuli, or the apparent loss of observable cardio-respiratory action. The wide spread use of mechanical ventilators that prevent respiratory arrest has transformed the course of terminal neurological disorders. Vital functions can now be maintained artificially after the brain has ceased to function. There is a need to diagnose brain death with utmost accuracy and urgency because of an increased awareness amongst the masses for an early diagnosis of brain death and the requirements of organ retrieval for transplantation.

**Thanatology** – is a branch of science that deals in death in all its aspects.

There are several aspects of estimation of death .Time of death seems to be a simple and straight forward term that obviously means that exact time the victim drew his last breath. Unfortunately, it is not quite that simple.

1. The physiological time of death- when the victim's vital functions actually ceased.
2. The legal time of death-the time recorded on the death certificate.
3. The estimated time of death-the time the medical examiner estimates that death occurred.

The time elapsed from the moment of death until the corpse is examined is known as Post mortem interval .Both the time of death and Postmortem interval cannot be determined with 100% accuracy, particularly when the body is found in advanced stage of decomposition or recovered from fire, water and ice. Therefore time of

death and Postmortem interval are given as estimates and can vary from hours to days. In most of the cases in India, the time of death is estimated from the physical changes noticeable on the dead body. In this particular article we have discussed the signs of death, PM appearances and its medico-legal aspects.

**MATERIALS AND METHODS**

Section-46 of IPC, defines death as “The word death” denotes the death of a human being. It does not define it .Death is defined as the irreversible cessation of life, insensibility, inability to move and permanent and complete stoppage of functions of vital organs of the body-known as tripod of life: Brain, Heart and Lungs.

The earliest criterion to declare death was stoppage of respiration for more than 5 minutes and stoppage of circulation for more than 5 minutes. However both the hypothesis proved to be inadequate to declare death.

In suspended animation the faculties of life are at such low level that it is not possible to diagnose it by routine examination. Sometimes the vital functions return to normal by Cardio-respiratory resuscitation, even after 50 minutes. Respiration and circulation can artificially be maintained on heart lung machine.

The next criterion to declare death was of brain death, but even that definition became incomplete since the heart and the lungs keep working at this stage.

**Diagnosis of Death****Routinely:** British Code / Harvard Criterion

- Stoppage of respiration

- Absence of pulse
- Absence of heart beat
- Fixed dilated pupil

#### Diagnosis of Brain Stem Death

- Deep coma for at least 6 hrs
- Absence of any typical posture due to decortications or decerebration.
- No epileptic movement
- Absence of spontaneous respiration, when disconnected from ventilator.
- Fixed dilated pupil.
- No motor response.
- Abolition of corneal, gag, vestibule-cephalic, vestibulo-ocular and bronchial stimulation reflexes.

#### Stages of Death

As per Shapiro, there are two stages

- 1-Somatic death
- 2-Molecular death

#### Somatic Death

It refers to the death of the tissue, system or body and is Clinical death, as a whole. It coincides with the death of the brain stem.

#### Diagnosis of Somatic Death

1. Permanent and complete cessation of function of brain---flat E.E.G
2. Permanent and complete cessation of function of heart---flat E.C.G
3. Permanent and complete cessation of function of the lungs---negative Winslow's Test, Mirror Test, Feather Test etc.

#### Molecular Death

It is the death of all individual cells within the body .It follows 2-3 hrs after somatic death.

#### Diagnosis of Molecular Death

- 1-Muscle does not respond to strong stimuli.
- 2-Pupil does not respond to stimuli and drug.
- 3-It is associated with early and late sign of death.

#### Medico-Legal Aspect of Stages of Death

From legal aspect

1-A person is dead when somatic death has occurred hence a death certificate can be issued for the disposal of the body.

2-The organs for transplantation must be removed from the deceased before the onset of molecular death. (Supravita period)

- Liver-within 15 mins
- Kidney-within 45 mins
- Heart-within 1 hr
- Cornea-within 3 hrs

3-Wounds caused during the supravita period are "Perimortem wounds" and should be differentiated from ante mortem wounds.

4-However there is no legal sanction to "Beating Heart Donor" -The cardio-respiratory function maintained by heart lung machine for a fully oxygenated cadaver transplant.

#### Modes of Death

As per Gordan there are 4 modes of death

1. **Anoxic anoxia-** due to lack of oxygen.
2. **Anemic anoxia-** due to reduced oxygen carrying capacity of the blood.
3. **Stagnant anoxia-** due to defective blood circulation.
4. **Histotic anoxia-** due to defective utilization of oxygen by tissue.

As per Xavier Bichat, a French physician, irrespective of what the remote cause of death may be, there are three modes of death.

- 1- **Coma:** Death due to failure of brain function.
- 2- **Syncope:** Death due to failure of heart function.
- 3- **Asphyxia:** Death due to failure of lungs function.

#### Modes of Death Typical PM findings

**Coma:** Congestion of brain and meninges, injury to head, Disease of the brain.

**Syncope:** anemia, Excessive hemorrhage, Heart contracted, chambers empty, Viscera pale.

**Asphyxia:** Cyanosis, edema, engorgement of right side of heart, petechial hemorrhage (Tardieu's spot), Viscera congested, increased fluidity of blood.

#### Signs of Death

The changes which occur after death are helpful in estimation of time of death.

1. Immediate signs
2. Early signs
3. Late signs

**Immediate Signs:** the earliest signs of death

- Stoppage of function of nervous system
- Insensibility and loss of both sensory and motor function.
- Loss of reflexes, no response and no tonicity of the muscles.
- Pupils are dilated.
- Complete stoppage of respiration.
- Complete stoppage of heart beat.

**Early Signs:** appears after 3-24 hrs of death

1. **Skin:** becomes ashy white, pale ,loses elasticity, lips are dry, brownish and hard due to drying
2. **Eye:** loss of corneal reflex, corneal opacity, flaccidity of the eye ball, segmentation of the retinal blood columns.
3. **Cooling of the body:** Algor mortis
4. **Post mortem lividity:** livor mortis
5. Rigor mortis.

**Algor Mortis**

The body starts cooling after 1-2 hrs after death and attains atmospheric temperature in 12-15 hrs. while internal body parts take 18-24 hrs to cool.

**Postmortem Lividity**

Due to gravitational force the blood flow to the dependent parts of the body, causing stagnation of blood in the toneless, dilated capillaries resulting in bluish purple staining.

**Time Required**

It starts appearing after 1 hr of death as small coloured patches. After 6 hrs it becomes fixed.

**Rigor Mortis:** It is the changes the muscles under go after death. It is defined as contraction, stiffening, shortening and opacity of the muscles after death.

**Sequence (fig-1)**

1. Primary relaxation or flaccidity.
2. Rigor mortis or Cadaveric rigidity.
3. Secondary relaxation.

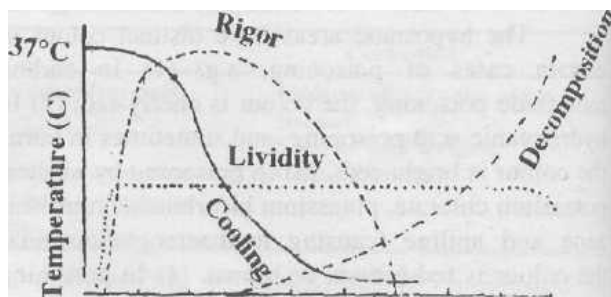


Fig.-1.

**Cadaveric Spasm**

It is a condition where in a group of muscles, which were in contraction or spasm at the time of death, continue to be in spasm even after death.

**Late Signs:** Manifests after 24 hrs after death

It involves

- 1- Decomposition or Putrefaction
- 2- Adipocere or Saponification
- 3- Mummification.

**Decomposition or Putrefaction**

It is a process by which complex organic body tissue break down into simpler inorganic compounds or elements due to the action of saprophytic micro-organisms.

**Essential Requirements for Decomposition**

- a. Warmth d. Cloth
- b. Air e. Surface injury
- c. Moisture f. Manner of burial

**Time Taken Decomposition**

1-10-20 days: black putrefaction occurs which is when noxious odour is released from the body parts undergoing a black discoloration.

2- 2 weeks: abdomen is bloated, the internal gas pressure is maximum.

3- 3 weeks: tissues have softened, organs and cavities are bursting.

**Casper's Dictum**

It gives the rate at which a dead body decomposes. The rate of decomposition in soil water air is equivalent to 1:2:8."According to an old rule of thumb (Casper's dictum) one week of putrefaction in air is equal to two weeks in water and eight weeks buried in soil, given same environmental temperature.

**Medico-Legal Importance**

- 1- It is the surest sign of death.
- 2- Can help in establishing time of death.
- 3- Cause of death may remain unknown in advance stage of putrefaction.

Mouth cavity	Tongue swollen and protruded	24-48 hrs
	Teeth becomes loose	3-5 days
	Pink teeth due to cephalic congestion from a head down position and moist environment	1-2 weeks
	Face become 'fish mouth' like appearance	48-72 hrs
Skin	Hair and nail becomes loose	48-72 hrs
	Skin of hand and feet may come off in a 'glove and stocking' manner	3-5 days
Eyes	Become soft and collapsed	12-24 hrs
	Cornea become white and flattened	12-24 hrs
	Eye protrudes	48-72 hrs
Genitals	Prolapse of uterus (PM delivery of fetus may take place)	48-72 hrs
Abdomen	Putrefaction stains on abdominal skin (green in colour)	12-18 hrs
	Abdominal gases become flammable	On 2 <sup>nd</sup> and 4 <sup>th</sup> day
	Abdomen bursts open	5-10 days
	Liquefaction	5-10 days
Cartilage and Ligaments	Become soft	5-10 days
	Soft firm tissues change to thick	5-10 days
Liver	Soft and flabby	12-24 hrs

	Blisters appears on its surface	24-36 hrs
Brain	Soft, discoloured, pinkish grey	within 72 hrs
	Skull sutures separates	3-5 days
	Liquefies	5-10 days

### Adipocere Formation or Saponification

It is formed by the anaerobic bacteria, hydrolysis of fat in tissue, such as body fat in corpses. It occurs most often in women or obese adult and children. Fat is transformed to fatty acids by the process of hydrogenation. (fig-2)

### Essential Requirement for Adipocere Formation

1-Absence of air 2-Excess of moisture 3-Warmth

### Time Required for Adipocere Formation

It takes 5-15 days in our country for adipocere formation.



Fig.-2.

### Medico-Legal Importance

- 1-Body appearances, features are retained which helps in establishing identity of the body.
- 2-All injuries are well preserved which helps in assessing the various causes of death.
- 3-It can help in establishing the time and place of death.

### Mummification

It is the rapid dehydration and shriveling of the dead body from evaporation of water, with preservation of natural appearances and features of the body.

### Essential Requirements for Mummification

1. Absence of moisture
2. Excess of air
3. Warmth

### Time Required for Mummification

The time required for complete mummification of a body varies greatly from 3-12 months or longer.



Mummification

### Medico-Legal Importance

1. It is the surest sign of death.
2. A rough estimate of the time of death can be made.
3. Well preserved natural appearances and features of the body helps in identification of the body.
4. The cause of death can be determined from the injuries.
5. The place of disposal of the body can be made.

### CONCLUSION

The determination of time of death is of crucial importance for Forensic Investigators, both in civil and criminal cases especially when they are gathering evidence that can support or deny the stated actions of suspects in a crime.

The time of death is not confined to criminal investigation; it can also come into play in civil situations. Insurance payments may depend upon whether the insured individual was alive at the time the policy went into effect or if he died before the policy expired Likewise property inheritance can hinge on when the deceased actually died.

Determining the time of death is both an Art and Science and requires that the medical examiner use several techniques and observations to make his estimate. Unfortunately the changes the body undergoes after death occurs is widely variable ways and with unpredictable time frames. There is no single factor that will accurately indicate the time of Physiological death, thus it is always a "BEST GUESS".

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