



Diagnosis of death

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What is death ?

Who can die ?

What is death ?

History of defining death

Medical and legal people were interested in defining death

Loss of bodily functions were considered as death

Problems with diagnosis of death

- Increasing ability to resuscitate people
- Patient connected to life support systems

What is death?

Death is not an event, it is a process

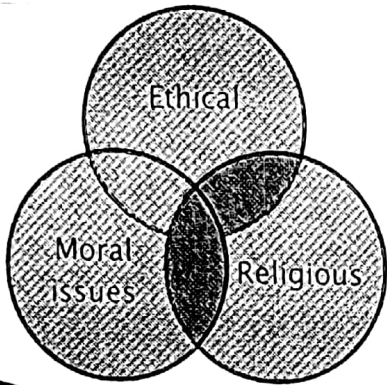
more specialized internal organs cease their functions at different rate

What is death?

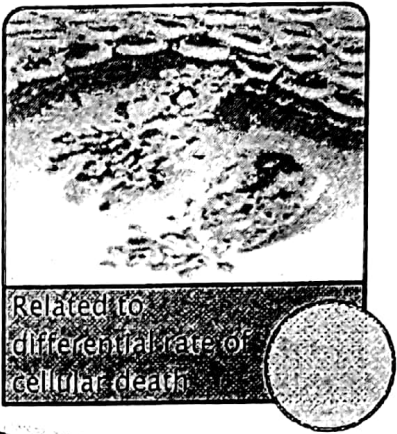
Process of dying

Process of death

Issues in rate of death



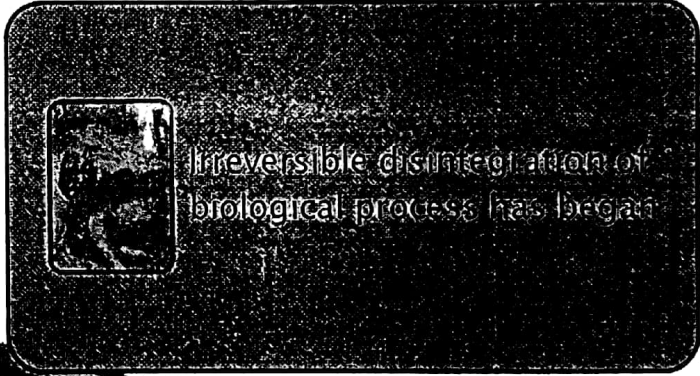
Issues in rate of death



Death is referred to

- ◀ Somatic death
- ◀ Molecular death
- ◀ Brain death

Somatic death



Somatic death

- Permanent cessation of
- Functions of brain stem
- Cerebral and brain stem respiration
- Cerebral circulation of blood flow

Somatic death

- Irreversible loss of
- Awareness and self-consciousness
- Reflex responses

Somatic death

- ☐ The person is unable to
- ☐ respond to sensory stimuli
- ☐ initiate voluntary movements
- ☐ have spontaneous respiration
- ☐ have circulation

Case

- › You are called to see a 75 year old terminally ill patient in the ward at midnight by the nursing officers.
- › In spite of resuscitation patient expired.
- › How do you confirm the death of this patient?

Diagnosis of somatic death

- Absence of pulse
- absence of heart sounds
- Absence of breathing
- absence of breath sounds
- Absence of brain functions

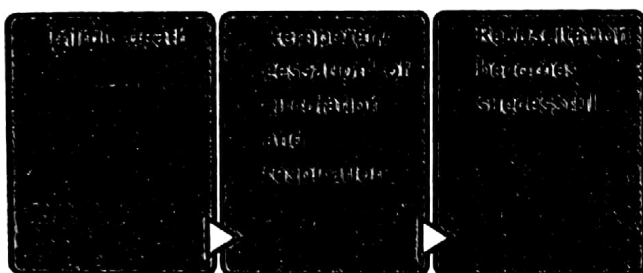
Diagnosis of absence of brain functions

- ☐ Person is unconscious
- ☐ loss of reflexes
- ☐ loss of tone
- ☐ fixed dilated pupils

* There may be cessation of body function / biological function to a minor level where we cannot identify the biological functions

✓ Suspended animation

*



Circumstances of suspended animation

- General anesthesia
- Near drowning
- Electrocution

Circumstances of suspended animation

Barbiturate poisoning and narcosis

Syncope attacks

Complete heart block

Yoga exercise

Molecular death

Cellular death depends on the sensitivity of the cells in different tissues to anoxia.

Molecular death

cerebral cortex	few minutes
cornea	8 hrs
skin graft	24 hrs
Bone graft	48 hrs
Arterial graft	72 hrs

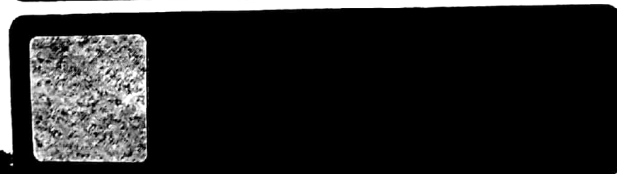
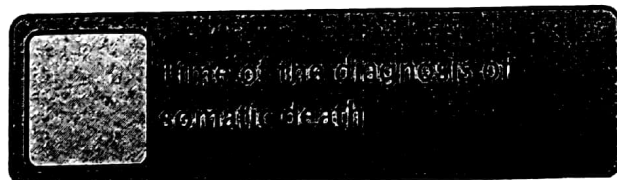
Cells may function after somatic death with anaerobic respiration.

Problems of diagnosis of death



In cardio-respiratory arrest, respiration and the circulation can be maintained artificially keeping brain alive.

The movement of death



Time of the diagnosis of brain stem death

Brain death

Sensitivity to anoxia



• Cortex - most sensitive



• Thalamus - next



• Brain stem - last

* sometimes there may be cortical death & no damage to the brain stem, brain stem is continuing respiration & circulation. 1/19/2018

Brain death

The brain stem death is the physiological decapitation of the person

Diagnosis of brain stem death



Applicable to those on artificial life support systems and those awaiting organ donations

Diagnosis of brain stem death

Conditions to be established

No reversible cause for unconsciousness

Brain damage is irreversible

Respiratory cessation is not due to drugs

Diagnosis of brain stem death

Exclude reversible causes for unconsciousness

Over dose of sedatives

Hypothermia

Metabolic disorders

Diagnosis of brain stem death

Reversible causes for unconsciousness

Brain injury (trauma)

Stroke (large territory)

when the person is connected to the ventilator

Clinical criteria for diagnosis of brain stem death

Absent brain stem reflexes

Absent motor responses

Apnoic test is positive

Test of brain stem functions

No gag reflex

The bulbar function is best tested by examining cough response to bronchial suctioning



Absence of corneal reflex

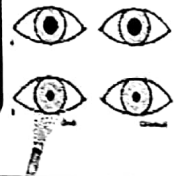


Absence of light reflex - fixed dilated pupils

Mild position = 4 to 6 mm



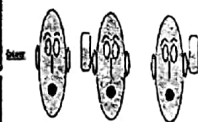
If uncertain use magnifying glass



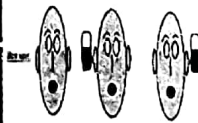
No vestibular ocular reflex

Head is elevated to 30 degrees

Vestibular reflex



5-10 cc of water into the external auditory canal



Quick movement to the side of the ear

Doll's head or ocular-cephalic phenomenon

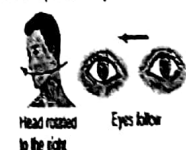
Elevate the eye lids

Normal (reflex present)



Rotate the head from right to left

Abnormal (reflex absent)



Eyes do not move within the orbit and follow the head

Absence of motor responses

Compressing the supra-orbital nerve

Forceful nail bed pressure

Temporo-mandibular joint compression

⇒ Absent limb movements

If these test are positive,

Aponic test



Correct hypothermia ($36^{\circ}\text{C} - 37^{\circ}\text{C}$)

Ventilate with 100% oxygen for 10 min

Carbon dioxide for 5 min

Absence of respiratory movements

Then disconnect ventilator

⇒ No respiratory stimulation
(No breathing movements)

~~not positive~~ → person living

Diagnosis of brain stem death

These tests are repeated minimum 6 hr interval

Brain death should be diagnosed by 2 doctors, not from transplant team

ICU consultant

Another doctor

who has more than 5 yrs experience
these two doctors should not be in
organ donation or organ transplant team

Importance of brain death

In beating heart cadavers

organs are not for

transplantation



While patient is on ventilator

confirm brain death and remove
the organs for transplant



Organ donation

- › Confirm brain death
- › Get the consent for organ retrieval from relatives
- › Approval from institutional head
- › Inform JMO
- › If there is an inquest, obtain magistrate order
- › Rapid process is vital for better transplant
- › Need good coordination among relevant parties

Summary

- › Death
- › Somatic death
- › Molecular death
- › Brain death