



# *SPECIAL COLLOQUIUM*

**24<sup>TH</sup> NOVEMBER, 2017 | 4PM | SILVER JUBILEE HALL**

## SPEAKER

**Professor Kanjaksha Ghosh**

MD, FRCP, FRCPATH, FAMS, FACP, FNASc.

Director, Surat Raktadan Kendra & Research Centre

## TITLE

**A holistic view of death**

## ABSTRACT

Death affects us all both in the inanimate as well as in the animate world, particularly when death is viewed as a major transformative process. Whatever is created is eventually destroyed. Universes are created and destroyed, galaxies are created and destroyed similarly stars are born to die as black hole.

Only the scale of time and size of these heavenly bodies are tremendous. Similarly when carbon and oxygen are burned together a new compound carbon dioxide or monoxide is formed essentially leading to death of both carbon and oxygen. Similarly the very elemental nature of radioactive elements undergoing transmutation process eventually becomes something else losing the original property of the elements. Though all the elements of the universe and on earth has come from fusion of hydrogen all of them will lose their identity while they become a part of neutron star. In physics or chemistry heat death is supposed to be the final denouement of our universe the basic idea being entropy maximization.

Similarly back in human organization; civilizations rise and fall, societies disappear, organizations, industries also have same fate. Actually in all of them we have a picture very similar to bacterial growth curve i.e., having a lag phase, log phase, phase of decline and disappearance. In Human and in other multicellular animals similar phases can also be seen. However in human being forensic science have classified death into somatic death and cellular death. Somatic death occurs when one of the three organs i.e., brain, lungs or heart fail or cease to function (Bishops Triad).

In fact a patient may traverse various routes to make one of these three organ fail i.e., he may have renal failure, liver failure, catastrophic bleed, poly trauma or multiorgan failure yet he /she cannot be declared dead unless one of three organs of Bishop's triad finally gives up. Now a days with advances in science we can keep patients on ventilation or on artificial cardiac support indefinitely still a person will die because brain will cease functioning. The situation is no different for multicellular animals.

However somatic death does not coincide with cellular death as different cells in our body has different resistance to lack of oxygen hence some cells continue to live days after a person dies. Hence in the living system living can be finally reduced to our ability to consume oxygen but this definition is also incomplete as in an anaerobic world organisms continue to live without oxygen, actually high levels of oxygen can kill these organisms. Biochemically life can be defined as 'Dynamic equilibrium in a polyphasic system'. But which of the chemical reactions not necessarily driven by oxygen defines life? The reaction in question being oxidation /reduction reactions. In other words life is a controlled combustion (Gautam Buddha has described the essence of this universe as 'Prajjalitam /prakampitam'). If all the life forms in the world is considered as one living cosmos in which we at individual levels also are then life has been described from generation to generation as : 'A continuum , a never ending stream of protoplasm , individuals are but passing eddies which rises and falls and then leaves no trace while the life flows on '.

Coming to the death of a cell a subject of immense interest to the cell biologists several patterns of cell death has been observed. The earliest one was described as necrosis where cells swell up, bursts and releases its contents into the surrounding causing inflammation. Other type of cell death for which detailed biochemical pathways have been analyzed over last two decades is called apoptosis. Apoptosis occurs in a similar manner in which multicellular organisms like man die his somatic death i.e., via nuclear stress ( Brain of Bishops triad ), Mitochondria( Lungs and heart of Bishops triad ) and cell membrane stress ( external stimuli ), endoplasmic reticulum ( inner milieu stress ). In addition there are many other forms of non apoptotic cell death and these deaths like Anoikis, Ferriptosis, Oncosis, Parthanatos, autophagy and few more. Of all this autophagy and apoptosis is getting greatest scientific attention today for its huge future potential for cancer therapeutics.

Finally do we really die? That is a metaphysically loaded question with no clear answer as yet?