

The anatomy of death

ABSTRACT

Medical science does not treat death as an independent physiological phenomenon. It believes that disease is the cause of death and treats both as preventable phenomena. Doctors and relatives nurture a guilt complex when death occurs. The moment of natural death is robbed of its poignancy. There is no cause of death. Death of the physical body is an intrinsic, time governed, built-in ontolytic program. It completes the biologic trajectory of the individual organism which begins at conception and ends with death. In this article, the actual built-in mechanism and operation of the physiological process of death is suggested vis-a-vis biology and medicine. The physical body of an individual is like a biological gadget which is constantly charged with life force received from cosmic energy through the subtle body which is an implement that cannot be objectified in the same way as the gross physical body but is experienced only subjectively by one and all, as mind (*antahkaran* in Sanskrit and Indian languages, meaning inner instrument, a subtler instrument in contrast to external organs of actions like limbs, tongue, etc. of the physical body). This life force keeps the subtle body and the entire physical body live and functioning. It maintains the body's integrity and internal homeostasis throughout life. The physical body like a gadget has a built-in program which decides how much total capacity, pace and quantum of life force it can use. It is often referred to as breath quota and heartbeat quota, however, they are manifestations and not the mechanism and operation of life and death in the physical body. When the quantum of life force of the physical body is exhausted, the subtle body, a connector for life forces departs, leaving behind the physical body. The vital functions stop and the person is declared dead. It is usually referred to as departure of soul (*Pran* or *Jiva* in India) from the physical body in common parlance. This phenomenon of predetermined capacity, pace and fixed quota of life force is operational in all the components of the body. Each cell, each organ, each system and the whole body is a packed unit of bioenergy. They are in structural and functional dynamic homeostasis under constant flux resulting in constant change in the body. The rate of expenditure contributes towards deciding the total life span of the cell, organ, systems and individual. It accounts for the phenomena of cell death, progressive diminution in vitality, change in organ and system functions during life and physical death of an individual at the end. Death is a bio-cosmic phenomenon governed by biological laws. There is variation in life span at the interspecies and intraspecies levels because we measure lifespan of an individual in terms of physical time and not in terms of biological time which is an independent entity, not measurable and predictable as physical time. Everyone lives one full unit of life in terms of biological time which begins at conception and ends with death. The normal distribution of each biological feature, including the biological unit of life, is independent of one another making each individual unique. The biological clock runs at its own dynamic unique pace in every individual. The biological timer starts ticking at conception and stops when the life force quantum is over. When the person dies, the physical body stops functioning and is left behind for others to dispose of. The timing of death is beyond the realm of objective perception and cannot be equated with chronological or physical time. It is a trans-science and trans-technique phenomenon beyond the ken of humankind to alter its mechanism and operation. The article explains the impact of extrinsic and intrinsic diseases, various treatments such as organ transplant, as well as the impact of lifestyle on the biological time scale of an individual. It spells out the difference between natural and unnatural death. With this understanding, death can be appreciated, accepted and respected as a built-in operational intrinsic physiological phenomenon for the end of one's life. It is a must for the survival and healthy continuity of all the species in the biological world including mankind.

Keywords: Death, biological clock, organ transplant, causation, yoga

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INTRODUCTION

“Death is one of the most mysterious and inexorable problems in biology. How does life end? What is the true nature of death? Is it absolute—a fundamental state? Or is it relative and a matter of degree? Can it be defined as part of some basic reality, a detail of an unknown whole rather than merely an illusion? Although any living creature anytime can lose its life, no creature can lose its death. This is why death is safe and secure in all living things.”

Biology of Death¹
EvMed Review, July 4, 2008

Death is an integral part of the biological world which includes humans. Death is a universal feature. It is the most democratic, a great leveler, transcending all boundaries of age, sex, geography, religion, race, caste, communities, lifestyle, health and wealth. A number of disciplines have tried to study the phenomenon of death since prehistoric times. Artists, writers and poets have very often made death the theme of their work. Cultural traditions have also evolved around the handling of death.² In 1970-80s Elizabeth Kubler Ross, a Swiss psychiatrist brought to the fore the necessity of studying and discussing in the medical field the 5 stages of grief associated with the natural phenomenon of death, whereas death as a natural phenomenon is a topic hitherto considered a taboo in the practice of medicine. Currently, thanatology has expanded into a multidisciplinary subject.² It is an academic cum scientific study of death among human beings. It deals with investigating the circumstances surrounding a person's death, grief experienced by the near ones, larger social attitudes towards death such as ritual and memorialization. It is undertaken by professionals in nursing, psychology, sociology, psychiatry, social work and veterinary science. Psychology deals with the individual mind vis-a-vis fear of death, avoiding the same and sometimes seeking it. Sociology tackles attitudes towards death in society. Cultural anthropology deals with current cultures dealing with death and archeology explores how past cultures dealt with death. Religion deals with what happens after death and talks about reincarnation or afterlife. The emphasis is laid on overcoming death. It can give comfort or generate anxiety or sometimes produce guilt. Medical science talks about what happens physically to individuals at the time of death and bodily changes after death. Pharmacology is directed towards drugs which can ease the process of death. Psychiatrists also put in practice, the medical application of psychological principles and therapeutic drugs. Medical ethics especially looks into the issue of “right to die”.²

Unfortunately, there is one blank page in medical practice. The scenario regarding the biology of death specially the physiology of process of death is not contemplated. No textbook of physiology includes the topic of the physiology of death. It has been suggested that the possible reason for the omission is because, in medicine, death is looked upon as an enemy and therefore medical research is directed towards prevention and cure; biological research has no historical precedent for studying death which represents the antithesis of life and there is a stigma associated with death.¹

Dr. Manu Kothari and the author have worked to make synthetic judgement on the phenomena of death, dying and diseases for more than 40 years. We have progressively unfurled the mystery shrouding the biology of death.³⁻⁸ This article completes the missing piece of the puzzle by discussing the actual built-in mechanism and operation of the physiological process of death going beyond manifestation of death vis-a-vis biology and medicine. The total picture is comprehensible by every living person. The synthesis is done based on different facets observed and experienced in day to day living. This perspective is based on observations in the laboratory called life where all the evidence is glaring and staring in the face of whosoever would like to understand and appreciate. No specific education or qualifications are required to understand the process of life which begins at conception and ends as death. It is empirical. It is definitely verifiable by observation or experience. At the same time the clarity of the perspective cannot be denied by logic or science.

DEATH IS CAUSELESS

Medical science has always insisted that death has a cause. The death certificate given by a doctor has to specify a cause of death. This linear correlation between cause and effect for death is not validated by science, philosophy and epistemology as pointed out below.

“Through causality, we may come to the conclusion that something happening regularly will always happen. This principle can successfully be applied to cases in which one has complete information on the situation involved. However, when complexity arises and uncertainties come into play, the principle becomes questionable.

It is when uncertainties get out of control that the validity of the principle can no longer be ensured. The more complex the nature of the situation, the more information is required. The lack of reliable information in the face of complexity imposes the limit on the validity of the principle.”

Professor Miguel Rubi⁹

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The Causality Principle: Complexity is the Limit

Fuller¹⁰, a philosopher, has stated that the earmark of causality is an invariant relation of events in which the cause must precede the effect and the effect must follow its cause, in time. “It is this sense of ‘must’ which distinguishes causal connection from coincidence.” He has emphasized that the effect must immediately follow the cause. “Causality can no more jump gaps in time than it can gaps in space.”

Bertrand Russell¹¹ wrote an essay on the notion of a cause. “In advanced science the word cause never occurs. . . . The Law of Causality, I believe like much that passes among philosophers is a relic of a bygone age, surviving like the monarchy, only because it is erroneously supposed to do no harm.”

Considering all the criteria spelt out above, we find that cause of death as assigned by Modern Medicine fails to fulfil them. It is a common observation that healthy individuals just drop dead like ripe fruit from the branch of a tree and individuals harbouring a veritable museum of pathology in the body continue to go on living. In more than 30% of deaths, even after autopsy, a cause of death is not found^{12,13}. We have been all along raising this question based on the tenets of the principles of causalism by an epistemologic necessity called the Bombay Razor.¹⁴ Any proposition that A causes B must in very same breath spell out why A often fails to cause B and why B manages to occur without A.

The day-to-day experience of physicians when giving cause of death vindicates that there is no linear correlation between cause of death and phenomenon of death. Doctors have been guided^{12,13} regarding death certification and giving cause of death as per the format prescribed by the WHO. Some of the salient features are as follows: “The mechanism of death (for example, cardiac or respiratory arrest) should not be reported as the immediate cause of death as it is a statement not specifically related to the disease process, and it merely attests to the fact of death. Therefore, the mechanism of death provides no additional information on the cause of death.” Any organ failure (i.e., heart or liver failure or brain dead) is not acceptable as an underlying cause of death. The disease or condition causing the organ failure should be entered as the underlying cause. The chain of events—diseases, injuries, or complications—that directly caused the death are to be entered. The terminal events such as cardiac arrest, respiratory arrest, or ventricular fibrillation should not be entered without showing the aetiology for the same. In cases where the certifier is unable to establish a cause of

death based upon reasonable medical certainty, he or she is advised to enter “unknown” in the cause-of-death section. It is acceptable to indicate that a thorough investigation was performed; however, no cause could be determined. When multiple conditions and sequences of conditions resulting in death are common, particularly in elderly individuals, there can be two or more possible sequences resulting in death, or if two conditions seem to have added together, physicians are advised to choose and report the sequence thought to have had the greatest impact.

In some cases, no overwhelming cause presents itself. The time interval is to be entered between the onset of the condition and the date of death. This interval can be minutes, hours, days, weeks, months or years. When the time of onset is unknown or cannot be determined, the entry should be “unknown.” From the above guidelines^{12,13} it is clear that a death certificate accepts that death is possible without any cause. The process of death if ascribed to a disease, this guideline accepts that individuals can live with the cause for years. It is also worth noting that as per the records of death certificates, a number of patients of living with cancer die due to heart attack¹⁵ and a number of patients with heart failure die due to cancer¹⁶. The same holds good for other chronic diseases such as stroke¹⁷, renal failure¹⁸, and metabolic diseases.¹⁹ The cause cannot be really pinpointed as responsible for the operation of the phenomenon of death.

Death is an intrinsic built-in program in the physical body. It is governed by bio-cosmic principles deciding the why and when of death. It does not require any agents to carry out this physiological function.

DEATH IS AN INTRINSIC, TIME GOVERNED PHYSIOLOGICAL PROCESS

Death is an intrinsic time governed built-in ontolytic program for the physical body completing the biologic trajectory of the individual organism which begins at conception and ends with death. The biologic timer is set at the time of conception and when it stops the life process ceases and is seen as death. Ontolysis is as integral to life as ontogenesis is for a human physical body. Everyone lives one full unit of life which begins at conception and ends with death. It is an end function of life when the physical body stops functioning and is left behind when the person dies for others to handle it.

The physical body of an individual is like a biological gadget which is constantly charged with life force. (Imagine electrical gadgets functioning when power supply is on.) This life force keeps the entire physical body alive and thereby the body

is seen as functioning with all vital systems of circulation, respiration, assimilation, excretion and ejection. The whole body maintains its integrity and internal homeostasis throughout life. This life force is received from the cosmos through the subtle body which is an implement that cannot be objectified in the same way as the gross physical body. But everyone experiences its presence subjectively for oneself as one's awareness of being and of mind - thoughts, memory, intellect, emotions and ego, and a sense of individuality distinct from others. Mind is called *antahkaran* in Sanskrit and Indian languages, meaning inner instrument, a subtler instrument in contrast to external organs of actions like limbs, tongue, etc. of the physical body. The subtle body and physical body, both are maintained by the life force. Each individual lives a complete unit of life which stretches from birth to death. Life is sustained by the life force from the cosmos. The connector with the cosmos is the subtle body.

The gross or the objectifiable physical body is enlivened by the subtle body for the onset of life during embryogenesis. The subtle body sustains it throughout life. Finally, when the subtle body dissociates from the physical body, death takes place.

The physical body has a built-in program of the total quantum, capacity and pace of life force it will be able to receive during life from the cosmos through the subtle body. Cosmic energy through the subtle body transfers life force to the gross body. Like a rechargeable battery operating a gadget (imagine a mobile), the physical body carries out its physiological functions and stores as configured biological energy in the form of cells, organs, systems and total body. These components in turn send back through the subtle body life force to the cosmos as cosmic energy. The cycle goes on till the biological life span of the rechargeable battery of the body is exhausted. In our daily life we have experienced how rechargeable batteries have finite capacity for recharging and life of definite time.

Every individual has a predetermined quota of how much vital force will be available for the total duration of life. When that quantum is exhausted, the physical body can no more be charged with the life force so the vital functions stop and the person is declared dead. The subtle body, a connector for life forces from cosmic energy departs leaving behind the physical body. In common parlance it is usually referred to as departure of soul (*Prana* or *Jiva* in India) from the physical body.

A human being is a biological entity. His physical body develops from a single live cell. Only living can beget new

individual. Every cell of the body is permeated by life force. Each cell carries out basic functions common to all cells of the body indicating it is alive, such as metabolism and molecular transport. Based on differentiation of cell it carries out the special designated functions assigned to it. Throughout life each functional unit of life and the whole-body needs air, water, sunshine/heat and live food directly or indirectly to sustain itself. The total physical body is configured biological energy. In physics the force is defined as an agency by which energy is transferred from one system to another.²⁰ That is how cosmic energy received from the cosmos is transferred as life forces to keep the physical body functioning and get configured as bioenergy.

Every component of the physical body starting with each unit of life, namely the cell, is configured bioenergy. This energy is in constant flux. In fact, each cell is nothing but a constant flux of energy which seemingly appears as configured entity. No individual remains the same. The individual is constantly changing like a flowing river. You cannot dip your feet in the same river twice as the water is constantly changing. Similarly, every component of the cell, organ, system and the whole body are constantly changing, though each of them appears to be static. Each cell, each organ, each system and whole body is in structural and functional dynamic homeostasis. This constant flux is life. It is in constant communication with cosmic energy picked up by subtle body and transformed as life force to charge the physical body and mind as configured bioenergy.

The capacity, pace and total quantum to receive and exchange the life force to maintain the configured energy is fixed. Because of fixed or finite quantum, the rate of expenditure decides the total duration of the life span of an individual. The same principle holds good for the individual component of the body namely cell, accounting for the phenomena of cell death, atrophy, necrosis and apoptosis. It operates at the organ, system and at the whole-body level too.

A rat, other mammals and a man at a species level have the same quota of life force on an average as exemplified by the similar number of heart beats or breaths in a given lifespan.^{8,21,22} A rat completes its quota in 2 years, a dog in 14 years and a man in 70 years, depending on the rate of expenditure.

Within species, death follows a very definite pattern. Gompertz function of the law of human mortality²³ was first stated in 1825. It stated that over much of the adult human lifespan, age-specific mortality rates increased in an exponential manner. Gompertz was an English actuary.

He noticed that his clients died in a predictable manner at the herd level. He confirmed the same in canine and equine clubs to formulate his Function or Law that human mortality takes off around the age of 16, to double every 8 years being at 64, 64 times more than the initial rate at 16: every year someone has to leave, no matter what. The Gompertz curve/law function has held fort in the face of all the advances of modern medicine. The who and when of death at an individual level are decided by herd distribution and can be only be predicted as probability.⁸

BIOLOGICAL TIME, BIOLOGICAL CLOCK AND BIOLOGICAL TIMER

Death is a bio-cosmic phenomenon which is regulated amidst apparent Chaos. Biological laws govern it. We find variation in lifespan at the interspecies and intraspecies levels because we measure the lifespan of an individual in terms of physical time which is based on external regular, predictable, and objectifiable phenomena. During embryogenesis, gestation, infancy, dentition, puberty, sexual maturity, i.e., early developmental milestones, physical time tends to vary so little from one person to another so as to form reliable, general history. Whatever the variations, they are normally distributed, albeit over so narrow a range that the range can be ignored. Unlike the absolute constancy of physical time and the near constancy of biological developmental milestones, bodily changes with aging, senescence, chronic intrinsic age-related diseases and time of death exhibit the widest range from womb to tomb at 100 years.⁸ Truly these subsequent changes and lifespan should be measured in terms of biological time.²⁴ The running of the biological time clock depends on the quantum and the pace at which the individual spends one's life force. Truly, everyone lives a full lifespan from birth to death.

The human body is made up of trillions of cells. They are classified^{25,26} into nondividing (neurons, receptors and muscles) or static and dividing - expanding (glands and viscera like liver, kidney) and renewing (lining of the skin, mucosa or bone marrow producing various component cells of the blood) cell populations. At the cell level the dividing cell populations, FCDC – Finite Cell Doubling Capacity²⁷⁻³³ indicates the biological clock marking biological time.^{3,24} The nondividing cell population complete their life at varied times from birth to death, the rate of diminishing progressively increasing with increasing age. The passage of biological time accounts for the atrophy of those systems. Similarly, the dividing cell populations progressively deplete their quota of FCDC with the ticking of the biological clock and timer. With that biological aging, age-related changes are

also concurrently seen. Once the limit of a given stem cell FCDC is over, it brings an end of the clone which was being maintained to replenish cells to maintain the fixity of cell numbers. The end result is seen as atrophy which is seen in the form of aging and various age-related dysfunctions in the body.³¹⁻³³ The biologic clock runs at a different pace at the interspecies level and runs at its own dynamic unique pace in every individual at the intraspecies level.

The various systems of the body have differing efficiency (e.g., vital capacity) and the pace and quantum of life force it utilizes also varies. The dynamic pace of the biological clock differs in different systems accounting for the degree of dysfunction in them. At the same time, the biological timer records the whole body's life force quota utilization and balance. This is beyond the realm of objective perception and cannot be equated with chronological physical time.

The biological timer starts ticking at conception and stops when the life force quantum is over. The journey in between is in constant flux in terms of pace and quantum. At the physiological functional level, its pace differs during the waking state depending on the state of activity, and the pace also differs during dream and in deep sleep. The pace also varies in health and disease. The biological timer marking and pace vary from species to species and within species from person to person. The pace at which any one completes all the stages of life, the quantum of life force available and the pace at which it is exhausted when the timer goes off – that is when the individual dies - is unique in everyone, both at the interspecies and intraspecies levels. It is often said that breath quota and heartbeat quota are fixed for a given individual.⁸ What is to be understood is that these two are indicators or manifestation of life. They do not represent the mechanism and operation of the total quantum of life force available to the individual and the rate at which it is utilized by the whole body and its various systems. The whole body dies only when the total quantum granted to that individual is over.

Death is seen at the structural and functional unit of life, namely the cell, throughout life. Cell death is seen as a normal physiological process. It is programmed, and is therefore called programmed cell death.³⁴ It is a normal homeostatic mechanism to maintain cell populations in tissues during development and aging.³⁴ A sperm, an ovum or fertilized embryo are alive independently and have a definite lifespan of some hours depending on how much stored life energy is available to them to sustain their life. Frozen sperm, ovum or embryo have some extended lifespan because the freezing minimizes the utilization of the stored life energy. At the organ and the system levels also, there is a programmed

limit. Each organ has a definite limit to the capacity for utilizing vital force in terms of day to day functioning and total capacity for its life time. The same holds good at the level of physiological systems. This capacity at the organ and system level is independent of the other organs and systems and the whole body even in the same individual. This distribution is also governed by biological laws and makes everyone unique in terms of capacity of function and survival. This forms the basis of aging, senescence and chronic diseases as one grows older.

The various systems of the body manifest their different efficiency depending on the pace and quantum of life force available to them and how much the body requires to function optimally. The dynamic pace of the biological clock differs in systems, but the biological timer records the whole body's life force quota utilization and balance. The final arbitrator is the total individual though each cell, organ and system have their independent program. This is beyond the realm of objective perception and cannot be equated with chronological physical time. It is a trans-science²¹ and trans-technique³⁵ phenomenon beyond the ken of humankind to alter its mechanism and operation.

BIOLOGICAL LAWS GOVERNING DEATH

Modern science propounds the CHAOS theory. The Chaos theory presents a universe that is deterministic, obeying fundamental physical laws, but with a predisposition for disorder, complexity and unpredictability. The science of chaos is chaology. This theory also operates in the biological world propounded by James Gleik in his tome - *CHAOS – Making a New Science*. In the biologic world where the Chaos theory prevails supreme, there are a number of biologic principles which operate governing all the biologic phenomena and their characteristics ranging from the sub-molecular component of an organelle of a cell to any organism. They hold good for the phenomenon of death. CHAOS needs to be reread as Cosmic Harmony Ahead Of Science. There is surprising order in the phenomena of death. Heisenberg, in 1927, declared that *Uncertainty is the only certainty*. Randomness is Nature's queendom of ordered divinity of distribution. Whenever a large sample of chaotic elements are taken in hand and put together in the order of their magnitude, an unsuspected and most beautiful form of regularity proves to have been latent all along. The distribution shows a perfect bell-shaped Gaussian curve. This is the cosmic power of normal distribution.

The universality of death in the biological world and the time-relatedness as well as the intrinsicity of the death

make it trans-science²¹ and trans-technique.³⁵ Trans-science questions are those that can be asked of science, but cannot be answered by science. Epistemologically, these are questions of fact presentable in the language of science but to which science has no rational answers; such questions transcend science. For example, about the 'why?' of the invariable variability of a person, from birth through death, questions have been asked of medical science, but have not been answered by medical science. Technique in medicine is whatever a doctor does to a patient, be it diagnosing, treating or prognosing. It admits of the simplest to the superlatively sophisticated techniques. Trans-technique aspects of disease and death are those innate, ordinary, day-to-day features of human diseasing and dying that technique can in no way modify to a patient's advantage. Modern medicine, in its ostensibly scientific and technical optimism, has not accorded due consideration to biological factors that are not only trans-modern-medicine but trans-any-science and trans-any-technique.

These biological factors are Temporality, Uncertainty, Relativity and Normality (TURN)²¹, as also Systemicity, Uniqueness, Cellularity, and Herdity (SUCHness).³⁵ TURN and SUCHness are integral to life including death, and are highly studiable without being alterable. In the physical world the apple still falls down. In fact, science reaches a higher stage when it allows you to perceive and declare the limitations of science and technology. At the root of medicine's failure in providing an answer to the questions of what, when, how, where and who is an assemblage of these eight independent biological factors which are operational. But they do not operate in the realm of the objective physical world of science. They weave a complex network connecting and operating the entire biological world metaphysically beyond the phenomenal world. Science is itself groping in the dark searching for the basis of the whole material world. Right now, it is hanging with the string theory³⁶ and God particle.³⁷ These abstract biological principles^{21,35} govern all that appears concrete in medicine be it laboratory research or the development of a person, physiological parameters, disease, and death.

Time is as fundamental as space and perhaps holds the essence of all reality. If matter has been understood as configured energy that means the biological world from the cell onwards is configured bioenergy, and then life needs to be understood as configured biological time stretching from conception to death. Human beings are configured time. A cell is configured time. Aging and senescence are built-in processes mediating biological maturation consisting of a series of gradual changes through time from conception

to death. Incidence of death and intrinsic diseases increase progressively with age.

Based on several criteria of relative time, it is noted that all mammals live about the same life span. All mammals, for example, breathe about the same number of times in their lives. The problems of middle and old age seen in humans are seen in middle-aged and elderly animals. It is true for atherosclerosis, be it, man, swine or killer whale. These realities and the Rat Palace observation of Simms and his co-workers drive home the relativistic nature of animal/human senescence and death.⁸ Senescence is seen in cells and individuals in similar form in each species. It is seen as the physicochemical changes in collagen, the incidence of vascular degeneration, the high incidence of cancer and other intrinsic diseases. It is directly related to the lifespan of the species. These changes are governed by a genetic programme in time specific to each species. The relativistic nature of animal/human senescence and death is directly related to the lifespan of the species. Collagen, although physico-chemically similar in man, horse, dog, cat and mouse, exhibits maximal, and very closely comparable, age-changes in these animals respectively at 70, 25, 12, 3 and 2 years. Thus man, in terms of ageing and death, is a mouse whose time scale has been enlarged 35 times. Hayflick²⁸⁻³⁰ has demonstrated that the duplicating capacity of the cells from the embryo of an animal relates closely to its lifespan - the greater the lifespan, the greater is the number of times the cells can serially multiply. The rates and number differ but not the basic style. Relativity explains the differences between species and normal distribution explains the differences within a species.

Any biological characteristic that can be measured, exhibits normal distribution. The appellation 'normal' here refers to a form of frequency distribution, also called Gaussian distribution. Such a distribution provides a graph or a curve that is bell-shaped, symmetrical, with its two ends stretchable to infinity, thus allowing the widest variations of a parameter. This could be human height, weight, intelligence, age of onset of disease, severity of disease and mortality. This explains the variations in the age incidence, the morbidity, mortality and other clinical and laboratory manifestations in ageing, senescence, diseases and death. Each biological feature in a given individual operates independent of the other biological features of that individual in health, disease and death. That forms the basis of uniqueness of every individual.

The phenomenon of death indicating the completion of vital force quota is unpredictable. Its distribution on the normal curves is unalterable. This is independent of all other biological features in health, aging and presence of other

diseases. Because of this, it is difficult to predict the what, when, why of any of death. That is how uncertainty operates at the level of the individual regarding the time of death.

The human body is a composite collection of cells. Advanced cytological techniques have revealed that a cell's behaviour, in health or disease, can hardly be trifled with. Cells have their unique capacity, pace and limitation of utilising the vital force. The same fact extends to the organ and the system. This accounts for one or more systems working poorly as compared to the other systems.

Uniqueness, variability, it is said, is the only invariable law of biology, a natural propensity that unfaillingly varies from one person to another. The uniqueness of every individual extends to the uniqueness of every disease and to the uniqueness of every death. This is the unsolved and unsolvable problem of medicine. There are as many different diseases as patients. Even 'identical' twins differ in their individual disease patterns and death. The presumed identity of the genotype in such twins is unable to circumvent this code of individuality. Naturally occurring diseases are extremely diverse even when they carry the same diagnostic label. No two cases of the same disease are identical either in their presentation or in their progress, morbidity and mortality. The behavioural uniqueness of a disease and death, based on the individual's cells, organs, system and whole body's life force quota, with its unpredictability, forms the basis for unexpected successes and equally unexpected failures, given the same treatment. This makes prognostication difficult. In most diseases, what the doctors can prognosticate is based on group statistics that obviously have no bearing on an individual case. All technological marvels, deal with the appearances and assumed correlations of a human being's disease; none, as yet, knows or can know of the life force quota uniqueness of such a biological entity. It is a one-to-one encounter where the uniqueness of the individual, his disease, his very biological trajectory is unpredictable, unalterable, and overwhelmingly important.

Herdity is a corporate program subserved by individual performance. Unlike the other biologic forces discussed thus far which are innate to an individual, herdity is a force that the human herd exerts on the individual. Mankind was, and is a single inclusive population and is endowed with a single corporate genotype, a single gene pool. In the physical world, quantum physics reveals a basic oneness of the universe in which, at a fundamental level, the seemingly separate parts of the universe are connected in an intimate and immediate way, in a complicated web of relations between the various parts and the whole³⁸. In a similar way, in the biological world

an individual's body, in health and disease, each unfailingly unique, is a spatiotemporal manifestation of a cosmic order. This is reflected in clinical, bedside reality demonstrating the role of heredity in the distribution of health, disease and death in any given group. As general statistics go, the incidence of the probability of events pertaining to health, disease and death is a function of a corporate herd program that finds expression at the level of an individual. Herdity, thus, is a reciprocal relationship between an individual and his herd, what geneticists have been describing as polygenic inheritance. The evolution of the concept of polygenic inheritance has brought a shift in genetic thinking, from heredity to herdity, for polygenic inheritance is necessarily a statistical concept that concerns not the individual but population aggregates. Programmed herd mortality as depicted by the Gompertz function is seen as a physiological function in man, in animals and in drosophila. No medical advance has been able to stem this operation.

This means that disease and death do not have a cause. Causeless diseases and death cannot be prevented; they are an integral part of man's growth; in terms of both cause and course they are trans-science and trans-technique. The principle of herdity governs all the phenomena in relation to disease and death in a herd. The herd determines who will get what and when, in whom the disease will be slow, in whom fast, and so on.

NATURAL AND UNNATURAL DEATH – ACCIDENTS, SUICIDES, HOMICIDES

Death is the ultimate phenomenon of life which begins with conception. Non acceptance of death as a natural phenomenon by society and by the medical fraternity has many consequences. Fear of death is universal. However, natural death is a spontaneous natural phenomenon. It is as wonderful a phenomenon as the making of us. Yogis, some Buddhist Lamas and Swami Vivekanand³⁹ have shown how effectively they leave behind the physical dead body by ejecting their subtle body. In nature, we see in the plant kingdom leaves, flowers and fruits falling from the trees when they are ripe. In the animal kingdom, most insects, and vertebrates die spontaneously. Man is no different. Death is almost like the switching off of the power of life force from the physical body. When one's quota of life force is over, the subtle body ejects itself from the gross body and the physical body is left behind lifeless reminding us of switching off power from the gadgets we use. This moment of death we only observe as stoppage of the main indicators of life, namely respiration and heartbeat. They are the manifestation of death and not the mechanism of death.

Actually, heartbeat and peripheral pulse represent active circulation of blood which is the lowest common, debate free denominator of life. The circulation of blood is maintained by anesthetists and surgeons doing open heart surgery or during cardiopulmonary resuscitation for cardiac arrest or for individuals buried under snow for a long time. The complex of trillion body cells assembled into different highly specialized systems are reciprocally connected to one another by the universal network of blood vessels, a very clear indicator of flow of life activity. The other functioning systems – respiration, digestion, excretion and reproduction also indicate life. Each system has its own capacity to function even after the supply of life forces has stopped after death. Experimental physiology and clinical experiences have shown that all organs do not die simultaneously at the time of death. When respiration stops, the brain and heart stop in a few minutes, followed by the liver, kidney and pancreas which remain functioning for a few hours. Skin, tendons, heart valves and corneas remain alive for more than a day and white blood cells, which are more independent, can keep going for about three days.⁴⁰

Unnatural deaths – suicides, homicides and accidents have a different modality. Active euthanasia can be included here. In each of them there is a deliberate or undeliberate killing of the gross body whereby the subtle body is unable to execute its program. Thereby the subtle body is left in the lurch with consequences which only the scriptures have described. Science has no access to it. No wonder, all these unnatural deaths are universally viewed as calamities.

BRAIN DEAD AND TRANSPLANT

“The ‘brain death’ standard as a criterion of death is closely associated with the need for transplantable organs from heart-beating donors. Are all of these potential donors really dead, or does the documented evidence of patients destined for organ harvesting who improve, or even recover to live normal lives, call into question the premise underlying ‘brain death’?”

Doyen Nguyen⁴¹

Brain death and true patient care

Brain dead persons are those whose heart and peripheral circulation are alive and therefore not dead. Heart alive is a manifestation of continuity of charging of the physical body with life force. Such an unconscious patient is a live donor, like any other live donor, and should be respected and treated as such.

Such live organs from the donor have their own built-in program of ability to receive and store bioenergy and accordingly it becomes one of the criteria which decide prognosis of the transplant in the recipient. How much life of the transplanted organ is remaining is not knowable beforehand because it is trans-science and trans-technique. No wonder, always young, healthy individuals are preferred as live donors including those from brain dead individuals.

AGING, SENESCENCE, DISEASES AND DEATH

Aging is the calendar of events that starts at conception, or at birth and ends only at death. Everything that lives, ages with reference to a starting point in time and does not connote an adverse state or event. With the ceaseless dynamism that characterizes life, an organism exhibits as it ages changes that promote its survival, benescence, and *pari passu*, changes that indicate the opposite, senescence. At any juncture the balance of the two directs the biological trajectory. A child developing diabetes shows senescence and an elderly person who recovers from COVID pneumonia with better immunity exhibits benescence.

The number of diseases that can affect the body can be broadly classified into two groups – interactional or extrinsic and intrinsic. Extrinsic diseases are a consequence of the unfavorable interaction between a human being and his or her environment – nutrition (excess or deficiency), microbial (worms, bacteria, viruses), mechanical or allergic. These diseases provide a scope to control or prevent. However, the balance between the severity of the external factor impact and the correct treatment and response from the individual's body to that impact and treatment decides the outcome of extrinsic diseases. The availability of vitality, thereby healing power of an individual has a significant say in the outcome of interactional diseases, Intrinsic diseases – cancer¹⁴, cardiovascular diseases³³, metabolic disorders and autoimmune disorders³² - are built-in programmes in the cells during the biological trajectory from womb to tomb and adhere to biological laws governing disease and death in terms of who, when, where, how and what. Aggressive medical practice for end-of-life care does not stop death. The pressure cooker environment of ICU's, the stress on patients, physicians and relatives only add to the agony of the event of death. Ventilators and life supporting drugs – excluding cases where there is reversible physiological damage to the organ due to trauma, poisoning or any other external factor – are merely providing props to a collapsing building. When there is no question of the biological trajectory getting reversed, such aggressive measures of artificial life support only prolong

the process of exhaustion of life force quota without giving any additional quality of active life.

The different manifestations during biological trajectory - aging, senescence, intrinsic chronic disease and death – are independent of each other. They demonstrate a wide variation that is governed by normality – normal distribution and heredity. On a normal curve that stretches from conception to 100 years or more of human existence, various pathologies and the various times of death that work independently are plotted. That makes clinical medicine and pathology into fascinating disciplines characterized by tantalizing uncertainty at every stage, at every age. All chronic diseases are senescent processes^{8,31-33} giving indication of wearing out of the biological time reserve but they are not the causes. We may conclude that aging, senescence and diseases are co-travelers in terms of time, running parallel and independent of death. We can label them as flag bearers of death but not the cause.

ROLE OF YOGA, EXERCISE, DIET AND LIFE STYLE

Yoga has been an integral part of Vedic practices in India and is recommended for physical, mental and spiritual health – a part of the way of living. Yogis have lived very long by practising it. Now science has accepted that longevity – potential lifespan and health are enhanced by basic yoga practices^{42,43} of meditation, pranayama (yogic breath control practices – postural, movement-based including aerobic) and dietary practices. The subtle body – mind – and the physical body are interconnected. That is how mental and physical health are mutually related. The practice of meditation has an effect on the mind – subtle body. Controlled breathing – pranayama and body exercise - and diet work at the level of the physical body. The two are mutually beneficial to each other in enhancing effective functioning. A healthy life style brings about an effective utilization of vital force. It does not exhaust it by excessive stimulation of the mind which is caused by drugs and the use of other intoxicating substances and exposure to or indulging in too many stimulating external activities. It does not strain the physical body by lack of physical activities and ill-suited diets in terms of quality and quantity. It is a common experience with all physical gadgets like cars and machines that they run smoothly and last long when cared for regularly and operated properly.

MODERN MEDICINE AND PHYSICIAN

“The common belief that medical science has greatly lengthened life is a misconception, arising from a failure to distinguish between lifespan and life expectancy.” Having so

generalized, Adams *et al*²² say that even if all coronary artery disease were eliminated, life expectancy would possibly be extended by 3.1 years, and if all cancer were eliminated, another 3.5 years. So even if the circle were squared, and the apple made to fall up, human life-expectancy will remain far short of human lifespan for most people and will never exceed it.

The knowledge that death is causeless and an integral part of life, should encourage discerning inaction in the practice of modern medicine.⁸ What a medical man needs to learn in today's technicalized scene is when not to act. Doing nothing is an integral part of relevant investigations, diagnosis and treatment. The word 'cure' comes from 'curatio' to take care. With a caring physician around, no disease or death is incurable in that sense of the word. A drug to ease, optimizing physiological functioning of the body or assist in maintaining effective utilization of vital force - providing supportive measures like lens implants in cataract surgery or joint replacement for better locomotion, or a procedure to palliate, a word of cheer, a graceful stoicism to hold the dying patient's hand, all fall within the curative competence of a clinician.

CONCLUSION

The human body is a biological entity, an ensemble of trillion body cells. It develops from a single live cell. The whole-body right upto each functional unit - a cell - is manifest, living, configured energy constantly in flux sustained by food which is a biological product. The whole body works in unison and maintains its integrity from conception to death completing one biological unit of life. It is kept alive by the life force which has a prefixed, designated quantum for every physical body. The quantum and the rate of expenditure decides the duration of life. The life force comes from cosmic energy by conduit of the subtle body which is beyond perceptive, objectifiable knowledge. It transcends the reach of science and technology which can explore the nature of external phenomena and world objects. When the allotted quota of life force is over, the biological timer stops, thereby the subtle body disconnects itself from the physical body keeping it no longer alive. This phenomenon of life from conception to death operates for the entire biological world. Life is a built-in cosmic phenomenon covering all the phases from conception to death. Therefore, death is a natural facet of life. It is causeless.

To restore the poignancy of death, this essay is concluded by a plea to mankind in general and medical practitioners in particular, to understand and accept death as a natural

physiological process necessary to maintain the homeostasis of the biological world. Dr. Farokh E Udwardia, a renowned physician practising in his eighties and taking care of very critically ill patients in ICU at a very well-established hospital, delivered The Jamshed Bhabha Memorial Lecture titled "*Art and Mankind*" at NCPA on August 21, 2021. He expressed his wish that he would like to depart as depicted in a poem by Walt Whitman *The Last Invocation*

Let me glide noiselessly forth;
With the key of softness unlock the locks—with a whisper,
Set open the doors, O Soul!

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