Aging: Is aging a disease?

Syed Riaz Baquir*

Aging is an irreversible change in an organism, organ, tissue or cell, taking place over a period of time after maturity. These changes represent gradual impairment in function and activity and are reflected in the increased probability of death. The technical term used for the study of these changes taking place with age and their causes is referred to as gerontology. Geriatrics is a medical specialization dealing with prevention, diagnosis and treatment of disease in aged people.

As aging proceeds gradually it becomes difficult to pinpoint a certain stage when an individual can be called as old. It varies from person to person. From a physiological standpoint, it is not possible to identify the age when senescence begins. It is because of this variation in life span that retiring age has been established in different counties. In Europe it is the age of 65 that a person retires, while in most other Asian countries the retiring age is 60.

Senility is considered as that stage of life when a person is no longer capable of living independently and is unable to perform his daily duties. Senility should not be regarded as a normal part of aging because only 5% of the population in U.S. over 65 years of age requires custodial care. Senility represents a combination of aging and disease that is the effect of aging itself.

Aging itself is never the cause of death as death is always associated with some or the other kind of disease. Among some of the main causes of death, among old people over 65 years is heart disease and cancer, though the former is three times more prevalent than the latter. Besides these two major causes, diabetes mellitus, pneumonia, including high blood pressure are also considered as some of the major diseases found in old age.

During the past 100 years the life expectancy and the life span has increased considerably due to use of medication, better nutrition, hygienic environmental condition and lack of infant mortality. The maximum life span in human being has been reported to be about 115 years, though occasional reports of individuals surviving up to 140 to 160 years are also available. These figures have been met with scepticism and may be due to lack of proper records.

Data about the average age in Pakistan is not available and therefore it is not possible to estimate an over all increase in life expectancy or life span of human being. Women have greater life expectancy than men. In the USA a report published about white male in 1984, reported a general increase of life expectancy from 47.9 in 1900, to 71.8 years in 1984, whereas those of white female was 50.7 in 1900 to 78.8 in 1984. The sex differences in longevity is biologically determined, may be because of hormonal variation. It has been noted that up to the age of 45, the presence of female sex hormone offer some protection against heart disease.

The proportion of longevity of elderly people has increased substantially with time. In U.S.A, only 4.1% people were reported to be over the age of 65 in 1900, which by 1980 has gone up to 11%. The percentage of elderly in the developing world is not so high because of the high percentage of birth rate. In the subcontinent as well as in Mexico and several other countries in Latin America and Africa, people over 65 years are hardly about 3-4%. However this trend is now on increase because of better medication and environmental health conditions. Genetic background also plays an important part in setting maximum life span. It has been noted that children whose parents and grand parents lived up to the age of 80 have a life expectancy of about 6 years greater. Some gerontologist believed that if the human body temperature could be lowered by 3 or 4 degrees from its normal 37.6°C, life expectancy might be extended by 5 to 10 years. Experiments with animals have shown that life expectancy can be increased by reducing food intake. Over eating and obesity have harmful effect on the life expectancy. Life expectancy is also influenced by living condition and also varies among occupational groups.

With advancing age muscular strength declines and ability to perform muscular works is impaired. The impairment is related to the reduced ability of the heart to supply blood to the muscles. However systematic exercise can substantially improve the performance of their heart and the ability to perform muscular work.

There is a gradual reduction in the amount of testosterone (male sex hormone) with advancing age that means a gradual lowering of sexual activity. The correlation between blood levels of testosterone and sexual behavior is relatively small. The general health, social customs and life time pattern of sexual activity are much more important in determining sexual behavior in older males than is the blood level of testosterone. The menopause is a normal physiological aspect of aging. This is associated with hot flashes, headache and depression in some women. The administration of female sex hormone is often effective in treating these symptoms. Most of the changes in the brain observed in elderly people

*Professor of Pharmacology and Editor-in-Chief, J. Baqi Med. Univ. BMU Karachi.
are the result of disease, primarily associated with the blood vessels in the brain. As an example arteriosclerosis may substantially reduce blood flow to certain part of the brain and the formation of small clots that block blood vessels may impair mental function and motor performances.

Aging does not affect all individuals in the same way. Some individuals are highly resistant to age changes and may have physiological characteristics similar to the average of individuals 20 years younger. Aging affects different organ systems differently. Declines are usually greater in function requiring integrated activities of a number of organ systems than in function that depend chiefly upon a single organ.

A common complaint of older people is impaired memory. It has been experimentally shown that though this deficit may begin to appear as early as age 50, it can be counteracted by associating new information with well-learned material. Young children learn most effectively when many repeated trails are given in a short time whereas older people learn much more effectively if the trial are distributed over a longer time. With advancing age, losses in visual acuity and hearing often occur. However these handicaps can be overcome by using hearing aids or glasses. Social isolation often imposed on older people can influence mental attitudes and behaviors. Individuals who remain active participants in life in the community remain mentally alert even to advance age. The psychological aspect of aging represents a close interaction between the social environments and the inner resources that the individual has developed over life time. The mental deterioration of old age may be as a result of an atrophy of disuse.

Usually cells in key organs, such as nerve, muscle and kidney cells, lose the capacity to regenerate after reaching maturity. However some body cells, such as those of skin, the lining of the gut and the red blood cells is able to reproduce themselves throughout life. Loss of the capacity to regenerate cells in key parts is the sign of aging. One of the primary questions for gerontologist is why cell die?

Impairment in the effectiveness of enzymes is an important factor which contributes towards cell death. Enzymes are essential for the chemical processes that maintain cell life. The information how specific enzyme molecules should be assembled is housed in DNA of the nucleus. This information is decoded through a complicated chemical process involving many steps. With aging errors may develop in the formation of enzymes. When such errors occur the cell dies.

Old skin with its many cross-linked collagen molecules become stiffer and less elastic in contrast to the young skin which is very elastic and contains few cross-linked collagen molecules. Similar changes occur in the collagen in blood vessels and with increasing age the blood vessels become stiffer.

Aging is said to occur due to break down in the control mechanisms that integrate the activity of the various organ systems. Aging, according to another theory, results from development of antibodies that react even with normal cells in the body and destroy them. This reaction may occur as a result of failure of antibodies to recognize normal cells as a normal or because of error in the formation of antibodies. Many control mechanisms that regulate the interplay of different organs and tissues lose their effectiveness, with advancing age.

Since time immemorial man has longed to develop a mechanism by which life expectancy could be increased. Different methods have been tried. Early in 20th century, injections of crude extracts of testicular tissue and even transplantation of gonads from young men into old were publicized as rejuvenator. Goat and monkey’s gonads were also transplanted into human beings. This however failed because of rejection by the immune system. Even today injections of purified male sex hormone are offered in some countries as a rejuvenating procedure. Injections of female sex hormones are regarded by some as useful and minimizing the effects of aging. All these methods have unfortunately been proved to be ineffective and hazardous because of the possibility of promoting the initiation of cancer.

In recent years various new products have been publicized which claim to slow down or reverse aging but they have not yet been recommended for sale. Studies on animals have shown that injected cells would be recognized as foreign cells and would be quickly destroyed by immune system of the recipient. However there are a number of procedures that can minimize the effect of age. However there are a number of procedures that can minimize the effect of age. Some of these are effective because they reduce the possibility of developing disease such as heart disease. Other procedures can improve the quality of life even if the life span is not appreciably increased. People engaged in some form of regular physical activity maintain better function of heart, lungs and muscles than those who lead a sedentary life. With age activity level decreases and therefore it is essential that the total calorie intake be reduced to avoid obesity. With their reduction in caloric consumption intake of a varied diet should be maintained to assure an adequate intake of essential vitamins and minerals. This should be supplemented by a regular check up of a periodic health examination beginning in middle age.