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BIOLOGICAL SIGNIFICANCE OF AGING AND DEATH

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Abstract
Aging is characterized by a gradual loss of physiological integrity, leading to functional decline and increased vulnerability to death. This deterioration is a primary risk factor for major human pathologies, including cancer, diabetes, cardiovascular diseases, and neurodegenerative disorders. Research on aging has seen unprecedented progress in recent years, particularly in understanding how the rate of aging is regulated by genetic pathways and biochemical processes that have been preserved at least to some extent through evolution.

Keywords: Genetic theories, cellular processes, disposable soma, biological significance of death.

Introduction

Currently, the number of deaths and aging varies globally due to several factors. Among these, the development of medical care, lifestyle, environmental conditions, genetic factors, and other socio-economic factors play significant roles. The number of deaths varies from country to country. In developed countries, a high level of medical care, clean water, sanitation, healthy nutrition, and other factors contribute to a lower mortality rate. Conversely, in developing countries, a higher mortality rate can be attributed to diseases, hunger, lack of clean water, and other issues.

In recent years, the COVID-19 pandemic has contributed to an increase in the number of deaths worldwide. Since the onset of the pandemic, millions of people have died from this disease. The number of elderly individuals is also increasing globally, leading to longer life expectancy. In developed countries, high-quality medical care, healthy lifestyles, and favorable socio-economic conditions enable people to live longer. Many developed countries are experiencing a decline in birth rates and an aging population.

Genetic Theories. Aging is a complex process regulated by genes. For example, telomere shortening is one of the main factors of aging. With each cell division, telomeres shorten, diminishing the function of these cells. Another gene-regulated process leading to aging is DNA damage. Over time, DNA can become damaged, hindering the proper functioning of cells.

Cellular-Level Processes

- **Senescence:** This refers to the aging phase of cells where they cease to proliferate after a certain number of divisions, which is one of the key indicators of aging.

- **Oxidative Stress:** This process involves free radicals damaging cells, accelerating aging. This can lead to socio-economic issues.

Longevity. Due to advancements in medical care and healthy lifestyles, people are living longer. For instance, in Japan, Switzerland, and other developed countries, the average life expectancy exceeds 80 years. In Uzbekistan, the number of deaths and aging is also influenced by various factors. In recent years, improvements in medical care, promotion of healthy lifestyles, and other socio-economic reforms have led to an increase in average life expectancy. However, cardiovascular diseases, cancer, and other illnesses remain the primary causes of death.

General Statistics. As of 2023, the average life expectancy worldwide is approximately 72 years. In developed countries, the mortality rate is about 10 deaths per 1,000 people. In developing countries, this figure can exceed 20 deaths per 1,000 people.
According to surveys, by 2030, 1 in 6 people globally will be aged 60 and older. Currently, the proportion of the population aged 60 and older has increased from 1 billion in 2020 to 1.4 billion. By 2050, this demographic may double to 2.1 billion. The number of individuals aged 80 and older is expected to triple from 2020 to 2050, reaching 426 million.

Key Facts. All countries face significant challenges to ensure their health and social systems are prepared to maximize the benefits of these demographic changes. Research indicates that by 2050, 80% of the elderly population may reside in low- and middle-income countries. The rate of population aging is accelerating compared to the past. In 2020, it was found that the number of individuals aged 60 and older exceeded the number of children under 5 years. Between 2015 and 2050, the proportion of the global population over 60 could increase from 12% to nearly 22%. Key indicators of aging include genomic instability, telomere attrition, epigenetic alterations, loss of proteostasis, dysregulation of nutrient sensing, mitochondrial dysfunction, cellular aging, stem cell exhaustion, and changes in intercellular communication. A primary task is to differentiate between the unique characteristics of candidates and their relative contributions to aging, with the

ultimate goal of identifying pharmaceutical objectives to improve health during aging with minimal side effects.

Conclusion

Aging and death are crucial biological processes that regulate the life cycles of living organisms. They support evolutionary changes, aid in the renewal of genetic composition, maintain population balance, and ensure ecosystem stability.

References

1. Blackburn, E. H., et al. (2006). Telomeres and telomerase: the path from maize, Tetrahymena and yeast to human cancer and aging. Nature Medicine.
2. López-Otín, C., et al. (2013). The hallmarks of aging. Cell.
3. Harman, D. (1956). Aging: a theory based on free radical and radiation chemistry. Journal of Gerontology.
4. Kirkwood, T. B. (1977). Evolution of ageing. Nature.
5. Medawar, P. B. (1952). An unsolved problem of biology. H. K. Lewis & Co..
6. Kerr, J. F., et al. (1972). Apoptosis: a basic biological phenomenon with wide-ranging implications in tissue kinetics. British Journal of Cancer.