



Review Article

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# The Biophysical Modelling of the Human-time

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To Cite This Article: Janos Vincze\* and Gabriella Vincze Tiszay. The Biophysical Modelling of the Human-time. Am J Biomed Sci & Res. 2023 19(6) AJBSR.MS.ID.002644, DOI: [10.34297/AJBSR.2023.19.002644](https://doi.org/10.34297/AJBSR.2023.19.002644)

Received: 📅 August 10, 2023; Published: 📅 August 17, 2023

## Abstract

A striking example of this is the process of ageing, which is composed of thousands and tens of thousands of microscopic qualitative changes, to be perceived macroscopically as a complex of phenomena characterised by slow quantitative changes accumulating over time. Under such circumstances, evolutionary development, the lawful inheritance of traits, would become impossible. The age-related increase in the number of cross-links slows down and makes the macromolecule-and indirectly the cell-less precise. The aging process, as the motto implies, does not clearly imply a decline in target activities. From this we can draw an extremely important conclusion about the ageing process: all the movements that a person repeats constantly throughout their life can be easily reproduced in old age. From sports medicine data, it is clear that individuals who exercise regularly on a daily basis have, at the age of 50, typical biological parameters that are on average those of 25-year-olds who do not exercise. For accuracy, the internal state of ageing must be distinguished from its external state. That is why there is a biological age and a calendar age, with one or the other in a hurry in relation to the other.

**Keywords:** Biophysics, Human-time, Gerontology

## Introduction

The modern biological approach, which requires a different approach, has made a significant change in that it has begun to look at individual organisms at the microscopic and molecular level. This has of course been made possible by applied physics methods such as electron microscopy, X-ray diffraction, electron spin resonance measurements, magnetic resonance measurements, etc. In the biophysics of living systems, qualitative changes do not occur as a consequence of quantitative accumulations, but rather, according to the theory of quantized states-a single well-defined quantitative value results in a qualitative jump. With the existence of quantized states, many biological phenomena can be understood and explained at the macromolecular level [1]. This is borne out by the fact that the most significant achievements in biological research in the last three decades have been in the field of molecular biology. This idea, which needs refinement, stems from the dialogue between humans and science, and was intended to suggest that it results in quantitative accumulation at the microscopic level. A striking example of this is the process of ageing, which is composed of thou-

sands and tens of thousands of microscopic qualitative changes, to be perceived macroscopically as a complex of phenomena characterised by slow quantitative changes accumulating over time.

It goes without saying, therefore, that gerontological research is nowadays also turning its attention to the world of macromolecules. Based on extensive research in recent years, we can be certain that DNA is at the heart of biological ageing. DNA is the repository of information accumulated during the historical evolution of the living world. Most of it is a highly stable polymeric compound found in the nucleus [2]. If the structure of DNA were unstable, it would cause chaos in protein synthesis, cell metabolism and function. Under such circumstances, evolutionary development, the lawful inheritance of traits, would become impossible.

It was found that age-related changes also occur at the macromolecular level. Thus, they terminologically described the age-related inactivation of genes, the alteration of information content, the failure of repair mechanisms. The amount of DNA in a set of chro-

mosomes does not change with age. To date, no significant changes in the primary structure of DNA have been detected, and for now we can only say that there are no gross changes in the structure of DNA during ageing.

## The Molecular Genetic

One of the most important experimental proofs of the hypothesis about the molecular genetic mechanism of ageing is the formation of cross-links in DNA. Cross-links are the result of the action of cross-linking agents that are always present in the body. Such cross-linking agents include aldehydes, free radicals, dibasic acids, etc. Cross-linkages may be present in the body at a younger age, but their number increases with age. This is the most significant specific structural physicochemical difference that has been detected in nucleic acids as a function of age [3]. This approach also makes it possible to clarify why macromolecules, and thus indirectly cells, age under the influence of the time factor, thus resolving the apparent antinomy between the macroscopic features of ageing.

Cross-links can also form in protein molecules. Cross-linking prevents molecules from moving freely, and the molecules thus linked form inactive units (inactive complexes), which disturb the physiological state of proteins and nucleic acids, resulting in a loss of function. The age-related increase in the number of cross-links slows down and makes the macromolecule-and indirectly the cell-less precise. At the molecular level, the increase in the number of cross-links is the most fundamental evidence of the ageing process. Disruption of cellular function leads to functional perturbation of the body. The body defends itself against this by breaking down these protein molecules and making new ones to replace them. There will no longer be any cross-links in the new molecule, so the new molecule will be functional again [4]. However, this mechanism only provides partial protection, because if too many cross-links are formed, or if cross-links are formed where the defence mechanism does not work, the cross-links formed will interfere with cell function. However, the defence mechanism can be helped by external interventions (e.g. root-control drugs).

Observations at the molecular level have provided another key piece of experimental evidence on the ageing process, showing an age-related decline in immune function. Many researchers suggest that the period of adulthood can be significantly prolonged by immunological manipulation (when the immune system is treated to maintain its normal function).

## The Biomechanical Processes

The dual nature of the ageing process-both in its internal logic and in its general context-is easy for the layperson to understand, because a number of structural and functional changes occur in the body of older individuals that are observable to the naked eye and that differ significantly from the average characteristics of middle-aged people [5]. The aging process, as the motto implies, does not clearly imply a decline in target activities, i.e., an older biological organism may achieve higher positive scores for certain traits than younger individuals.

Biomechanical processes are present or absent in the vast majority of human traits that shift in a positive direction in older age, and in a smaller proportion of negative lags. The experience accumulated in older age means nothing more than that the target activities carried out by the living organism have developed their own dynamic stereotypes, which are orders of magnitude greater in number than in younger age [6].

Tens of thousands of repetitions of the same sequence of movements in the same order and intensity over decades of time were required. So, for an old person, to develop a certain form of activity required a greater and more vigorous "total effort", but the amount of effort at any one time was less than for a young person. An excellent pianist, violinist or instrument maker over the age of 80 can play the piano, violin or hold a screwdriver with more confidence than a 20-year-old.

From this we can draw an extremely important conclusion about the ageing process: all the movements that a person repeats constantly throughout their life can be easily reproduced in old age. Thus, the ageing process typically becomes dominant in non-repetitive or sporadically applied movement sequences. This brings us to the core of our conclusion, in which we claim that the more movements a person practices into a dynamic stereotype, the less they age! [7].

So the person who delays the onset of old age best is the one who develops and uses all their muscle groups harmoniously and purposefully: walking, running, gymnastics, weight lifting, swimming, football, typing, hiking, driving, chopping wood, in other words, repeating the most varied "movement sequences" on a regular basis, and intellectual activities such as reading and speaking foreign languages. This repetition is well known among elite athletes, where it is called a workout. Exercise needs to be woven into our lives in a metaphorical sense, in a broader sense and for a lifetime [8]. It follows from what has been said that the number one, most decisive and fundamental antidote to ageing is movement! For all those who want to delay their ageing process, we recommend that they fetishise their own movement!

From sports medicine data, it is clear that individuals who exercise regularly on a daily basis have, at the age of 50, typical biological parameters that are on average those of 25-year-olds who do not exercise. In some countries, such as the United States, advocates of the "run for your life" movement share the same principle. Statistical studies in gerontology also show that individuals over 100 years of age were characterised by a lifetime of active physical activity. Numerous observations show that intense exercise, as an effective human need, ensures normal metabolism in the body over a long period of time, regardless of diet and habit, and contributes significantly not only to increasing the life span of middle age, but also to extending the life span of individuals.

Unfortunately, this scientific discovery was not followed by adequate social education, i.e. the mass media were far from convincing the masses of the importance of physical activity in order to

preserve health and delay ageing. In this context, we can speak of a lag in social education, and we must also mention the lack of environmental conditions. Unfortunately, there is no single place where everyone can play mass sports at the same time. There are no sports complexes available to the population that would allow a lifetime of varied physical activity [9]. Given these circumstances, it is up to each individual to decide how many times a week they kick the ball, how many times a week they lift weights at home, how many kilometres a day they walk to keep their muscles flexible, which then acts as a rebound ball for their mental state, helping to create mental balance and more effective mental activity.

## Gerontology

Regardless of one's age, but even more so in old age, people carry within themselves all the conditions, opportunities and capacities that they have been given by their history and present as a bondage and freedom of choice, which then they shape through their actions and desires. The teleological view of ageing has a tradition going back to the beginning of science. All thinkers directly or indirectly involved in gerontology have had to face the question: do ageing processes follow a trajectory that can be read as the embodiment or fulfilment of a predetermined goal? The question is obvious to the everyday naive mind. Ageing should be considered primarily in terms of process (function) rather than structure [10].

For accuracy, the internal state of ageing must be distinguished from its external state. That is why there is a biological age and a calendar age, with one or the other in a hurry in relation to the other. The ability of the older organism to adapt to changes in the external and internal environment is reduced. The extent to which an old person can functionally compensate for these influences is very significant. The psychological safety of an elderly person depends primarily on the accuracy of the data on endogenous factors that are relatively easier to work out and exogenous factors that are more difficult to obtain, and on their relative proportions in terms of quantity and quality [11]. The difficulty of the task is to establish the relationship between outcome measures and factor measures, to extrapolate existing trends and tendencies in a realistic way, and finally to assess the changes in the main structural parameters of the phenomenon under study-the ageing process-on the basis of appropriate information. Imperfections in the registering and feedback mechanisms explain the increased vulnerability of the body in old age. This explains the introduction of the dynamic concept of "relative health" in this age group.

We find different historical lifestyle models across the historically changing spectrum of human lifestyles [12]. They have been greatly influenced by the sense of material existence as an organiser of life, and by the value orientations and requirements of life. The activity of the elderly is a historically changing process, determined by specific conditions, nourished by natural and social resources, in constant interaction with production, with constantly changing content, constantly reborn and reproduced at a higher level of satisfaction, satisfying needs. These are objective needs, the

consciousness of which, as an inner ideal, must be realised both in the individual and in society. So old age is an essential condition of life, an inalienable part of life. Then, and in this respect, humans are not forced to grow old by the alien, blind forces of society; their compulsion is a natural and not a social compulsion. Humans seek to break free from the constraints of nature, to alleviate their blind subordination to nature by recognizing the laws of nature. The elderly are alienated from themselves and their environment. The main condition for the elimination of alienation is the environmental impact, which is the backbone of the process, but the resolution of the brackets in the formula-the complete elimination of alienation-is a long and complex process. This state is significantly characterized by contradictions, but there is no absolute contradiction between the facts. Conscious ageing is no longer an inevitable acknowledgement, but a recognition, a necessity absorbed into the human consciousness.

Ageing is nothing to fear. Those who have been preparing for old age for sixty-five years live rightly. One should prepare for it as a "great holiday" that ends with one's death, when one can indulge in the pleasures that life has denied them while at work, and we are ultimately responsible for the way our old age unfolds. We ourselves must create a peaceful, harmonious old age.

These ideas reflect the tasks of applied gerontology, which can be summarized as follows:

- a) to extend productive life and prepare for retirement.
- b) the possibility of maintaining activity (employment) and overcoming loneliness.
- c) to maintain independent living for as long as possible and to ensure appropriate social support.
- d) the optimum provision of the various types of temporary or permanent institutional care desired, including respect for the individual's personality and the balance between their physical and mental state.
- e) creating hospital wards that meet the needs of the elderly.
- f) ensuring the availability of suitably trained and sufficient staff to deal with these complex tasks.

## Acknowledgement

None.

## Conflict of Interest

None.

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