

## PHYSIOLOGICAL AND PATHOLOGICAL ASPECTS OF THE AGING PROCESS

Dragos VIRVESCU<sup>1</sup>, Dragos Nicolae FRATILA<sup>1,\*</sup>

<sup>1</sup> Faculty of Dental Medicine, University of Medicine and Pharmacy Gr.T.Popa, Iasi, Romania

---

### Abstract

*Demographic changes in the world have begun to raise concerns among experts that health systems, pension funds, as well as health insurance companies and the public funding system will be affected in the long run, changes that will be severely affected by the rapid growth of population. The extent of older people's needs is growing and includes environmental, psychological, social, educational and financial functional confluences as well as physiological and structural problems. The elderly challenge the health care systems due to multiple levels of their needs. In general, medical problems are the result of poor nutrition, deviation of physiological constants, disorders in regulating the inflammatory reaction, walk disorder, immobility, confusion, syncope, sleep disorders. As a result, even the road to the pharmacy can be a torment. The physiological changes that occur as we age are undeniable. The most common visible changes are related to greying hair, changes in the perception of the sense organs, changes in the appearance of the skin, muscle tone, etc. Loss of vision may be a barometer of the onset of aging in somatically healthy patients*

**Keywords:** *demographical changes; elder people; medial problems; physiological changes.*

---

### Introduction

The biological sciences see old age as an infirmity, disease or disability, and the aging process as inherent in life; life cannot be significantly extended (anti-aging medicine, there are no remedies against aging).

**Physiological aging** is a biological process of the entire organism, which follows a period of development, being considered the last phase of biomorphosis.

In practice, for the evaluation of physiological aging, the reference criterion is the normal of the adult that does not correspond to reality, some corrections being necessary. In order to make corrections, the changes brought by aging at different levels must be known [1-3].

Aging occurs at all levels of organization of living matter: molecular, cellular, tissue, organs, apparatus, and is characterized by morphological, physiological, biochemical, anthropological changes. Characteristic changes appear in all elements of the stomatognathic system, sometimes being difficult to differentiate the physiological forms from the pathological ones. Within the senescence of the body, these complex changes are triggered by genetic factors, exposure to the environment, lifestyle, psycho-social factors that are indicators of the aging process.

There are a number of general involutive changes that could explain the occurrence of such varied oral pathology: decreased cell mass - decreased parenchymal cells which causes atrophy of internal organs, increased connective tissue that causes sclerosis of vessels, resulting in insufficient blood flow and organs, decrease of the entire metabolic activity: decrease of the

intensity of the protein metabolism with the onset of a negative nitrogen balance, disturbance of the tissue and humoral lipid metabolism having as effect the increase of lipids in blood and the thickening of the vascular walls with diminished exchanges, decrease of the tolerance to carbohydrates with depreciation of Krebs cycle and onset of a prediabetic state, decrease of the hydro-electrolytic metabolism, the existence of lipofuscin, toxic catabolite that appears in connection to the metabolic defect within senescence; decrease of the secretion of the endocrine glands with age [4].

The degree of organ damage is variable, so that aging as a process in itself may evolve according to different patterns, depending on the correspondence that is established between biological age and chronological age [5].

All these changes depend on the alteration of the cellular enzymatic equipment and on the aging of the neuroendocrine system. Involuntary metabolic changes lead to alteration of adaptive possibilities with influences upon functional parameters in tissues, organs, systems [1].



**Fig. 1.** Elderly patients: Involutive aspects of the oral mucosa [6]

The physiological changes that appear as people age are visible changes, related to greying hair, changes in the perception of the sense organs, changes in the appearance of the skin, muscle tone, etc. Loss of vision may be a barometer of the onset of aging in somatically healthy patients. Not all physio-pathological changes caused by aging can be diminished or compensated [7,8]. Edentations, decreased visual or auditory capacity can be compensated by prosthesis. A series of changes is found in the elderly: atrophy of the tissues of the organs, a progressive increase of vulnerability to trauma and infections, an increased susceptibility to malignant processes, a progressive decrease in the most important physiological functions of the body; not all organs age the same way. The speed of nerve conduction and metabolic processes are slowly reduced, compared to the vital capacity and speed of blood circulation, the decline of which is much faster; there is an important individual variation of the aging phenomena.

From a pathological point of view, the changes in elderly patients are related to the chronicity of older lesions during youth or adulthood [9].

In the elderly, not all physio-pathological changes caused by aging can be compensated or diminished; decreased visual or auditory capacity can be compensated by prosthesis.

Important changes found in the elderly are: atrophy of the tissues of the organs, a progressive increase of vulnerability to trauma and infection, an increased susceptibility to malignant processes, a progressive decrease in the most important physiological functions of the body. Not all organs age the same way [Fig. 2].



**Fig. 2.** Progressive atrophy of the mandible [10]

The speed of nerve conduction and metabolic processes are slowly reduced, in contrast to the vital capacity and speed of blood circulation, whose decline is much faster. There is an important individual variation of the phenomena of aging. The most frequent pathological changes of the body in elderly patients are linked to the chronicity of older lesions, from their youth or adulthood[11].

Aging is a dynamic set of gains and losses that leads to a successful psycho-social adaptation to the aging process.

In the elderly, tooth loss and resorption of the alveolar margins lead to a decrease in the vertical diameter of the facial mass by shortening its lower third. Overall, the facial mass in the elderly is similar to that in children, except for the chin, which in children appears dimmed, and in the elderly is prominent.

#### ***Characteristics of the general pathology of the elderly***

Pathological aging refers to physiological aging that interferes with pathological phenomena (chronic degenerative diseases that accelerate physiological aging). It is the result of the action upon the body of external or internal environmental factors that change the normal course of the aging process.

The effects of aging the body are very strongly felt in its morbidity when diseases occur. Through the progressive decrease of the biological capital in the involution process, the elderly show signs of illness compared to the young adult[12].

Old age in itself is an unfavorable prognostic element for the patient, but this should not be used as a reason against careful examination to reveal the potential (possibility of undergoing treatment) and the risk to which that patient is subjected. In general, there is no pathology specific to the elderly, but the entire pathology acquires a characteristic touch: the risk of contracting a disease is higher and the diseases are more complex with the maximum frequency of diseases called geropathies; more than in any other population group, in elderly it is of a particular importance the investigation of the general personal antecedents due to the influence that some general diseases have on the stomatognathic system and the possible risk of using dental treatment in these conditions; compared to other age groups, the elderly are more susceptible to disease, getting ill is more complex with the maximum frequency of some diseases: cardiovascular, degenerative joints, respiratory, mental, nutritional diseases, cancer - many of the patients have several diseases at the same time (polypathology), that is why the complex multiple diagnosis must be made; the form of disease is sometimes atypical, non-specific, with the lack of classical symptoms, pathognomonic; pain, which by its characteristic forms and intensity is a pathognomonic sign for some diseases, can be abolished or may be absent, by altering perception, which makes the diagnosis - difficult; diseases have a longer evolution with a tendency to chronicity due to the low reaction of the body's defense system; their etiology is multiple, there is a need for concomitant treatment of all causes, and the form it takes is sometimes atypical; complications of diseases are more common, convalescence is long lasting, functional rebalancing is more difficult, taking more time; diseases are very difficult to stabilize through drug therapy due to pharmacokinetic and pharmacodynamic changes; the differential diagnosis is sometimes simplified by the frequency or rarity of diseases in old age.

Thus, a number of sensory diseases: glaucoma, senile cataracts, cochlear deafness and neurological diseases: cerebral-diffuse atherosclerosis, strokes, chronic paraparesis, Parkinson's disease, late epilepsy - are specific to the elderly patient.

Because many of the chronic diseases that the elderly have influence local reactivity and increase the risk of dental treatment or even contraindicate it, it is very important to know them and work with the general practitioner, the oral cavity being considered the mirror of the whole body[13].

Among the most common general ailments encountered are: cardiovascular diseases, obstructive pulmonary diseases, asthma, diabetes, kidney diseases, etc.

Oral respiration further accentuates the changes in senescence that occur in the oral tissues, making them more susceptible to the action of irritating local factors.

Diabetes is a disease that affects 9.3% of the population over the age of 65 and is a common condition in the history of the elderly. In poorly controlled diabetes there is not only an increased level of glucose in the blood but also an increase in salivary glucose contributing to the increased incidence of caries, periodontal disease and mucosal disorders[Fig.3].



**Fig. 3.** Aspects of oral manifestation in diabetes (population over the age of 65 years) [14]

Examination of the oral cavity in those with untreated diabetes may reveal candidiasis, dry mouth, multiple cavities, periodontal disease, and mucosal lesions in various forms. Elevated glucose levels result in delayed wound healing and decreased resistance to infection[15,16].

Generalized osteoporosis is the most common systemic condition, which includes both sexes[17,18]. In women, it occurs at a younger age (after the onset of menopause) and is more severe than in men. NORDIN and SMITH show that due to the phenomena of aging, in elderly patients there is an absolute quantitative dependence on bone tissue of up to 30%, while in men it is about 10%(Fig. 4).

The condition is dominated by pain, functional impotence, significant decrease in bone structure and component, bone deformities. The most serious complications are fractures. The patient's posture and walk can be edifying. Hesitant appearance or walk will be related to disorders of the osteo-articular system or to the state of effort that is imposed on the patient in case of debilitating diseases. Heeled walking (walking on heels) is related to the previous existence of a partially recovered stroke. Intentional tremor is mainly related to Parkinson's disease but it also occurs in those treated with tranquilizers. These inaccurate movements are often the basis of total prosthesis fractures [20-22].

In the field of dentistry, osteoporosis translates by diminished to extinction of the alveolar ridges, flattening of the palatal arch, which causes multiple difficulties in solving the maintenance and stability of total prostheses. Muscle activity decreases due to decreased muscle tone and coordination. All these changes are due to muscle fibrosis or loss of muscle elasticity [23-25].

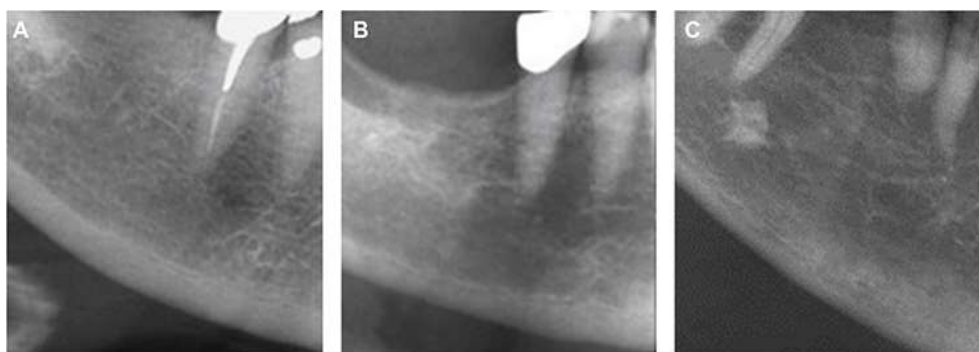


Fig. 4. Mandible bone loss in osteoporosis [19]

Thus, the circulation undergoes a process of slowing down and the vascular bed becomes much more fragile. The cardiovascular system is affected during aging; the value of blood pressure increases with age; erythrocyte sedimentation rate reaches a maximum in the 5th and 6th decade of life; arteriosclerosis is more common and more severe in elderly patients [26-28].

Psychological changes can manifest as decreased attention and memory, confusion, depression, anxiety and lowered self-esteem. Major sociological changes may also occur as a result of retirement, death or illness of a spouse, of friends and family members, of functional impairment, deterioration of the knowledge system, pain and suffering, major changes in living conditions, neglect and abuse of the elderly, decreased life expectancy, and other causes [29-32].

## Conclusions

Gerontology creates the premises for a specific approach to the elderly in a bio-psycho-social context with a profound impact on its insertion in the social circuit, without avoiding the creation of an adequate framework grafted on the current requirements of the quality of life.

Aging can be considered a chronic evolutionary poly-dystrophy of the life period following reproductive and somatic maturation.

## References

- [1] Gusic V.I., **Biologia vârstelor și lupta împotriva bătrâneții**, Ed. Științifică și Pedagogică, Buc.,1984.
- [2] Fontaine, Roger, **Psihologia îmbătrânirii**, Polirom, Iași, 2008.
- [3] Gîrleanu-Șoitu D., **Vârsta a treia**, Institutul European, Iași, 2006.
- [4] Goffman, E., **Aziluri: eseuri despre situația socială a pacienților psihiatrici și a altor categorii de persoane instituționalizate**, Polirom, Iași, 2004.
- [5] Miftode, V., **Dezvoltarea comunităților etno-culturale**, Editura Expert Projects, București, 2004.
- [6] [www.indianacademy.com](http://www.indianacademy.com)
- [7] Muntean A., **Psihologia dezvoltării umane**, Polirom, Iași, 2006.
- [8] Revista de Administrație Publică și Politici Sociale Anul I, 57, Nr. 3, 2010.
- [9] Zamfir E., **Sistemul de asistentă socială**, curs, București, 2005.
- [10] <https://www.intechopen.com/books/emerging-trends-in-oral-health-sciences-and-dentistry/denture-and-overdenture-complications>
- [11] Zamfir E., **Strategii anti-sărăcie și dezvoltare comunitară**, Editura Expert, București, 2000.
- [12] Legea nr. 448/2006 privind protecția și promovarea drepturilor persoanelor cu handicap republicată în M.O. nr 1/3.1.2008.

- [13] Batista A.L.A., Barbosa E.C.S., Godoy G.P., Catão M.H.C.V., Lins R.D.A.U., Maciel S.M.L., *Avaliação das condições de saúde bucal de idosos institucionalizados no município de Campina Grande*, **PB. Odontol Clín Cient** 7, 2008, 203–208.
- [14] [https://link.springer.com/referenceworkentry/10.1007%2F978-3-319-18741-9\\_54](https://link.springer.com/referenceworkentry/10.1007%2F978-3-319-18741-9_54)
- [15] [https://jada.ada.org/article/S0002-8177\(14\)63883-6/pdf](https://jada.ada.org/article/S0002-8177(14)63883-6/pdf)
- [16] Silva E.M.M., Barão V.A.R., Santos D.M., Delibem J.A., Ribeiro A.C.P., Galgo A.K.G., *Principais alterações e doenças bucais que o paciente geriátrico*, **Revisão da literatura Odonto** 19, 2011, 39–47.
- [17] Dehler K., Brannon R., Muzyka B., *Biopsied oral lesions in a geriatric population*, **Oral Surg Oral Med Oral Pat**, 95, 2003, 417.
- [18] Harris C.K., Warnakulasuriya K.A., Cooper D.J., Peters T.J., Gelbier S., *Prevalence of oral mucosal lesions in alcohol misusers in south London*, **J Oral Pathol Med**, 33, 2004, 253–259.
- [19] Jainkittivong A., Aneksuk V., Langlais R.P., *Oral mucosal conditions in elderly dental patients*, **Oral Dis** 8, 2002, 218–223.
- [20] <https://www.dovepress.com/alveolar-bone-loss-in-osteoporosis-a-loaded-and-cellular-affair-peer-reviewed-fulltext-article-CCIDE>
- [21] Silva E.M.M., Barão V.A.R., Santos D.M., Delibem J.A., Ribeiro A.C.P., Galgo A.K.G., *Principais alterações e doenças bucais que acometem o paciente geriátrico*, **Revisão da Literatura Odonto**, 19, 2011, 39–47.
- [22] Moreira R.S., Nico L.S., Tomita N.E., Ruiz T., *Oral health of Brazilian elderly: a systematic review of epidemiologic status and dental care access*, **Cad Saude Publica** 21, 2005, 1665–1675.
- [23] Henrique R.B., Bazaga M.Jr., Araújo V.C., Junqueira J.L.C., Furuse C., *Prevalência de alterações da mucosa bucal em indivíduos adultos da população de Uberaba, Minas Gerais*, **RGO** 57, 2009, 261–267.
- [24] Ship J., **Oral health in geriatric patients**. Hamilton: BC Decker Inc, 2006.
- [25] García-Pola Vallejo M.J., Martínez Díaz-Canel A.I., García Martín J.M., González García M., *Risk factors for oral soft tissue lesions in an adult Spanish population*, **Community Dent Oral Epidemiol**, 30, 2002, 277–285.
- [26] Saraswathi T.R., Ranganathan K., Shanmugam S., Sowmya R., Narasimhan P.D., Gunaseelan R., *Prevalence of oral lesions in relation to habits: a cross sectional study in South India*, **Ind J Dent Res**, 17, 2006, 121–125.
- [27] Namrata M., Jayanth Kumar V., *Assessment of quality of life in patients with chronic oral mucosal diseases: A questionnaire-based study*, **Int J Orophac Biol** 1, 2017, 24–27.
- [28] Pillai H.S., Nithya J., *Tobacco – A potential threat to oral cavity*, **Int J Pharm Pharm Sci** 6, 2014, 38–40.
- [29] Naveed N., *Prevalence of oral mucosal lesions and their correlation to adverse habits – A pilot study*, **Int J Dev Res** 7, 2017, 8845.
- [30] Nandhini T., Nithya J., *Prevalence of oral submucous fibrosis among different habitual chewers*, **J Pharm Sci Res** 8, 2016, 1106–1109.
- [31] Axell T., Pindborg J.J., Smith C.J., Van der Waal I., *Oral white lesions with special reference to pre-cancerous and tobacco-related lesions: conclusions of an international symposium held in Uppsala*, **J Oral Pathol Med**, 25, 1996, 49–54.
- [32] Kovac-Kavcic M., Skaleric U., *The prevalence of oral mucosal lesions in population in Ljubljana*, **J Oral Pathol Med**, 29, 2000, 331–335.
- [33] Gopinath V., *Oral hygiene practices and habits among dental professional in Chennai*, **Indian J Dent Res**, 21, 2010, 195–200.

---

Received: November 11, 2021

Accepted: March 2, 2022