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Analyze Ways to Prevent or Optimally Treat Age-Related Muscle Loss

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Abstract: It is worth noting that skeletal muscles play a crucial role in various metabolic processes in the human body, which, in addition to their function of movement, can contribute to improving health or the risk of diseases. Muscles store a large amount of glycogen and are the main place of glucose excretion from the body by stimulating insulin when necessary, and the largest component of the basic metabolism, directly or indirectly affecting bone density. It also produces myokines, which have a pleiotropic effect on muscles and other tissues, including the brain, and accumulate essential essential amino acids. At the same time, when food intake is reduced and stress is aimed at eliminating negative effects on the body, muscles also ensure that protein synthesis is maintained in moderation. However, in various pathological conditions, as well as depending on age, there is a decrease or loss of muscle mass beyond the norm, and this is called sarcopenia. Therefore, it is not surprising that the manifestation of skeletal muscles with a decrease in mass and muscle strength in various pathological conditions acts both as a strong risk factor and as the main consequence of chronic diseases, disability and loss of independence, and this, in turn, is one of the strongest risk factors for death. Thus, skeletal muscles remain one of the most plastic of all tissues, because it is here that there is a rapid change in the rate of protein synthesis and breakdown in response to physical activity and inactivity, inflammation, nutrition and hormonal background. In recent decades, the development of pharmacological treatments to increase muscle mass and prevent its loss in chronic diseases or age-related loss of muscle mass has become an important goal. However, although significant progress has been made recently in understanding the molecular and cellular regulation of muscle protein metabolism, the introduction of drugs with positive effects and approved for the treatment of sarcopenia in millions of older people remains a challenge. In this regard, one can only think about theoretical measures to solve problems such as age-related diseases and the lack of new and effective pharmacotherapeutic treatments that reduce or eliminate muscle loss.

Keywords: Sarcopenia, vitamin D, Omega-3, non-pharmacological and drug treatment.

Annotation. It is known that conditions such as involuntary loss of muscle mass, strength and function are called sarcopenia in medical practice, in which muscle mass decreases by about 8% every ten years in people over the age of thirty, and even this level of decline remains high after the age of 60. For this reason, sarcopenia is described as one of the most striking consequences of age-related changes, and the metabolic changes characterizing sarcopenia include age-related endocrine and nutritional changes, as well as a sedentary lifestyle. It is the involuntary loss of muscle mass, strength and function that is the main cause and factor of disability not only in the elderly, but also in middle-aged people eligible for ablki. Because sarcopenia, in turn, increases the risk of falls and vulnerability to injury or propensity to injury for these age groups and, therefore, can lead to functional dependence as well as disability [1, 2, 3, 4]. A decrease in muscle mass is also accompanied by a progressive increase in fat mass and, as a result, a change in body composition and is associated with increased insulin resistance in the elderly. In addition, bone density decreases, joint stiffness increases and there is a slight slowdown in growth. All of these changes can affect several diseases, including type 2 diabetes, obesity, heart disease, and osteoporosis. The loss of muscle mass in the human body begins in middle age.up to about 1% annually in this age group and in severe cases can lead to the loss of ~50% of life in people aged 80-90 years [5, 6]. Thus, regardless of how sarcopenia is diagnosed, both low muscle

mass and weak muscle strength are common and important risk factors for disability and potential death in the elderly. It should be noted that many chronic diseases found in medical practice, in addition to aging, can accelerate the decline in muscle mass and strength, and enough data has been described to suggest that this effect is the main mechanism of chronic diseases that cause physical disability. Conditions such as loss of muscle mass associated with age and human diseases require special attention to conditions like diabetes and obesity. The development of treatments for age-related and painful loss of muscle mass can improve the active life expectancy of older people, as well as significantly save on health care costs and improve the quality of life [7, 8, 9, 10].

The main purpose of this studied manuscript is a theoretical analysis of the disease sarcopenia, which is now considered a potential problem for medical practice, and its optimal treatment by discussing preventive or treatment measures.

Age-related changes in muscle mass in the human body. The decrease in skeletal muscle mass with age is a process of complex etiology that proceeds slowly and affects all people, even those who are very physically active and well-nourished. A comprehensive review and analysis of the molecular, neurological, mobile and metabolic factors associated with sarcopenia have shown that a decrease in the size and number of fibers, mainly type II, is well described with age. This, in turn, is explained by factors such as a decrease in the maximum sprinting ability of athletes or a decrease in strength providing intensity and intensity, as well as a decrease in maximum strength with age of all men and women. Selective atrophy of type II fibers has been described by a number of authors, and the relative safety of type I fibers with age. Several pathways lead to decreased muscle protein synthesis and weight with age, including increased insulin resistance due to increased body fat and a sedentary lifestyle.inflammation, decreased testosterone levels and the production of growth hormone [10, 11, 12 13]. Since in most cases sarcopenia is associated with aging of the body, it is often diagnosed in the elderly, but this condition causes quite problems, although it also occurs in young patients. The classification of muscle mass reduction or loss includes a distinction between primary and secondary sarcopenia depending on the underlying cause. In particular, primary sarcopenia associated with hormonal changes is mainly due to a decrease in the content of sex hormones, the level of somatotropic hormone, a relative increase in free cortisol, a violation of the normal circadian rhythm of cortisol, a decrease in vitamin D and hormone D, and a decrease/deterioration in the sensitivity of receptors to hormone D. At the same time, processes such as activation of apoptosis processes, mitochondrial dysfunction, which determines the processes of cellular aging, and differentiation of the mesenchymal stem cell into an adipocyte occur. However, in some cases, a decrease in muscle mass occurs without a decrease in body weight due to the replacement of muscle tissue with fat due to conditions such as degeneration of the nervous system, deterioration of innervation of muscle fibers and denervation. It is also worth noting separately that in the case of primary sarcopenia, the process is irreversible, progressing, and therefore this particular group of patients requires the development of qualified diagnostic and treatment methods. In secondary forms of sarcopenia, as a rule, one important etiological factor is noted, including a significant decrease in functionality and an increased risk of fractures in patients with endogenous hypercorticism aged 25-30 years. In most cases, this form has a complete or partial reverse development after these processes have reached remission of the disease [13-18].

Existing therapeutic measures for sarcopenia and their disadvantages. Therapeutic measures for sarcopenia, as with all diseases, will consist of non-pharmacological and drug treatment. It is known that lack of physical activity is the most important factor in the development of sarcopenia, and even athletes, including those who continue to train actively, begin to lose muscle mass, muscle strength and endurance after the age of 30. Nevertheless, physical activity is an important component of sarcopenia therapy, as short-term strength training has been shown to increase the ability of muscle tissue to synthesize protein.In the case of non-drug treatment, a traditionally healthy lifestyle includes measures such as improving paws and physical activity, as well as reducing muscle overload [19, 20, 21]. Unfortunately, to date there is no specific or special treatment of sarcopenia with drugs because it is the medicine with registered indications for the treatment of sarcopenia that has not yet been put into

practice. Nevertheless, although today dehydroepiandrosterone and human growth hormone demonstrate minimal effectiveness in the treatment of sarcopenia, it is important to note that this effectiveness is insufficient. Human growth hormone increases protein synthesis by muscles and, as a result, muscle mass, but does not affect the increase in muscle strength and functionality. Recombinant insulin-like growth factor 1 affects inflammatory processes and other age-related factors, but is ineffective in sarcopenia. The use of the hormone testosterone demonstrates a number of positive effects, in particular, it has a certain positive effect on muscle strength and muscle mass, but its use in elderly patients increases the likelihood of a number of side effects. In particular, the development of prostate cancer, an increased risk of cardiovascular diseases in addition, testosterone in women causes serious anxiety conditions associated with virilization. In this regard, the potential possibilities of ghrelin, angiotensin converting enzyme inhibitors and eicosapentaenoic acid for correcting or slowing the progression of sarcopenia are being considered today. However, in elderly patients, the use of vitamin D preparations with relatively high efficacy and safety may be recognized as the optimal method of treating sarcopenia [22, 23, 24, 25, 26].

Suggested recommendations for the prevention of sarcopenia. The priority issue is to prevent or eliminate muscle fiber atrophy and loss of muscle fibers, i.e. hypoplasia, which affects two main mechanisms regulating the decline in muscle mass and muscle function with age. In this regard, the treatment and prevention of sarcopenia includes exercise, increasing the total amount of protein in the diet, choosing the right type of protein, increasing Omega-3 intake, normalizing hormonal levels, increasing vitamin D intake, eating more anti-inflammatory foods, limiting foods and alcohol that cause inflammation, and quitting smoking contains. As vitamin D preparations, the possibilities of the chemical structure of colecalciferol, alfacalcidol and calcitriol, their bioavailability, increasing the functional capabilities of the elderly and increasing their effectiveness in reducing the risk of miscarriage are being considered today [27, 28, 29, 30].

Discussion. Sarcopenia is a syndrome characterized by a progressive complete loss of mass, strength and performance of skeletal muscles, and today its burden on medicine is increasing. Scientists believe that, in addition to low physical activity, the following risk factors play a role in the development of sarcopenia: an age-related decrease in the number of nerve cells responsible for sending signals from the brain to the muscles to start moving, insufficient intake of calories and/or protein to maintain muscle mass, a decrease in the body's ability to synthesize protein and a decrease in the concentration of certain hormones., including growth hormone, testosterone and insulin-like growth factor. It should be noted that the severity of sarcopenia can serve as a comprehensive clinical indicator of the condition of these patients, reflecting the intensity of metabolic stress, concomitant diseases and the presence of complications. Sarcopenia reduces the quality of life, increases the likelihood of hospitalization and is an independent predictor of mortality in both the elderly and patients, which leads to the need for its correction. Taking into account the etiology of sarcopenia, therapeutic measures aimed at its correction should be multidisciplinary, but today the central link in the prevention and treatment of sarcopenia is to provide adequate dietary support. In this regard, assessment of the level of physical activity and physiotherapy should be a mandatory part of monitoring patients receiving renal replacement therapy.

Conclusions. Thus, the loss of muscle tissue due to age-related and some serious diseases can lead to a significant decrease in human functionality, as well as, as a result, to an increased risk of falls, an increase in the likelihood of injuries and fractures.

Namely, optimal methods of treating loss of muscle mass, leading to serious injuries, disability and even death, do not exist today, and special drugs of specific action have not been put into practice. However, existing medications have problems such as their use, as well as many serious complications and side effects related to age.

However, as measures to prevent sarcopenia or reduce muscle loss, the prospect of using various vegetable and animal fats, vitamins, along with maintaining a healthy lifestyle, regular sports and measures to reduce muscle overload is considered.

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