The law is strict on rapamycin and metformin, requiring a prescription. In comparison, alcohol and tobacco do not require a prescription or medical supervision. Smoking has no health benefits and significantly reduces life span, accelerating all diseases. While smoking causes cancer, rapamycin prevents it, including smoke-induced lung cancer. Is it not paradoxical, then, that alcohol and tobacco are sold without prescription, while rapamycin and metformin are not? The Goal of Geroscience is Life Extension. Mikhail V. Blagosklonny February 2021. (Translation)

Theme of the month: Sarcopenia and longevity

What is sarcopenia?

With advancing age, almost everything that makes up the components of a human being or other vertebrate gradually loses its efficiency: digestive, cardiac, neurological and immune systems, skeleton, skin, etc. Muscles are no exception to the rule.

Sarcopenia (or age-related muscular dystrophy) is the age-related progressive decline in muscle mass and strength, associated with a decline in physical performance.

In 1989, the term "sarcopenia" was defined by Irwin Rosenberg, researcher and acting director of the Neuroscience and Aging Laboratory at Tufts University in the United States, to refer to the decrease in muscle mass during aging.

From what age?

From the age of 30, muscle tissue undergoes a progressive degeneration of about 3 to 8% per decade. From the age of 50 onwards, the loss of muscle quantity and strength accelerates. By the age of 70, half of the muscle mass is lost to fatty tissue. The loss of muscle mass affects all older people, including those who are healthy and active.

The causes and consequences of sarcopenia?

Several interrelated causes are involved in the development and progression of sarcopenia. These contribute to the loss of muscle mass

and strength:

- Denervation and loss of motor unit functionality is thought to result in reduced muscle fiber constructibility.
- The effect of anabolic hormones is strongly disrupted in the course of aging. Either the concentration of circulating hormones is reduced, or the sensitivity of the muscle to the action of certain hormones such as insulin appears to be diminished.
- Dietary proteins are no longer used efficiently by the body. As a result, the nutritional intake of the usual diet is inadequate to meet the needs of the aging body.

The risks and consequences of sarcopenia vary greatly depending on age and degree of impairment:

- progressive decrease in muscle strength
- Fatigue leading to a decrease in physical activity
- Weakness
- increased risk of falls and fractures
- increased risk of dependency and loss of quality of life.

Is it possible to slow down sarcopenia?

Some nutritional strategies combined with sufficient physical activity make this possible.

Protein pulse feeding: "this consists of providing 80% of the recommended daily protein intake in a single meal. This technique makes it possible to partially saturated splanchnic extraction (i.e. retention of dietary amino acids by the intestine and the liver for their own needs) in order to obtain better bioavailability of amino acids for the stimulation of postprandial muscle protein synthesis" (source: Wikipedia).

Citrulline (the only amino acid not taken up by the liver) and leucine both have a stimulating effect on muscle protein synthesis through their action on the mTor pathway. They are therefore good strategies for combating sarcopenia.

In addition, in order to reduce muscle loss as well as for the proper functioning of the rest of the metabolism, sufficient physical activity must be combined with the nutritional strategy.

What is the state of scientific research on sarcopenia?

In December 2021 laboratory-grown human muscle cells were launched into space in an experiment conducted by the University of Liverpool.

This study, called MicroAge, aims to monitor the growth of muscle cells in microgravity and help understand why the body weakens with age.

At the end of the experiment in January 2022, the muscles will be frozen and returned to Earth where scientists will undertake further analysis.

The relationship between sarcopenia and cardiovascular disease

Both sarcopenia and cardiovascular disease are accelerated by the chronic inflammation of aging, but the onset of physical weakness resulting from sarcopenia can also contribute to cardiovascular disease through reduced physical activity.

Changes in lean body mass are common critical determinants in the pathophysiology and progression of cardiovascular disease (CVD). Sarcopenia can induce CVD through common pathogenic pathways such as malnutrition, physical inactivity, insulin resistance and inflammation; these mechanisms interact.

Sarcopenia and CVD are widespread in the elderly and share common pathogenesis and interactions. The understanding of their relationship is still in its infancy, and more clinical and experimental data are needed.

A large number of studies have shown that the progression of CVD and the decline in muscle function worsens the condition of patients. By screening for sarcopenia at an early stage, with effective detection and assessment methods in place, it is possible to effectively delay the progression of the disease.

Sarcopenia and gene therapy

In 2015, Elizabeth Parrish underwent a - controversial - gene therapy with telomerase and follistatin as part of the creation of the startup BioViva. In the case of follistatin, the aim is to directly suppress myostatin or to enhance follistatin to suppress myostatin. This has the effect of increasing muscle mass and reducing fatty tissue, while adapting the functioning of the metabolism to a healthier mode of functioning.

These injections consist of a myostatin inhibitor to protect against the loss of muscle mass with age.

After further examination and testing, comparison of Parrish's pre-therapy and post-therapy data revealed additional positive changes.

And tomorrow?

As written at the beginning of this letter, with age, almost everything that constitutes the organic components of a human being or any other vertebrate gradually loses its efficiency. But the rate of loss varies greatly depending on the tissue: from 1 to 1000, from a few weeks to a few centuries. The future, thanks to the progress of knowledge already

underway, may consist in doing at least as well, sustainably and... muscularly as the longest-lived species.

Good news of the month

The World Health Organisation (WHO) maintains the International Classification of Diseases (ICD), which is revised regularly.

ICD-11 officially came into effect on 1er January 2022 (although implementation of ICD-11 may not begin for several years.

Unlike previous versions, ICD-11 allows for a variety of synonymic interpretations, including those that may be very useful to a clinician treating older people, such as "aging", "senescence", "senile state", "frailty" and "senile dysfunction", which refer to a health condition. The new classification includes the code "age-related" in the etiology or causality category to target the pathogenic processes of aging.

Some have suggested that the code "old age" should be excluded from the latest version of the International Classification of Diseases, ICD-11, on the grounds that treating old age as a disease could have the negative consequence of treating civil age as a disease.

Yet, far from discriminating against the rights of older people and encouraging neglect of their curative or preventive health care, the ICD-11 codes for old age and age-related causation do exactly the opposite: they draw public and professional attention to the specific health problems of older people and call for action to improve prevention and treatment specific to them.

For more information:

- See: heales.org, sens.org, longevityalliance.org and longecity.org.
- Source of the image