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Sarcopenia or muscle modifications in neurologic diseases: a lexical or pathophysiological difference?

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Sarcopenia is a condition characterized by a decrease in muscle mass and function (strength and mobility) that is frequently observed in the elderly. In people with paresis and altered mobility due to central nervous system (CNS) diseases, this definition then may not be applicable. In CNS diseases, mainly stroke and spinal cord injury, different and specific patterns of muscle loss and muscle changes have been described, due to denervation, disuse atrophy, spasticity and myosteatosis. The main observations available about these phenomena in CNS diseases are reviewed, and a broad view on the specific pathophysiological mechanisms is also described. Moreover, a description of the potential pharmacological targets and treatment strategies (physical and nutritional) is provided. Since sarcopenia of the elderly and muscle modifications and muscle atrophy in CNS diseases have different mechanisms, it is probable that they do not respond equally to the same treatments.

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1. Which of the following biological systems is considered as the most important contributor to disuse induced muscle atrophy?

- A. Lysosomes
- B. The ATP dependent ubiquitin-proteasome pathway
- C. The Ca dependent calpain system
- D. Akt phosphorylation
- E. The TNF cytokine family

2. Which of the following is not one of the main mechanisms underlying muscle atrophy after a CNS disease?

- A. Myostatin
- B. TNF- α
- C. Oxidative stress
- D. Decreased protein synthesis
- E. Decreased proteolysis-autophagy

3. In which case can a conversion of slow muscle fibres to fast ones be observed in leg muscles?

- A. Regular long-distance-running healthy adults
- B. Athletes undergoing chronic electrical muscle stimulation at 10 Hz
- C. Duchenne Muscular Dystrophy patients
- D. Aging humans
- E. Patients with hemiplegia due to stroke

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The role of exercise on sarcopenia in the elderly

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Sarcopenia leads to a loss of strength, later on to a decreased functional status, impaired mobility, a higher risk of falls, and eventually an increased risk of mortality. There are many factors responsible for the decline of muscle mass and muscle strength associated with aging, although the complex, multi-factorial mechanisms driving the sarcopenic process are not clearly understood. Physical inactivity or a decreased physical activity level is a part of the underlying mechanisms of sarcopenia and therefore physical activity can be seen as an important factor to reverse or modify the development of this condition. Several treatments have been proposed for the treatment of this loss of muscle and strength, but there is no doubt that exercise represents the most important approach to prevent and treat sarcopenia. In this review, we describe first the conceptual distinctions between the terms sedentary behaviour, physical activity and exercise. In addition, we review the benefits of physical activity in the elderly population, including lower mortality and functional independence, and discuss the four categories for specific recommendations for exercises (aerobic exercise, progressive resistance exercise, flexibility and balance). Finally we discuss the principles governing the prescription of physical activity for older people with sarcopenia and make some specific advices for how to engage older adults in appropriate exercise.

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4. Even in healthy persons, muscle mass declines:

- A. By approximately 0.5% per year
- B. By approximately 1% per year
- C. By approximately 2% per year
- D. By approximately 2.5% per year
- E. By approximately 3% per year

5. The ACSM recommendations state that flexibility exercise should be done at the intensity level of:

- A. 1-2 /10
- B. 3-4 /10
- C. 5-6 /10
- D. 7-8 /10
- E. 9-10 /10

6. In elderly, an absolute contraindication for exercise is:

- A. Very old age
- B. An orthopedic condition that prevents weight-bearing
- C. Onset of muscle soreness following exercise
- D. Unstable angina
- E. Amyotrophic lateral sclerosis

See answers on page 147.