

QRS 1010 Pelvicenter

Repetitive peripheral magnetic stimulation to correct functional pelvic floor disorders

Scientific documentation and medical information

Seniors with sarcopenia



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causes

Muscular changes are particularly relevant for older people. At the latest from the 4th decade of life, the so-called sarcopenia begins with an annual loss of muscle mass of 0.6% [\[1\]](#). From the age of 50 to 80, it even accelerates to 0.5 to 1.5% [\[2\]](#).

The cause is a decrease in anabolic (muscle building) in favor of catabolic (muscle breaking down) processes, with increasing malfunctions in the muscle cell, decoupling of motor units from the nerve supply and the infiltration of fat and connective tissue also playing a role. The cause of sarcopenia is also related to a declining testosterone secretion, which increases by about 1% annually in men over the age of 30 and is even stronger in women between the ages of 20 and 45 [\[3\]](#).

physiology

Looking more closely at sarcopenia, the decline of the alpha motor neurons of the spinal ganglion (degeneration of the axons) plays an important role. Because the remaining neurons have the task of innervating more and more muscle fibers, which means an enlargement of the remaining motor units [\[4\]](#), [\[5\]](#). This is particularly noticeable in the distal muscles.

After the age of 60, a reduction in motor units in the lumbosacral spinal ganglion of more than 50% can be assumed compared to young people [\[6\]](#), [\[7\]](#). Furthermore, the decrease in skeletal muscle strength is characterized by the degradation of fast muscle fibers (type II), while the number of slow muscle fibers (type I) remains largely unchanged [\[8\]](#), [\[9\]](#).

To make matters worse, protein synthesis decreases with age. In addition, protein quality decreases as a result of free radical damage, leading to an increased need for proteins in the elderly [\[10\]](#). As if all of this weren't enough, the rate of ATP production in skeletal muscle also decreases due to oxidative damage to the largely unprotected mitochondrial DNA. ATP production is therefore reduced by up to 50% in older people [\[11\]](#). As a result, sarcopenia is further aggravated by physical inactivity, various diseases and diet.

Consequences of sarcopenia

A decrease in muscle mass and muscle strength affects the lower extremities in particular, since walking is one of the essential necessities of everyday life. Too little attention is paid to the fact that decreasing muscle strength also affects the "core".

The core is the "force distribution center" in the middle of the body, consisting of abdominal muscles, diaphragm, deep back muscles and the pelvic floor. This muscular core is the stabilizing element and for all physical actions. The core is essential for balance and the ability to balance [\[12\]](#), [\[13\]](#). A sarcopenia in this area slows down any power transfer and precision in targeted movements of the upper and lower extremities.

fall risk

An unsteady gait, which correlates directly with the muscle strength of the lower extremities [14], [15], increases the risk of falling and thus also the risk of mortality [16]. Falls can be life-threatening, they are among the most common causes of death in people over the age of 65 [17]. 1/3 of all older people state that they have fallen at least once within the last year. 2/3 of these people fall again within a period of 6 months [18], [19].

Falls can lead to significant physical limitations in independence and psychological problems for those affected. One speaks here already of a "post-traumatic stress syndrome". 40% of those who have fallen show symptoms that suggest this [20], [21]. With the loss of confidence in one's own mobility, the danger increases that the motivation for physical activity dwindles. This is accompanied by further functional limitations [22], [23], [24], in a vicious circle [HYPERLINK "https://pelvicenter.com/wp-admin/post.php?post=291&action=edit" \l "_edn22"](https://pelvicenter.com/wp-admin/post.php?post=291&action=edit).

fracture risk

A fall in old age carries a very high risk of fracture. A lack of physical exercise or the absence of corresponding muscular tensile forces have brought about the "remodeling" of the bone in the direction of bone loss. This does not only refer to sarcopenia in old age, but mainly to any reduced physical activity, which is reflected in negative remodeling processes in muscles and bones [25].

Because the tensile forces of the inserting muscles result in the stimulation for bone formation [26], which was already described in 1892 by Wolff's law [27]. 42% of all falls in the elderly lead to a fracture [28]. In Germany, more than 100,000 fractures near the hip ("femoral neck") can be assumed [29].

muscle strength and mortality

There is clear evidence that reduced muscle strength in older people causes a higher risk of mortality [30], [31], [32]. However, it is not certain whether this is related to a logical loss caused by sarcopenia. Because according to some intervention studies, a comparatively small increase in lean body mass (muscles) causes a significant improvement in strength [33]. So it is not surprising that it is not the muscle mass that is decisive for the mortality risk, but rather the pure muscle strength, which results from the muscle quality [34].

QRS Pelvicenter rPMS effect

The rPMS has been developed for the stimulation of central or peripheral nerves, e.g. in therapeutic, neuromuscular muscle stimulation (neuromodulation) [\[35\]](#), [\[36\]](#), [\[37\]](#), [\[38\]](#), [\[39\]](#) [\[40\]](#), [\[41\]](#), [\[42\]](#), [\[43\]](#), [\[44\]](#), [\[45\]](#), [\[46\]](#), [\[47\]](#), [\[48\]](#), [\[49\]](#), [\[50\]](#). In particular, it is used for weak or damaged musculature of the pelvic floor and the surrounding periphery [\[51\]](#), [\[52\]](#). The relatively young discipline of rPMS is increasingly coming to the fore in this therapy segment.

Muscle contractions caused by rPMS are reflected, among other things, by an increase (5-fold) in muscular creatine kinase (CK-MM), although this is not associated with any muscle damage given normal values for haptoglobin, bilirubin and creatinine [\[53\]](#). At the same time, there is an increase in muscle-specific proteins such as MyH or Desmin.

Targeted training of the quadriceps thigh muscle is one of the most common rehabilitation strategies for gait insecurity, especially in older people. With rPMS (3 times a week / over 5 weeks), the isokinetic maximum and the average torque increase at flexion speeds of 60 degrees/sec and 120 degrees/sec.

study situation

Animal experiments (mouse) showed that a 10-day rPMS application (stimulation frequency at the tetanus threshold) increased the fiber diameter of atrophic muscles of type 1, 2A and 2B by an average of 20% [\[54\]](#), which is the big Potential of rPMS for the prevention and treatment of muscular atrophy. Corresponding findings have already been obtained from sedated rat muscles, which hardly lost any (muscle) weight as a result of rMPS application [\[55\]](#).

In a current study on rehabilitation after the implantation of a THA after a femoral neck fracture, the verum group received 15 rPMS applications (5 x weekly / 3 weeks) on the vastus lateralis muscle, while the control group was treated with sham. With verum, this led to a significant increase in muscle strength. In addition, the tandem stance time (one foot in front of the other, standing still without support for as long as possible) and the normal walking speed improved drastically [\[56\]](#).

The extent to which an increase in strength can be derived from an increase in the cross-section of the muscle was examined, for example, over a 12-week active resistance training session with a representative clientele of older women (Ø 69 years). While this led to an increase in strength of between 28 and 115% and the type 2 muscle fibers thickened by an average of 20.1 compared to baseline and the control group, there was no growth reaction in the type 1 fast muscle fibers [\[57\]](#).

summary

The most important human movement musculature is the core, the center of gravity and the hub for all power transmission and coordination from the center to the periphery. If the balance of power is disturbed (imbalances) or if strength decreases naturally, for example with age (sarcopenia), this has enormous effects on health.

In old age in particular, muscle atrophy and injuries from falls go hand in hand. More than 40% of all falls in the elderly result in a fracture, up to 20% of those who fall have to move to a nursing home because of permanent frailty, and 40 to 60% of those injured in falls never regain their previous level of mobility.

Younger people are also increasingly affected as a result of predominantly sedentary activities. Inactivity results in the loss of muscle and bone mass. This is particularly important because the sedentary way of working in our service society, which is dominant today, not only causes muscle wasting on an epidemic scale, but also carries the other risk attributes of civilization diseases.

If the recovery rate of muscle weakness caused by being bedridden or sedentary lifestyle is much slower than its loss, there are many arguments in favor of strategically preventing this complication - and not only treating it afterwards as a consequence of inactivity [\[58\]](#), [\[59\]](#).

The Pelvicenter rPMS technique makes it possible to train deep muscle groups at an intensity that is higher than that of active muscle training. In addition, in just a few applications, without self-control, without doing anything yourself, in a comfortable posture and completely painless and stress-free, whereby the muscle contractions generated are completely natural and therefore physiologically favorable.

These advantages have an enormous impact on rehabilitation, where maintenance and development training can be carried out using rPMS without affecting the operated or immobilized body part (e.g. training the thigh and gluteus muscles in the case of cruciate ligament injuries).

From the findings of muscle activation in paraplegics, the pain treatment of myofascial syndromes ("chronic back pain"), enormous successes in the treatment of an insufficient pelvic floor ("urinary incontinence") or indications from competitive sports: rPMS-based core training can definitely be a new one for older people enable performance level.

Sources

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