Editorial

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Exercise rehabilitation strategy for the prevention of sarcopenia in cancer populations: 8th in a series of scientific evidence

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Although the number of cancer patients is rapidly increasing due to various reasons, cancer survivors are also increasing due to the development of medical technology. A cancer population includes cancer patients and survivors. Among them, it is easy to find sarcopenia, which is a loss of muscle mass. Cancerous sarcopenia significantly deteriorates the quality of life by weakening bodily strength and interfering with physical functions that enable daily life. Cancerous sarcopenia can be considered a consequence of removing cancer cells, that is, chemotherapy, radiation therapy, or surgery. It is very common in cancer populations, although it depends on the location and severity of cancer. The prevalence of sarcopenia in them is reported to be as low as 14% to as high as 80%. For cancer populations, since a decrease in muscle mass leads to a decrease in immunocyte function, it is obvious that the resistance capacity to cancer cells will decrease, and the lifespan of the populations will be shortened. Therefore, it is necessary to prepare countermeasures for cancerous sarcopenia.

Despite the high demand for effective treatment of sarcopenia, pharmacological agents produce relatively unsatisfactory results (Dent et al., 2018), whereas resistance training is considered a safe method to increase muscle mass or prevent sarcopenia (Schoenfeld et al., 2017). However, it is not a simple linear relationship between the resistance exercise and the hypertrophic effect. It also is uncertain to what extent the knowledge regarding the effects of resistance exercise on muscle mass gleaned from healthy populations can be generalized into cancerous populations. Therefore, this editorial aims to investigate how resistance training can impact muscle growth and various strategies for muscle growth in cancer populations.

As reported in the last 7th editorial, the skeletal muscle mass obtained through resistance exercise is because myokine is secreted from muscle fiber peptides. These several types of myokine are the best attackers that can actively kill cancer cells by stimulating immunocytes. In general, the exercise regimen for inducing hypertrophy in healthy adults is as follows. The resistance exercise intensity that causes hypertrophy is about 6–12 repetition maximum (RM), which is about 60%–85% of 1RM. In particular, the set to be performed according to this exercise intensity is 3–6 sets (Kraemer et al., 2002). The recommended frequency of exercise is 2–3 days per week, and a rest period of about 24–48 hr after exercise. A recent pilot study used the above exercise regimen, resulting in muscle hypertrophy in cancer survivors and, at the same time, increasing the function of adaptive immune cells (Lee and Jee, 2021). It was found that resistance exercise improved the acquired immune cells, which can help kill cancer cells by increasing the strength and muscle mass in ovarian cancer survivors. In other words, the results of this study provide support that resistance exercise is beneficial for cancer survivors.

According to one review study, cancer patients who received resistance training reported that their muscle mass was 0.9 kg higher than that of the control group (Koeppel et al., 2021). What stood out in their study was the mode of supervision. By changing the definition of the supervision modality when cancer patients were asked to perform resistance exercise, a positive dose-response rela-

tionship between the effect on lean mass and the severity of the supervision could be observed. This means that strict exercise supervision may be more effective than less strict supervision. Another notable result was that the use of BIA to measure muscle mass in patients was low-cost, and there was no radiation exposure, but there were possibilities of errors in the measurement. On the other hand, while computed tomography and magnetic resonance imaging have no errors in measurement, they are expensive, and there is concern about radiation exposure, so the measurement of muscle mass by dual-energy x-ray absorptiometry (DXA) should be considered. The method of protein supplementation to increase muscle mass is known to positively effect muscle growth in humans performing resistance training.

In the fields of exercise physiology and exercise rehabilitation, it is consistent with the fact that resistance training inhibits the catabolic pathway of muscle cells. There seems to be agreement that it can induce skeletal muscle growth by stopping the cell atrophy mechanism and at the same time stimulating anabolic pathways in cancer populations. Cancerous patients with high rates of sarcopenia showed a higher mortality rate than patients with low rates of sarcopenia. In other words, resistance training can be an important preventive and therapeutic strategy for cancer patients who have sarcopenia or are prone to have it. Ultimately, based on the results of several studies, resistance exercise is necessary to prevent cancerous sarcopenia, which often occurs in cancer populations. In addition, strict supervision is required to perfectly follow the prescribed exercise during resistance exercise. A more desirable effect appears when DXA for measuring muscle mass and protein supplementation for increasing or maintaining muscle mass is accurately followed.

However, more studies designed specifically for the cancerous sarcopenia cohort are needed that utilize the best knowledge in exercise rehabilitation science to increase muscle mass while taking into account the limitations of this same population.

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CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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