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The Impact of a Sauna on Post-Exercise Recovery

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Streszczenie
Regeneracja organizmu po intensywnym wysiłku fizycznym to kluczowy element niezbędny do prawidłowego procesu poprawy wydolności i osiągania lepszych wyników w treningu siłowym. Jedną z najważniejszych kwestii u każdego sportowca jest nieprzerwana kontynuacja treningów oraz jak najbardziej optymalna regeneracja tkanek i organizmu, która jest niezbędna w dalszym doskonaleniu umiejętności i rozwoju w danej dyscyplinie sportowej. Istnieje wiele metod, które pozwalają wspomagać procesy naprawcze tkanek i wspomóc organizm w walce z kontuzjami i mikrourazami, do których dochodzi podczas wysiłku fizycznego i są nieodzownym elementem budowy siły i masy mięśniowej. Przykładem, który w ostatnim czasie zyskał bardzo dużą popularność w środowisku sportowym jest stosowanie sauny cechującej się właściwościami termicznymi, dzięki którym możliwy jest wpływ na procesy fizjologiczne przyspieszające powrót do formy i osiągania lepszych wyników w rywalizacjach sportowych. Taka forma nie tylko wspomaga regenerację tkanek, ale odpręża i wycisza organizm, który podczas uprawiania sportu ulega pobudzeniu i wymaga wyciszenia po jego zakończeniu.

Abstract
Regeneration of the body after intense exercise is a key element necessary for the proper process of improving performance and achieving better results in strength training. One of the most important issues in any athlete is the uninterrupted continuation of training and the most optimal regeneration of tissues and the body, which is essential for further improvement of skills and development in a given sport. There are a number of methods to support the repair processes of tissues and help the body fight injuries and micro-injuries that occur during exercise and are an indispensable part of building strength and muscle mass. An example that has recently become very popular in the sports environment is the use of saunas characterized by thermal properties, through which it is possible to influence physiological processes that accelerate the return to form and achieve better results in sports competitions. This form not only helps tissue regeneration, but also relaxes and calms the body, which is stimulated during sports and requires calming afterwards.

Key words: Sauna, Body recovery, Physical activity, Heat therapy

The aim of a study

The main purpose of this paper is to describe the effects of heat therapy on the human body after exercise, taking into account its effects on tissue repair processes, metabolism, the cardiovascular system, effects on hormone secretion, actions on the nervous system and reduction of muscle tension. The analysis is based on articles available in PubMed and Google Scholar databases.

1. Introduction

Sauna is a place that has been known for centuries and found in various cultures [1], which has become a popular tool to aid recovery in many sports with an emphasis on those with high physical strain. There are many types of saunas, which are used on a daily basis not only by athletes, but also by people who care about their health. The main premise of using heat therapy in the process of tissue regeneration is the use of high temperature and reduced humidity, which affect the functioning of the body, as well as the processes of healing and muscle adaptation [2]. It is often used both after training and as part of injury prevention [3]. The studies suggest that the regular sauna bath correlates with adaptations produced by medium or high magnitude physical activity [4,5]. The purpose of this article is to present the mechanisms by which the sauna can support recovery processes.

2. Saunas and Their Effect on the Body

Saunas can be divided into different types depending on the conditions in them. The most popular are Finnish saunas, which are characterized by high temperatures reaching up to 100 degrees Celsius and low humidity of 10%-30% [6,7,8], and steam saunas, where the humidity is much higher. Recently, places where infrared light is used to raise the temperature of tissues have become very popular [9]. The use of saunas is associated with a number of physiological responses that can contribute to improved recovery.

2.1. Increased Blood Flow and Muscle Relaxation

Sauna under the influence of high ambient temperature leads to the dilation of blood vessels and their relaxation, which leads to a decrease in blood pressure [10,11,12,13,14]. As a result, blood flow through the tissues increases, along with the nutrients and oxygen it contains. Increased blood supply to the muscles can accelerate the repair and recovery processes after training, helping to reduce muscle acidification. The increase in body temperature also affects muscle relaxation, which reduces muscle stiffness and tension. This is particularly important in the context of reducing the risk of injury.

2.2. Removal of Metabolic Products

Under the influence of high temperature, there is an increased amount of sweat secretion, which can help eliminate toxins such as lactic acid, which accumulates in the muscles after intense training, but also the loss of valuable minerals such as sodium, magnesium, potassium, chloride, calcium [15]. Although this process is not the main mechanism for removing lactic acid, it can contribute to its reduction, thus aiding recovery [16].

2.3. Increase Hormone Production

Sauna can also affect hormone levels, which play a key role in regenerative processes. Studies indicate an increase in the production of growth hormone, which is responsible for tissue regeneration and protein synthesis [17]. Stimulation of the immune system through activation of endocrine glands is another of the benefits of using the Finnish sauna [18]. As studies have shown, hormonal changes remain brief and reversible [19].

3. Biological Mechanisms of Sauna Effects in Muscle Regeneration

3.1. Increased Blood Flow

The dilatation of blood vessels as a result of exposure to high temperatures leads to an increase in blood flow, which enables faster removal of metabolic products and delivery of essential nutrients to the muscles, speeding up their recovery. Once the heart rate increases in response to heat, the body mimics the effects of moderate exercise, promoting better cardiovascular health over time. The combination of improved blood circulation and increased heart rate can help improve overall cardiovascular function, leading to better endurance and reduced risk of heart-related diseases. Additionally frequent sauna bathing reduce risk of hypertension which has a adverse effects on health [20].

3.2. Reducing of Inflammation

Sauna can also have an effect on reducing inflammation in muscles by improving blood circulation and promoting detoxification processes. As a result, the time required to repair damaged tissues can be shorter. Stimulating the immune system by activating endocrine glands is another of the benefits of using a Finnish sauna [21]. The exposition to the heat leads to the activation of the immune system which can have positive effects for the cardiovasular system and metabolism [22,23]. In addition to the exposition on the heat increases the concentration of the interleukin 6 (IL-6) in the blood stream [24,25].

3.3. Increase the Activity of the Autonomic Nervous System

High temperature stimulates activation of the autonomic system [26], which can promote regenerative processes by increasing metabolic efficiency and better absorption of nutrients by the body. Systematic attendant in sauna sessions are associated with improved sleep quality, as relaxation helps the body move into deeper sleep phases, which aids nervous system repair [27]. Sauna use can also relieve chronic pain and muscle tension, which can directly benefit the nervous system by increasing blood flow, relaxing muscles and releasing Beta-endorphins [28]. In addition, consistent sauna use is associated with better mood and can help reduce symptoms of depression and anxiety [29].

Additionally, sauna sessions might boost cognitive function and mental clarity, likely due to improved brain blood flow and overall relaxation. It is important to use saunas safely and stay hydrated, particularly for individuals with specific health conditions. Furthermore, studies show that Finnish sauna can have a significant impact on reducing the risk of the Alzheimer's disease and dementia [30].

4. Conclusion

Conclusions from research on the effects of sauna on post-workout recovery suggest that sauna can be an effective tool to aid muscle recovery. Using a sauna can reduce muscle soreness, improve blood flow to tissues, reduce muscle tension and help remove metabolic by-products such as lactic acid. It is also possible to improve circulation, which affects faster recovery of damaged tissues. Improved circulation also helps deliver oxygen and nutrients to muscles, promoting faster repair and reducing recovery time. In addition, sauna sessions trigger the release of endorphins, contributing to relaxation and stress relief, which are key to mental recovery. Sauna-induced sweating can promote detoxification, although the extent of this benefit is still under debate. Sauna heat can also improve the flexibility of muscles and connective tissues, potentially increasing flexibility and reducing the risk of injury. Furthermore, the cardiovascular benefits of sauna use, such as increased heart rate, may support overall heart health. While sauna offers many recovery benefits, it is important to consider individual health conditions and tolerance, as effects may vary depending on frequency and duration. While results indicate positive effects, further research is needed to fully understand the mechanisms of sauna and its potential in the context of different forms of physical activity.

Disclosure:

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