

The *Yin* and *Yang* of Sports Physiology: An Integrated Approach to Sports Medicine

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Research in recent decades has shown that sports and exercise address more than just leisure and competition. Regular physical activity has been proven to be effective way both for health promotion and prevention of onset or worsening of many chronic diseases, and the slowing down of age-related functional decline in the general population.¹

Whereas Western specialists successfully apply sports in medicine, practitioners of Eastern medicine do not always provide their patients with appropriate exercise recommendations for safe and effective integration of sports into practice.

Prescription of a reasonable exercise program always requires the practitioner to be aware of the basics of sports physiology. The lack of such information seems to be the main obstacle that prevents acupuncture practitioners from creating modern exercise programs for their patients.

A theoretical assessment of yin- and yang-featured categories of sports physiology presented in this report aims to provide specialists of Eastern medicine with a substantial understanding of contemporary sports physiology. This inflow of Western scientific information into Oriental medicine will help to create optimal exercise programs and improve the overall effect of acupuncture treatment in patients.

The latest information related to sports medicine has been considered in this report and evaluated in the light of the yin-yang principles of traditional Chinese medicine. Categories of exercise physiology, i.e. energy systems, skeletal muscles, etc., are presented in a way complementary to each other. Systematization, carried out within each category, is made in approximate order to allow one to view them through the yin-yang perspective.

Contemporary View of Exercise Physiology

A. Energy systems. There are two commonly recognized energetic systems that provide muscles with required energy during physical activity. The first is the anaerobic system, which works for short periods (up to 1.8 seconds) of heavy physical activity. The other is the aerobic system, which is the main energetic system of light-to-moderate long-term exercise.

B. Energy sources. The anaerobic system uses carbohydrates for its energy needs, whereas for the aerobic system, the main source of energy is fat.

C. Skeletal muscles. There are two types of muscle fibers that comprise skeletal muscles. Those with rapid contraction speed and quick fatigue development, abundant glycogen stores and poorly developed networks of capillaries and mitochondria are called fast-twitch (FT) fibers. The second type of fiber is characterized by slow contractile ability of long duration, poor glycogen stores and a rich capillary system and mitochondria, and is known as slow-twitch (ST) fiber. It would be reasonable to admit here that FT fibers prefer to work with the anaerobic system, while ST fibers utilize the work of the aerobic energetic system.

D. Sporting activities. According to specialists of exercise physiology, all sports activities can be roughly divided into two groups: "multiple sprint" sports (e.g., weightlifting, sprinting, throwing, and the majority of team sports), for which FT muscles play a major role, and "endurance" sports (e.g. marathon running or swimming, bicycling, jogging, dancing), in which the main role belongs to ST muscles.²

The Yin and Yang of Sports Activities

Presented analysis of diversities in exercise physiology followed by conventional division of sports activities into two groups allows one to consider these activities from the Chinese perspective as yin- and yang-featured diversities of sports.

Keeping in mind that characteristics such as strength, rapidity and short periods of time belong to yang, it is affordable to consider multiple sprint (and resistance-type) sports as yang-type physical activities. On the contrary, yin-featured events of low intensity, slow rhythm and that occur over long periods of time can be attributed to endurance-type exercises (see **Table 1**).

Table 1: Yin and Yang Characteristics of Exercise Physiology

Parameters of Exercise Physiology	Yin	Yang
Energy system	Aerobic	Anaerobic
Main source of energy	Fats	Carbohydrates
Fiber type of skeletal muscles	Slow-twitch	Fast-twitch
Type of sports activity	Endurance	Multiple sprint/resistance

Discussion

The simplified presentation of main characteristics of contemporary exercise physiology aims to help practitioners of Chinese medicine to understand and effectively apply modern scientific achievements of sports medicine in their daily practice.

The results of presented comparative analysis indicate that the yin and yang powers of the human body can be switched on not just by proper application of acupuncture or herbal treatments. By performing resistance exercises, for instance, we will activate our anaerobic system, which uses carbohydrates as the main source of energy, and thus boost the development of FT fibers of skeletal muscles, i.e., the yang part of our body.

The management of diabetes can serve as an example of presented observation. Specialists of Western medicine underline the usefulness of resistance exercises or repeated bouts of intense activity for patients with diabetes in controlling blood glucose levels.³ This positive effect can be explained from the perspective of Chinese medicine as well: as far as resistance exercises increase the yang power of the body, it can be considered as an overall warming effect of resistance exercises, suitable for treatment of spleen *qi* vacuity, i.e., diabetes.

The majority of observations related to integrative application of Western and Oriental medicine usually consider Chinese medicine as an alternative and/or complementary treatment to contemporary medical procedures. Presented analysis has demonstrated the reverse, i.e., the ability of modern science to provide acupuncturists with valuable information in sports medicine that is applicable to their daily practice.

Proper identification of sports activities together with acupuncture treatment protocols can enhance the overall effect of both in dealing with many chronic medical conditions. Further in-depth analysis of exercise physiology in the light of TCM is necessary for wider integration of Western and Chinese medical modalities in favor of patients with different medical problems.

References

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