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Main Ways to Raise the Aerobic Contribution in Athletes Body

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Abstract

When working with athletes, coaches often find it difficult to choose the right training schedule in order to achieve the best results. Our article helps coaches achieve the desired results and has direct practical implications in sports and champion training.

Keywords: Accumulated oxygen deficit; Aerobic pathway; Long-term physical activity; The efficiency of energetic pathway; The iron-sulfur proteins

Introduction

This paper provides a scientific rationale how to improve the efficiency of energy supply in athletes body, and the goal is to help the coaches' practice. The challenge is to discuss a complex topic regarding the contribution of aerobic energy supply to long-term physical activity with medium intensity, because in the case mentioned below, muscle contraction is mainly provided by aerobic energetic path. It is a known, that marathon running for 2500, 5000 and 10000 meters, swimming for 800 and 1500 meters, skating for 5000 and 10000 meters is provided with aerobic energy systems. During marathon running, the aerobic energy supply contributes 80% of muscle activity. The efficiency of the aerobic pathway is very high- 50%, and the efficiency of aerobic energy production in an athletes' body indicates their overall endurance. In the aerobic pathway of energy production, energy continuum is mainly provided by fats. The metabolic capacity of the aerobic pathway is virtually limitless, as due to fat reserves, a person can work 7-10 days without a break [1]. Ergo, fats distribution in the body must be sufficient to meet the needs in energy during competition. Actually, well-trained sportsmen must not be too skinny. During non-intense training, the maximum speed of the aerobic path energy formation is reached at second minute in athletes, and at 5th minute in untrained. This peack of speed can have been maintained for 30 minutes. The best result in competition is achieved in this time interval. It is known that aerobic path takes place mainly in the slow (red) muscle fibers, and as the muscle fibre distribution is uneven between the athletes, hence the sportsmen with red muscle fiber recruitment will perform better during competition, than those with fast (white) fiber muscles, which is why the bulk of the muscles loaded in athletes by coaches' trainings must be of this, red variety. The athletes with well-trained red muscles can maintain a high level of physical activity during a long time, as is needed for marathon. Formation of ATP, that provides the muscle fibers with needed for contraction energy depends on many factors. When intensive work, ATP in the cell is relatively low, which results in activation of cardiovascular system, and breathing also speeds up. The heart and respiration rate return to normal only after the increased cellular need in ATP has been met and accumulated oxygen deficiency is extinguished. As the absorption of O_2 in the lungs is equivalent to its use in the synthesis of ATP in mitochondria, the organelle which is the only one providing the cells with aerobic ATP production, hence aerobic pathway intensity is often measured by the intake of O_2. The untrained can absorb maximally 40ml/kg of O_2 per minute, while for athletes, this figure is 80ml/kg [2]. When decomposing carbohydrates to

final waste products, CO_2 and H_2O, O_2 is consumed 12% less, than for decomposition of other substances, namely proteins and fats. Ergo, the energy continuum is higher per same O_2 unit, when the ATP production is provided by breakdown of carbohydrates, than by the breakdown of fats and proteins [3]. Therefore, in cases of O_2 deficiency (e.g., during marathon running, especially closer to the final), ATP is primarily obtained through the breakdown of carbohydrates. And since during exercise it is the liver, that supplies the body with the necessary carbohydrates, athletes should try to increase the reserves of glycogen as the main stored form of carbohydrates in the liver and the muscles [4]. Then, trainers should suggest training programs to increase mitochondrial count and mitochondrial enzyme efficiency, and thus increase the efficiency of aerobic energy supply. Since the iron-sulfur proteins are constituents of the main components of mitochondrial electron transport chain, it is very useful to increase iron-containing supplements in the athletes' diet [5]. Exhausting training is also beneficial for this type of athlete, as it helps to overcome the meters close to the finish line, which are always repaid due to the anaerobic pathway. However, exhausting exercises will shorten the duration of their aerobic energy path, so they should not be dominant in their exercise [4,6].

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