

Research Article

Relationship between Sport Nourishment Supplement and Athletes' Sports Abilities

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Abstract: It is very important for the athlete's body recovery and rehabilitation to have sport nourishment supplement. In this study, it analyzed the effect of sport nourishment supplement with the overview of sport nourishment supplements, discussing the influence of sports nutrition supplement on sports abilities of athletes.

Keywords: Sport nourishment, sports abilities, sports food

INTRODUCTION

Compared with the ordinary people, since athletes must shoulder the heavy task to improve physical fitness, enhance physical strength, create the excellent sport achievement, challenge the limit of human beings, therefore, in addition to keeping the balance of the intake, athletes should also increase the special "meal" with sport nourishment supplements to balance the material of energy metabolism for quick movement (Heck *et al.*, 2004).

Sport nourishment supplement refers in order to make the athlete achieve the achievements that cannot be realized by ordinary training method in sports training, in order to fully develop the potentiality of the athletes, it adopted the training methods of enhancing athletes own abilities of controlling energy, as well as a program or pharmaceutical to improve the utilization rate of energy.

With the development of physical education, mining the potentialities of athletes is deeper and deeper, with more and more details. By means of a variety of nutritional supplements to accelerate the elimination of fatigue, it can promote the recovery of consumption increase the immune regulation function, improve the sports abilities of athletes, which is one of the hottest research topics in the field of sports. Sports training process is a process from adaptation-no adaptation-adaptation, the function of nutrition supplement is to promote the body to adapt itself to the phase of adaptation, so that the athletes can achieve a new balance with a new and higher metabolic level, athlete's sports abilities can reach a new level correspondingly. Therefore, nutritional supplement and recovery is the basis of scientific training, only combined the reasonable nutrition and scientific training together, it can better promote the improvement of athletic achievement, otherwise it will not achieve the ideal result (Fig. 1). A large amount of the existing

literature shows that biochemical research of sports nutrition supplements is mainly from the following four aspects, namely: human nutrition metabolism, the relationship between the amount of the requirement and sports abilities; the formation of athlete's nutrition and biochemical monitoring system and its application in practice; reasonable diet nutrition and dietetics strengthening methods in training and competition of the application as well as the corresponding intervention measures for athletes to adapt themselves to the exercise training. Among the index of evaluating sports nutrition supplement on body influence, serum Creatine Kinase (CK), Lactate Dehydrogenase (LDH) are two important and commonly used indicators in sports biochemistry, through the changes of the two, it can indirectly reflect the damage extent of tissue, evaluating the load-bearing strength suffered by skeletal muscles as well as the level of aerobic endurance (Sibson, 1977).

In 1993, China Interim Management Measures for Athletes of Using Sports Nutrition Supplements clearly pointed out: "the range of the sports nutrition supplements of the management includes enhancing physique, improving exercise capacity, promoting body to eliminate fatigue quickly, with obvious effect to offer nutrition, the production of nutritional supplement, Chinese herbal medicine and medicine that is added with traditional Chinese herbal medicine and Western medicine that have been approved by the departments of health, medicine, food officially, moreover, it is strictly prohibited to use drug supplements and other nutritional products with the components of sports nutrition that contained the added constituents which the International Olympic Committee banned, so as to protect the athlete's physical health and improve sports skills" (Antonellini and Aydin, 1994). So far, management on sports nutrition supplements is still according to this principle, which is annually compared with the banned drug and composition announced by

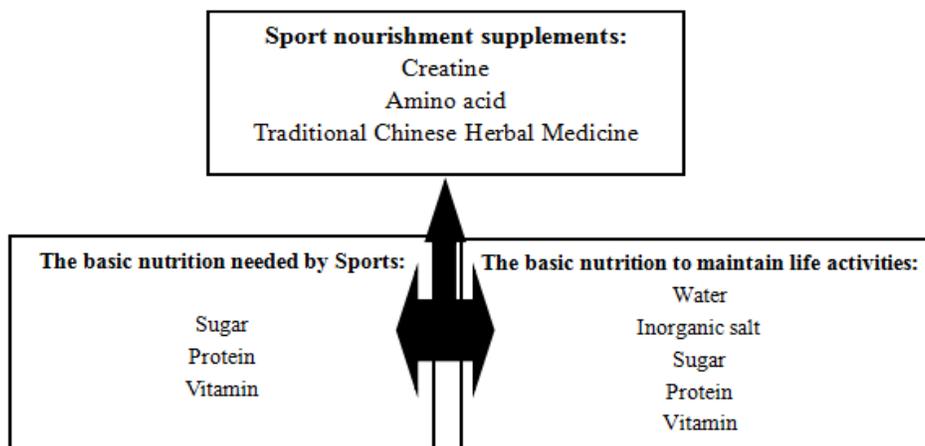


Fig. 1: Relationship between sport nourishment supplement and basic nutrition

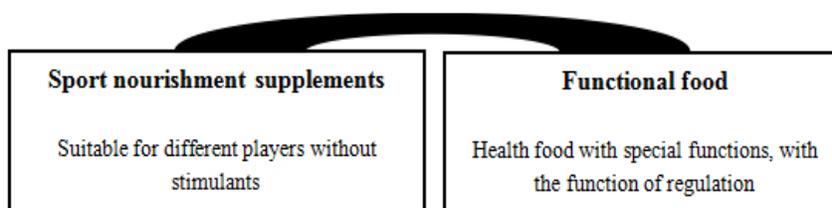


Fig. 2: Relationship between sport nourishment supplements and functional foods

the World Anti Doping Agency (WADA), comparing with the same nutritional supplements of different batches, if the formula composition changes, it must be checked respectively through the detection of doping detection center (Fig. 2).

MATERIALS AND METHODS

The effect of sport nourishment supplements: The effect of sport nourishment supplement is multiple, which not only can be targeted *in vivo* nutrition supplement for extreme sports athletes who consumed nutrients, but also can play its role to accelerate the speed of the metabolism, accelerate the removal of body's metabolic end products, promote the recovery of energy substances in the body, enhance the body's immunity, stabilize internal environment, regulate the system functions of the organs in general, so as to improve the effect of exercising capacities. Through nutritional supplements, it may cause the athlete's body adapt itself to hypo-function and disorder caused by the high load exercise with a new adaptation based on the foundation of new balance, namely, training-recovery-retraining-re-recovery. Generally speaking, the level of new recovery on the whole is higher than the initial level, which is so-called super compensation, thus the sports abilities can be continuously improved (Morrow *et al.*, 1984). Sports training process is from balanced process-unbalanced process-new established balanced process, the effect of nutritious supplement is to promote the body go back to the equilibrium state from

the unbalanced state, generating a new higher level of balance, which can promote exercising capacities of athletes correspondingly to a higher level. Since quality training must rely on high quality recovery, taking nutritional supplements is one of the most direct ways as well as the most important means of recovery (Hopper, 1991).

Principles of using sport nourishment supplement: It should be combined with special items: The nutritional supplements for athletes can be divided into three basic categories: energy substances, substances that can maintain homeostasis, substances that can enhance immune function and regulation function. The concrete operation should be focused on the application of glucose and fructose, branched chain amino acid, glutamine, as well as the supplement of water. According to the training intensity of the athletes, it should increase carbohydrate, vitamin A, C, B, calcium, zinc, iron, reduce the intake of fat and protein, paying attention to the rehydration and reasonable energy distribution of three meals.

Paying attention to the use of various nutrients: generally speaking, all of the nutrients should be mixed up in accordance with a certain proportion, the effect of which should be better than single use. Cao Jianmin and his staff used traditional Chinese herbal medicine, heme iron, lycopersicin element, compound vitamin and so on, through the pre-experimental results with a certain percentage of the ratio components of the intervention of anti-anemia iron compound nutritional supplements,

which can obviously increase the content of serum iron, significantly reduce the content of transferrin protein in sports anemia rats serum and improve the content of serum ferritin.

Pay attention to the individual differences: exercise training, especially for higher level athletes training, it should be based on individual circumstances such as age, gender of athletes, etc., to adopt different nutritional supplement formulas. Because the metabolism of different age, different gender has great differences.

RESULTS AND DISCUSSION

Influence on athletes' sports abilities of sport nourishment supplement: Intensive sports with high intensity and long time can lead to the drop of body's movement function, generally, it can check the activity of lactate dehydrogenase and creatine kinase in the serum to judge the exercising intensity after sports training or competition. At the same time, lactate dehydrogenase and creatine kinase are also used to evaluate the strength of skeletal muscle and the level of aerobic endurance, judging the body's recovery level and state through adding with different supplementary nutrients.

The supplementation of creatine kinase can increase the content of creatine phosphate *in vivo*, before improving the exercising intensity, creatine phosphate is the most important source for the re-synthesis of ATP. During the recovery period, high concentration of creatine can accelerate the re-synthesis of creatine phosphate, which can reduce the loss of adenine nucleotides, ensure the circulation of ATP.

Influence on lactate dehydrogenase and creatine kinase of sports nourishment supplement with the supplement of energy consumed materials: A lot of facts and experience showed us that adopting scientific ways to take glucose before the movement, during the movement or after the movement, which can be beneficial to the exercise and recovery of the body. Recent studies also indicated that glucose supplement also can enhance immune function, research proposed that the glucose supplement can keep the density of blood glucose, which can help to reduce the stress hormones, keep immune function stable, avoiding the occurrence of the disease during the athletes take part in large amount of exercises.

Creatine was got attention in 1990's and widely used in many sports items. Studies showed us that: there is close relationship between the change of the content of BUN in blood that is caused by exercises and the intensity of exercises, time, type of exercise and individual characteristics. You Chunying with her staff made research and reported, after 5 days that the athletes took high dose of creatine, the change of the activity of serum CK-MB and LDH is not obvious. It

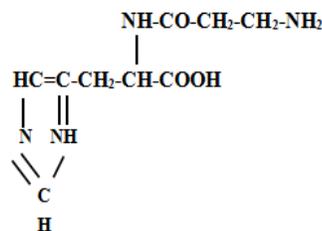


Fig. 3: Molecule structure of carnosine

means that after having creatine supplementation, in athlete's body, the synthesis and metabolism of ATP is more than catabolism, meanwhile, the ration of glycolytic metabolism for energy is not relatively high, the accumulation of lactic acid is less, which is beneficial to delaying the generation of fatigue.

Free radical scavenging: Free radical is the inevitable product of the normal metabolism of body's movement, the excessive free radicals will attack the biological membrane unsaturated fatty lipid peroxidation and cause the change of biological membrane structure and function. It can make muscles work ability declined, resulting in the occurrence of fatigue. Eliminating free radicals of the body mainly rely on the antioxidant systems such as SOD, CAT, GSH-Px and antioxidant vitamins such as vitamin C, E, A and other antioxidants coenzyme Q, etc., (Fig. 3).

The antioxidant properties of carnosine is related with its peptide bond. It has obtained the feature of buffering physiological pH, reducing the lipid peroxidation caused by pH variation, meanwhile, acting as a free radical scavenger, metal chelating agent and hydrogen donor, which can have the feature of anti-lipid oxidation. Experiments showed us that carnosine had antioxidant effect in the range of 5.1~7.1 pH, its antioxidant activity is not affected after 15 min when it is heated at 100°C. The antioxidant feature is also shown that it can inhibit the hemoglobin and catalyze lipid oxidation; it can inhibit riboflavin and catalyze lipid oxidation activated by light; it also can inhibit lipid oxidation of fatty oxygen catalytic synthase. Liu Changzhen with his staff used hydrogen peroxide and sodium glutamate to affect PC12 cell and successfully established the cell model of oxidative stress injury, which showed carnosine had obvious protective effects on the PC12 cell with its oxidative stress damage.

Research believed that carnosine had the activity which is similar to the activity of SOD and lipid peroxidase. Carnosine is considered to be a new high efficient free radical scavenger and antioxidant *in vivo* after SOD, CAT, VE. Thus, taking carnosine can play an important role in scavenging free radical that is produced during the process of movement.

CONCLUSION

With sports competition gradually closes to the limit of human beings, it is a necessary route for the

development of sports to use science and technology methods to challenge human beings. People began to think and studied through a variety of nutritional supplements to accelerate the elimination of athlete's fatigue, helping the athletes to improve the quality of training, so as to create new miracles of sports continuously. Sports nourishment supplement can not affect the athletic performance as fast as stimulant, but if it can be used properly, it can play its role in promoting the good performance of sports.

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