



Research Article

ISSN : 0975-7384
CODEN(USA) : JCPRC5

Influence of Physical Ability Fast Recovery of Athletes Based on Movement Food Nutrition

Xiao-feng Su¹, Li Guo*² and Ping-ping Liu³

¹College of Arts and Sciences, Shanghai Maritime University, Shanghai 201306, China

²School of Kinesiology, Shanghai University of Sport, Shanghai 200438, China

³Capital University of Physical Education and Sports, Beijing 100191, China

ABSTRACT

With the booming fitness, sports nutrition more and more people's attention. Physical effects of various nutrients for athletes recover quickly reviewed, the method of training during sports supplement food nutrition and dietary antioxidant in sports and physical fatigue effects, rapid recovery of different projects personalized nutritional needs. In this paper, based on the athletes during the movement of the body for energy characteristics, combined research of sports nutrition supplements, high-level athletes to improve physical fitness and sports nutrition analysis and make the appropriate measures to restore and maintain the health of athletes and to improve exercise capacity has been inspire. Dietary nutrition is the foundation of human life to maintain the vitality of the human body, dietary intake is extremely important, especially for occupational athletes, scientific and reasonable meal arrangements, good nutrition structure is very helpful in training and competition, sports multiplier effect, thus achieve energetic, purpose and requirements competition.

Keywords: Physical Ability Recovery, Food Nutrition, Dietary Antioxidant

INTRODUCTION

The body proper nutrition, good nutrition structure, mainly refers to the proportion of essential nutrients appropriate, and the necessary material contains sufficient nutrients to the principles guiding the deployment of the diet, which is called a balanced diet. Specifically, a balanced diet means that while athletes make in four areas between dietary nutrient supply and establish a balance between the body's physiological requirements, namely amino acid balance, heat balance of nutrients constitution, and a variety of acid-base balance between nutrient intake balance, only that help absorb and use nutrients for optimum ratio of the chemical composition of the human body to maintain. During exercise, the body needs more energy intake and oxygen consumption increased, which led to an increase in free radicals will be doubled, to reach up to a thousand times. The body had to consume large amounts of antioxidant vitamin E to repair the extra free radicals. Therefore, food and nutrition experts suggest: athletes after high-intensity exercise is best to take the right amount of vitamin E supplements and foods rich in vitamin E, wheat germ, wheat germ products.

EXPERIMENTAL SECTION

Nutrition

Body functions and physical energy and reduce the load by a temporary decline in the state after the load back and exceeded the level before the process is called regeneration process. Athletes regeneration mainly relies adjust the amount of exercise, physical therapy and massage. Proper nutrition is an important factor in winning athlete, is to ensure the health of athletes and athletic ability, and nutrition for athletes training, functional status, physical adaptation, recovery and movement disorders are closely related [Pitkanen, 2003]. Fig.1 shows logical structure of the nutrition system.

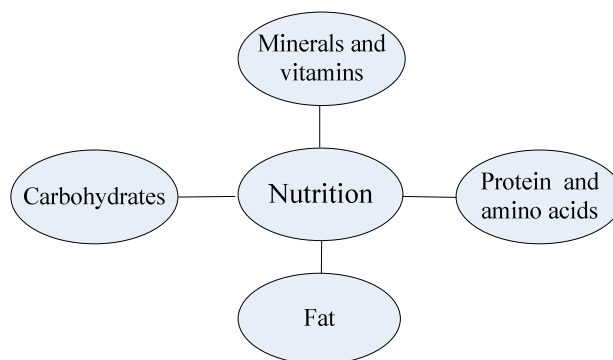


Fig.1: The basic model of nutrition

Carbohydrates (sugars short) are a major player in the energy supply of food substances for. Human tissue sugar content of about 2% of body weight, but the energy the body needs about 60%, the latest research on sports nutrition demonstrated by the supply of sugar in the diet, carbohydrates have the best results for the athletes to play an important role, high-intensity endurance training athletes carbohydrate intake accounted for 60% of the heat energy than a 70%. 60 to 90 minutes after making a big load of training, almost run out of glycogen reserves, under normal mixed diet, can only be to make up for about 72 hours later. However, if the supplemental carbohydrate-rich foods, then the glycogen reserves in the 24 hours after the end of the load that is able to restore the original level. This case shows that good nutrition for physical recovery process is very important [Tsali, 2004].

Fat is high energy materials, heat production per unit weight of fat for carbohydrate and protein than twice. Late prolonged endurance exercise mainly depends on fat for energy, but do not digest fat, metabolic oxygen consumption is high, so the proportion of fat in the diet is too high will affect the supply of oxygen and fat metabolism more acidic substances, athletes endurance and recovery after physical activity detrimental. Generally believed that fat for energy a 30% to 25% of the total heat supply, the daily diet containing 50 grams of fat generally meet human needs, endurance athletes may be increased, but must be noted that the diet of fish, meat, etc. different types, including the amount of fat is different, different conditioning methods used grease should also be different, otherwise easily lead to excessive fat intake.

When the athlete's body has enough sugar and fat, protein is not involved in supplied-energy, and its role is to update the body proteins. Dietary amino acids are not stored in the body, most of them will quickly degrade, which require a sufficient number and because they contain a variety of amino acids in protein to replenish. Excessive protein supplement will produce an excess of ammonia, uric acid and sulfide, resulting in decreased blood pH, prompting Fatigue, another excess protein metabolism will increase the burden on the liver and kidneys. Protein is an important component of the body's tissues constitute different exercise intensity and movement, human demand for protein is also different. In the case of a large amount of exercise, not only consume a lot of energy, but also makes the body protein breakdown strengthen even negative oxygen balance. Therefore, in order to ensure the quality and quantity of the protein intake of the supplement athletes' loss, increase muscle strength, and promote the synthesis of hemoglobin and accelerate recovery from fatigue will have great significance.

Athletes at high temperature or high humidity or large amount of exercise lasting endurance sports, mainly rely on a lot of sweat to achieve the effect of body heat. Profuse sweating cause loss of water increases, and the body of minerals and vitamins, especially water-soluble vitamins lost with sweat, water and Sport. The loss of a large amount of sodium chloride with sweat during exercise, if not add will appear pathological phenomena such as muscle spasms, loss of calcium ions more easily lead to inadequate intake such as muscle cramps, fatigue, decreased bone density and fractures. Vitamins are the maintenance of human life and can regulate metabolism,; may lack nutrients, vitamin deficiency, the body live power weakened, lowered immunity, resulting in reduced exercise capacity [Dubnovq, 2004].

Food Supplements Method

Sports drinks are a class of nutrient composition and content can be adapted to the athletes or sports exercise physiological characteristics of the population, with special nutritional needs, regulate the body balance and soft drinks can improve exercise capacity, it can provide enough water and energy for the body quickly. With the development of sports, sugar - electrolyte drinks has been widely used, containing 20% Effect of drinking the right amount of sugar and salts drinks oligosaccharides in human experiments showed that drinks can maintain blood glucose oligosaccharides at higher levels, and stabilize blood volume, serum insulin, serum magnesium, potassium and blood lactate, increased exercise acting and time.

Premotor and supplementary motor sports drinks, for muscle, brain and other organs to provide energy for the body to maintain fluid balance and prevent dehydration provide water, this need not only for the long endurance exercise plays an important role, but also for in short-term high-intensity intermittent exercise. Sports drink after exercise supplements help restore sport fatigue, studies have reported that the former is the best time 2h muscle glycogen re-synthesis after exercise, and catch up on sugar consumption can quickly re-post-exercise muscle glycogen synthesis, there are conducive to physical recovery. Cyclists make sugar found immediately after exercise carbohydrate supplement can increase blood glucose levels after 30min, and promote the recovery of blood lactate. When high-intensity exercise, increasing the demand for carbohydrates, but if excessive intake of carbohydrates can lead to weight gain, the same effect on improving athletic performance. Coyle and other detailed study of the amount of carbohydrate in endurance sports, and concluded that eating 30 ~ 60g carbohydrate per hour, which can effectively support the ability to endurance exercise [Ward KD, 2004].

Fluid in the body plays a synthesis and decomposition energy substances transported nutrients, oxygen, and take action on behalf of the radio product to regulate body temperature, is extremely important in maintaining physiological functions. If not timely infusion will cause a lot of sweat after dehydration and electrolyte imbalance, not only the athlete's physical decline, but also affect the normal life of metabolism, hazardous to their health. In the case of a lot of sweat should use hypotonic or isotonic drinks, the temperature 5 °C to 15 °C an appropriate, timely rehydration after the game, the way it should be a small number, in order to speed up physical recovery.

Experts summarizes the research of drinking water during exercise reasonable and made a few suggestions below: 1. eat nutritionally balanced meals and during the 24 hours before the game drinking enough liquid to facilitate the movement of fluid balance or before the game; 2. in the two hours before exercise, drink 500ml liquid, ensuring the body water balance and give enough time for the body eliminate excess moisture; 3 campaign as soon as possible, there are regular and intermittent drinking enough fluids to make up for the sweat loss of water; 4 sport longer than one hour of sport, should be added the right amount of sugar in the liquid and electrolytes; 5 per liter of liquid should contain 0.5-0.7g sodium. After the loss of a large amount of exercise training will also increase iron, iron is an important component of hemoglobin synthesis, cause if you do not replenish iron deficiency anemia in advance. Generally daily 15g or eat more iron-rich foods, such as spinach and sheep and so on [Fudge, 2006].

The Effect of Regeneration

Athletes during exercise in stress, the body produces a large amount of free radicals and cause damage to the cell membrane lipid peroxidation, is one of the important mechanisms of fatigue occurred. Therefore, as soon as possible to eliminate free radicals athlete fatigue is one of the key factors in the recovery. In recent years, a number of vitamins and mineral salts as a non-enzymatic antioxidants become a hot research, they are VE, VC, carotene, selenium, zinc, and taurine.

VE is recognized as fat-soluble vitamins have antioxidant effects, it is through a direct effect on a variety of oxygen free radicals, such as singlet oxygen, superoxide radicals and lipid peroxides, interrupt the chain reaction of lipid peroxidation, protection biofilms from lipid peroxides damage. Therefore, the body's complement VE can reduce oxygen free radical damage. The amount of added VE day is necessary, during anaerobic endurance training, recruitment VE day should be 100 to 400 international units. VC has a variety of antioxidant activity, involved in the body's lightweight, can scavenge superoxide anion radicals, free radicals and reactive derivatives light active groups .

Selenium is hazy valley skin peroxidase cofactors, can eliminate lipid peroxide, peroxide protect cell membranes from damage. At the same time, but also enhance the antioxidant selenium VE, and synergy with other antioxidants, but excessive intake of selenium harmful. Zinc is an important trace element studies have shown that zinc deficiency can lead to increased production of free radicals, lipid peroxidation strengthened, while zinc is able to inhibit the generation of free radicals, preventing an increase in lipid peroxidation, but only appropriate amount of zinc to produce beneficial effects on free radical defense system. Under normal diet and training, the athlete daily amount of zinc supplements for 15mg, may be appropriate to increase the amount of anaerobic endurance training supplement. Studies have reported that zinc supplementation for athlete 15-50mg/d, a dose of less than 500mg/d is non-toxic. But excessive zinc can inhibit the absorption of copper and zinc and use the body, which affects metabolism of free radicals.

Taurine is widely distributed in animal tissue cells, and the content is very rich in fish and shellfish. Many studies show that taurine as essential amino acids the human body, with a clear anti-lipid peroxidation, taurine supplements can prevent decline of SOD and GSH effectively inhibit lipid peroxidation of cell membranes, improve the body's antioxidant capacity, is an important protective agents. In addition, taurine is also a good endogenous Caz. Steady-state regulator, taurine on the body as soon as possible to eliminate fatigue is very favorable.

Individual Needs

Reasons for different sports and different training methods fatigue are different, so the regeneration methods are also differences. Wrestling is the power of sports, fitness and nutrition project athlete relationship is very close. Specifically, a balanced diet means that while athletes make in four areas between dietary nutrient supply and establish a balance between the body's physiological requirements, namely amino acid balance, heat balance of nutrients constitution, and a variety of acid-base balance between nutrient intake balance, only that help absorb and use nutrients for optimum ratio of the chemical composition of the human body to maintain. During exercise, the body needs more energy intake and oxygen consumption increased, which led to an increase in free radicals will be doubled, to reach up to a thousand times. The body had to consume large amounts of antioxidant vitamin E to repair the extra free radicals. Therefore, food and nutrition experts suggest: athletes after high-intensity exercise is best to take the right amount of vitamin E supplements and foods rich in vitamin E, wheat germ, wheat germ products. Wrestling requires greater strength and coordination of the nervous system, and requires a short time to produce explosive force, making this type of movement severe hypoxia, and oxygen debt is greater than the nitrogen metabolism strong [Watson, 2005]. Fig.2 shows wrestlers sports.



Fig.2: The wrestler sports

Therefore, wrestlers, the protein in food supply should be increased to more than 2g per kilogram of body weight, which accounted for 50% of high-quality protein, food, vegetables and fruits should be 15% to 20% of total energy to meet Wrestlers need carbohydrates, vitamins and inorganic salts on. Energy constitutes about 10% of the protein to 15%, about 25% of a Fat 30%, carbohydrates about 55% to 60%. Nutrition education of Athletes was lacking. Athletes thinking that nutrition cognitive has no roles to sport performance accounted for 43.8%, and who had a poor appetite to the nutrition knowledge accounted for 40.6%. The probability was also one of the factors lead to low nutrition KAB level of most athletes. It showed that how to compile readable nutrition books athletes was very important. Athletes haven't systematic learn Sports Nutrition accounted for 8% and who haven't hold lecture on nutrition knowledge accounted for 68%.

Badminton skills classes compete against the project belongs to a longer exercise duration, time is short and frequent intermittent movement, exercise intensity and volume are large, their energy supply is characterized by both aerobic anaerobic, energy consumption and lactic acid substances accumulate in the muscles and the blood is the main badminton player fatigue generated. Therefore, nutritional supplements after the badminton game, in addition to water and minerals, should immediately take 100-150g glucose. After the game two or three days should maintain a high calorie diet, rich in easily absorbed sugars and protein, lower fat content, multi vitamin supplements. Fig.3 shows badminton sports.

Long-distance running is a typical cyclical rate, speed and strength, speed, stamina and technique of combining physical class project. Technical characteristics of long-distance running is active front leg swing and the ground, do not stress after kicking knee straight, with emphasis on kicking swing, step length and stride frequency suitable fast. According to its technical characteristics, the system mainly based on long-distance sports fatigue and nerves, etc. To ensure the long-distance athletes completed a large load of training, in addition to the usual diet should be protein, sugar and minerals iron-based, and we have to carry out additional supplements according to the actual situation. Recommend endurance athletes taking following strong nutrients, such as fitness nutrients, glutamine, bits of iron, and so on Chang-bai Faerie King. It is worth noting that, after long-distance running, athletes glycogen almost exhausted, the most direct and effective nutritional supplements that add sugar, and glucose was found. Supplemental fructose mixture help supplement the absorption of sugar and energy, accelerated regeneration. Fig.4 shows long-distance running sports.



Fig.3: The badminton sports



Fig.4: The long-distance running sports

Recovery Nutrition Measures of Physical Fitness

No-training will not improve athletic performance, and training will bring sports fatigue. Athletes for the Intensive training and competition will inevitably arise ATP- CP synthesis rate slows, glycogen reserve depletion, dehydration, accumulation of acidic metabolites, electrolytes and other phenomena caused by the loss of short-term movement of fatigue, as well as long-term recovery after a large amount of exercise training inadequate metabolic disorder caused by hemoglobin and blood testosterone decreased fatigue and other long-term, there may even be overtraining. Proper nutrition is also important to measure the ability to recover movement, including the following aspects. Fig.5 shows recovery nutrition measures of physical fitness.

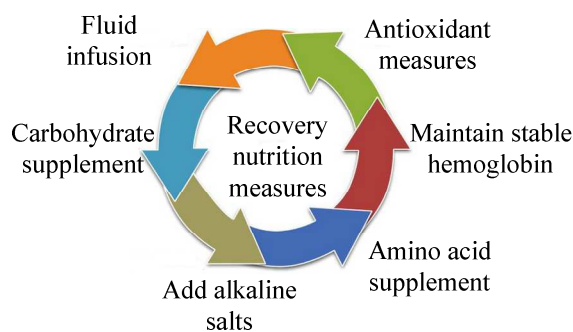


Fig.5: The recovery nutrition measures of physical fitness

Rehydration mainly refers to replenish water and electrolytes, basketball players during training and competition, as a result of elevated body temperature, excessive perspiration, causing dehydration and body electrolyte (mainly

sodium, potassium, magnesium, calcium ions) is lost. Dehydration can cause reduction in blood volume, the burden on the heart; electrolyte loss will affect the membrane potential, the nerve excitability pass obstacles, so that athletes fall athletic ability. Therefore, athletes in sports must adopt reasonable methods timely rehydration. Rehydration principle subject to a few times, the first general sports supplement 400 a 500mL, pause the game can rehydration 150 a 300mL, rehydration after exercise should be a few times. Pay special attention to athletes in sports generally do not use mineral water, which will soon reduce plasma osmolality, urine output increased, but dehydration.

Sugar for energy as kinetic energy substance, small oxygen consumption, high efficiency for energy, is the movement of aerobic and anaerobic energy supply of the main energy source, is the main energy of the brain. Sugar in the human body mainly glycogen, muscle glycogen reserves in the form of human blood glucose concentration in the blood must maintain a certain level, if the blood glucose concentration drops can cause central fatigue. Glycogen reserves to maintain physical fitness and basketball players have an important relationship. When the limit is generally short-term or intermittent intensity exercise does not cause significant depletion of glycogen, and in submaximal intensity (60% to 80% VO₂max) sustained exercise time more than 40 minutes can cause significant reduction in muscle glycogen. Strength training sessions with the basketball game, the time in line with the above characteristics. High-intensity training and competition athletes will consume a lot of glycogen reserves, and ordinary diet is not enough to ensure its return to the original level, therefore, we must attach great importance to improve recovery reserve and sports of basketball players after the body glycogen to ensure athlete's ability to prolonged exercise [Heaney, 2011].

Normal human blood PH value 7.35- 7.45, skeletal muscle cells PH value 7.05, when a large load exercise basketball player, present in the blood, skeletal muscle buffer substances insufficient buffer accumulation of lactic acid after exercise acidic products produced, resulting in the sound of the blood drops to 6.1, glycolysis in PFK activity was inhibited, the sugar for energy metabolism process is slow, mainly for the exercise capacity of athletes fall. Containing sodium bicarbonate or trisodium phosphate and other alkaline salts drinks can better cushion blood, skeletal muscle cells in H ions replenish during exercise can speed up the removal of acidic substances, effectively maintain the physical fitness of athletes.

Some branched-chain amino acids (leucine, isoleucine) can enter the brain through the blood-brain barrier, keeping the central nervous vitality. Athletes during strenuous exercise, due to increased catabolism, resulting in branched-chain amino acid content decreased, prompting plasma free tryptophan content was significantly increased. Tryptophan on the central nervous inhibition, engender a sense of sleepiness, which is leading basketball players big load.

Hemoglobin (Hb) The main function is to transport oxygen and carbon dioxide, have a significant effect on aerobic endurance level basketball players. Male Athlete of the ideal value of H₁, the normal value for each 100mL of blood (12.5 a 16.6) g, woman for every 100mL of blood 11—15g, athletes before Hb, one rabbit per 100mL of blood around. Currently nutrition measures are often used: Eat iron-rich foods; folic acid and vitamin supplements Biz (drill alamin); taking sports nutrition supplements containing ferrous sulfate or ferrous gluconate, while vitamin C to promote iron absorption. Note that, the blood must be combined with exercise stress and personal circumstances of athletes, not blindly supplement, if H₁) will result in high levels of blood viscosity but not conducive to exercise and health.

At present, a large number of studies have shown that athletes in the long-term big load exercise, the body will produce large amounts of oxygen free radicals and lipid peroxidation of cell membranes will strengthen the permeability of the cell membrane damage, leading to decreased exercise capacity of athletes. So basketball players should fight radical sports seriously enough nutrition supplements during a training class. Currently these sports nutrition supplements are: 1.6 diphosphate, taurine (main role is to protect the heart); Coenzyme Q10 (to protect the inner mitochondrial membrane); Fan lycopene, vitamin C, R-carotene and so on [Burke, 2013].

CONCLUSION

The human body is a complex organism, while maintaining the life and activities require a certain energy consumption, exercise training can't do without the supply of energy, and the movement of energy sources of nutrients, a variety of nutrients and athletes with physical recovery close contact, this article describes the specific relationship of some nutrients function and movement. Sports Nutrition for sport-specific measures, as long as the cause of coaches, athletes attention, increase nutrition knowledge, implementation of scientific catering, strengthen the study of special nutritional problems, regularly check the nutritional status of the athletes, the study of nutrition and training, rehabilitation and fitness the relationship between the various aspects of a comprehensive conduct, will achieve the desired results. Appropriate to add sugar, fat, protein and amino acids as well as vitamins and other

minerals and nutrients for the rapid restoration of physical athlete has an important role, and in the training and exercise also need to add some nutrients. Due to movement of the body in stress, and therefore need to add certain antioxidants.

ACKNOWLEDGMENT

The authors wish to thank the helpful comments and suggestions from my teachers and colleagues in intelligent detection and control lab of HIT at Weihai. And also thank Beijing Up-tech to provide part hardware. This work is supported by the study fund of HIT at Weihai (No.IMVQ02020003 and IMIQ21080002).

REFERENCES

- [1] Burke, L. M N. L. Meyer, et al, **2013**,. *Nestle Nutr Inst Workshop Ser*, 76: 103-120.
- [2] Burkhart, S. J. and P. C. Pelly, **2013**, *Appetite* 70: 6- 13.
- [3] Doyle-Lucas A.F and B. M. Davy, **2011**. *J Dance Med Sci* 5(2): 65-75.
- [4] DubnovqConstantini NW, **2004**, *Int J Sport NutrExerc Metab*, 14(1), 30-37.
- [5] Fudge BW, Westerterp KR, Kiplamai FK, **2006**. *Br J Nutr*, 95(1), 59-66.
- [6] Heaney, S, H. O'Connor, **2011**,ca al. *Int J sport Nutr Exerc Mctab*, 21(31): 248-261.
- [7] Pitkanen HT, Oja SS, Rusko H, Numrnela A, Komi PV, Saransaari P, Takala T, Mero AA, **2003**. *Amino Acids*. 25(1), 85-94.
- [8] Quatrowoni P. A, **2008**. *J Am Diet Assoc*, 108(4): G 89-694.
- [9] Tsali s q Nikolaidis Mq Mougios V, **2004**. *Int J Sports Med*. 25(4) ,306-13.
- [10] Valliant M .W H. P, **2012**. *N utrients*, 4(6):506-516
- [11] Ward KD, Hunt KM, Berg MB, Slawson DA, Vukadinovich CM, McClanahan BS, **2004**. *Int J Sport Nutr Exerc Metab*, 14(2), 209-221.
- [12] Watson TA, Blake RJ, Canister R, Garg ML, **2005**. *Lipids*,40(4), 433-435.
- [13] Xie Wei, Ma Jiachen, Yang Mingli, **2010**, "Design of hybrid architecture for intelligent service mobile robot", Proceeding of international cocrference on electrical and control engineering, pp 740-743.