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# *Monitoring Sports Nutrition and Health and Sports Ability Based on Intelligent Medical Care Data*

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***Keywords:*** Smart Healthcare Data, Exercise Capacity, Sports Nutrition, Nutritional Supplement, Free Radicals

***Abstract:*** The application of smart medical big data in the field of medical services is still in its infancy. Most of the existing health care big data services cannot be fully developed in accordance with the way doctors think and the management of hospitals, resulting in big data technology not being able to give full play to its due effect. Therefore, how to realize the deep integration of health and medical big data with the existing medical service system, how to integrate massive data to realize efficient data mining, analysis and utilization are problems to be solved urgently. In order to adapt to a large number of high-intensity professional training, we must provide athletes with nutritional supplements in addition to normal diet to promote their physical and athletic ability recovery. This article mainly studies the relationship between sports nutrition and health and athletic ability. The experiment divided male rats into three groups (n=20), namely control group, exercise group, exercise + nutrition group. Sports intervention is a 6-week Torredemir training. The teams took samples 24 hours after the last exercise. Next, LDH was measured by colorimetric method, protein content was measured by Coomasibrialand method, and SOD activity was measured by cyclophosphatase method. Finally, perform statistical processing on the measurement data. Experimental data shows that exercise MDA reaches its peak 1 hour after exercise, and then gradually decreases. The exercise + nutrition group is lower than the exercise group, and there is a significant difference 6-24 hours after exercise ($P<0.05$). Experimental results show that nutritional supplements can greatly reduce the MDA content of the liver and skeletal muscle of mice after exercise, and increase the activity of SOD, GSH-PX and the content of GSH.Through this, we can help athletes improve their athletic ability based on the results obtained. Under the condition of ensuring their physical health, we can also improve their athletic ability to a certain extent.

## 1. Introduction

With the development of society, people are under more and more pressure, and many people are in a sub-healthy state. Appropriate nutrition is the basic condition to ensure normal sports training. This is an important basis for athletes to maintain a good training and competitive state, and is also the main reason for recovery after training. In addition to the influence of genetic factors and acquired training-related factors, the athlete's physical strength will also be determined by the quality and quantity of acquired nutrition.Under the current situation of continuous development of information technology, the application of big data technology under smart medical care has broad prospects. When targeting athletes' physical health, we can monitor their physical health data, and then we can adopt This timely management strategy for their patients will enable them to respond in a timely manner through monitoring data when their body data is abnormal, and help them through a variety of effective food supplements, etc. To enhance your physical condition. More importantly, by observing the data of athletes when they are nutritionally supplemented, they can find out at what level their physical health is the best and their athletic ability can reach the best.

Nutritional supplements can strengthen the body's ability to eliminate free radicals, improve physical health, and enhance immunity. At the same time, it has a good effect on the removal of free radicals produced by the liver and skeletal muscles and the body's antioxidant capacity after intense exercise training.Supplementing nutrition in time during exercise can restore the athlete's physical fitness in a short time. Hong believes that Chinese sports nutrition supplements are an auxiliary driving means for sports training and competitions, and has conducted in-depth research on their application in the recovery and improvement of football players. First, he summarized the development status of sports nutrition supplements in China. Secondly, he analyzed the fuzzy clustering algorithm based on Monte Carlo T test and introduced the main indicators. Third, he set the purpose and method of the experiment. Although his research has certain reference significance in theory, it lacks experimental data[1].

Zuniga believes that most NCAA programs do not have sports nutritionists, which allows athletes to gather information from sources of varying credibility. His purpose is to determine the need to develop accessible and reputable nutritional information resources by evaluating the current use of nutritional information resources, dietary habits, and sports nutrition knowledge for first-class college athletes. He selected 72 athletes in eight sports to complete a questionnaire about the nutritional resources used, eating habits and sports nutrition knowledge. In addition, he assessed the level of interest in mobile device applications used to deliver nutritional information and tools. His research lacks a certain degree of innovation[2].Rosenbloom found that athletes seeking to reduce inflammation and muscle aches after exercise often use non-steroidal anti-inflammatory drugs. Although non-steroidal anti-inflammatory drugs have been sold over the counter for many years, they are not without health risks, especially when taken in large doses for a long time. He proposed whether cherry juice or blueberry juice, which is rich in polyphenols, can be used as a natural method for natural recovery speed without causing drug side effects. Therefore, he studied the evidence of using tart cherry juice and blueberry juice as a nutritional recovery strategy after strenuous exercise. He found that tart cherry juice has moderate benefits in reducing pain, relieving muscle soreness and muscle inflammation after exercise. Although the chemical properties of blueberry juice are similar to tart cherry juice, there is currently limited evidence to support its use as a rejuvenating drink. Eating cherry juice or blueberry juice is harmless and may have some positive benefits for athletes and active people's recovery and increased fruit consumption. Although his research is feasible, it is not comprehensive enough[3].

This study established an obese rat model, performed exercise and nutritional supplements on obese rats, studied the effects of exercise and nutrition intervention on weight loss in rats,

preliminary studied its mechanism, and revealed the weight loss mechanism of exercise and nutrition intervention. The rich research on obesity theory, scientific health training and the research and development of natural nutrition and health food have played a positive role. Discussing the relationship between sports nutrition and health and sports ability plays a vital role in improving the body's sports ability.Under the health monitoring of intelligent medical data, it can help athletes find the most suitable nutritional supplement, and can also timely correct their poor physical condition in time to ensure their health. Let's improve their athletic ability.

## 2. Sports Nutrition and Exercise Ability

### 2.1. Sports Nutrition

By measuring various nutrients, the level, absorption and utilization of nutrients in the athlete's diet can be accurately assessed. Long-term low serum protein indicates insufficient nutrition of biological protein. Branched chain amino acids are an important part of protein sports nutritional supplements. Three important factors are to promote athletes to use nutritional supplements: improve athletic ability, enhance immune function, and promote recovery after exercise. Although protein and amino acid are not the most widely used nutrients, protein and amino acid are the basic organic matter that constitutes cells. They have important physiological functions such as promoting muscle growth, improving immunity, and restoring fatigue. This is also the key to nutrition-assisted exercise. The metabolic decomposition of BCAAS is mainly in muscle cells. BCAAS can decompose important amino acids supplied by exercise for a long time. The ability to synthesize the influence of brain nerve transmission substances on the concentration of BCAAS also requires the intake of precursor amino acids, and regulates protein synthesis through various tissues. In many complex sports nutrition foods, taurine in amino acids plays an important role and is an anti-decomposition nutritional food that prevents muscle protein from decomposing[4].

There are two basic characteristics of athlete nutrition. First, due to their professional nature such as training and competition, athletes have different requirements for energy and nutrition from ordinary people. Second, because sports activities are different, athletes' nutrition has specific sports groups and special functions. Athletes are a special type of team and must often deal with increasingly stringent competition issues. Under the premise of banning the use of stimulants, in order to maintain fierce physical strength, it is necessary to restore physical strength as soon as possible after fierce fighting to fight again, reasonable and effective nutritional intervention is very necessary. After training, the method of eliminating fatigue for athletes and the supply of nutritional products that do not contain irritants other than food are important links for the best exercise state before the game[5].

### 2.2. Sports Nutrition Supplements

Sports nutrition supplements refer to the human body taking in a variety of nutrients from outside the diet according to the characteristics of various sports activities to meet the needs of various nutrients during exercise. In order to maximize the possibilities of athletes, strengthen their own energy production and improve the energy efficiency of nutritional supplements. Sports nutritional supplements are high-purity or concentrated nutrients widely contained in foods. Some nutritional supplements are intermediates of sugar, fat or protein metabolism. These are the indispensable nutrients in human life activities. The nutritional content of these foods meets the physical needs of people in sports, and is somewhat different from ordinary foods and healthy foods. Generally speaking, there are mainly four kinds of nutrients: one is to strengthen muscle function, which improves physical strength by accelerating the metabolism of muscle cells; the other is to

accelerate energy metabolism; the third is to relieve fatigue to restore physical strength; and the fourth is a special nutritional supplement food to reduce Fat is used to suppress body weight. The design principles of sports nutrition food are energy ratio principle, amino acid balance principle, anti-free radical principle, mineral supplement principle, vitamin supplement principle, hypotonic principle, electrolyte balance principle, special principle of sports nutrition, safety principle and nutrition first. The consumption of energy and substances during exercise is higher than the consumption of energy and substances during rest. In order to promote the metabolism of substances, it is necessary to increase nutritional supplements. In order to supplement the necessary amount of nutrients according to their needs, athletes need to appropriately increase the daily basic nutrients nutrient supplements[6].

Ribose is the starting molecule of ATP synthesis and an important part of nucleic acid. In vivo, ribose is mainly produced through the source indicator pathway. Nucleotides are precursors of synthesis. Therefore, it speeds up the synthesis of ribose, an important energy raw material of synthetic substances, ribose and cardiac muscle PRPP through the head and supplementary pathway of bone and myocardium, and accelerates the synthesis speed of fat body in the way of eliminating phosphoric acid and sugar, and regulates ribose to increase the exercise ability. Studies have proved that ribose is a safe and effective supplementary food for sports nutrition[7].

Energy supplement foods mainly include various solid energy supplement foods, sports drinks, beverages and other powdered energy supplement foods that can be brewed. Sports drinks contain a certain amount of sugar. This helps restore the balance of vitamins and electrolytes during exercise. In addition, liquid can promote human absorption. Protein powder mainly promotes muscle growth by providing high-quality protein or amino acids[8].

### 2.3. Exercise Capacity and Free Radicals

During exercise, the body produces more free radicals than in a quiet state. In high-intensity aerobic exercise, the body's oxygen intake increases by 10-15 times compared with that at rest, and the generation rate of free radicals is bound to increase. Prolonged fatigue exercise may increase the production of active oxygen in certain organs in the body by 2 to 3 times. Experimental studies on humans and animals have shown that if it is an acute exercise, the body's ability to capture free radicals is lower than the incidence of free radicals under exercise stress, which will cause the body to produce a rapid increase in the amount of oxygen free radicals, and somatic cells are oxidatively stressed. State, it will damage the structure and function of cells. Exercise of different intensities will have different effects on the generation of free radicals and the defense system of free radicals in the body. Intense high-intensity exercise will reduce the activity of the mitochondrial respiratory chain and cut off the electronic transmission of the mitochondrial respiratory chain. As a result, oxygen cannot be effectively reduced, and the generation of oxygen radicals is greatly increased.

For the description of the position and posture of the rigid body, we select a reference coordinate system in advance to describe the position and posture of the rigid body. With respect to this reference system, a 3D column vector can be used to describe the position of a certain point in space and a 3×3 rotation matrix can be used to describe the rigid body. The pose in space, and the pose of a rigid body is described by a 4×4 homogeneous transformation matrix.

Taking the coordinate system {A} as the reference system, the position of the specified point P in the space in {A} is expressed as P, and its form is shown in Equation 1, which represents the projection of the point P on each coordinate axis.

$$P = \left[p_x p_y p_z\right]^T \quad (1)$$

Only the position vector is not enough to describe the object in space, and the pose description

should be introduced at this time. In order to describe the pose of the rigid body B in the reference system, a rectangular coordinate system {B} is also required to be fixedly connected to the rigid body B. The related equipment for detecting motion state is shown in Figure 1:

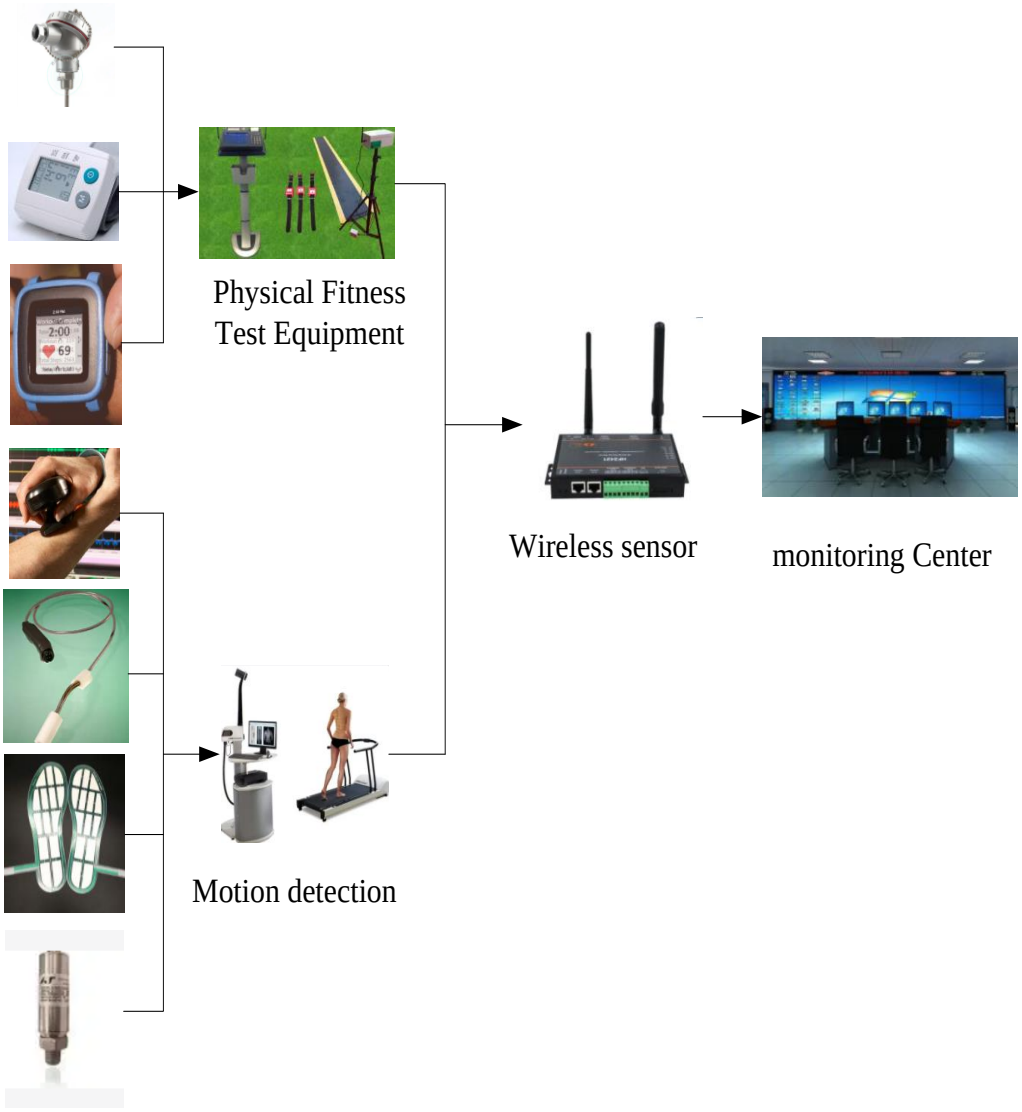


*Figure 1. Motion state detection equipment*

During intense exercise, the body's oxygen consumption increases significantly, and the mitochondrial oxygen consumption increases significantly. In the process of electron leakage in the respiratory chain, a large amount of oxygen is converted into oxygen free radicals. Long-term aerobic endurance training can reduce the production of MDA, increase the activity of other antioxidant enzymes, resist free radicals generated during exercise, and improve the body's ability to remove free radicals after exercise.

In this way, the relationship between the rigid body B and the reference frame {A} can be described by R:

$$R = \begin{bmatrix} X_b & Y_b & Z_b \end{bmatrix} = \begin{bmatrix} r_1 & r_2 & r_3 \\ r_4 & r_5 & r_6 \\ r_7 & r_8 & r_9 \end{bmatrix} \quad (2)$$

So by the addition of vectors, we can get:

$$^{A}P=^{A}Q+^{B}P \quad (3)$$

If the angle θ is rotated around the X, Y, and Z axes, then the rotation matrix of the rigid body is as follows:

$$R(x,w)=\begin{bmatrix}1 & 0 & 0\\ 0 & \cos w & -\sin w\\ 0 & \sin w & \cos w\end{bmatrix} \quad (4)$$

$$R(Y,w)=\begin{bmatrix}\cos w & 0 & \sin w\\ 0 & 1 & 0\\ -\sin w & 0 & \cos w\end{bmatrix} \quad (5)$$

$$R(Z,w)=\begin{bmatrix}\cos w & -\sin w & 0\\ \sin w & \cos w & 0\\ 0 & 0 & 1\end{bmatrix} \quad (6)$$

Then the relationship between $^{A}P$ and $^{B}P$ can be represented by the following homogeneous transformation:

$$\begin{bmatrix}^{A}P\\ 1\end{bmatrix}=\begin{bmatrix}^{B}_{A}R & ^{A}P_{BO}\\ 000 & 1\end{bmatrix} \quad (7)$$

Can be simply expressed as:

$$^{A}P=^{A}_{B}T\,^{B}P \quad (8)$$

Therefore, the position and rotation transformation relationship of the end-fixture relative to the world coordinate system is:

$$\begin{cases}^{W}_{T}R=^{W}_{B}R^{B}_{T}R\\ \begin{bmatrix}^{W}P\\ 1\end{bmatrix}=^{W}_{T}R\begin{bmatrix}^{T}P\\ 1\end{bmatrix}\end{cases} \quad (9)$$

With the above transformation relationship, the homogeneous change matrix of the end-fixture relative to the world coordinate system can be obtained:

$$^{W}_{T}T=\begin{bmatrix}^{W}_{T}R & ^{W}P\\ 000 & 1\end{bmatrix} \quad (10)$$

However, different exercise methods and intensity will have different effects on the body's ability to resist free radicals. High-intensity acute exercise can increase the generation of free radicals in the body, strengthen the lipid peroxidation reaction, decrease the activity of antioxidant enzymes, cause damage to tissues and cells such as biological bones, red blood cells, and kidneys, and is related to the formation of exercise fatigue[9] .

## 2.4. Exercise Capacity and Iron

In competitive sports, athletes must continue to be overloaded with stimulation during sports training. Therefore, athletes must have a high level of energy metabolism rate to meet the needs of high-load and strenuous exercise. The high level of energy metabolism rate is closely related to the energy productivity of the active respiratory chain of enzymes and the body's oxygen supply capacity. Appropriate use of high-load training, balanced diet and physical health care in the competition is an important basis for improving athletes' exercise level. Appropriate nutrition includes reasonable meal time, reasonable weight loss structure, and reasonable intake of nutrients. The competitive state and physical recovery after intense exercise play an important role in improving training effects, improving athletic ability and preventing overtraining[10].The specific effect of lactoferrin on the human body is shown in Figure 2.:

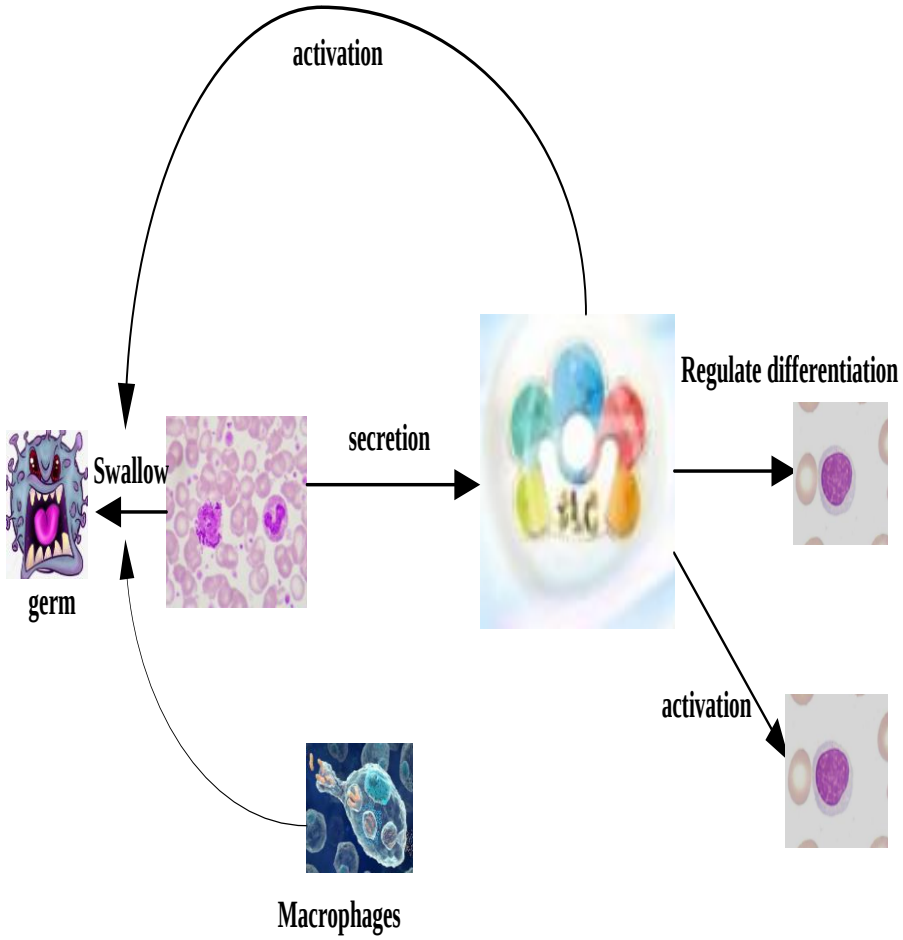


*Figure 2. The specific effects of lactoferrin on the human body*

The iron status of athletes in sports mainly depends on the iron absorption capacity of the intestines, iron supply, and iron loss. In sports training, the blood circulation speed increases, the generation of free radicals increases sharply, the body temperature rises, the blood PH value drops, and the muscles and soles of the feet are compressed. Oxidation increases the fragmentation of red blood cells, and the released hemoglobin combines with bilirubin and hemoglobin in the plasma to form a complex that is swallowed by the fine mesh endothelial system. After hemoglobin is

decomposed, iron is released. Part of the iron is held by the fine mesh endothelial cells, and part of the iron is re-released and transported to the muscle tissue, bone marrow, and spleen through the transformer[11-12].

## 3. Experiment on the Effect of Nutritional Supplements on the Athletic Ability of Rats

### 3.1. Subject

60 male SD rats. Use standard clogs to raise ordinary feed for 3 weeks, feed 200 grams of feed a day, supplement 200 grams the next day, and prepare drinking water. The environmental conditions of the animal room are as follows: the room temperature is 22-25 ℃, the humidity is 55%-70%, the biological rhythm of day and night is controlled, and there are 12 hours of light every day.

### 3.2. Grouping of Experimental Subjects

The rats were trained in TRAIR. The rats were trained for 10 minutes at a speed of 10m/min for the first 3 days, and then were randomly divided into three groups. That is, the control group, increased load Trid Mille exercise group (referred to as exercise group), increased load Trid Miru exercise + nutrition supplement group (called exercise + nutrition group at the end of the 5th week) to supplement nutrition. Each group has 20 mice.

### 3.3. Sports Nutrition Intervention Methods

The training includes 6 weeks of running training, the slope of the running platform is 0, the sprint speed is 250m/min, the training is carried out for 60 minutes a day, and training is carried out 6 days a week, with a rest on Sunday. Nutritional interference is supplemented with a nutrient solution mixed with L-carnitine and soybean peptide. The main components of the nutrient solution are carbohydrates, B-chain amino acids, vitamin B6, vitamin B12, tyrosine, taurine, glutamic acid, N-acetylcysteine, L-arginine and some minerals. Distilled water was used in the exercise group and the control group. Every group has common food.

### 3.4. Sampling and Testing

The teams took samples 24 hours after the last exercise. Blood was collected from the great abdominal artery during intraperitoneal anesthesia with 2% pent barbiter. In order to determine hemoglobin (HB), red blood cell count (RBC), hemoglobin (HCT) and other indicators, 0.5ml and 3ml blood samples were anticoagulated with screw. Lead yellow phosphorus, red blood cell anti aniline receptor and the remaining blood samples were injected into the centrifuge tube, and rotated for 30 minutes at 37 ℃ for 3000 times per minute. The blood circulation was performed for 15 minutes. The serum was separated and quickly put into the refrigerator at - 20 ℃ to measure the blood indicator. After blood collection, the tissue was quickly wrapped in tin foil, frozen in liquid nitrogen, and tested in a low-temperature refrigerator at - 80 ℃.

### 3.5. Test Indicators

(1) Measuring the activity of skeletal muscle lactate dehydrogenase (LDH): LDH generates keto acid through the catalysis of lactic acid, and reacts with 2,4-nitrophenyl in alkaline solution to produce nitrophenyl. Reddish brown, the enzyme activity can be seen by comparing the color. Measure the absorbance of each tube by ultraviolet-visible spectrophotometry.

(2) Determination of the protein content of muscle tissue Homogenet: Use an electronic balance to correctly weigh the mouse skeletal muscle tissue. At 4℃, prepare 10% of the tissue according to the weight-volume ratio of the tissue and the weight of the corresponding physiological saline. Centrifuge for 30 minutes at 3000rpm/min, and use a pipette to clear up. The protein content was determined by the melanin blue method.

(3) Determination of tissue SOD activity: The xanthine oxidase method is used to generate superdioxes from the xanthine and xanthine oxidase reaction system. The latter form nitrite from oxidized hydroxylamine. When SOD is included in the test sample, the formation of nitrite is reduced due to the specific inhibitory effect of superoxide anion. The absorbance value measured by colorimetric analysis is lower than the absorbance value of the control tube. SOD is an important metal oxidase in the body. Copper, Zn-SOD, Mn-SOD and Fe-SD are classified into three types by metal. SOD directly eliminates hyperoxemia and protects cells from hyperoxemia.

### 3.6. Statistical Processing

All data results are expressed as mean ± standard deviation. First, confirm the normal distribution of the data and the uniformity of dispersion, use SPSS13.0 to perform data statistics, use unidirectional dispersion analysis (unary configuration dispersion analysis) in the comparison between groups, and use the LSD method in multiple comparisons. After the obtained data were t-tested for independent samples, the pre-test data and post-test data of various groups were t-tested, and it was found that the significance difference level was $p<0.05$, and the significant difference level was $P<0.01$.

## 4. Analysis of the Effect of Sports Nutrition on Exercise Ability

### 4.1. Analysis of Changes in Liver and Skeletal Muscle MDA after Exercise

The change of MDA content is shown in Table 1 and Figure 3. Compared with the control group, the MDA of the liver after exercise, except for 24 hours after exercise, was significantly higher in the exercise group than the control group ($P<0.05$). The MDA of the exercise group reached its peak 1 hour after exercise and gradually decreased. The MDA level of the exercise + nutrition group was lower than that of the exercise group, and there was a significant difference between 6 hours and 24 hours after exercise ($P<0.05$). The MDA level of the exercise + nutrition group reached a peak 1 hour after exercise, and then gradually decreased. Athletes' physical function monitoring is usually carried out before and after the training phase or cycle, and comparisons are made before and after the evaluation results. In the case of anemia, extreme exercise and aerobic exercise will lead to low exercise capacity. When the motor function is in good condition, the body adapts to the exercise load, the hemoglobin value becomes higher, training and competition will show better exercise results. When evaluating the blood index of tennis players, it is necessary to objectively evaluate whether the athlete has the possibility of sports anemia, and combine the hemoglobin index with other blood indexes and some biochemical indexes. HMB promotes protein synthesis, reduces decomposition, and improves body strength. At the same time, it is a new nutritional supplement that improves strength, increases muscle mass, and reduces body fat. Muscle cell damage caused by stress during intense exercise results in net protein breakdown. Because HMB can be used to synthesize cholesterol, it can quickly repair muscle cell membranes. Therefore, HMB nutrition can reduce the degree of muscle damage, promote the increase of muscle mass and the cross-sectional area of muscle fiber, and thus cause the increase of muscle strength. Appropriate nutrition can provide energy materials during exercise and ensure the good use of energy materials, which helps to improve sports ability. If you get the right carbohydrates from your diet, your body

can properly preserve muscle glycogen. Proper intake of vitamins and trace elements can ensure the smooth progress of energy metabolism. Appropriate nutrition can reduce the degree of exercise fatigue, delay exercise, and promote physical recovery after intense exercise. The main reason for the low exercise capacity of the human body is due to appropriate nutritional supplements. Before strenuous exercise or competition, dehydration, body temperature rise, accumulation of acid metabolites, electrolyte balance disorders, and energy storage depletion after competition. Moreover, supplementing water will increase the reserves of vitamins, alkalis, glycogen, and water, and delay the occurrence of fatigue.

*Table 1. Changes in MDA content*

| Group | 0h | 3h | 6h | 9h | 12h | 15h | 18h | 24h |
|---|---|---|---|---|---|---|---|---|
| Control group | 0.621 | 0.587 | 0.607 | 0.611 | 0.579 | 0.603 | 0.671 | 0.581 |
| Sports group | 0.912 | 0.779 | 0.851 | 0.905 | 0.718 | 0.927 | 0.833 | 0.944 |
| Exercise + Nutrition group | 0.754 | 0.811 | 0.699 | 0.774 | 0.684 | 0.812 | 0.588 | 0.716 |

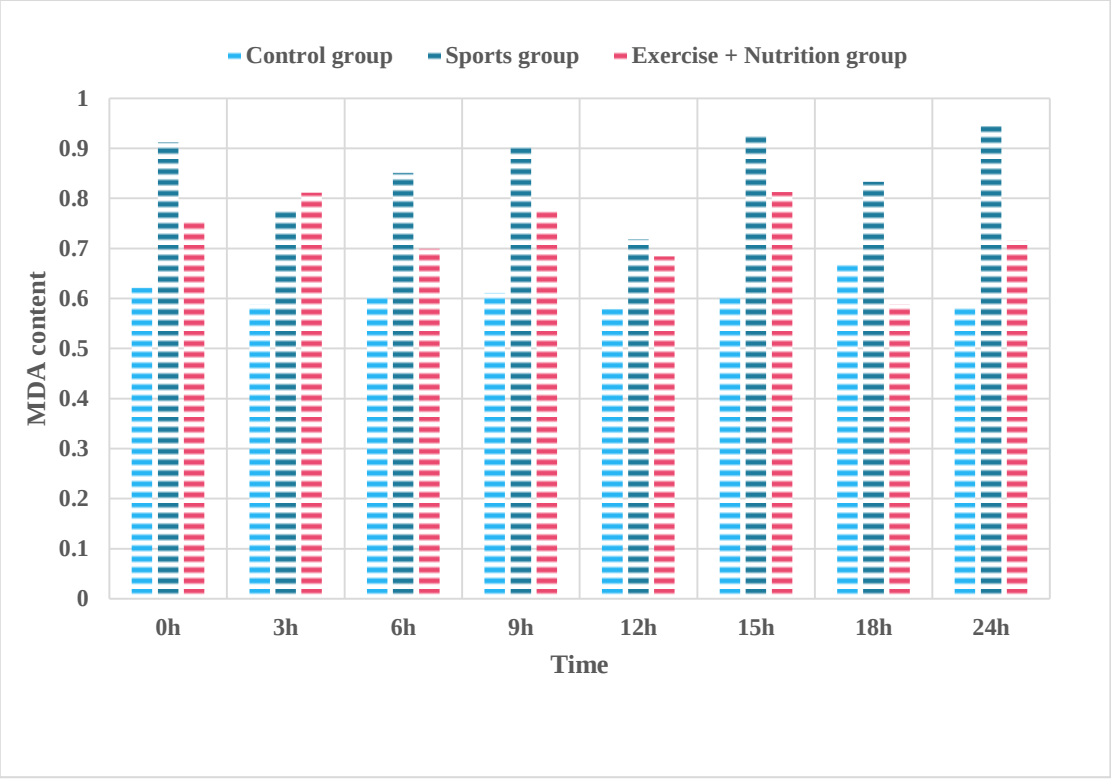


*Figure 3. Changes in MDA content*

### 4.2. Effect of Nutrition Intervention on Sports Ability

The weight changes of rats in each group are shown in Table 2 and Figure 4. After two weeks of exercise and nutrition intervention, compared with the intervention group and obesity control group, there was no significant difference in the weight of rats in the nutrition intervention group ($P > 0.05$). By the end of 6 weeks, when the body weight of obese mice in exercise intervention group, nutrition intervention group and exercise + nutrition intervention group was lower than that of obesity control group, there was significant difference between the simple exercise and nutrition intervention group ($P < 0.05$), and the exercise + nutrition intervention group had an unusual significant difference ($P < 0.01$). The weight of rats in exercise + nutrition intervention group was significantly lower than that in exercise + nutrition intervention group ($P < 0.05$). Reasonable supplement of sports nutrition auxiliary food can improve the performance of animals and athletes, and improve the anti fatigue ability. Different nutrients have different effects on the body. The dual intervention of exercise and nutrition is one of the important indicators to objectively reflect obesity, which has a great impact on the surrounding and skin thickness of obese youth. Obesity has no effect not only on body fat, but also on health. In addition, the distribution of fat is also closely related, the distribution of waist fat is an important factor affecting health. If fat accumulates in the waist, it can also affect insulin secretion. In order to maintain the basic physiological functions such as heart rate and respiration, energy is needed. Metabolism, digestion and storage of food, as well as the energy consumption of various physical activities, are the biggest factors of energy consumption. The minimum energy required to maintain a person's awakening state is the basal metabolic rate. Exercise can change the enzyme activity of fat metabolism, promote fat decomposition and hinder fat synthesis. According to the theory of energy continuity, the utilization rate of various energy materials mainly depends on the intensity and duration of exercise. The longer the duration of continuous exercise, the higher the proportion of total energy metabolism caused by fat oxidation. Exercise can promote the metabolism and utilization of fat. Energy selection in muscle exercise is related to the duration, intensity and nutritional status of muscle contraction. After a long period of exercise, the total energy used increased significantly, but FFA accounted for 50% - 70%. On the other hand, with the increase of free fatty acids and glucose in the blood during exercise, fat cells will release a lot of FFA. On the other hand, fat cells will contract and consume too much blood sugar value, which will not be converted into fat, so body fat will be reduced and body weight will be reduced.

*Table 2. Changes in body weight of rats in each group*

| Group | 0 weeks | 2 weeks | 4 weeks | 6 weeks | 8 weeks |
|---|---|---|---|---|---|
| Control group | 375.64 | 380.69 | 401.22 | 411.22 | 392.55 |
| Sports group | 370.16 | 384.36 | 389.66 | 379.15 | 384.22 |
| Exercise + Nutrition group | 379.25 | 379.88 | 397.55 | 381.45 | 369.38 |

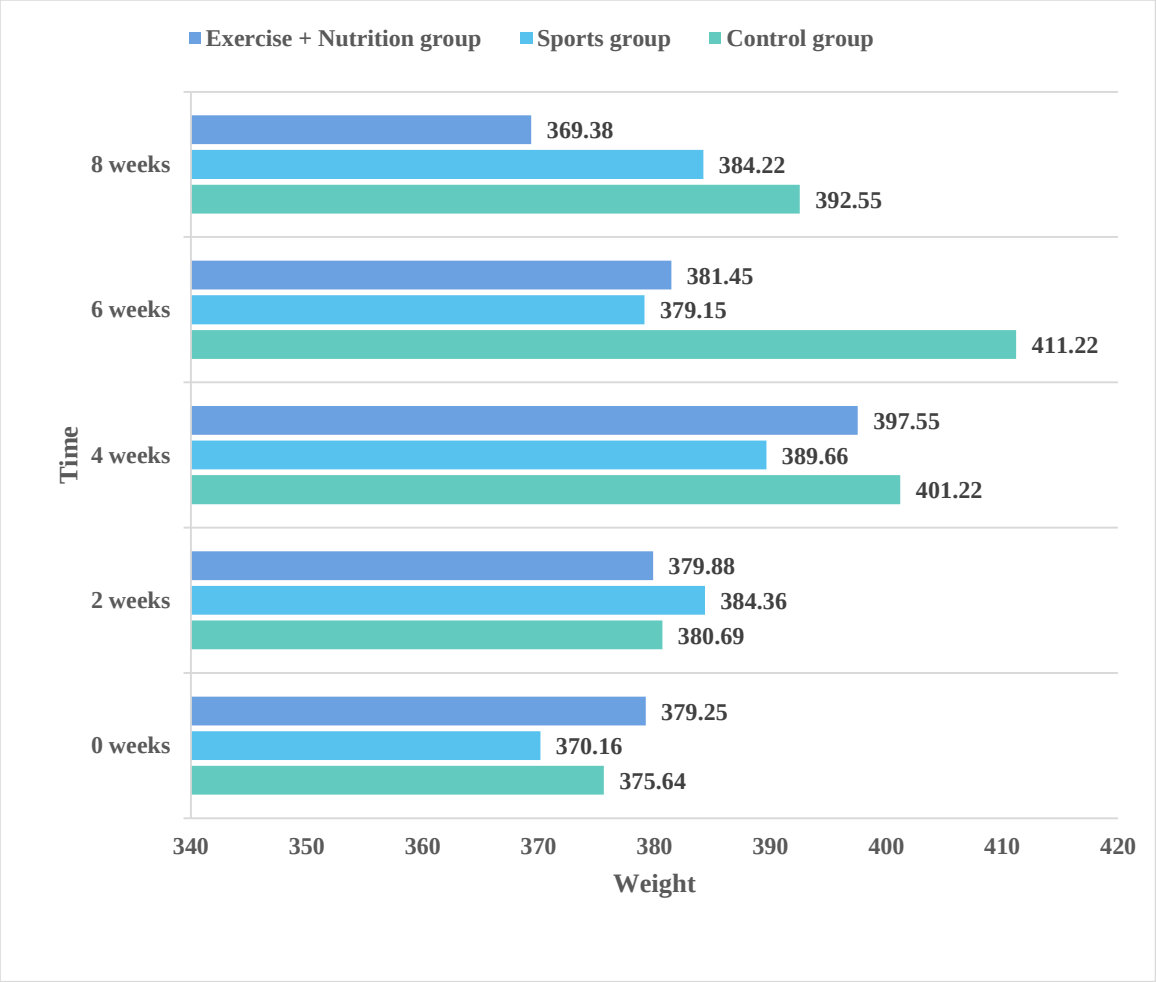


*Figure 4. Changes in body weight of rats in each group*

### 4.3. Effect of Nutrition Supplement on Biochemical Indexes of Athletes

The effect of nutritional supplements on biochemical indexes of athletes is shown in Figure 5. After 10 weeks, the hemoglobin content of the placebo group and the positive control group did not change significantly. The anti-fatigue nutritional supplement group increased significantly after 10 weeks. This shows that nutritional supplements can effectively improve the hemoglobin level of athletes after 10 weeks. BCA is an important functional component of sports nutrition supplements. It mainly promotes the synthesis of muscle protein, relieves central fatigue, promotes recovery after exercise, and improves immunity. At the same time, the accumulation of BCA in the body is often used to diagnose some diseases. AABA can be used as a biomarker for sepsis, multiple organ insufficiency syndrome, liver disease and alcohol dependence. AIBA is a metabolite of Val. The changes in the blood or urine concentration of healthy athletes may reflect the state of BCA to a certain extent. As an important inhibitory neurotransmitter, GABA in plasma can reflect the level of motor nerve recovery after stroke, and is a biomarker of depression and progressive multiple sclerosis. Therefore, the separation and analysis of BCA and gabA isomers are very important. In addition, sports nutrition products applied to athletes, in general, excessive dependence, excessive use, and unscientific use methods may cause physical damage to athletes. Therefore, in order to improve athletic performance and protect physical health, it is very important for athletes to develop personalized nutritional supplementary food strategies. Athletes' physical function monitoring is

usually carried out before and after the training phase or cycle, and comparisons are made before and after the evaluation results. Monitoring the athlete's function should be a comprehensive evaluation of the overall multi-index, multi-level, and multi-factors according to the changes of specific conditions. The theory of sports physiology and biochemistry, as well as the monitoring results are objective and comprehensive scientific comprehensive evaluation, scientifically grasping and guiding the sports training process, and effectively improving the training effect. The function of monitoring and evaluation principles during tennis training is based on long-term research and practice, combined with special training content and requirements, combined with training schedules and athletes' physical reactions during training, scientifically and rationally monitors the selection of hitting indicators, adjusts the test time, and makes timely and accurate judgments For athletes' fatigue and recovery, adjust the current training plan to provide coaches with reference for the next stage of training. Regarding body weight, compared with the control group, the body weight of the exercise group and the exercise + nutrition group was significantly reduced after the experiment, with a very significant difference ($P<0.01$). Compared with the exercise group, the weight of the nutrition group increased significantly after the experiment, showing a significant difference ($P<0.05$). Experiments show that scientific diet and exercise help to lose weight, but unilateral diet management and exercise cannot bring good results.

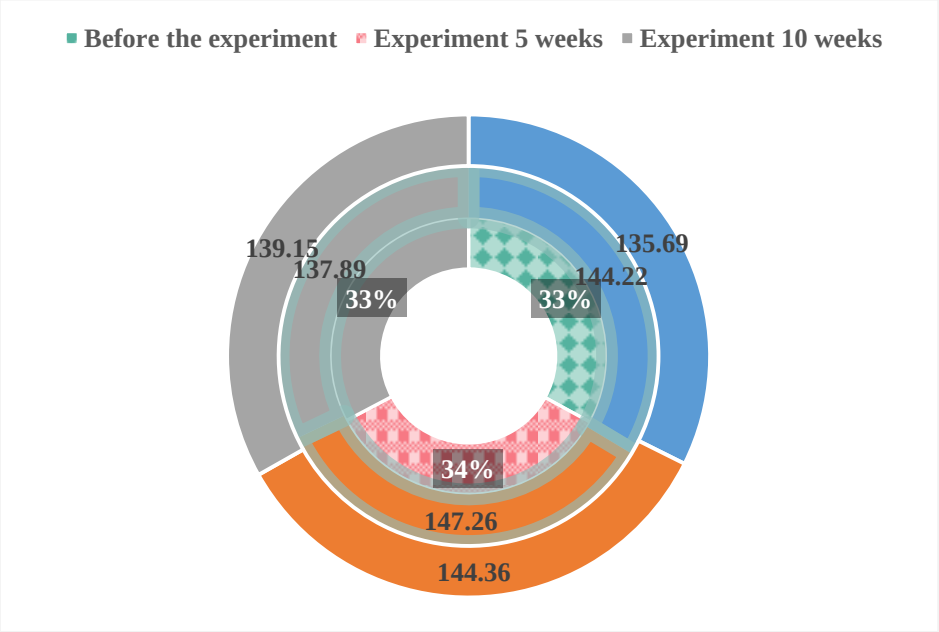


*Figure 5. The effects of nutritional supplements on athletes' biochemical indicators*

## 4.4. Effects of Exercise Nutrition on Liver and Skeletal Muscle

The influence of sports intervention on various indicators of the body is shown in Figure6. MDA is a highly sensitive indicator of free radical metabolism in the body. As a representative product of lipid peroxides, it is often used to indirectly reflect changes in body free radical metabolism. Since it is one of the main metabolites of polyvalent unsaturated fatty acids caused by peroxidative cell damage in biofilms, it may continue to cause cell damage through the decomposition of lipid peroxides. Therefore, the measurement of the amount of MDA can indirectly perform lipid peroxidation in the body. The degree of acid cell damage. During exercise, the body's metabolism accelerates and oxygen consumption increases. If the oxidative phosphorylation of mitochondria is damaged, the signal transmission chain will not be able to transfer electrons to oxygen normally, the leakage of mitochondria's electrons will increase, and ultimately the

production of free radicals will increase. Mitochondrial membrane contains a lot of unsaturated fatty acids that are vulnerable to ROS attack. According to the role of ROS, the unsaturated fatty acids on the membrane generate free radical intermediates, which react with oxygen to generate peroxide free radicals and lipid peroxides (LOOH), which are finally decomposed into diformaldehyde (MDA) or ethane and pentane. The increase in oxygen consumption and free radical production through high-intensity exercise is the main reason for the substantial increase in MDA after exercise. During intense exercise, the body's oxidative stress response is strengthened, and the blood consumption of skeletal muscles and other exercise systems is greatly increased. As a result, blood is redistributed, leading to ischemia and hypoxia in other tissues, reducing energy supply, and reducing energy supply. Decrease in efficiency and athletic ability. Moreover, during intense exercise, a large amount of free radicals and lactic acid will be produced, which will worsen the cell load, cause a chain reaction of free radicals, damage the body's oxidation-antioxidant system, and even lead to a decline in exercise capacity. The two sources of fatty acids used by muscle tissue in aerobic exercise are glycerol from muscle cells and free fatty acids from plasma. During long-term exercise, the energy supply of glycerol and free fatty acids in muscle tissues account for 25% and 75%, respectively. Aerobic exercise may increase the concentration of free fatty acids in the plasma. Carnitine assists the delivery of nutrient A to the inner mitochondrial membrane by activating the fat produced by fatty acids to improve the consumption and utilization of total fat. At the same time, soybeans can change the composition of lipids in the blood, lower cholesterol, and increase the concentration of HDL-C, which significantly increases fat metabolism in obese mice.

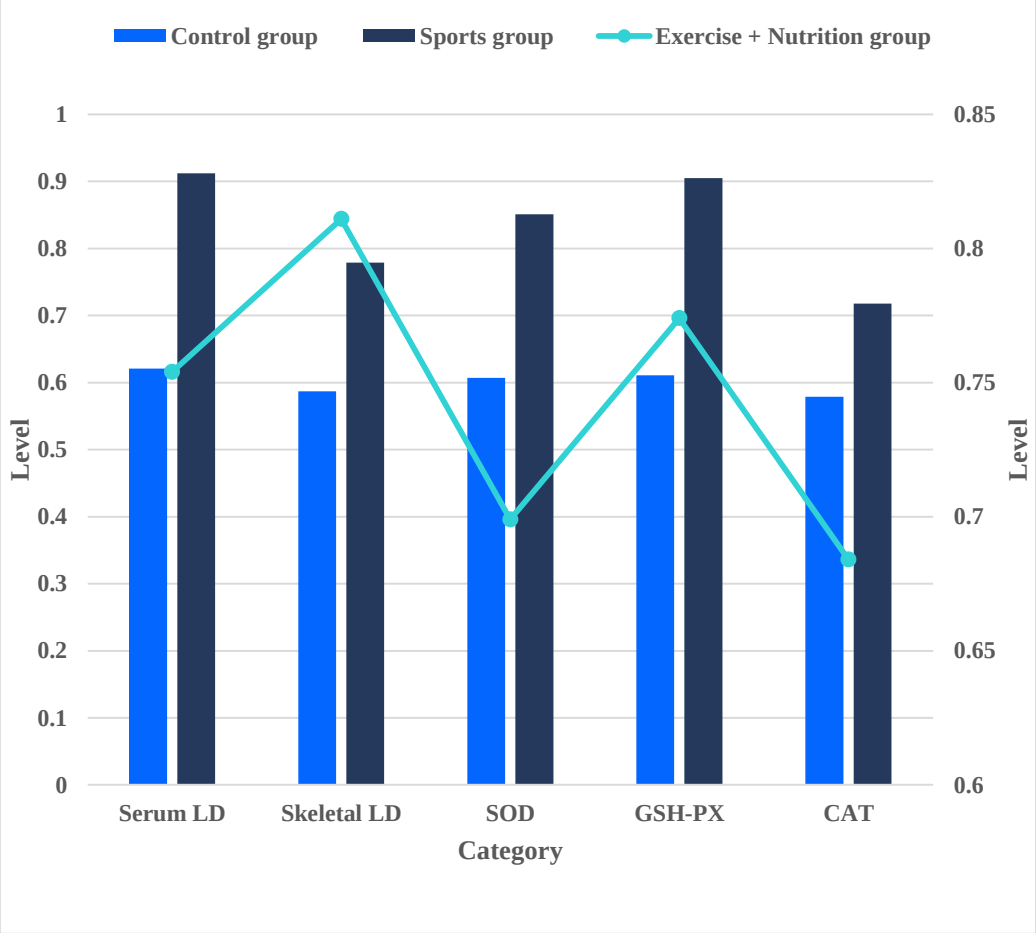


*Figure 6. The effect of exercise intervention on different indicators in the body*

## 5. Conclusion

This research mainly discusses the relationship between sports nutrition, health and sports ability. The intervention of exercise and nutrition improved lipid metabolism. The concentrations of TG, TC, LDL, and Apob in obese mice decreased significantly, and the concentrations of HDL and Apoa were increased; there was no significant change in the blood glucose concentration between groups. In endurance exercises, the supply of BCA hinders the increase of Tyr and Phe in muscles and blood, and the intake of BCA hinders the hydrolysis of muscle protein. Exercise increases the ratio of free tryptophan and branched amino acids (Try/BCA) in plasma. Since the intake of BCA increases the plasma concentration, it can balance the increase in Try/BCA caused by exercise, thus reducing the synthesis and release of 5-HT.

In recent years, in the research of sports nutrition, metabolism and molecular biology methods, sports biochemistry has provided a biological basis for the development of sports nutrition research. With the development of nutritional products and the development of anti-doping exercises, the intake of nutrients, improve physical strength, play a role in promoting the development of sports nutrition. Proper nutrition-assisted exercise is a very effective way to improve health. Exercise can adjust energy balance, help maintain proper weight and body fat, and nutrients can strengthen and increase the intensity of exercise.In order to better help the physical health of athletes and normal people's health big data, wearable devices, mobile phones and other terminals can be used to efficiently manage personal health, such as real-time monitoring of various indicators of personal health; combined with monitoring data to determine personal health Physical health; provide personalized health management programs. For medical institutions, health care big data can help doctors more efficiently manage the health of patients, improve the utilization rate of hospital diagnosis and treatment resources, reduce the length of stay of sports patients, and improve the service level of medical structures. Reasonable use of big data technology can effectively prevent this. So as to achieve better help athletes extend their careers. It can also help athletes improve their athletic ability.

Motion perception is not only the integration of object changes in time and space, but also the reflection of external object movement and body movement. Perception controls our actions, and then our own actions affect our perception. The development of movement perception develops with the development of human movement and depends on the maturity of higher-order mental functions. The visual system plays an important role in the development of motion perception.

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## Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

## Conflict of Interest

The author states that this article has no conflict of interest.

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