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Research Article

Mechanism of Trace Elements on Recovery after Physical Exercise -

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ABSTRACT

Objective to analyze the mechanism and effect of chromium on the recovery of bodybuilding. By consulting the data, the experimental analysis method was adopted. The results of research practice show that the comparison of relevant indicators among people who exercise regularly shows that people who exercise regularly have a higher content of chromium than normal human body, and there is a significant difference between the two. The combination of chromium and people who exercise regularly can increase the biological activity of insulin in human body. Chromium supplementation will produce the effect of sports and fitness lipid metabolism, consume fatty acids, and promote the conversion of amino acids into protein to grow muscle faster, and enhance the size and strength of muscle fiber. Enhance metabolism. The conclusion is that chromium can effectively repair excessive oxygen free radicals in human body, break the balance between antioxidant, timely repair oxygen free radicals without causing accumulation in the body, reduce the cycle damage of free radicals to the body, etc. People should pay attention to timely supplement chromium after exercise, the body will have a series of good effects.

Keywords: Chromium; Exercise and keep fit; Antioxidant; Free radicals; Biological activity of human body

INTRODUCTION

In the past, there were many studies on the effects of supplementing calcium, iron, zinc and selenium after physical exercise, but little attention was paid to the role of trace element chromium in human life activities.

Chromium (chromium) is a trace element widely existing in the natural environment. Trace element chromium is required for the metabolism of proteins and lipid carbohydrates in human body. Studies have shown that a variety of diseases in humans are caused by a lack of a variety of trace elements due to free radicals that cause lipid peroxidation in biofilms. The biochemical function of human body movement confirmed that Cr³⁺ has nutritional function, and Cr⁶⁺ with potential toxicity was identified as a carcinogen by the international agency for research on cancer.

The large amount of mobilization and loss of chromium in sports and fitness will lead to the reduction of the human body's chromium reserves. Exercise and fitness will cause the human body's glucose metabolism, blood lipid metabolism and insulin sensitivity to the lack of chromium demand, and exercise and fitness can also increase the human body's chromium reserves. The mechanism of disease is to study the metabolites of lipid peroxidation in the human body. The amount of trace elements in the human body of athletes can reflect the functional status of lipid peroxidation in the body, reflect the status of the damaged body cells, and reflect the biochemical indicators of body function, so as to protect the sports physical function.

RESEARCH OBJECTIVE

Objective to analyze the mechanism and effect of chromium on the recovery of bodybuilding

Research objects and methods

The research object: Regular physical exercise middle school students, including amateur sports school long-distance running athletes, aged 13-16 years old, 45 males, and 45 males in the control group.

Design: non-randomized controlled trial

Design, implementation, and evaluator: this paper implements the collection of data statistics, implements the design technical routes, and the test methods are completed by all the authors. The experiment was completed by the staff of the hospital biochemical laboratory. All statistical evaluations were completed by the staff in cooperation in August 2017.

Inclusion criteria & Exclusion criteria

Inclusion criteria:

- Original research, relevant conceptual mechanism, analysis of test subjects, and research results.
- Influence of chromium content in middle school students who exercise regularly in the form of sports, application and operational research

Exclusion criteria: Repetitive studies and similar unrelated studies.

Quality assessment

Uniform standards will be tried out for the research objects of sports and fitness, and relevant standards will be used. Arguments and arguments are reliable.

Data extraction

Excluding the content of test data for unrelated research purposes, and summarizing and summarizing the tested credible data for research.

Research methods and determination were carried out in the laboratory.

Urine collection: the disposable urine of the exercise test subjects was collected as samples, and the disposable urine cup (50 ML) was collected and divided into 50 ML centrifugal tube. The collected samples are stored in a special container.

Urine sample detection: 50 ML urine sample was taken and 40 ML volume fraction was added as 0.40% of the nitric acid solution was shaken and mixed. Conduct sample testing; inductively coupled plasma mass spectrometer was used to determine the cooling gas flow rate of 12.2L/ min, the airflow velocity is 0.6 ML/ min, the active pump speed was 30 r/ min, and the flow rate of the atomizer was 0.8 L/ min; the yttrium solution (GSBG6203290):100 µg/ L was used as the internal standard to determine isotopes.

Statistical analysis, the determination of data input by the author of microcomputer, points three groups according to age, the data was analyzed by SPSS 17.0 statistical software, the test results of the measurement data with the average standard deviation ($\bar{X} \pm s$) said, within each group is using statistical analysis, single factor variance analysis to data mean the significant difference of, between groups comparing the samples t test, *P* values obtained by significance test method.

RESULTS AND ANALYSIS

The urinary chromium content is measured as $\mu\text{g/L}$. Urinary chromium level in the fitness group: the average urinary chromium content of 45 subjects was $0.54 \pm 3.74 \mu\text{g/L}$ (before exercise), and $0.53 \pm 3.30 \mu\text{g/L}$ (after exercise). The difference between different age groups was statistically significant.

- Results among the 45 participants in the fitness group, $0.43\mu\text{g/L} \text{--} 0.60\mu\text{g/L}$, with significant differences among age groups (see table 2) ($P < 0.05$).

Table 3 of the control group was compared with table 2 of the fitness group ($P < 0.05$).

Research results: statistical test data were expressed as mean standard deviation ($\bar{X} \pm s$), sample t test was used for comparison of each group, and age comparison between fitness groups was analyzed, and the significance level was ($P < 0.05$) (Table 1).

In the control group, there was no significant difference in the content of human body at different ages in each group ($P > 0.05$) (see table 3).

Table 2 and table 3 were compared in different age groups, and there were significant differences ($P < 0.05$), for example, between 14~15 years old and 15~16 years old, and the significance of t test ($P < 0.05$) between the two groups, for example, between 14~15 years old and 14~15 years old, was statistically significant.

The mechanism and effect of chromium on the recovery of bodybuilding were analyzed. Through access to relevant data, comparison research often participate in sports fitness index showed that the exercise group than the control group of $0.51 \pm 3.40 \mu\text{g/L}$ high chromium content, obvious difference in (see table 3), before and after exercise, chromium content have change. The urinary chromium

content mean 45 fitness group was $0.53 \pm 3.30 \mu\text{g/L}$ after fitness table 2, fitness differences statistically significant group of chromium content. Compared with the exercisers before and after exercise, the change of chromium content was caused by the decreased excretion of chromium in urine due to sweating after exercise, which reduced the content of reserves in the body, and compensated for the increase of muscle volume and strength after exercise. Lack of chromium low insulin effect will appear high blood sugar; Body proteins required for carbohydrate metabolism and lipid of chromium element, is to maintain the essential elements of life, chromium element to insulin and combining with the specific receptors, faster to promote blood glucose for synthesis of glycogen yuan, chromium may enhance insulin sensitivity protein synthesis, improve the density of lipoprotein, reduce the body's muscle cells, and enhance the function of muscle strength. The mechanism is the tissue that can utilize both fatty acids and glucose. After the degree of fatty acids decreases, the oxidative utilization of glucose can also start to increase when the energy released by the metabolism of fatty acids cannot balance the energy required for human movement. Chromium, as one of the components of glucose phosphoric acid mutase system and succinic acid-cytochrome dehydrogenase system, takes part in the metabolism of sugar and lipid in human body, making the glucose carbon chain and acetic acid root penetrate fat and accelerate the oxidation of fat [1]. Lack of chromium in human body will lead to impaired glucose tolerance and adverse reactions with increased plasma insulin, serum TC and TG levels. The composition of glucose tolerance factor GTF is that chromium, as A mass cofactor in glucose metabolism, plays A regulatory role in insulin, and the GTF containing chromium promotes the formation of two disulfide bonds between the A chain of thiohydroxyidene insulin molecules in the cell membrane more quickly, making insulin play an important role [2].

DISCUSSION

Protein metabolism and growth and development in the human body, amino acid binding protein contains chromium synthetic protein, in the part of DNA and RNA contains chromium, chromium plays an active role in the nucleic acid metabolism structure. Lack chromic element human body function can maladjusted, the central nervous system function of the person appears disorder, and human body fights infection virus ability to differ easily and suffer from epidemic contagion, white blood cell reduces the ability that kills infectious microorganism bacterium to be able to compare poor. The element chromium assists insulin to mobilize the metabolism of sugar, protein and fat, inhibits the synthesis of cholesterol by fatty acids, and can guarantee the stability of cell membrane, so as to protect the inner lining of human arteries from the invasion of foreign viruses. The element chromium in preventing human arteriosclerosis has a good effect on serum cholesterol in the human body environment [3].

The 3-valent chromium element penetrates into the carbohydrate protein fat, promotes the glucose oxidation faster, promotes the glycogen synthesis faster, the amino acid and the nucleic acid synthesis metabolism, regulates the glucose content, promotes the hemoglobin synthesis faster. Chromium inhibits the synthesis of cholesterol and fatty acids, reduces the effects of cholesterol, low-density lipoprotein and triglyceride, and metabolizes lipid for glucose metabolism to improve the hypoxia of sports myocardium and restore the normal heart rate of human body. Chromium is closely related to human sports health, and human diseases are all related to the absorption amount of chromium in the diet. Dietary inorganic chromium only absorbs 1-2%, while chromium in GTF

Table 1: Chromium content in human body of different ages in the fitness group (table 1 before fitness) ($\mu\text{g/L}$) ($\bar{X} \pm s$).

Age (yrs)	n	Range Number	Average
13~14	15	$0.43 \pm 1.12\text{--}0.53 \pm 0.13$	0.50 ± 0.10
14~15	15	$0.46 \pm 0.16\text{--}0.58 \pm 0.18$	0.55 ± 1.02
15~16	15	$0.47 \pm 0.10\text{--}0.60 \pm 0.11$	0.58 ± 0.10

($P < 0.05$).

Table 2: Chromium content in human body of different ages in the fitness group (table 2 after fitness) ($\mu\text{g/L}$) ($\bar{X} \pm s$).

Age (yrs)	n	Range Number	Average
13~14	15	$0.42 \pm 1.08\text{--}0.52 \pm 0.10$	0.50 ± 0.20
14~15	15	$0.42 \pm 0.19\text{--}0.56 \pm 1.16$	0.54 ± 0.13
15~16	15	$0.46 \pm 0.18\text{--}0.58 \pm 0.15$	0.56 ± 0.09

($P < 0.05$).

Table 3: Chromium content in human body of different ages in the control group ($\mu\text{g/L}$) ($\bar{X} \pm s$).

Age (yrs)	n	Range Number	Average
13~14	15	$0.43 \pm 0.12\text{--}0.52 \pm 0.32$	0.50 ± 0.13
14~15	15	$0.44 \pm 0.19\text{--}0.53 \pm 0.16$	0.51 ± 0.17
15~16	15	$0.46 \pm 0.13\text{--}0.54 \pm 0.18$	0.53 ± 0.11

($P > 0.05$).



is more than 20%. Oxygen to the body to make the production of large Numbers of oxygen free radicals in the myocardial tissue formation and excessive consumption, can cause lead to the body element chromium content in blood increased fatigue, lowered the antioxidant capacity, fitness exercise increases the body repair of oxygen free radicals by more consumption ability is abate, exercise the body mechanism can effectively repair too much oxygen free radical and exercise make induced by oxygen free radical generation, oxidative stress has a physiological effect, sports fitness products to produce a large amount of unsaturated fatty acids and decompose more oxygen free radicals, break the balance between antioxidant, timely repair of oxygen free radicals without accumulating inside the body, Thus to induce the human body tissue cell peroxidation, the production of more concentrations of lactic acid. When oxygen absorption becomes more difficult during exercise and fitness, more and more oxygen free radicals are produced in the body, which is easy to form a vicious cycle. The amount of exercise in the body further accelerates the damage of oxygen free radicals. Exercise intensity increased, with the body's red blood cell oxygen transport increase, more oxyhemoglobin oxidization and produce more a large number of free radicals, increase oxygen consumption increase free radicals produce organization, more than the body's movement radical oxidation system repair ability will damage human cells [4]. Long-term and high-intensity exercise increases the free radical changes in the body and significantly decreases the antioxidant capacity. Aerobic exercise can make the body chromium content increased, improve the body's antioxidant capacity. Aerobic exercise for a long time through the change of antioxidant enzymes, will strengthen the body's antioxidant ability level, strengthen the repair free radicals inside the body, and reduce the damage of free radicals in the body, thus inhibiting physical deterioration caused by reducing antioxidant capacity, faster to promote the environment inside the body of the balance between oxidation and antioxidant system, the body produces positive effect to the person, aerobic exercise can delay the body early decline. In sports and fitness, the human body needs energy compensation, and the body needs to consume a lot of antioxidant vitamins and trace element chromium to repair excess free radicals [5]. Studies have confirmed that various diseases in the human body are caused by the lack of a variety of trace elements so that free radicals can trigger the lipid peroxidation of the biofilm.

Chromium supplementation is necessary for normal human body, and it is more necessary to supplement chromium in time after exercise, which should be paid attention to. Lack of chromium will lead to decreased glucose tolerance and poor blood lipid. Exercise and fitness have a direct relationship between the decrease of plasma insulin concentration and the amount of exercise. The more the intensity increases, the more the concentration decreases, and the decrease of chromium content must be the decrease of insulin receptor sensitivity to insulin, the formation of insulin resistance IR affecting peripheral tissues, and the impairment of glucose uptake and utilization in skeletal muscles. When chromium levels are low, the pancreas's ability to secrete insulin is weak, and insulin-dependent function will be very impaired. Fill chromium improve glucose tolerance and insulin biological activity can give play to the role of the maximum effect human biology, chromium element combined with exercise can increase the human biology activity of insulin, increase organism of insulin sensitivity, exercise increases insulin adjustment after GLUT4 protein and its MR - NA multiply fast red muscle fiber, increase the number of GLUT4 to move faster to promote the body to absorb glucose. Human blood chrome content higher density

will be beneficial to enhance insulin human biology activity, can promote insulin increase muscle vascular blood flow velocity and the redeployment of blood, can make muscles to absorb glucose increased, to improve the quality and endurance, body fitness to exercise the body's absorption of sugar and glycogen reserves, to make the body restore functional status as soon as possible. Utilization rate of chromium in human body is reduced, affect the change of the balance and regulate metabolism in the body, chromium supplementary affects lipid metabolism to play a positive role for fitness, body fatty acid consumption, faster growth of amino acids into proteins muscle, muscle fiber volume and strength, can inhibit fat accumulation, reduce the metabolic product of lipid peroxidation. The metabolism of body cells can generate oxygen free radicals, which can cause lipid peroxidation, and the products of the reaction between free radicals and the body. The level of trace element chromium can reflect the lipid peroxidation level of the body in sports, and its value is reflected in improving the antioxidant capacity of the body and reducing the cycle damage of free radicals to the body in sports [6]. Chromium is an auxiliary component of insulin, which can regulate the metabolism of glucose, promote the synthesis of fat and protein, promote the hematopoietic function of hemoglobin synthesis, and maintain the physiological functions of growth and development of the body. The human body is prone to diseases due to the lack of chromium. When people become adults, chromium is obviously insufficient, food structure is not comprehensive, low chromium intake is easy to produce high blood sugar, vascular sclerosis disease. Supplemental chromium helps to improve arteriosclerosis, diabetes, iron deficiency heart disease and promote patient recovery. Chromium plays a role in maintaining the balance of serum cholesterol in human body. The lack of chromium can reduce the activity of insulin and induce lipid metabolism disorder through glucose metabolism. Chromium can enhance enzyme activity. Lipoprotein enzyme and lecithin cholesterol acyltransferase activity, 2 enzymes participate in the synthesis of high-density lipoprotein. Chromium and protein nucleic acid metabolism, through methionine, glycine, serine, amino acid into the cell to promote protein synthesis, chromium to improve the efficiency of nitrogen absorption synthesis of protein, promote nucleic acid synthesis to protect against heat, complement chromium in the cell to regulate the function of genes [7].

CONCLUSION

Chromium supplementation also promotes the maintenance of myocardial cell growth, enhances metabolism, and enhances the beating ability of myocardial cells. Lack of chromium affects glucose uptake in epididymal adipose tissue and reduces glucose function, can synthesize the liver endothelial cell esterase and the plasma lecithin cholesterol acyltransferase activity, the union lipoprotein esterase function, and achieves the blood fat and the cholesterol drop good. Chromium accelerates insulin's ability to regulate blood flow to muscles, allowing the body to absorb glucose more quickly. The increased concentration of chromium in the blood is conducive to enhancing the biological activity of insulin in the human body, increasing the amount of glucose absorbed by muscles, and enhancing the endurance of physical exercise. After exercise, it will be conducive to the absorption of sugar and glycogen reserve in the human body, and accelerate the recovery of the body's functional level. If the human body is deficient to the extent of chromium deficiency, the ability of the pancreas to secrete insulin compensation is difficult, insulin dependent function will be involved in human life and health. Added polymer chromium element form living state, after



the body to absorb quickly activate the hematopoietic function, to generate hemoglobin, red blood cells, promote blood oxygen ability, improve the blood oxygen content, enhance the cell vitality, promote cells metabolism, improve blood microcirculation, increase blood specificity antibodies [8], chromium supplementary can influence exercise each body system of relief in sight-but loose, rapid expansion of the respiratory tract mucosa capillary network, speed up the circulation of the blood system, activate cell metabolism, so that the respiratory tract mucous membrane in the white blood cells in the blood quickly destroy bacteria and viruses of the body, make human body to avoid infection.

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