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## Adaptogens Instead Restricted Drugs Research for An Alternative Itemsto Doping In Sport.

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### ABSTRACT

The article considers the possibility of using herbal extracts of adaptogens in the training process of athletes with the purpose to increase their adaptive potential. The authors studied adaptogensherbs growing in the Russian Federation and have chosen leuzea, ginseng and eleutherococcus. It was carried out a three-week study of the clinical and physiological characteristics of volunteers athletes taking extracts of adaptogens before training. The article contains analysis of the obtained results and discussion. The authors points out that studied adaptogens can be used in sport as replacement of various restricted dangerous drugs from “doping-list”.

**Keywords:** adaptogens, adaptogenic effect, leuzea, ginseng, eleutherococcus, sport, athletes, doping, WADA

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### INTRODUCTION

Recently, sport has been given a lot of attention at the state level in many countries. This is due to the popularization of a healthy lifestyle and the interest of governments in professional athletes of world level. However, along with this, the level of "doping" scandals is growing: according to reports of independent expert commissions of the World Anti-Doping Agency (WADA), a mass use of doping in various sports has been recently revealed [2]. In some countries it is even systematized and regulated by the Ministry of Sport [1]. The annual report of WADA [2] shows the percentage distribution of doping drugs by frequency of use:

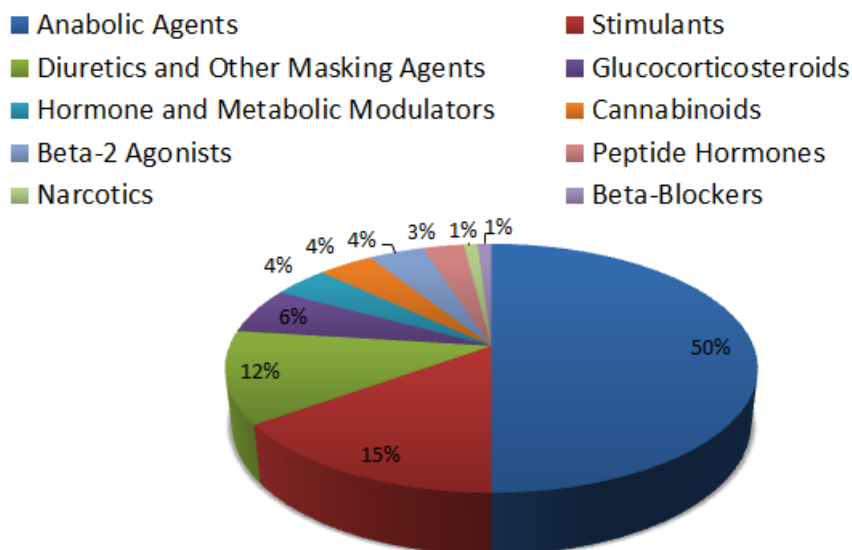


Figure 1: The most frequently used prohibited preparations (according to 2015 WADA anti-doping report)

Thus, from the information given, despite modern modifications of doping, in half of all cases of use of prohibited drugs, athletes use anabolics. This is a common problem that has been relevant since the middle of the last century, which will be decided for more than one year. The analysis of the anabolic drugs used by athletes, based on the information presented in the WADA report (Figure 2), showed that the most common use of stanozolol (22%), nandrolone (13%) and methandienone (10%).

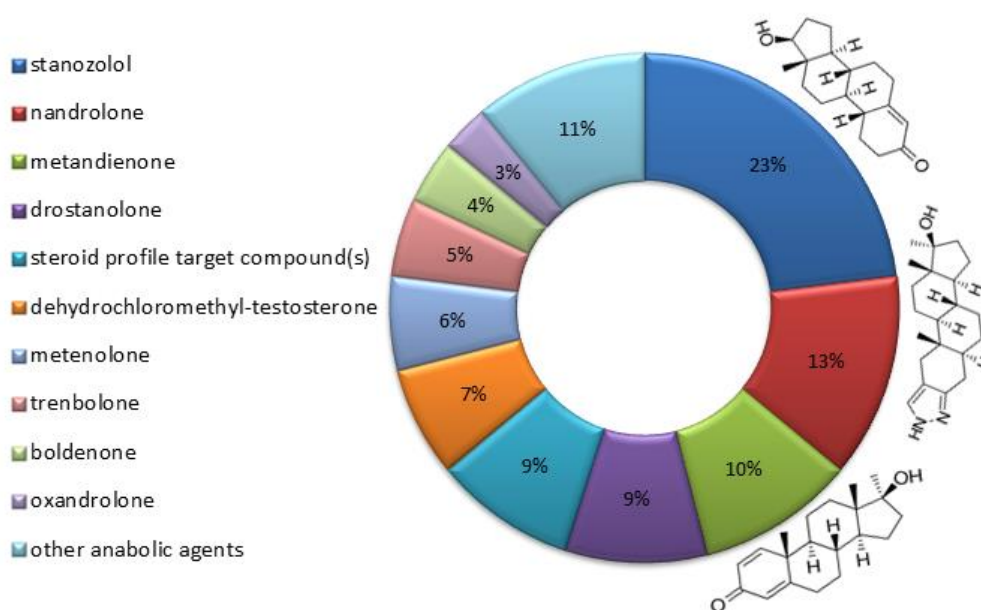


Figure 2: The most frequently detected anabolic substances in the analysis of athletes (according to 2015 WADA anti-doping report)

In this case, all three substances have a similar pharmacological effect. Penetrating into the nucleus of the cell, they activate the genetic apparatus, which leads to an increase in the synthesis of DNA, RNA and structural proteins, activation of link enzymes and enhancement of tissue respiration, oxidative phosphorylation, ATP synthesis, and accumulation of macroergs in the cell. Stimulate anabolic and suppress catabolic processes caused by glucocorticoids (also claimed by dishonest athletes). Improves tissue trophism, promotes the deposition of calcium in the bones, delays in the body nitrogen, phosphorus, sulfur.

In this regard, it is important to search for the permitted means to improve sports results without significant harm to health. Currently, much attention is paid to adaptogens, which attract the attention of doctors of sports medicine as a means that can optimize the achievement of high fitness and accelerate the course of recovery processes. A positive effect is achieved by optimizing functions, saving metabolic processes, protecting tissue structures from uncontrolled destruction.

The main and invariable property of adaptogens (ginseng, eleutherococcus, leuzea, etc.) is an increase in the physical work performed [4].

The use of phyto-adaptogens by athletes is based on numerous studies. Basically, their use is associated with two points: an increase in the reserve capacity of the body to perform increased loads (both physical and mental); full recovery of the body after the transferred stresses [3].

In the popular scientific literature there are opinions that the most effective are herbal stimulants and adaptogens obtained in the form of extracts of plants such as: ginseng, eleutherococcus spiny, leuzea safflower, astragalus, ginkgo biloba, crooks creeping, Camellia Chinese, and some others, of them in Russia, the most common are the first three. A confirmation of the anabolic effect of adaptogens can be the studies of Brekhman II. (2008), who noted the gonadotropic effect, Saratikova AS (2013), which established an increase in the number and size of mitochondria and ribosomes under the influence of extracts of some adaptogens (the effectiveness of this action and the final result was investigated).

There is already some evidence of the sporting benefits of ginseng, eleutherococcus and leuzea. For example, the use of ecdystene (the main active substance of leuzea) in conditions of daily aerobic anaerobic loads [5], or the use of extracts of these plants during two-hour swimming of rats was accompanied by a lower consumption of glycogen, creatine phosphate and ATP muscles, and the concentration of lactate in muscles under the influence of these adaptogens increased to a lesser extent. This effect allows you to reduce the fat content and increase the muscle mass of rats. Their extracts interfered with changes in the content of residual nitrogen, ammonia and glutamine in muscles, as well as in various biochemical processes and physiological functions. Eleutherococcus and saponins from leuzea (*L. safflower*) were declared a new class of anabolic substances still in the Soviet Union. also have a powerful anti-edematous effect by promoting lymphatic drainage [6] and a wide range of pharmacological effects on organs such as the brain, cardiovascular and nervous system. This suggests that these drugs create conditions in which muscular work is performed with a smaller share of gluconeogenesis.

## MATERIALS AND METHODS

For the experiment, powdered ginseng, leuzea and eleutherococcus roots were purchased. From the powders of plants by the method of ultrasonic extraction, extracts were prepared, which were used for testing in humans.

Experimental athletes were selected in the age category of 18-23 years (junior athletes). There was no gender division. Volunteers took three types of extracts in the prescribed volume (100 ml) three times a week before each training for three weeks to determine the adaptive properties of the extracts studied.

To conduct experimental studies on the study of the functional state and adaptation to the physical loads of amateur athletes, four groups of volunteers were organized among students of the North Caucasus Federal University. The first group was the control group (n = 5), i.e. athletes underwent physical exertion, but did not take the extracts studied, the following three groups differentiated according to the type of extracts

taken: ginseng (n = 5), eleutherococcus (n = 5) and leuzea (n = 5). Physical exercises were organized three times a week for three weeks and passed in submaximal intensity with a cycle of 3 minutes.

To assess the adaptive properties of an extract of herb-adaptogen, after training volunteers underwent pre-clinical examination in the Stavropol polyclinic # 6 and senior students of the Stavropol State Medical University.

The main indicators of adaptation to exercise were: heart rate (HR); blood pressure (BP); vital capacity of the lungs (VCL); adaptive potential (AP); Index of Mass Corporal (IMC); the Ruffier index (Ri); the Skibinsky index (Si); Stange test (ST); Genci test (GT).

### **RESULTS AND DISCUSSION**

The results of a three-week research cycle of the main functional indicators of experimental amateur athletes are presented in Table 1. Statistical processing of the obtained data did not demonstrate significant differences in the dynamics of these indices ( $p > 5\%$ ).

When comparing the experimental groups with the parameters of the control group, there was also no difference in indices.

From the information in Table 1, it can be seen that the use of extracts of adaptogens does not cause a significant increase in the level of blood pressure, heart rate, and even in the third week of taking adaptogens, an increase in the vital capacity of the lungs by 80-380 ml was noted in the experimental groups, processes.

Separately it is worth mentioning the indicator of adaptive potential, estimated in each of the groups in the dynamics and at the time of the last measurement. The above adaptogens did not yield significant ( $p > 5\%$ ) differences.

**Table 1: Clinical and physiological characteristics in experimental group**

Duration (weeks)	Age	Weight (kg)	Height (cm)	HR	BP. systolic (mm Hg)	BP diastolic (mm Hg)	VCL (l)	AP	IMC	Ri	Si	ST	GT
Control													
0 M±m	21±0,96	77,8±3,79	177,4±1,84	85,4±7,92	116,4±1,57	73,8±2,79	3,52±0,39	2,287±0,11	22,14±0,96	17±1,25	1,76±0,33	41±3,12	22,4±3,0
1 M±m	21±0,96	77,8±3,79	177,4±1,84	85,4±7,92	116,4±1,57	73,8±2,79	3,52±0,39	2,287±0,11	22,14±0,96	17±1,25	1,76±0,33	41±3,12	22,4±3,0
2 M±m	21±0,96	77,8±3,79	177,4±1,84	85,4±7,92	116,4±1,57	73,8±2,79	3,96±0,39	2,287±0,11	22,14±0,96	17±1,25	1,76±0,33	40±4,17	23,6±2,58
3 M±m	21±0,96	77,8±3,79	177,4±1,84	80±5,09	119±0,84	74±2,8	3,96±0,22	2,26±0,11	22,14±0,96	17±1,25	1,76±0,33	41±3,12	22,4±3,0
Ginseng													
0 M±m	22,2±0,81	80,8±2,82	176,6±1,18	87±5,82	117±3,91	74±3,63	3,2±0,17	2,3656±0,1	25,94±0,61	13,4±1,37	1,48±0,26	39,4±4,2	19,2±1,34
1 M±m	22,2±0,81	80,8±2,82	176,6±1,18	87±5,82	117±3,91	74±3,63	3,2±0,17	2,3656±0,1	25,94±0,61	13,4±1,37	1,48±0,26	39,4±4,2	19,2±1,34
2 M±m	22,2±0,81	80,8±2,82	176,6±1,18	87±5,82	117±3,91	74±3,63	3,2±0,17	2,3656±0,1	25,94±0,61	13,4±1,37	1,48±0,26	41,6±4,25	20±1,43
3 M±m	22,2±0,81	80,8±2,82	176,6±1,18	83,6±4,49	118±3,91	72±2,86	3,58±0,06	2,326±0,08	25,94±0,61	13,4±1,37	1,48±0,26	39,4±4,2	19,2±1,34
Eleutherococcus													
0 M±m	21,6±0,43	79,2±2,99	176,8±0,81	81,6±6,7	115±1,33	74±1,58	3,18±0,19	2,2536±0,1	25,36±1,05	12,2±1,23	1,642±0,11	42±3,25	21,8±2,09
1 M±m	21,6±0,43	79,2±2,99	176,8±0,81	81,6±6,7	115±1,33	74±1,58	3,18±0,19	2,2536±0,1	25,36±1,05	12,2±1,23	1,642±0,11	42±3,25	21,8±2,09
2 M±m	21,6±0,43	79,2±2,99	176,8±0,81	81,6±6,7	115±1,33	74±1,58	3,48±0,2	2,2536±0,1	25,36±1,05	12,2±1,23	1,642±0,11	45±3,21	22,8±2,09
3 M±m	21,6±0,43	79,2±2,99	176,8±0,81	79,8±4,45	116±1,58	74±1,58	3,26±0,18	2,247±0,08	25,36±1,05	12,2±1,23	1,642±0,11	42±3,25	21,8±2,09
Leuzea													
0 M±m	21±0,7	79,8±2,32	175,8±1,87	86,2±2,83	119±1,58	79±0,84	3,48±0,13	2,402±0,03	25,83±1,12	12,2±1,67	1,914±0,18	48,2±4,02	26±2,73
1 M±m	21±0,7	79,8±2,32	175,8±1,87	86,2±2,83	119±1,58	79±0,84	3,48±0,13	2,402±0,03	25,83±1,12	12,2±1,67	1,914±0,18	48,2±4,02	26±2,73
2 M±m	21±0,7	79,8±2,32	175,8±1,87	86,2±2,83	119±1,58	79±0,84	3,64±0,12	2,402±0,03	25,83±1,12	12,2±1,67	1,914±0,18	50,6±4,23	27±2,73
3 M±m	21±0,7	79,8±2,32	175,8±1,87	79,4±1,72	120±1,33	77±1,69	3,56±0,14	2,324±0,03	25,83±1,12	12,2±1,67	1,914±0,18	48,2±4,02	26,2±2,51

## CONCLUSION

A number of scientists, as well as us, noted the weak activity of adaptogens in changing clinical indicators of people (blood pressure, heart rate). At the same time, based on the general well-being and subjective assessments of athletes who took adaptogens, there was a significant improvement in vitality, strong-willed stimulation, motivation for subsequent aerobic exercise, and strength sports, which resulted in overcoming 10% of athletes in the plateau. A review of scientific and popular scientific literature, the use of preparations based on ginseng, eleutherococcus and leuzea can contribute to improving sports performance of junior athletes and even professionals. However, these drugs are harmless to human health and are not listed in the WADA list.

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