WayScience

6th International Scientific and Practical Internet Conference

«Integration of Education, Science and Business in Modern Environment: Winter Debates»

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Medical sciences
(Pharmaceutical sciences)

FORMATION OF MODERN REQUIREMENTS FOR THE QUALITY OF A DIETARY SUPPLEMENT FOR ATHLETES CONTAINING A COMPLEX OF AMINO ACIDS

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Introduction Branched-chain amino acids (BCAAs) are three essential amino acids: leucine, isoleucine, and valine, which have a branched molecular structure [1]. They make up approximately 35% of all amino acids in muscle tissue and play a key role in the processes of protein synthesis and muscle recovery after exercise. Since the body cannot synthesize these amino acids on its own, they must be obtained from food or special supplements. BCAAs are widely used in dietary supplements, especially among athletes, bodybuilders, and people who are actively involved in fitness. The main reason for the popularity of these amino acids is their ability to maintain muscle tone, reduce fatigue, and accelerate recovery after training. Leucine, one of the key BCAA amino acids, activates the mTOR protein complex, which stimulates the growth and repair of muscle tissue. In addition, BCAAs help protect muscles from destruction during intense physical exertion, especially in a calorie deficit. They are also able to reduce the level of tryptophan in the brain, slowing the formation of serotonin, a hormone that causes fatigue. Because BCAAs are metabolized directly in the muscles, they can serve as a source of energy during exercise, which makes them especially useful for long, high-intensity workouts. BCAA supplements are usually available in powder, capsule, or liquid concentrate form. They are recommended to be taken before, during, or immediately after exercise to maximize muscle recovery. A typical dose is 5-10 g per day, depending on activity level and body weight. BCAAs are especially useful for those looking to build muscle mass, improve endurance, or minimize muscle soreness after exercise. [2]

To improve the situation with the quality control of dietary supplements, it is necessary to increase the requirements for manufacturers and strengthen control at all stages: from product development to its implementation. Among the measures that can improve the system is the introduction of mandatory certification according to international standards, such as GMP (Good Manufacturing Practice). Registration of new supplements should be accompanied by mandatory laboratory tests. Increasing control standards will help protect consumer health, develop fair competition and increase confidence in the dietary supplement market in Ukraine. That is why the development of a draft specification and control methods for a dietary supplement containing a mixture of amino acids is an urgent task.

Materials and methods of research: bibliographic, analytical and comparative - study of current standards (Ukrainian Pharmacopoeia, USP, European Pharmacopoeia) for quality control of raw materials and finished products., logical, generalization.

Results: Given the very similar structure of valine, leucine, and isoleucine and the similarity of pharmacopoeial analysis methods, we propose to use physicochemical analysis methods for quality control of APIs. The first step is the identification and quantification of BCAAs. High-performance liquid chromatography (HPLC) is used to precisely determine the concentration of each amino acid. Thin-layer chromatography (TLC) can also be used to confirm the presence of amino acids and infrared spectroscopy (FTIR) can be used to analyze characteristic functional

groups.The next important aspect is to check for purity and the absence of impurities. Gas chromatography with mass spectrometry (GC-MS) helps to detect organic impurities, while atomic absorption spectroscopy (AAS) can determine the level of heavy metals such as lead, cadmium, mercury and arsenic. In addition, microbiological analysis is performed to exclude bacterial contamination, the presence of yeast and mold. Stability tests are performed to determine shelf life. In particular, accelerated aging testing (elevated temperature and humidity) allows us to assess how the properties of the product change over time. Chromatographic analysis allows us to verify the stability of BCAAs during storage. The last but not least important stage is dosage control. The mass of the capsules or powder is checked for compliance with the declared dose, as well as the even distribution of the active ingredients in the product.

Conclusions: An analysis of the market of dietary supplements for athletes containing BCAA (branched-chain amino acids) was conducted. It was shown that the largest number of DD is produced in the form of capsules (36.1%), the largest producers are Poland (23.2%) and the USA (22.5%). . A draft specification for DD in the form of capsules containing leucine:isoleucine:valine in the ratio 2:1:1 was proposed, which includes modern physicochemical methods and pharmaco-technological tests. This specification can be used in laboratory conditions for standardization and certification of dietary supplements containing BCAA (Branched-chain amino acids) - branched-chain amino acids

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