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Gunina L. M.¹, Milashius K. M.², Chernozub A. A.³,

Danylchenko S. I.³, Voitenko V. L.⁴

Improving the Training of Qualified Athletes-Students by Modern Nutritional Technologies

¹Olympic Institute of National university of physical training and sport of Ukraine,
Kyiv, Ukraine

²Vytautas Magnus University, Kaunas, Lietuva

³Petro Mohyla Black Sea National University, Mykolaiv, Ukraine

⁴Medical Institute of Sumy State University, Sumy, Ukraine

Currently, a significant part of highly qualified athletes are students of higher educational institutions at the same time, which manifests itself not only in an ultra-high level of physical activity, but also in significant psycho-emotional stress. Therefore, the search and introduction of modern technologies in the process of sports training, including pharmacological, hygienic, rehabilitation, etc. are continuing. An essential place among such technologies is occupied by a comprehensive methodology of nutrition-metabolic support of the training process, built on the principles of evidence-based medicine and using the latest achievements of laboratory and functional diagnostics, biochemistry and pharmacology.

The purpose of the study is the formation of ideas about the necessity, validity and effectiveness of nutritive-metabolic support of the process of sports training of students of higher education institutions.

Nutrition-metabolic support is part of a sporting nutritiology that possesses all the features of basic science – terms, definitions, and at the same time has great practical significance, helping to form relevant and well-grounded programs of nutrition-metabolic support of the training and competitive process of athletes, as well as to contribute to preservation the health and quality of life of athletes. This position is particularly important in student sports, where the body of an athlete is exposed to additional stressors due to the complexity of the need for a rational and effective combination of the educational and training process of highly qualified athletes.

Conclusion. The applied nutritive-metabolic technologies such as methods of metabolic support of motor activity should take into account the specialization and qualifications of athletes, their gender-age characteristics and should be applied depending on the

training period and the orientation of the loads. In connection with the improvement and tightening of doping control, it is extremely important that sports nutrition products and special nutritional supplements that are widely used to optimize the functional state of the athlete's body and maintain their health and quality of life do not contain substances related to the World Anti-Doping Agency Prohibited List, while ensuring a pronounced ergogenic effect.

Keywords: sports of the highest achievements, student-athletes, sports nutritiology, functional sports nutrition products, supplements.

Research relation to the programs, plans, and department themes. The work was carried out within the framework of the research work of the National University of Physical Education and Sport of Ukraine «Health-saving technologies of stimulating the working capacity of qualified athletes» (state registration number 0114U001532).

Introduction. In modern difficult conditions of university education and at the same time the participation of many students in the process of sports training, the problem of optimization and maintenance of the functional state of the body acquires special significance. Various factors can be used to solve this problem, primarily out-of-training – rehabilitation technologies, hypoxic trainings, pharmacological programs and support of nutrient composition of the diet. Because of the minimal toxicity to the organism, it is the optimization of diet and the use of special food additives that take the most important place in improving the training of athlete students [1, 2].

The purpose of the work is the formation of ideas about the necessity, validity and effectiveness

of nutritive-metabolic support of the process of sports training of students of higher education institutions.

Methods of research – review and systematization of existing scientific literature data on the issue under study.

Results. Sports nutrition as a science (sport nutrition science) is an integral part of clinical nutrition and deals with all aspects of the influence of food (nutrition) and its components (nutrients) on human life and health, active in sports, adaptation of the regime (diet) nutrition to changing conditions in everyday life, training and competition to maximize physical fitness, and the processes by which the athlete consumes, absorbs, transports, disposes and excretes all components of the diet [3].

The objectives of sports nutrition are the development, study and practical introduction of sports nutrition products in order to enhance the adaptation to excessive physical activity, accelerate the recovery and preservation of the health of athletes, and one of the main tasks of this discipline is to identify and correct the factors limiting the physical working capacity of athletes.

Methods of nutritional support for motor activity should take into account the specialization and qualifications of athletes, their gender and age characteristics and should be applied depending on the period of preparation and the orientation of the loads. In connection with the improvement and tightening of doping control, it is extremely important that sports nutrition products and nutritional supplements (NS), or earlier biologically active additives (BAA) widely used in sports, do not contain substances related to the WADA Prohibited List, while providing pronounced ergogenic effect [4].

Unfortunately, many questions of individualized nutritional, as well as pharmacological, support of sports activity and improvement of physical working capacity all over the world are «carefully guarded secret» which explains the current lack of reliable and objective information in the special literature [5].

At present, the system of training in sport, especially of the highest achievements, is characterized by exceptionally high training and competitive loads accompanied by a high level of emotional stress. Many Olympic champions are students of higher education institutions and students of the Olympic Reserve Higher Schools. Undoubtedly, the combination of educational and training process imposes a much greater responsibility on the athlete and creates an additional number of stressors in the body. It is quite natural that such high loads are the most powerful factor in mobilizing the organism's functional reserves, stimulating intensive adaptation processes, increasing stamina, strength, speed abilities and, naturally, the growth of sports results. At the same time, an important role in

increasing physical working capacity, preventing fatigue and accelerating recovery processes after physical activity belongs to rational nutrition and the reasonable use of special means of nutritional support.

Therefore, modern sport of the highest achievements, and student sport is no exception, is characterized by the increasing role of dietary factors in the system of means and methods ensuring the high level of working ability of an athlete throughout his career. The change in the structure of the training process required special attention to the issues of nutrition organization at different stages of the annual training cycle and during the competition. The introduction of two- and three-time training significantly changed the diet of highly qualified athletes, and the improvement of training methods led to a significant increase in the energy consumption of the organism. The identification of metabolic characteristics in the process of assimilation of nutrients at the cellular and sub-cellular level made it possible to determine the athlete's needs in individual components of the food ration, to determine their optimal ratios, necessary for increasing physical working capacity, accelerating the processes of adaptation to loads and the influence of negative environmental factors, and activating the processes of body recovery.

There was a need for adequate energy recovery by increasing the energy value of nutrition, which in turn led to the need of the creation of specialized food for athletes, the development of special food of greater nutritional value, as well as dietary (biologically active, food additives) as important dietary factors of ergogenic orientation [6]. Thus, in modern sports-medical science and practice, pharmacology and dietary science a new science has appeared – sports nutrition [7], which is still very young but of importance for the practice of training athletes, including improving the effectiveness of competitive activity and longevity, while maintaining the health and quality of life of athletes in our opinion, it is difficult to overestimate.

It is now well established that scientifically sound, literate, individualized use of macro, micro and pharmaceuticals can optimize human capabilities, increase the strength of muscle contraction, general and special endurance of both in professional and amateur athletes.

The nutritive-metabolic support (NMS) strategy is an alternative to «rigid», and sometimes prohibited, pharmacology, and is based on the principle of «gradual but steady formation of directed metabolic changes in the organism, improving the physical form of a person». This approach is similar to the modern approach in clinical nutritiology, where a definition of «nutritive-metabolic therapy» already exists [8]. As emphasized by the authors [9, 10], «*numerous studies allow us to state that the existing malnutrition is a*

slower recovery, the threat of various complications, a longer hospital stay, higher costs for the treatment and rehabilitation of patients, as well as their higher lethality». Nutritive-metabolic support is now an integral part of basic or (more often) adjuvant therapy of most diseases and pathological states (syndromes).

For the field of sports nutrition, carefully selected by composition, adapted by frequency and duration of application in a particular sport, individualized by the NMS in combination with a balanced basic diet (food ration) is able to create metabolic conditions for the expression of the body's maximum physical and mental abilities, avoiding development of protein-energy and substrate insufficiency, increased risk of injury and delayed recovery. In the actual conditions of sport of the highest achievements, including student elite sports, as studies have shown, energy deficiency (negative difference between energy input and consumption) occurs on average in 43% of the representatives of most sports, contributing to the formation

of negative metabolic changes, slow recovery, lower sports performance and high risk of injury.

New nutrition strategies are based on product-specific effects on signaling and metabolic cell pathways that provide muscle strength, and power, endurance, rapid recovery of water-electrolyte, protein, carbohydrate and fat metabolism after loading in all sports, which will help qualified students-athletes to achieve competitive results while maintaining health and quality of life.

Conclusion. Thus, the application of modern nutritional technologies makes it possible to successfully combine the educational process with the strenuous process of sports training, while contributing to the optimization of the functional state of the organism, maintaining health and achieving a highly competitive outcome.

The prospects for further research lie in the assessment of safety and in the study of the effectiveness of various diets and special food supplements in the training of student athletes.

References

1. Pilis K, Stec K, Pilis A, Mroczek A, Michalski C, Pilis W. Body composition and nutrition of female athletes. *Rocz Panstw Zakl Hig.* 2019;70(3):243–251. PMID: 31515983. doi: 10.32394/rpzh.2019.0074
2. Harty PS, Zabriskie HA, Erickson JL, Molling PE, Kerksick CM, Jagim AR. Multi-ingredient pre-workout supplements, safety implications, and performance outcomes: a brief review. *J Int Soc Sports Nutr.* 2018;15(1):41. PMID: 30089501 PMID: PMC6083567. doi: 10.1186/s12970-018-0247-6
3. Dmitriev AV, Gunina LM. *Fundamentals of Sports Nutrition.* SPb: Izd-vo «Russkiy yuvelir»; 2018. 560 p.
4. Dmitriev AV, Gunina LM. *Sports Nutrition.* M: Izd-vo «Sport»; 2020. 639 p.
5. Dmitriev Alexander, Gunina Larisa. Sports nutrition: science and practice of implementation in the aspect of improving performance and maintaining the health of athletes. IOC Consensus. *Nauka v olimpiyskom sporte.* 2018;(2): 70–80. doi: 10.32652/olympic2018.2_6
6. Mankowski RT, Anton SD, Buford TW, Leeuwenburgh C. Dietary Antioxidants as Modifiers of Physiologic Adaptations to Exercise. *Med Sci Sports Exerc.* 2015;47(9):1857–1868. PMID: 25606815. PMID: PMC4690615. doi: 10.1249/MSS.0000000000000620
7. Busquets-Cortés C, Capó X, Martorell M, Tur Josep A, Sureda Antoni, Pons Antoni. Training Enhances Immune Cells Mitochondrial Biosynthesis, Fission, Fusion, and Their Antioxidant Capabilities Synergistically with Dietary Docosahexaenoic Supplementation. *Oxid Med Cell Longev.* 2016; 2016: 8950384. PMID: 27698953. PMID: PMC5028859. doi: 10.1155/2016/8950384
8. Dmitriev AV, Kalinchev AA. *Pharmacnutrients in sports medicine.* M: Izd-vo «Binom»; 2017. 280 p.
9. Luft VM, Afonchikov VS, Dmitriev AV. *Clinical Nutrition Guide.* Luft VM, Ed. SPb: «Art-Ekspress»; 2016. 484 p.
10. Luft VM, Dmitriev AV. The concept of “Rapid Metabolic Optimization” in the preoperative preparation of patients in abdominal surgery (review). *Hirurgiya. Zhurnal imeni NI Pirogova.* 2017;(10):65–71. PMID: 29076485. doi: 10.17116/hirurgia20171065-71

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СОВЕРШЕНСТВОВАНИЕ ПОДГОТОВКИ КВАЛИФИЦИРОВАННЫХ СПОРТСМЕНОВ-СТУДЕНТОВ С ПОМОЩЬЮ СОВРЕМЕННЫХ НУТРИЦИОЛОГИЧЕСКИХ ТЕХНОЛОГИЙ

Гунина Л. М., Милашюс К. М., Чернозуб А. А., Данильченко С. И., Войтенко В. Л.

Резюме. В настоящее время значительная часть высококвалифицированных спортсменов является одновременно студентами высших учебных заведений, что проявляется не только в сверхвысоком уровне физических нагрузках, но и значительном психоэмоциональном напряжении. Поэтому поиски и внедрение в процесс спортивной подготовки современных технологий, включая фармакологические,

гигиенические, реабилитационные и др., постоянно продолжают. Существенное место среди таких технологий занимает комплексная методология нутритивно-метаболической поддержки тренировочного процесса, построенная на принципах доказательной медицины и использующая самые последние достижения лабораторной и функциональной диагностики, биохимии и фармакологии. Нутритивно-метаболическая поддержка является частью спортивной нутрициологии, которая обладает всеми чертами фундаментальной науки – терминами, понятиями определениями, и одновременно имеет большую практическую значимость, помогая как формировать актуальные и обоснованные программы нутритивно-метаболической поддержки тренировочного и соревновательного процесса спортсменов, так и способствовать сохранению здоровья и качества жизни спортсменов. Особую важность это положение обретает в студенческом спорте, где на организм спортсмена воздействуют дополнительные стрессорные факторы, обусловленные сложностями необходимости рационального и эффективного сочетания учебного и тренировочного процесса спортсменов высокой квалификации. Применяемые нутритивно-метаболические технологии как методы метаболической поддержки двигательной активности должны учитывать специализацию и квалификацию спортсменов, их поло-возрастные особенности и применяться в зависимости от периода подготовки и направленности нагрузок. В связи с совершенствованием и ужесточением допинг-контроля крайне важно, чтобы продукты спортивного питания и специальные пищевые добавки, широко применяемые для оптимизации функционального состояния организма спортсмена поддержания его здоровья и качества жизни, не содержали веществ, относящихся к Запрещенному списку WADA, при этом обеспечивая выраженный эргогенный эффект.

Ключевые слова: спорт высших достижений, студенты-спортсмены, спортивная нутрициология, функциональные продукты спортивного питания, специальные пищевые добавки.

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ВДОСКОНАЛЕННЯ ПІДГОТОВКИ КВАЛІФІКОВАНИХ СПОРТСМЕНІВ-СТУДЕНТІВ ЗА ДОПОМОГОЮ СУЧАСНИХ НУТРИЦІОЛОГІЧНИХ ТЕХНОЛОГІЙ

Гуніна Л. М., Мілашюс К. М., Чернозуб А. А., Данильченко С. І., Войтенко В. Л.

Резюме. В даний час значна частина висококваліфікованих спортсменів є одночасно студентами вищих навчальних закладів, що проявляється не тільки у надвисокому рівні фізичних навантажень, але і значному психоемоційному напруженні. Тому пошуки й впровадження в процес спортивної підготовки сучасних технологій, включаючи фармакологічні, гігієнічні, реабілітаційні та ін., постійно тривають. Вагоме місце серед таких технологій займає комплексна методологія нутритивно-метаболическої підтримки тренувального процесу, яка побудована на принципах доказової медицини, і використовує найостанніші досягнення лабораторної та функціональної діагностики, біохімії і фармакології. Нутритивно-метаболическа підтримка є частиною спортивної нутрициології, яка володіє як усіма рисами фундаментальної науки – термінами, поняттями, визначеннями, водночас має велику практичну значущість, допомагаючи як формувати актуальні і обґрунтовані програми нутритивно-метаболическої підтримки тренувального і змагального процесу спортсменів, так і сприяти збереженню здоров'я та якості життя спортсменів. Особливу важливість це положення знаходить в студентському спорті, де на організм спортсмена впливають додаткові стресові фактори, обумовлені складностями необхідності раціонального та ефективного поєднання навчального і тренувального процесу спортсменів високої кваліфікації. Нутритивно-метаболическі технології як методи метаболическої підтримки рухової активності повинні враховувати спеціалізацію і кваліфікацію спортсменів, їх статево-вікові особливості й застосовуватися з урахуванням періоду підготовки і спрямованості навантажень. У зв'язку з удосконаленням і посиленням допинг-контролю вкрай важливо, щоб продукти спортивного харчування та спеціальні харчові добавки, які широко застосовуються для оптимізації функціонального стану організму спортсмена підтримки його здоров'я та якості життя, не містили речовин, що належать до Забороненого списку WADA, й при цьому забезпечували виражений ергогенний ефект.

Ключові слова: спорт вищих досягнень, студенти-спортсмени, спортивна нутрициологія, функціональні продукти спортивного харчування, спеціальні харчові добавки.

ORCID and contributionship:

Larisa M. Gunina : 0000-0003-2107-0983^{A,B,C,E,F}

Kazys Milashus : 0000-0002-1109-7421^{C,E,F}

Andrii A. Chernozub : 0000-0001-6293-8422^{C,D,F}

Svitlana I. Danylchenko : 0000-0001-5312-0231^{C,D,F}

Valentina L. Voitenko : ORCID: 0000-0002-3911-8116^{B,C,E}

A – Work concept and design, B – Data collection and analysis,
C – Responsibility for statistical analysis, D – Writing the article,
E – Critical review, F – Final approval of the article

CORRESPONDING AUTHOR

Larisa M. Gunina

National Ukrainian University of Physical Education and Sports,
Olympic Institute

15 A, Goloseevsky Ave., apt. 88, Kyiv 03039, Ukraine

tel. +380996063251, e-mail: gunina.sport@gmail.com

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