

DOI: <https://doi.org/10.54702/3mexqd66>**The effect of dynamic lactic training on specific endurance, the enzyme creatine phosphokinase, and 1500-meter running achievement under 20 years of age**Rahim Ruaih Habeeb⁽¹⁾✉, Muhammed Hatem Abdul Zahra⁽²⁾✉, Talib Shahad Ghanem⁽³⁾✉

1&2 Physical Education and Sport Sciences College / Al-Qadesiah University

3 College of Veterinary Medicine / University of Baghdad

Received: 08/01/2024, Accepted: 06/03/2024, Published: 30/04/2024

This work is licensed under a [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/)., © Modern Sport**Abstract**

The physical and functional preparation of the body's systems is of great importance in order to reach the best sporting achievements. The development of skill levels and the amazing digital achievements that we hear about being achieved in various sports are certainly the result of the development of various sports and physiological sciences and coaches following the correct scientific approaches in an attempt to invest human energy to the maximum limits. Training for athletics events depends on developing scientific and codified training programs to develop the level of the athlete and bring him to the highest levels. Each event has its own specifications and requirements, including middle-distance running events, including the 1,500-meter running event, which requires the development of some physical characteristics and its energy systems to obtain... Physiological and physical adaptation to perform and withstand the effort expended during the race to achieve the best time. From this standpoint, the research problem was focused on preparing dynamic lactate training exercises and their effect on specific endurance, the enzyme (CPK), and achieving a 1,500-meter run. The study aimed to identify the effect of dynamic lactate training exercises on specific endurance, the enzyme (CPK), and achieving a 1,500-meter run. The researchers used the experimental method (one group) to suit the nature of the research, and the research sample was chosen randomly from the research community represented by young players from Diwaniyah Governorate athletics clubs in middle-distance running, aged (18-19) years, numbering (8) players for the season. Athlete (2022 - 2023). Then the researchers carried out the homogenization process according to the research variables, and through the results, the researchers concluded that a direct relationship appeared between the high level of the enzyme (CPK) and the level of development of achievement. Dynamic lactate training also had a clear effect on special endurance, which led to the development of Achievement (running 1,500 meters). The study aimed to invest human energy in the training method and functional and physical variables in developing the achievement of the 1,500-meter running event. and this achieves one of the sustainable development goals of the United Nations in Iraq which is (Good Health)

Keywords**dynamic lactate training , special endurance , creatine phosphokinase enzyme , running 1500 meters****Introduction:**

Through field experience in training for medium and long-distance running and reviewing many scientific sources and references and the opinions of experts in sports training, he noticed that there is a discrepancy among them in determining which is more important and contributes to energy

production systems within training programs in developing physical characteristics and physiological variables affecting 1500 meter running event, as this event has become one of the fast-paced competitions as a result of the world's achievements. From this standpoint, the research problem was focused on preparing dynamic

lactate exercises and their effect on personal endurance and the enzyme creatine phosphokinase (CPK), and achieving 1500 meter running. This is for contributing to achieving and developing the Iraqi digital level of (3.43.33) minutes compared to what the world reached with a number of (3.26.00) minutes. From this standpoint, the importance of research lies in knowing the extent of the impact of these exercises on special endurance (speed endurance - Strength endurance) and the enzyme creatine phosphokinase (CPK) and running 1500 meters, in order to achieve the best possible level of achievement. The study aimed to prepare dynamic lactate training and identify the effect of dynamic lactate training on specific endurance, the enzyme (CPK), and the achievement of running (1500) meters for under 20 years. The researchers hypothesized that there is an effect of dynamic lactate training on specific endurance, the enzyme (CPK) and the achievement of running (1500). meter. The research areas were represented by the human field, which are the young players of Al-Qadisiyah Governorate clubs in athletics, who ran the 1,500 meters for the 2022-2023 season, and the spatial field on the athletics track and the indoor sports hall in the College of Physical Education - Al-Qadisiyah University, and the Diwaniyah Sports Club stadium, while the

temporal field took a period of years 20 /10/2023 until 30/12/2023.

Methods and procedures:

The researchers used the experimental method (one group) because it suits the nature of the research, and it is one of the methods through which accurate results can be reached, as (Wajih Mahjoub) pointed out that “experimentation is one of the most efficient means of arriving at reliable knowledge” (1). (Qasim Al-Mandalawi) pointed out, “It is the only method that can truly test the hypotheses of cause-and-effect relationships.” (2) as the research population was determined from young athletes from Diwaniyah Governorate athletics clubs in middle-distance running and under (20) years of age. The number of them is (10) players for the sports season (2022 - 2023), then the research sample was chosen randomly and numbered (8) players from the research community after excluding (2) players due to injury, as they constituted (80%) of the research community. The researchers then performed the homogenization process according to the research variables, as in Table (1). Accordingly, the measurements were determined by performing a skewness coefficient law treatment after extracting the arithmetic mean, standard deviation, and mode for the sample, and Table (1) shows this.

Table .1 shows the arithmetic mean, standard deviation, median, and skewness coefficient for the research variables

Variables	Arithmetic mean	Standard deviation	Mode	Skewness	Result
Weight	69.42	6.27	70	-0.09	Homogeneous
Length	186.25	9.07	185.5	0.08	Homogeneous
Chronological age	17.5	0.67	18	-0,74	Homogeneous
Training age	2.71	1.62	2	0,43	Homogeneous
Endurance speed(s)	97	0.365	93	0.3.88	Homogeneous
Endurance strength (meters)	200	2	208	2	Homogeneous
Chemical variable (cpk)	228.083	8.509	232.022	0.09	Homogeneous
Achievement(min/sec)	4.10.20	0.365	271.02	3.975	Homogeneous

The devices and means used included registration forms and (5) electronic manual stopwatches. Electronic calculator (Sharp) - medical cotton - sterile material. Accordingly, the researchers decided to evaluate the level of performance of the research sample through variables under study in the pre- and post-tests of the experimental

group, as (Muhammad Reda Ibrahim) indicated that (tests are one of the important means of evaluating the level reached The athlete also shows the validity of any training program (3). Then the group's pre- and post-tests were compared to determine the differences between

them and which had more influence on those variables and achievement.

The tests included:

Tests and measurements used in the speed endurance test (4) (Shaker Mahmoud).

Speed endurance is tested by running (600) meters on an athletics track, and the time taken is recorded to the nearest fraction of a second.

Strength Endurance Test (4) (Shaker Mahmoud).

The test is performed by alternating running and jumping for one minute on an athletics track, and the distance traveled is recorded in meters. While the measurement of creatine phosphokinase (CPK) was done by drawing a blood sample amounting to (5) cc by a specialized doctor, who tied the upper arm area with a compression bandage (Tourniquet) in the muscular vein. After that, the amount of blood was drawn and the samples were placed in storage tubes. The names of the players are recorded on it and placed in a cooling box. Then it is transported to the laboratory to conduct the necessary analysis to extract the concentration of the CPK enzyme. As for the achievement, it was a test of running 1,500 metres. After the tests, the researchers prepared dynamic lactate exercises to develop special endurance and the enzyme (CPK) and to complete a 1,500-meter run, relying on their field experience and drawing on the opinions of some experts and specialists in the field of sports training and athletics, in addition to scientific training and physiological sources. See Appendix (2). These programs included different proportions of anaerobic and aerobic training for a period of (8) weeks, as (Muhannad Al-Bashtawi) indicated that the activity of the CPK enzyme increases by 36% after an 8-week training program, and therefore the training does not increase the muscle reserve of creatine phosphate. Not only that, but its breakdown rate also increases, and this shows the extent of the benefits resulting from increasing the reserve and increasing the breakdown of creatine phosphate to

produce energy, which appear and are available through appropriate training approaches” (5). The researchers conducted the exploratory experiment, which is a miniature image of what will be applied on the day of the actual implementation of the tests. This is done on a small sample of the community to which the tests will be applied, in order to avoid the difficulties and obstacles that the researchers may face during the implementation of the main experiment, and to identify the strengths and weaknesses of the work. And the extent of its validity. In order for the work to be accurate, the researcher conducted the exploratory experiment for the purpose of arriving at the correct results and implementing the tests accurately. The researchers conducted the exploratory experiment on Tuesday 2/17/2024 in the arena and field stadium in the Afak Olympic Stadium, where the researchers applied the study tests for the purpose of Knowing the suitability of the tests to the level of the research sample members, identifying the extent of the sample members’ understanding and assimilation of the tests used, ensuring the number and efficiency of the assistant work team, and knowing the time it takes the researcher to apply his tests and the time it takes to apply each test.

The pre-tests for the research were conducted by the work team and under the supervision of the researchers for the group of individuals in the research sample, which included laboratory tests and field tests, which included two days. The first day contained speed and strength endurance tests, while the second day contained a 1,500-meter running test and the chemical variable (CPK). Then, posttests and measurements were conducted on the research sample in the same manner in which the pretests and measurements were conducted. As for statistical methods

Statistical methods: The search data was processed through the Statistical Package for the Social Sciences (SPSS).

Law of rate of evaluation = $\frac{\text{Highest value} - \text{lowest value}}{\text{lowest value}} \times 100$ (6) (Muhammad Abdel-Al Amin)

Results:

Table .2 shows the arithmetic mean, the standard deviation, the calculated and tabulated T-value, and the

No.	Variables	Arithmetic mean	Standard deviation	T value Calculated	T value Tabulated	Type sig
1	Pre-test	97	0.365	17.111	2.021	sig
2	Post-test	93	0.664			
Under 8 degrees of freedom and an error level of 0.05						

significance of the differences in the pre- and post-tests in speed endurance.

Table .3 shows the percentage of evaluation between the pre- and post-tests in speed endurance

Variable test	Pre-test (sec/min)	Post-test (sec/min)	Percentage of evaluation	
			Time difference	%
Group	97	93	4	5.36

Table .4 shows the arithmetic mean, the standard deviation, the calculated and tabulated T value, and the

No.	Variables	Arithmetic mean	Standard deviation	T value Calculated	T value Tabulated	Type sig
1	Pre-test	200	0.365	17.111	2.021	sig
2	Post-test	233	0.664			
Under 9 degrees of freedom and an error level of 0.05						

significance of the differences in the pre- and post-tests in strength endurance.

Table .5 shows the percentage of evaluation between the pre- and post-tests in strength endurance

Variable test	Pre-test (meter)	Post-test (meter)	Percentage of evaluation	
			Time difference	%
Group	200	233	33	6.81

Table .6 shows the arithmetic means, standard deviations, and the calculated and tabulated T value for the

No.	Variables	Arithmetic mean	Standard deviation	T value Calculated	T value Tabulated	Type sig
1	Pre-test	228.083	8.509	4.438	2.021	Sig
2	Post-test	238.08	5.484			

research sample for both the pre- and post-test in the test for measuring the CPK enzyme in the blood

Table .7 shows the arithmetic mean, the standard deviation, the calculated and tabulated value (t), and the

No.	Variables	Arithmetic mean	Standard deviation	T value Calculated	T value Tabulated	Type sig
1	Pre-test	4.10.20	0.365	17.111	2.021	Sig
2	Post-test	4.03.66	0.664			
degrees of freedom and an error level of 0.05						

significance of the differences in the pre- and post-tests in achieving a 1,500-meter run.

Table .8 shows the percentage of evaluation in the pre- and post-tests for achieving a 1500-meter run.

Variable test	Pre-test (sec/min)	Post-test (sec/min)	Percentage of evaluation	
			Time difference	%

Achievement

4.30.20

4.23.66

6.54

2.42

Discussion:

Through the tables above, the results appeared clear between the pre- and post-tests. The researchers attribute this development in the speed endurance and strength endurance variables of the sample to the application of the dynamic lactate training vocabulary, which contained training loads based on scientific foundations of size, intensity, and rest commensurate with the capabilities of the research sample in terms of training intensity. In different proportions, a large percentage of anaerobic training was used compared to aerobic training, which helped these training to improve and develop speed endurance among the athletes of the research sample, as (Abu Al-Ala Ahmed Abdel Fattah) confirmed (that speed endurance training performed at an intensity close to the athlete's maximum intensity works to improve the ability of the device. The central nervous system transmits nerve signals to the muscle and the effectiveness of these signals and their role in alerting the muscle to contract despite conditions of increased accumulation of lactic acid in the muscles and blood (7). As for (Mufti Ibrahim Hammad) (anaerobic training, which is used by performing exercises with high intensity, leads to an increase in the system Lactic energy production also adds that muscle organizations increase with increased anaerobic training, which allows for high levels of muscular efficiency and better levels of lactic acid, which allows oxygen to be released from lactic acid to be electronic, which reduces fatigue (8). The development of strength endurance was evident with self-resistance through various jumping exercises, and continuing to exert this strength for as long as possible. Mufti Ibrahim emphasized, "The more muscular strength increases, the more resistance it can overcome, the more speed increases." (8), as it appears that the continuation of muscular work for a relatively long period without a significant drop in speed was the distinguishing feature among the sample as a result of improved strength endurance. They have through those exercises used. For the purpose of identifying the rate of development of the sample level as a result of applying the training program and its effect on the development of speed

endurance and strength endurance, as it is one of the variables of the study, the rate of development was extracted by comparing the pre-test and post-test, as in Table (3) and (5). As for Table (6), which shows the results of the statistical treatments for laboratory tests for the research sample, the calculated (T) value was (4.438), which is greater than the tabulated T value, which indicates the presence of a significant difference in favor of the post-test, and the researchers attribute this increase in the concentration of This enzyme is part of the training curriculum to which the research sample was exposed, and since dynamic lactate training has a high content of anaerobic training, it highlights the role of the CPK enzyme in helping the body to obtain ATP from creatine phosphate with the help of this enzyme. (Majewski, M., Susanne, H., & Klaus, S) have concluded (that the activity of the CPK enzyme after training is affected by several variables, namely chronological age, training age, gender, and the inter-training intensity and duration) (9). Accordingly, the main influence on the level of CPH enzyme activity in the research sample can be considered the training approach, as researchers believe that the amount of energy produced from ATP is not sufficient to perform complex exercises (speed endurance, speed endurance, power endurance) whose time exceeds 3 seconds. The reason for this is that the amount of ATP stored in the muscle is a small amount, which most sources confirm is depleted during the first seconds of exercise. (Ali Muhammad Talaat) pointed out that (monitoring differences in the concentration of this enzyme through laboratory tests is very important, as it gives an indication A detailed study on the development of phosphate capacity, especially on the use of the anaerobic system during sports training (10). From observing previous research and studies on this enzyme, we notice that most of these studies agree on increasing the activity of the CPK enzyme, which occurs by increasing the concentration of that enzyme inside the muscle cell, which enters as an auxiliary factor to increase anaerobic metabolic processes inside the muscle cell, thus increasing the speed of muscle contraction and the maximum speed of the player for a period of time.

A specific period of time, and this was confirmed by (Safaa Razouki) when he pointed out that muscle activity is accompanied by a series of reactions in which enzymes contribute as auxiliary factors, an effective active contribution, and thus the activity of enzymes that work as auxiliary factors in the anaerobic metabolism process increases clearly due to training (11).

When observing Table (7-8), it appears that there has been a development in the time of running (1500) meters among the sample, as we notice in the aforementioned table significant differences in the time of running (1500) meters in the pre- and post-test, in favor of the post-test. The researchers attribute this development to the application of the vocabulary of dynamic lactate training, which contained training loads based on scientific foundations of size, intensity, and rest, commensurate with the capabilities of the research sample and the requirements of the research's physiological variables and achievement, as the proportion of the program's exercises included (anaerobic-aerobic). (Raysan Khuraibit) mentions that "regular and programmed training, the use of regulated types of intensity in training, and the use of optimal types of rest between repetitions lead to an improvement in achievement" (13). Therefore, the development that occurred among the sample after implementing the training program led to the occurrence of A change in the variables of physical and chemical research and achievement, as (Ahmed Farouk Khalaf) confirmed, "The process of regular training leads to changes in the cells of various tissues of the body. The changes that occurred after aerobic and anaerobic training are the improvement of the ability to perform muscle work in the absence or availability of oxygen." This improvement occurs mainly through an increase in myoglobin and mitochondria (energy houses), in addition to an increase in muscle glycogen stores, in addition to an increase in enzyme activity (12). For identifying the rate of development of the sample level as a result of the application of the training program and its effect on achievement, the rate of development was extracted. By comparing the pre- and post-test, as in Table (8). As it is mentioned in the similar study (14)

Conclusions:

Through the results, the researchers concluded that there is an effect of dynamic lactate prepared exercises in improving and developing the study variables and achievement. Significant differences also appeared between the pre- and post-tests for the study variables, and there is a direct relationship between the increase in the level of the enzyme (CPK) and the level of development of achievement. In addition, special endurance exercises led to the development of Endurance of speed and development of strength, which led to the development of achievement.

Recommendations:

The researchers recommend the necessity of preparing training curricula according to the physiological foundations for young people, in addition to knowing their experimental impact in running medium and long distances, and the necessity of conducting physical and physiological tests as indicators of the adaptation of functional systems and evaluating the training status of Iraqi club athletics players.

References:

- 1- Wajih Mahjoub. (1993) Scientific Research Methods and Methodologies, Baghdad, Dar Al-Hekma for Printing and Publishing, p. 327.
- 2- Qasim Al-Mandalawi. (1989). Tests, measurement and evaluation in physical education, Mosul, Higher Education Press, p. 217.
- 3- Muhammad Reda Ibrahim (2008). Field application of theories and methods of sports training, 1st edition, Baghdad, Al-Fadhli Office, p. 256.
- 4- Shaker Mahmoud Zanil (2001) The effect of standardized fartlek training methods on developing speed endurance, lactic acid concentration in the blood, and achieving 400m and 1500m runs, unpublished doctoral thesis, University of Baghdad, College of Physical Education, p. 54.
- 5- Muhannad Hussein Al-Bashtawi (2006): Physiology of Physical Training, 1st edition, Amman, Wael Publishing House, p. 87.
- 6- Muhammad Abdel-Al Amin. (2005) Advanced Statistics in Physical Education

- with Spss Applications, Baghdad, Dar Al-Hekma for Printing and Publishing, p. 127.
- 7- Abu Al-Ala Ahmed Abdel Fattah (1996). Load training and athlete health, advantages and risks, Cairo, Dar Al-Fikr Al-Arabi, p. 195
 - 8- Mufti Ibrahim Hammad. (2001). Modern sports training - planning, application and leadership, 2nd edition, Cairo, Dar Al-Fikr Al-Arabi, 127
 - 9- Majewski, M., Susanne, H., & Klaus, S. (2006). Epidemiology of athletic knee injuries: A 10-year study. *The Knee*, 13(3), 184–188. <https://doi.org/10.1016/j.knee.2006.01.005>
 - 10- Ali Muhammad Talaat (2003) The effect of using ballistic resistance training on some physical and skill variables of basketball players, unpublished master's thesis, Helwan University, Faculty of Physical Education, 76 pages.
 - 11- Safaa Razouki (1987): Introduction to Biochemistry, Baghdad, Dar Al-Kutub for Printing and Publishing, pp. 55-67.
 - 12- Ahmed Farouk Khalaf (2003). Scientific Journal, Issue (40), 56 The effect of a ballistic training program on some physical and skill variables of basketball players, Helwan University, Faculty of Physical Education for Boys, p. 88
 - 13- Raysan Khuraibit (1995) Applications in Physiology and Sports Training, 1st edition, Baghdad, Noon for printing preparation. p. 67
 - 14- Tahir, S. A. Al selmi, A. D. H. (2023). The Effect of a Training Curriculum According To the Physiological Index and the Transitional Speed of the 100m Hurdles Runner. *Revista iberoamericana de psicología del ejercicio y el deporte*, 18(3), 259-262. <https://www.scopus.com/record/display.uri?eid=2-s2.0-85166317191&origin=resultlist>

Appendix (1) Training program

	Weeks	Training unit	Days	Intensity	Repetitions	Rest	Sets	Rest
1	First	1	Saturday	% 80	200m× 4	5 :1	2	3-2 min
		2	Monday	% 75	1200m × 3	2:1	-	-
		3	Wednesday	% 85	400M× 3	4 :1	2	3-2 min
2	Second	4	Saturday	% 85	200m × 5 150m× 4 (Jump running)	6 :1	-	
		5	Monday	% 75	2000m× 2	2 :1	-	
		6	Wednesday	% 90	300M × 5	4 :1	2	3-2 min
3	Third	7	Saturday	% 90	600m × 4	4 :1	-	
		8	Monday	% 75	3000m × 2	2 :1	-	
		9	Wednesday	% 85	150m (× 4 Jump running)	6 :1	2	3-2 min
4	Fourth	10	Saturday	% 80	200m × 4	5 :1	2	3-2 min
		11	Monday	% 75	1200m × 3	2 :1	-	-
		12	Wednesday	% 85	400M3	4 :1	2	3-2 min
5	Fifth	13	Saturday	% 85	150m× 4 (Jump running) 200m× 2	6 :1	-	-

		14	Monday	% 75	2000m × 2	2 :1	-	-
		15	Saturday	% 90	400m × 4	5 :1	-	-
6	Sixth	16	Saturday	% 90	600m× 4	5 :1	-	-
		17	Monday	% 75	1200m× 2	2 :1	-	-
		18	Wednesday	% 95	400m× 2	5 :1	-	-
7	Seventh	19	Saturday	% 95	200m× 4 300m × 4 150m 4 × (Jump running)	5 :1	-	-
		20	Monday	% 75	3000m × 2	2 :1	-	-
		21	Wednesday	% 95	200m × 4	5 :1	-	-
8	Eight	22	Saturday	% 80	150m × 4 200m × 2	5 :1	-	-
		23	Monday	% 75	2000m × 2	2 :1	-	-
		24	Wednesday	% 85	400m × 4	5 :1	-	-

تأثير تدريبات اللاكتك الديناميكي في التحمل الخاص و انزيم كرياتين فوسفو كاينيز وأنجاز راكضي 1500 متر تحت 20 سنة

رحيم رويح حبيب 1 ، محمد حاتم عبد الزهرة 2 ، طالب شهد غانم 3
2&1 جامعة القادسية / كلية التربية البدنية و علوم الرياضة
3 جامعة بغداد /كلية الطب البيطري

أن للأعداد البدني والوظيفي لأجهزة الجسم أهمية كبرى للوصول الى افضل الإنجازات الرياضية ، فتطور المستويات المهارية والإنجازات الرقمية المذهلة التي نسمع عن تحقيقها في مختلف الالعاب الرياضية هي بالتأكيد جاءت نتيجة تطور مختلف العلوم الرياضية والفلسفية واتباع المدربين المناهج العلمية الصحيحة في محاولة استثمار الطاقة البشرية لاقصى حدود ، فتدريب فعاليات العاب القوى يعتمد على وضع البرامج التدريبية العلمية والمقننة لتطوير مستوى الرياضي والوصول به إلى المستويات العليا ، ولكل فعالية مواصفات ومتطلبات خاصة بها ومن بينها فعاليات ركض المسافات المتوسطة ومنها فعالية ركض 1500 متر والتي تحتاج الى تطور بعض الصفات البدنية وأنظمة الطاقة الخاصة بها للحصول على التكيف الفسيولوجي والبدني لأداء وتحمل الجهد المبدول أثناء السباق لتحقيق افضل زمن. فمن هذا المنطلق فقد تركزت مشكلة البحث وذلك من خلال اعداد تدريبات اللاكتات الديناميكية وتأثيرها في التحمل الخاص وانزيم CPK وأنجاز ركض 1500 ، وهدفت الدراسة الى التعرف على تأثير تدريبات اللاكتات الديناميكية في التحمل الخاص وانزيم CPK وأنجاز ركض(1500) متر، استخدم الباحثون المنهج التجريبي بأسلوب (المجموعة الواحدة) لملائمته طبيعة البحث، وتم اختيار عينة البحث بالطريقة العشوائية من مجتمع البحث المتمثل بلاعبي شباب اندية محافظة الديوانية بالعباب القوى في ركض المسافات المتوسطة وباعمار من (18- 19) سنة والبالغ عددهم(8) لاعب للموسم الرياضي (2022 – 2023). ومن ثم قام الباحثون بإجراء عملية التجانس وفق متغيرات البحث ، ومن خلال النتائج استنتج الباحثون ظهور علاقة طردية بين ارتفاع نسبة انزيم CPK ومستوى تطور الانجاز كما ادت تدريبات اللاكتات الديناميكية تأثيرا واضحا في التحمل الخاص والتي ادت الى تطوير الإنجاز(ركض 1500 متر) هدفت الدراسة الى استثمار الطاقة البشرية في الأسلوب التدريبي والمتغيرات الوظيفية والبدنية في تطوير انجاز فعالية ركض 1500 متر وهذا ما يحقق احد اهداف التنمية المستدامة للامم المتحدة في العراق (الصحة الجيدة)

مستخلص البحث

الكلمات المفتاحية تدريبات اللاكتات الديناميكية ، التحمل الخاص ، انزيم كرياتين فوسفو كاينيز ، أنجاز ركض 1500 متر