

Comparing the effect of MTC1 gene variation on hospitalization speed in terms of the lactic threshold of handball players

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ABSTRACT--*The study aimed to identify the genetic diversity of the MCT1 gene and the speed of hospitalization for handball players. Besides, comparing the genetic diversity and its effect on the speed of hospitalization in terms of the lactic threshold. The research problem is to question what level has the most influence on the speed of hospitalization in terms of the lactic threshold for handball players. Therefore, the researcher assumed that there were statistically significant differences between the levels of the MCT1 gene among handball players. The researcher used the descriptive method in the survey due to its relevance to the research problem. The community was chosen in an intentional style, and they are the Diwanayah youth handball players team 2017-2018 year, and they are (twelve) players. The sample was divided according to the levels of the MCT1 gene as the high level reached was five players. The average level is four. The number of the low level reached was three players. The exploratory experiment was conducted on (Tuesday) on (19/1/2018) in the sports hall of the Diwanayah Sports Club. The experiment carried out on a sample consisting of (4) players and the scientific foundations of the test performed. The main experiment conducted between Monday 5/2/2018 to 2/8/2018, during which the hospitalization of the lactic acid concentration measured to find out the effectiveness of the MCT1 gene. By training on the physical exertion bike for 30 seconds, according to Bruce's test and repetition, the training set twice with a rest for 60 seconds between them. At the end of the effort, these measurements are obtained by continuing the work of the devices and measuring the concentration of lactic acid during (5, 10, 15, 20, 30, 60) minutes, and accordingly, three players tested for each day for four days after which the researcher collected and processed the data statistically.*

Keywords-- (MTC1 Gene, Lactic Threshold)

I. INTRODUCTION AND IMPORTANCE OF RESEARCH:

The variation of the genetic factors from one generation to another is what gives individuals hereditary traits and, in turn, leads to the emergence of individual differences between individuals, which leads to the appearance of a variation in physical traits. The variation in genetic factors gives the importance of players selecting in the field of sports training which is recently highlighted. Selecting according to the genetics of the individual's physical characteristics assured workers in the sports field, especially coaches, to pay attention to the physiological side and study bodily functions and variables as well as skill and training plans. Studying

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physiological aspects allows players to present achievement and develop physical characteristics that enable them to develop their athletic level of performance. Therefore, we can explore the direct and long-term effects that physical training generally has on the functions and organs of the body. Among the topics that posed a scientific challenge for workers in the field of sports training physiology is the hospitalization stage that follows the effort directly. Since the body with its functional systems seeks to restore physiological balance as well as building stores Energy again and recovery of body cells, which are targets for this stage. Therefore, the circulatory system is one of the most important indicators that do not only reflect the level of sports training but also extend to the rest period or hospitalization of the player through compensation of energy sources and disposal of lactic acid and compensation of consumed oxygen. It is necessary to know the biological foundations that effects training in sports practicing and how to guide training and process Hospitalization using gene expression connotations. Among the most important genes that have a role in the disposal of energy waste is MCT1, as it is responsible for the movement or transmission of lactic acid from outside to inside the cell, this means that the removal process is connected to genetic factors that can control its transmission. Therefore knowing the effect of this factor can be directed at Hospitalization and training operations for athletes. The research importance is to the exam and compares the levels of the MCT1 gene, and its effect on the speed of hospitalization depending on the lactic threshold.

II. RESEARCH PROBLEM

Physical training has an impact on the development of physical potential as well as the response of physical functions by the genes of the individual, which has a fundamental role in physical potential and the extent of the response, which gives the player the ability to recover quickly. In the game of handball, a system dominated by the oxygen factor. The researcher noticed that there were some handball player's who has delay of recovery, and some of them are hospitalized fast. Since the physical susceptibility essentially based on genetic work, the researcher decided to proceed into this field to answer the following question: What is the most important level that Influences hospitalization speed in terms of the lactic threshold of handball players?

III. RESEARCH OBJECTIVE

- 1- Learn about the genetic diversity of the MCT1 gene
- 2- Knowing the speed of hospitalization for handball players
- 3- Comparing genetic diversity and its effect on hospitalization speed in terms of the lactic threshold

IV. RESEARCH ASSUMPTIONS

- 1- There are statistically significant differences between MCT1 gene levels for handball players
- 2- There are statistically significant differences in the effect of MCT1 gene levels among handball players groups.

V. RESEARCH FIELDS

- 1- Spatial domain: It is the closed housing hall for sports in Al-Diwaniyah Governorate.

2- The human domain: They are Al-Diwaniya national football team, with handball ages (16-18).

3- Time domain:

2- Method and Procedures:

2-1-Method and Procedures:

VI. RESEARCH COMMUNITY AND SAMPLE:

Prepare a systematic way to celebrate the participation in the FIFA World Youth Championship (2017) for youth, (12) players, and divided the players according to the levels of gene MCT1 as the high level (5) players. For the average level (4), the least number of players (3) players and experimental exercises (height, weight, and training age) as well as shown in Table (1).

Table 1: Shows the arithmetic mean, standard deviations, and the convolution coefficient of the research sample

Variables	Arithmetic mean	standard deviation	Standard error	Torsion Coefficient
Length	1.691	0.105	0.303	-0.93
Weight	1.69	3.166	0.913	-0.303
Training age	2.4167	0.900	0.259	-0.152
Lactic	3.042	0.4981	0.143	0.470

As shown in Table (1) that the torsional coefficient in those variables is limited to (± 1), and accordingly, the sample is distributed naturally, as whenever the torsional coefficient values are between (± 1), the sample is homogeneous.

2-1-2 Research methods for gathering information, equipment, and supplies:

- 1- Two Stopwatches.
- 2- One conveyor belt.
- 3- One laptop computer device.
- 4- One Fit Met-Pro device to measure Vo2max.
- 5- One device for analyzing lactic acid.
- 6- 120 Kits imported to determine the concentration of lactic acid.
- 7- Twelve Medical injections with medical cotton.
- 8- Medical sterilizer.
- 9 – Twelve anticoagulant tubes.
- 10- Cooling box.
- 11- One centrifuge
- 12- Twelve test tube
- 13- Twelve imported clamps to measure the MCT1 gene
- 14- One PCR device.

2-2 Field research procedures:

2-2-1 determining the study variables:

First: determine the levels of the MCT1 gene

Second: the anaerobic differential threshold

2-3-2 Exploratory experience:

The exploratory experiment conducted on Tuesday (19/1/2018) at ten o'clock in the morning in the sports hall of the Al-Diwaniyah Sports Club. The experiment conducted on a sample consisting of four players from the research community; its purpose is to know the possibility of the auxiliary team. The physician completes his duties represented by drawing blood and placing it in (tubes) numbered according to the sequence of the players, as well as transporting it from the place of the experiment to the laboratories to be measured and know the validity of the devices.

2-4 Scientific foundations of the test:

• The validity of the test:

The content validity, based on the opinions of experts and specialists, was used to confirm that the test measures phenomenon was intended.

Stability of the test:

The test and retest method used to find the stability coefficient. As the first test conducted on (Tuesday) 9/2/2018, and it was reapplied after a week (Tuesday) 16/2/2018 taking into consideration that all conditions for the first test itself are fixed. The experiment operated on four players, and the simple correlation coefficient law was applied to Pearson to extract the coefficient of stability, as the value of the correlation coefficient reached (0,89).

The objectivity of the test:

Laboratory tests are tests based on taking data directly to use physiological measuring devices and therefore do not require objectivity as they are not subject to verdicts subjective and free from bias. Therefore, the "lactic threshold" was measured by the direct method.

2-5 Laboratory Procedure (Biochemical)

2-5-1 Examination of the MCT1 gene (rest time):

A 5CC blood sample drawn from the players after the effort at nine O'clock in the morning and on the player's rest time without exercising or physical effort to know the diversity of the MCT1 gene. The blood sample was drawn from the player's vein by a nurse. The blood drains from the injection into the blood-saving tubes. The saving tubes numbered according to the names of the players registered in the test form. The number on the tube expresses the player's name. Each tube is stirred 3-5 times by hand so that the blood sample mixed with the anticoagulant inside the tubes, and then stored in the Cool Box and transferred to a frigid place (Freezer) and repeated the same process with the rest of the players, as in Figure 1.



Figure 1: Demonstrates the blood draw for genetic analysis

2-5-2 MCT1 gene measurement: -

Appropriate steps measured genetic diversity of the MCT1 gene in addition to a group of chemicals, and Figure 2 shows the steps:

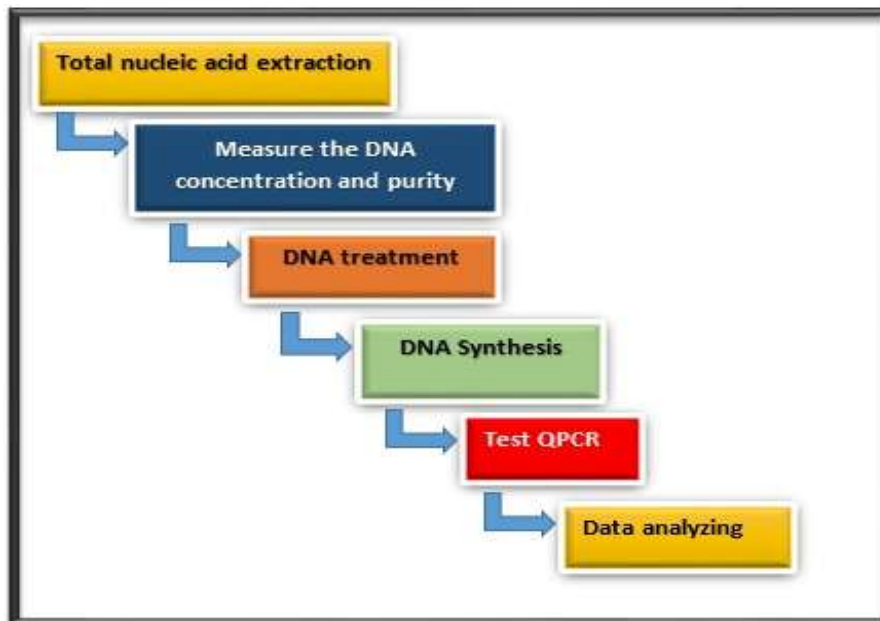


Figure 2: Explains the steps to detect a gene

2-5-3 Wingate Test to measure anaerobic power (Mohamed Nasr El-Din, 1998)

The purpose of the test: to measure anaerobic power

Procedures: The test is performed using the Monark stationary bike, according to the following steps:

- 1- The checked player is weighed to the nearest correct kilogram.

2- The examiner performs a warm-up on the bike for 3 minutes, and resistance of 1-2 kg placed according to the weight of the examiner.

3- The examiner's data loaded to the computer, and the resistance is placed according to the examiner's weight, which is equivalent to 7.5% of his body weight.

4- The examiner climbs in the bike, and the seat is adjusted according to its length so that there is a very light fold at the knee joint in the range of 10 degrees and then connects the foot belt.

5- Lift the weight from the gravity basket and the examiner begins to move the bike wheel at the fastest possible speed of not less than 80 cycles for a period not exceeding three seconds, then after that, the weight is lowered gently, and at the same time the distance is measured by pressing the distance button to start the measurement process, and the athlete continues to move the wheel for 30 seconds, to be encouraged until the end of the test

2-5-5 Measurement of lactic acid:

The lactic acid was measured in the blood using the lactic pro2 device shown in its image below. The kit slide that is used to measure the lactic acid by drain blood is inserted into the measuring device. The test processed after sterilizing the player's thumb and by a special needle. The second blood drop counted to avoid the appearance of lactic salts. Thus, this affects the results of lactic acid placed on the test Strips. The reading is done directly after 15 seconds to measure lactic acid in the blood and explains the steps to obtain a blood sample to extract the lactic acid alive then, by measuring the lactic acid, the player's lactic threshold is determined.



Figure 3: Lactic pro2 Device

2-6 The main experience

The main experiment conducted within the period between Monday 2/5/2018 to 8/2/2018, during which the hospitalization of the concentration of lactic acid was measured to find out the effectiveness of the MCT1 gene through working a physical bicycle effort for 30 seconds according to the Bruce test and repeat it twice between them for 60 seconds. At the end of the effort, these measurements are obtained by continuing the work of the devices and measuring the concentration of lactic acid during (5, 10, 15, 20, 30, 60) minutes, and accordingly, three players measured for each day for four days.

2-7 Statistical means: -

The researcher used the SPSS statistical bag to process the data and through it.

- 1- Arithmetic mean.
- 2- Standard deviation
- 3- Contrast test (P) of the differences between the groups.

4- LSD is the least significant difference.

5- Simple correlation.

3- Presenting, analyzing, and discussing the results:

The results were formulated in the form of tables because they represent the ease in extracting scientific evidence and because it is an appropriate explanatory tool for research and to reach the research goals and check its hypotheses.

3-1 Presentation, analysis, and discussion of the results:

3-1-1 Present the results of the MCT1 gene for the sample individuals, they were classified into three levels (low, medium, and high) and analyzed: Table (2)

Table(2)			
The classification of the individuals according to the MCT1 gene is divided into three levels (low, medium and high)			
the level	Num of sample	MCT1 gene	Distance
High level	1	57.5	2.023
	2	51.85	2.01
	3	152.5	2.517
	4	153.6	0.499
	5	107.62	2.592
Intermediate level	6	33.44	1.633
	7	10.23	0.791
	8	14.38	2.059
	9	21.44	0.994
Low level	10	8.19	0.547
	11	5.08	1.9
	12	12.02	2.72

The values of the high level ranges were (51.85 - 153.6), while the average level value ranges were (10.23 - 33.44), the low level was (5.08 - 12.02) this shows the high level of the MCT1 gene at a higher level.

3-1-2 Present the results of the moderate distribution according to the MCT1 gene variation for the three levels of lactic acid accumulation within the hospitalization period after the Lactic effort and its analysis:

Table (3)

The sample description and their moderate distribution according to the MCT1 gene variation shows the three levels of lactic acid accumulation during the hospitalization period after the lactic effort.

Table 3		
Three levels of Lactic acid according to MTC1 gene variation		
Gene Level	Num	Hospitalization periods

		5 Min		10 Min		15 Min		20 Min		30 Min		60 Min	
		Std	A	Std	A	Std	A	Std	A	Std	A	Std	A
High level	5	7.86	0.69	7.68	0.79	4.34	0.35	3.94	0.63	1.98	0.81	1.98	0.61
Mid-level	4	8.2	0.68	7.85	0.70	6.95	0.1	5.8	0.86	3.85	0.41	3.85	0.5
Low level	3	11.06	0.58	10.9	0.45	8.81	0.74	7.28	1.90	4.43	2.67	4.43	0.11

It was shown through Table (3) for the moderate distribution of the sample according to the MCT1 gene. Variation for the three levels of lactic acid accumulation within the hospitalization period after the anaerobic effort. 8.2) with a standard deviation (0.68), and for the low level, the mean was (11.06) with a standard deviation (0.58). In minute 10, the mean for the high level (7.68) reached a standard deviation (0.79), and for the average level the mean (7.85) with a standard deviation (0.70). For the lower level, the mean (10.9) was with a standard deviation (0.45), but in the 15th minute, the mean for the high level was (4.34) with a standard deviation (0.35), and for the average level the mean was (6.95) with a standard deviation (0.1). At the lower level the mean was (8.81) with a standard deviation (0.74), In the 20th minute, the mean for the high level reached (3.94) with a standard deviation (0.63), and for the average level the mean (5.8) with a standard deviation (0.86) and at the low level they mean (7.28) with a standard deviation (1.90). In contrast, in the 30th minute, it reached the mean for the high level (2.96) with a standard deviation (0.81), and at the intermediate level, it reached. The mean is (4.77) with a standard deviation (0.41), while the mean for the low level (6.38). With a standard deviation (2.67), while in the 60th minute the mean was reached for the high level (1.98) with a standard deviation (0.61), and at the average level the mean (3.85) reached a standard deviation (0.5), but at the low level mean (4.43) Standard deviation (0.11)

3-1-3 Present the results of the differences between the levels of the MCT1 gene variation of lactic acid accumulation after the lactic potential.

Table (4) shows the differences between the three levels of the MCT1 gene diversity for the accumulation of lactic acid. After the effort and during the hospitalization period, the value of F in minute 5 (23.576) was significant, and in minute 10, the value of F (22.623) was significant, and in minute 15, the value of F (109.206) was significant. In 20 minutes, the value of F (8.915) was significant, and in the 30th minute, the value of F (5.847) was significant, but in the 60th minute, it reached (26.968), and it was also significant.

Table (5) L.S.D shows between the three levels of MCT1 gene diversity for lactic acid accumulation after the anaerobic voltage

Table (5) shows the differences between the three levels of the diversity of the MCT1 gene for the accumulation of lactic acid after the effort. In the fifth minute, the results indicated a preference for a high level of MCT1 gene. The significant differences that appeared in the table, followed by significant differences in favor of the average level when compared to the low level. However, comparing the high level with the middle level, the results indicated that there were no significant differences between them. On the tenth and fifteenth minute (the

hospitalization period), the results of the same table indicated a preference for the high level of MCT1 gene.

Table 4						
It shows the differences between the levels (low, medium, high) of the MCT1 gene variation for lactic acid accumulation after the effort						
Source of contrast	Sum of squares	Degree of freedom	Average groups	Calculated F value	indication level	Signification
5 Min						
Between Groups	21.264	2	10.632	23.576	0.000	Significant
Inside Groups	4.059	9	0.451			
10 Min						
Between Groups	22.311	2	11.156	22.623	0.000	Significant
Inside Groups	4.438	9	0.493			
15 Min						
Between Groups	39.889	2	19.944	109.206	0.000	Significant
Inside Groups	1.644	9	.183			
20 Min						
Between Groups	21.939	2	10.969	8.915		Significant
Inside Groups	11.074	9	1.230		0.007	
30 Min						
Between Groups	22.726	2	11.363	5.847	0.024	Significant
Inside Groups	17.491	9	1.943			
60 Min						
Between Groups	13.692	2	6.846	26.968		Significant
Inside Groups	2.285	9	.254		0.000	

Table (5)						
L.S.D shows between the three levels of MCT1 gene diversity for lactic acid accumulation after the anaerobic voltage						
Hospitalization periods	Genes Level		Arithmetic medians	Standard Error	significance	Significance Type
5 Min	High Level	Low Level	-3.20667-*	0.49042	0.000	Significant
	mid-Level	Low Level	-2.86667-*	0.51290	0.001	Significant
10 Min	High Level	Low Level	-3.22000-*	.51283	.000	Significant
	mid-Level	Low Level	-3.05000-*	.53633	.001	Significant
15 Min	High Level	mid-Level	-2.61000-*	.28668	.000	Significant
		Low Level	-4.47667-*	.31209	.000	Significant

Through the significance of the differences that appeared in the table. The significance in favor of the intermediate

	mid-Level	Low Level	-1.86667-*	.32640	.001	Significant
20 Min	High Level	Low Level	-3.34333-*	.81007	.007	Significant
30 Min	High Level	Low Level	-3.42333-*	1.01809	.021	Significant
60 Min	High Level	mid-Level	-1.87000-*	.33798	.001	Significant
		Low Level	-2.45333-*	.36795	.000	Significant

level. As for the 20th and 30th minutes, the results indicated that there were significant differences in favor of the high level of MCT1 gene when compared to the low level. There are no differences between the high and medium levels.

In the 60th minute (from the hospitalization period), the table shows that there are significant differences between the three levels of the MCT1 gene (high, medium, and low) in favor of the high level

3-4 Discussing the results of differences between the three levels of the MCT1 gene and the concentration of lactic acid during the hospitalization period:

Tables (4, 5) show a significant difference between the levels of the MCT1 gene during the hospitalization period after performing anaerobic effort). Where the results showed the moral advantage of the high level, so the researcher sees all that happens during the physical effort and with the participation of many chemical indicators that contribute to increasing the accumulation of lactic acid in the blood by degrees more than getting rid of it. If we know that the period required for the actual performance, which is 60 seconds, is appropriate to reach the highest production of lactic acid in additional quantities, and the large percentage is for the anaerobic system. In a study conducted by (Halestrap) explains the tremendous physiological role of MCT1 is to facilitate the shuttle movement of lactic acid inside or outside cells according to its metabolic mechanism in cells, and it can be used to transfer lactate to create sugar that is the central pillar, especially after exercising (Halestrap, 2004 619 628.).

The MCT1 gene adopts its work in the shuttle transfer of molecules according to the type and nature of tissue that falls under the responsibility of the function of the gene, where it is known that the gene falls on the cell chromosome and the individual acquires genetic characteristics that distinguish it from others. The nature work of the MCT1 gene is the transfer of lactic acid from inside to outside the cell Muscular. This essential biological work has a significant role in maintaining the lack of pH in a manner that affects the movement of molecules and the production of energy within working cells, mainly as this occurs in cases of hypoxia and this mechanism can delay the onset of fatigue as a result of the accumulation of lactic acid. Since the moral advantage was in favor of people with a high level of the MCT1 gene, they have a high hospitalization speed, which corresponds to the work of the gene, as the muscle cells were able to get rid of large quantities of lactic acid during 30 minutes after the end of the physical effort. This matter reflects the speed Hospitalization after anaerobic effort, which is the rapid removal of lactic acid from working muscles, in this case, the body tries, through its biochemical means, to return to a state of physiological balance (i.e., to a homogeneous stability situation), when it was in a very high active state during exercise (Muhammad) Ibrahim also, 2008, p. 467-468). Accordingly, the genetic diversity MCT1 can explain 50% or more of the individual differences that can occur between individuals when they respond to training or physical effort. As for the other part, it depends on the chemical system of the body represented by the activity of the LDH enzyme and the increase of muscle washing processes by increasing the indicators of the cardiac muscle represented With the size of the stroke and the cardiac impulse, accordingly, the amount of return to normal state was faster for the members of the sample with a high level of the MCT1 gene. During the hospitalization period

and the increase in oxygen consumption, phosphate compounds regenerated with muscles (Bahaa El-Din Ibrahim, 1999, p. 184).

By taking oxygen from the lungs and then transporting it through the circulatory system to the working muscles, full recovery recovered, as well as those sources of anaerobic energy systems and the oxygen and blood stores in the blood and muscles (Hazza bin Muhammad Al-Hazaa, 2009, p. 2). Once stopped working, The body works to recover the quantity borrowed from the oxygen during the muscular work. For this, oxygen consumption remains high during the hospitalization at the beginning of the hospitalization period and gradually decreases. Other factors make the oxygen debt high during the hospitalization period, including removal of accumulated lactic acid as well as maintaining the homogeneous stability of the body's systems that have undergone significant changes as a result of the high-intensity physical effort. As a result of this accumulation of lactic acid and after the end of the effort, the body needs an amount of oxygen equivalent to the amount that the body needed during the physical effort, and the body was not able to obtain it. This oxygen amount used to renew energy sources of phosphate Fatality and regeneration of spent glycogen, disposal of lactic acid, as well as compensation for myoclonic oxygen and restoration of the body to the pre-start state (Jabbar Rahima Al Kaabi, 2007, p. 49).

VII. CONCLUSIONS AND RECOMMENDATIONS

4-1 Conclusions:

- 1- There are differences between the players according to the levels of the MCT1 gene for Diwaniya Sports Club handball players.
- 2- The preference in the speed of recovery is for the high-level group of the MCT1 gene among Diwaniya Sports Club players with handball.

4-2 Recommendations:

- 1- Selection according to genetics in the sports field became an essential factor, as it has a role in the physical potential of the players.
- 2- The training personnel should highlight the levels of the MCT1 gene and distribute them according to the appropriate activities.
- 3- It is possible to make new studies that correspond to the studied gene, among other activities in the sports field.

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