EVALUATION OF THE CONDITION DEHYDROGENASE CYCLE OF TRICARBOXYLIC ACIDS WHILE ALLOTRANSPLANTING FETAL TISSUE MUSCLE TO RATS

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Abstract

The purpose of our research was to study dehydrogenase CAC (citric acid cycle) activity at allotransplantation of embryonic muscular tissue and operation without replanting.

For this purpose, the following enzymes were investigated: piruvate degidrogenase, α-ketoglutarate dehydrogenase, suktsinatdegidrogenase, laktatdegidrogenase, malatdegidrogenase, izotsitratdegidrogenase. So, allotransplantation leads to activation of oxidizing processes in the investigated muscular tissue of an adult individual.

Keywords: Allotransplantation, cycle of citric acids, degidrogenase, embryo

Introduction

Embryonic tissues has special (characteristic) morphological and biochemical features. They consist, generally, from the blast and the stem cells that have low antigenicity and high proliferative and energy potential (Grishchenkov.I., 2004; Masur U.I., 1995).

Exactly these properties led to the wide use of embryonic tissues in experimental and clinical medicine for transplantation with the purpose of regeneration stimulation, as on the basis of the transplanted fabrics creates the model for regeneration processes (D. S. Sarkisov et al., 1991).

Regeneration processes not only provide restoration of fabrics defect at their damage, but also are a structural basis of cellular and fabric functions restoration (Tiboni G. M., et al, 1997). According to this fact the intensity and nature of regeneration processes significantly influence to the resistance of an organism. One of the main ways to influence regeneration processes is the transplantation of embryonic tissues.

The wide use of fetal tissue transplantation in medical research led to a number of issues related to the definition of its effect on the course of various diseases and the study of the metabolic processes flow (particularly of energy exchange) in the graft.

Thus, the study of the fetal tissues metabolism has a dual purpose - on the one hand is to identify of biochemical features of embryonic tissues energetic exchange, on the other - the definition of the metabolic relationships of embryonic transplants and tissues of the recipient, which can be used in the medicine practice.

Materials and methods

The purpose of our research was to study dehydrogenase CAC activity at allotransplantation of embryonic muscular tissue and operation without replanting.

We have been investigated such enzymes: pyruvate dehydrogenase, α-ketoglutarate dehydrogenase, succinate dehydrogenase, lactate dehydrogenase, malate dehydrogenase, isocitrate dehydrogenase.

Fetal thigh muscle tissue was transplanted by homologous adult individual.
The same procedure was carried out with an abdominal muscle tissue of the embryo. Indications were taken at 1^{st} – 3^{rd} and 7^{th} day after allotransplantation. Muscle tissue served as control, and was not subjected to surgery.

The activity of investigated dehydrogenase were determined by Gabler method (Gabler S., 1961) in modification by Kiessling and Lundquist (Kiessling K.N, et al, 1961). Statistical results analyze was performed using Student's method (Rokitsky P.F, 1972).

Results and Discussion

Allotransplantation of femoral muscle tissue does not lead to significant changes in the activity of pyruvate dehydrogenase in the femoral muscle of adult individual.
In the femoral muscle tissue of the embryo there was observed a significant decrease of the pyruvate dehydrogenase activity.

Table 1. Activity of CAC enzymes at allotransplantation of embryonic femoral muscular tissue (nMol ferritsionid/g tissue).

Tissue / Enzymes	Thigh muscle tissue of adult rat				Thigh muscle tissue of the embryo			
	Control	1st day	3^{rd} day	7^{th} day	Control	1st day	3^{rd} day	7^{th} day
Pyruvate dehydrogenase	50±3	40±5	60±7	60±8	90±2	50±1*	80±1*	80±1*
α-Ketoglutarat-dehydrogenase	20±1	50±2*	60±8*	80±5*	70±1	50±2*	50±1*	90±1*
succinate dehydrogenase	10±2	50±1*	80±2*	70±1*	80±2	30±1*	60±2*	70±2*
lactate dehydrogenase	20±5	70±7*	60±2*	60±1*	85±1	70±3*	50±1*	70±3*
malate dehydrogenase	20±5	50±1*	50±5*	50±1*	80±8	60±4	50±1*	60±2*
isocitrate dehydrogenase	20±4	60±5*	70±1*	70±1*	80±4	50±2*	60±1*	100±10

t≥2,3- significantly relative to the control

Investigating of α-ketoglutarate dehydrogenase activity it is possible to note a significant increasing as in femoral muscle of adult individual, as in the femoral muscle tissue of the embryo at the 7^{th} day of research.

Activity of a suktsinatdegidrogenase increases in femoral muscular tissue of an adult individual while in femoral muscular tissue of an embryo there was a recession of this activity. The same picture was observed with activity of a laktatdegidrogenase and malatdegidrogenase.

Analyzing the activity of an izotsitratdegidrogenase at allotransplantation of embryonic femoral muscular tissue it is possible to note the reliable increase of it in femoral muscular tissue of an adult individual. In femoral muscular tissue of an embryo at 1^{st} -3^{rd} days of research the activity of an izotsitratdegidrogenase decreased concerning the control, but right to the 7^{th} day it increased to control results.

Activity of piruvatdehylrogenase at allotransplantation of fetal abdominal muscle was increased by day 7 of research, as abdominal muscle tissue of adult individual as in abdominal muscle tissue of an embryo (Table 2).

Table 2. Activity of CAC enzymes at allotransplantation of embryonic abdominal muscle tissue (nMol ferrizionid/g tissue)

Tissue / Enzymes	Thigh muscle tissue of adult rat				Thigh muscle tissue of the embryo			
	Control	1st day	3rd day	7th day	Control	1st day	3rd day	7th day
Pyruvate dehydrogenase	60±1	40±1*	50±2*	90±3*	30±1	60±1*	30±5	70±3*
α-Ketoglutarat-dehydrogenase	60±5	50±1	60±8	70±5	40±2	50±4	60±1*	60±5*
succinate dehydrogenase	40±3	60±7*	50±1*	50±2*	60±5	40±1*	70±4	80±1*
lactate dehydrogenase	50±5	60±1	50±1	90±2*	50±1	50±5	50±4	60±5
malate dehydrogenase	60±4	60±6	50±1*	80±9	50±1	50±3	50±1	80±7*
isocitrate dehydrogenase	40±2	50±3*	70±1*	60±4*	60±5	40±3*	70±5	40±1*

t≥2,3- significantly relative to the control

Regarding α-ketoglutarate dehydrogenase - significant change in the activity occurred only in the abdominal muscle of the embryo right to the day 7 of research.

In the abdominal muscle tissue of adult individual with allotransplantation of embryonic muscle tissue there was a significant increase in the activity of succinate dehydrogenase, lactate dehydrogenase and isocitrated dehydrogenase concerning to the control at day 7 of research.

Activity of a malatdegidrogenase at day 7 of research authentically didn't differ from the control. In the abdominal muscle tissue of the embryo the activity of succinatedehydrogenase and malatedehydrogenase was significantly increased at 7 day of research concerning to the control.

During operation without replanting, the activity of piruvatdegidrogenase significantly decreased concerning the control, both in tissue the femur and the abdominal muscle tissues at day 7 of the research (Table 3).

Activity of α-ketoglutaratedehydrogenase, succinatedehydrogenase and isocitratedehydrogenase in the femoral muscle of adult rat significantly increased concerning to the control at day 7 of the research.

In the abdominal muscle tissue of adult individual there was a significant decrease of α-ketoglutarate dehydrogenase, lactate dehydrogenase, malate dehydrogenase and isocitrate dehydrogenase activity at the 7 day of the research. Succinate dehydrogenase activity was not significantly changed in the abdominal muscle tissue of adult individual.

Table 3. Activity of CAC enzymes duting operation without replanting (nMol ferritsionid/g tissue)

Tissue / Enzymes	Thigh muscle tissue of adult rat				Thigh muscle tissue of the embryo			
	Control	1st day	3rd day	7th day	Control	1st day	3rd day	7th day
Pyruvate dehydrogenase	50±1	50±2	64±7	28±3*	60±1	47±5*	64±8	29±2*
α-Ketoglutarat-dehydrogenase	20±1	53±1*	58±5*	33±5*	60±1	43±5*	55±5	33±4*
succinate dehydrogenase	10±2	42±8*	50±5*	32±2*	40±1	38±5	50±6	31±7
lactate dehydrogenase	20±5	45±8*	53±2*	32±3	50±5	52±1	63±1*	30±4*
malate dehydrogenase	20±5	43±5*	33±5	23±2	60±1	49±8	36±1*	24±3*
isocitrate dehydrogenase	20±4	47±5*	60±5*	31±2*	40±1	47±8	80±4*	28±1*

t≥2,3- significantly relative to the control

So, allotransplantation leads to activation of oxidizing processes in the studied muscular tissue of an adult individual.

Pyruvate dehydrogenase activity in the femoral muscle of adults with no replanting operations decreased, and at Piruvatdegidrogenase activity in the femoral muscular tissue of

an adult individual during operation without replanting decreased, and at the femoral allograftembryonic muscle tissue remained unchanged.

Consequently, allotransplantation has a positive effect on the activity of pyruvate dehydrogenase. Activity of α-ketoglutarate dehydrogenase, suktsinatdegidrogenaze and izotsitratdegidrogenaze increased as well as at allotransplantation of embryonic femoral muscular tissue, as during operation without replanting. According to this fact we can say that, allotransplantation not affect changes in the activity of such enzymes.

Since animals exposed a surgery without replanting, malatedehydrogenase and lactate dehydrogenase activity in the femoral muscle tissue remained virtually unchanged, and allotransplantation led to an increasing of these enzymes activity, we can claim that allotransplantation has a positive effect on their activity.

Allotransplantation of emrional abdominal muscle tissue has a positive effect on the activity of all enzymes researched in the abdominal muscle of adult individual at day 7 of the research.

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