

Z.B. Yessimsitova¹, A.S. Kozhamzharova², R.T. Tagirova², S.A.Mankibaeva¹,
A.A. Yelemes¹, M.U. Aitzhan³, I.A. Myrzakhanova²

¹Ai-Farabi Kazakh National University

²Asfendiyarov Kazakh National Medical University

³LLC Scientific Production and Technical Center «Zhalyn»

MORPHOFUNCTIONAL CHANGES OF HEARTS OF RATS IN THE EXPERIMENT

Data of histological changes of cardiomyocyte of rats are provided in work. Morphological indicators of heart at a hipokineziya against the background of use of dietary supplements were investigated. Hipokinesia rats is led to disrupt of blood circulation by a plethora, plasmorrhagia with the subsequent dystrophy and cellular reaction. Use of biologically active supplements promoted reduction of violations of blood circulation, dystrophic processes. These histologic researches demonstrate beneficial effect of specialized products action on structurally functional integrity of bodies and fabrics.

Key words: heart, plethora, dystrophy, cardiomyocyte, specialized products, rats.

Introduction. Now sharp depression of muscular activity of the person in the course of work and everyday life becomes perceptible. The hypokinesia turned into one of the current problems of the present demanding acceptance of immediate measures on its prophylaxis. In this regard studying of mechanisms of hypokinetic disorders, development of methods, prophylactics and corrections of consequences of a hypokinesia gain great social value. The scientific and technological revolution which now turned into constantly accruing scientific and technical progress, which declared infinite power and force of human mind at the same time put the person in conditions of a social hypokinesia [1-13].

Hypokinesia is the lowered physical activity. Until recently medicine, biologists almost didn't pay attention to hypokinesia questions. Experts in the field of space medicine as the hypokinesia is one of the factors inherent in space flight began to deal with a problem of a hypokinesia in the last 25 years actively. The sufficient activity of skeletal muscles is necessary for ensuring normal activity of a human body. Reorganization of metabolic processes in an organism at various stages of space flight causes change of requirement of an organism in a number of feedstuffs and energy. Studying and use of specialized products will allow to reduce the adaptation period, to improve the general condition of a human body and animals. Development of products of the directed preventive action for correction of a basic food allowance of people substantially will promote increase in working capacity, adaptation opportunities of an organism and decrease in negative impact on an organism of various ecological factors [14-22]. Development of food is priority for the Republic of Kazakhstan and is of great interest to the foreign states. Material and technique of a research: For identification of adaptic opportunities of the rats who received a hypokinesia with use of a specialized radio tire-tread product "TanSaulesy" within 30 days pilot study on 15 experienced puberal rats – males of the line Vistar, trimensual age with the initial body weight of 180-220 grams was conducted. During the experiment all animals were in identical standard conditions of a vivarium. The decapitation of animals was carried out with use of a narcosis to strictly fixed time – between 9 and 11 o'clock in the morning. An object of a histological research were the main populations of cells of a myocardium.

All experiment was made within 30 days, all animals were parted on 3 groups: 1 group of animals - control; The 2nd group of animals contained in hypokinesia conditions within 30 days; The 3rd group of animals a hypokinesia + a radio tire-tread product "Tan Saulesy" within 30 days; Experimental animals received Water beyond all bounds.

Results of researches their discussion. Histological studying of microdrugs of a myocardium control rats on semi-thin sections showed that the muscular cover of heart is formed by cross-striped muscle cells. Squared cordial myocytes. In the central part of a myocyte 1-2 cores of the oval or extended form are located. Myofibrils lie strictly rectilinearly (figure 1).

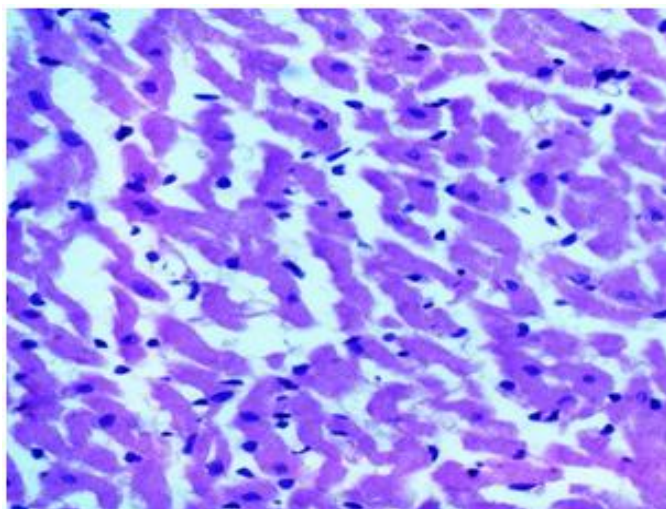


Figure 1 - Histological structure of heart of rats of control group. Semi-thin cut. Coloring hematoxylin - eosin. Magnification.x 400

At a morphological research of heart of rats of the second group it was revealed that the structure of a structure and an arrangement of muscle fibers aren't kept. On histologic medicines cross painting layers of fibers of the friable connecting fabric containing a large number of vessels indistinctly came to light. Often in the same capillary thinnings and swellings of a wall come to light. At the same time nucleus and cytoplasm of endotheliocytes can bulk up, blocking a microvessel gleam. Process of the microvesicle transport is broken, the big congestion the pinositosis of vesicles in cytoplasm of endotheliocytes is observed that can be characterized as stagnation of a vesicle structure, the expressed intermuscular has swelled (figure 2). Convincing damage of the fact that the gipokineziya leads to morphostructural violations of blood capillaries of a myocardium are changes of structure of endotheliocytes.

Histostructure of a myocardium of rats of the second group who were exposed to hypokinesia a within a month.

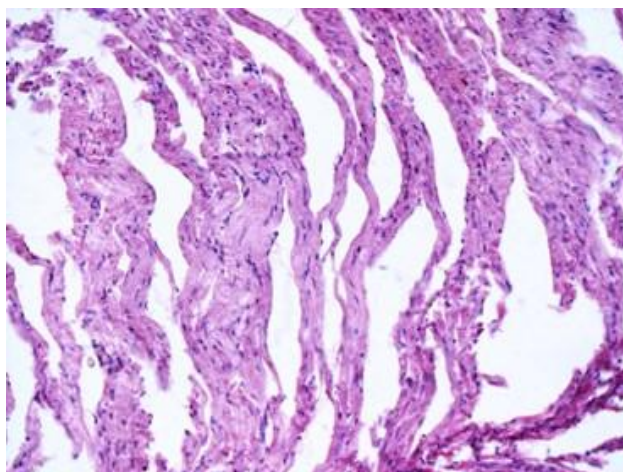


Figure 2 - Intramuscular edema. Semi-thin section Eosin-hematoxylin coloring. Magnification x 200

Changes in microstructure of investigated organs were observed in investigation of heart of animals that went through hypokinesia within a month. On histological preparations of heart we can observe expressed muscular edema.

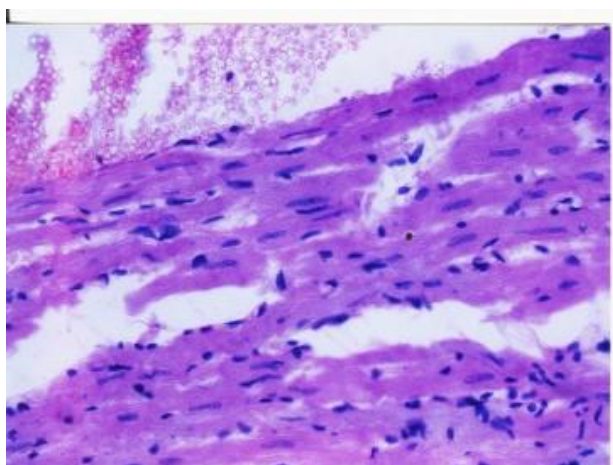


Figure 3 - Interstitial edema with vascular fullness. Semi-thin section. Coloring of hematoxylin-eosin. Magnification x 400

As a result of a research of the animals that received a hypokinesia and a radio tire-tread specialized product "Tan Saulesy" small interstitial edema with vascular fullness is noted in bodies of heart. At the same time less expressed changes of capillaries are noted in the right departments of heart, a nucleus slightly indistinct. In heart against the background of edema subcardinal hemorrhages were observed. Therefore, as a result of a research of the animals that received a hypokinesia and a radio tire-tread specialized product "Tan Saulesy" partial violation in bodies of heart is observed (figure 2).

Experimental research on 15 experienced puberal rats – males of the line Vistar, trimensual age with the initial body weight of 180-220 grams morphostructural changes in heart organs, which happened under the influence of a hypokinesia and a hypokinesia with addition of special additive, are revealed. There are no distinct changes in control rats. Delicacy, a malaise, change of behavior at rats isn't revealed, the general normal state, gross weight, pupils and a wool integument is normal, physiological deviations didn't take place. All organs are in normal state, the structure is kept. Distinct pathological and physiological changes are not revealed. More than a half of experimental animals of the second group relatively calmly endure hypokinesia conditions, the others show excitement and even some aggression that, is obviously bound to a hypokinetic stress. The mass of the studied organs at the rats who are calmly enduring a hypokinesia-without changes, and at restless- decreased. The hypokinesia leads to morphological damages of system of microcirculation of heart. At the same time the complexity and depth of the morphofunctional shifts depend both on hypokinesia duration, and on display of a hypokinetic stress. Around microvessels pericapillary edema is formed. Often in the same capillary thinnings and swellings of a wall come to light. At the same time nucleus and cytoplasm of endotheliocyte can bulk up, blocking a microvessel gleam. Process of the microvesicle transport is disrupted – the big congestion the pinocytosis vesicles in cytoplasm of endotheliocytes is observed, that can be characterized as stagnation of a vesicleformation.

The researches of the first stage enabled to make the following conclusions:

1. Hypokinesia of rats leads to disrupt of blood circulation by plethora, plasmorrhagia with the subsequent dystrophy and cellular reaction;
2. Use of biologically active supplements promoted reduction of blood circulation disrupt, dystrophic processes;
3. Favorable effect of a specialized product is connected with their positive influence on trophic of tissues, normalization of exchange processes in the conditions of a hypokinetic stress.

REFERENCES

- 1 В.С. Оганов Изменение состояния костной ткани у женщин в условиях 120-суточной антиортостатической гипокинезии // *Авиакосм. и эколог. мед.* – 1997. – Т. 31, №5. – С. 59–63.
- 2 Л.И. Кузнецова Пищевая ценность консервированных продуктов в тубах для питания летчиков и космонавтов // *Космич. биол. и авиакосмич. мед.* – 1983. – № 2. – С. 30–35.
- 3 Джо Витале Здоровый образ жизни. – 2008. - 320 с.
- 4 В.П. Акоюн Гипокинезия и мозговое кровообращение. – 2000. - 186 с.
- 5 Солодков А.С., Сологуб Е.Г. Физиология человека общая, спортивная, возрастная. – М.: Тера-спорт, 2001. - 520 с.
- 6 Евстафьева Е. Р. Изменение показателей липидного обмена и системы крови у крыс при адаптации к гипокинезии: Автореф. дисс. ... канд.биол.наук - Л., 1985. - 24 с.
- 7 Могендович, М.Р. Гипокинезия как фактор патологии внутренних органов // *Физиология и патология моторно-висцеральных рефлексов.* – Пермь: 1961. – Вып. 3. – С. 9–26.
- 8 Григорьев, А.И. Гипокинезия: медицинские и социальные аспекты. – М.: 1997. – 229 с.
- 9 Шустов, Е.Б. Закономерности адаптации к деятельности в экстремальных условиях // *Всероссийская научная конференция с международным участием, посвященная 150-летию со дня рождения академика Ивана Петровича Павлова, Санкт-Петербург, 15-17 сент., 1999.*: Материалы конференции. – СПб.: 1999. – С. 53-56.
- 10 Васильев, В.П. Влияние длительной гипокинезии на течение некоторых патологических процессов // *В кн.: Авиакосмическая медицина: Тез. Докл. V всесоюз. конф.* – М.: 1975. – Т.2. – С.125–126.
- 11 Коваленко, Е.А. Патологические аспекты проблемы длительной гипокинезии // *Патолог.физиология и эксперим. терапия.* – 1975. – № 3. – С.11–18.
- 12 Шурыгин, Д.Я. Эндокринные системы при гиподинамии и реадaptации // *Военно-медиц. журнал.* – 1976. – №12. – С.55–58.
- 13 Тигранян, Р.А. Состояние процессов метаболизма в условиях ограничения двигательной активности // *В кн.: Авиакосмическая мед.: Тез.докл. У всесоюз. конф.* – М.: 1975. – Т.2. – С.187–190.
- 14 Рыльников, Ю.П. Влияние гипокинезии на липидный состав крови и тканей у кроликов различного возраста // *Космич. биол. и авиакосмич. мед.* – 1974. – Т.8, №2. – С.8–14.
- 15 Барбашова, З.И. Изменение резистентности организма, функционального состояния тканей и биохимических процессов в них при гипокинезии // *В кн.: Адаптация к мышечной деятельности и гипокинезии.* – Новосибирск: 1970. – С.26–35.
- 16 Коваленко, Е.А. О проблеме гипокинезии в современной медицине // *Гипокинезия. Медицинские и психологические проблемы.* – М.: 1997. – С. 35–36.
- 17 Михайлов, В.М. Гипокинезия как фактор риска в экстремальных условиях // *Авиакосм. и эколог. мед.* – 2001. – №2. – С. 26–31.
- 18 А.Н.Агуреев Возможности использования специализированных продуктов и биологически активных добавок в повышении адаптационных возможностей организма при воздействии неблагоприятных факторов космического полета // *Международная научная конференция «Суверенный Казахстан: 15-летний путь развития космической деятельности», посвященная 70-летию академика У.М. Султангазина.* – Алматы: 2006. - С. 291-292.
- 19 К.В. Смирнов Пищеварение и гипокинезия. – 2004. - 520 с.
- 20 Дудкин, М.С. Пищевые волокна – радиопротекторы // *Вопр. пит.* - 1997.- № 2. - С.12-14.
- 21 Синявский, Ю.А. Лечебно-профилактические продукты питания. - Алматы: 2000. - 183 с.
- 22 Смирнова, Л. Диеты астронавтов. - М.: АСТ.- Мн.:Харвест, 2006. – 192 с.

**З.Б. Есимсиитова¹⁻³, А.С. Қожамжарова², Р.Т. Тагирова², С.А. Манкибаева¹,
А.А. Елемес¹, М.У. Айтжан³, И.А. Мырзаханова²**

¹ *Әл-Фараби атындағы Қазақ Ұлттық Университеті*

² *С.Ж.Асфендияров атындағы Қазақ Ұлттық Медицина Университеті*

³ *«Жалын» Ғылыми-өндірістік техникалық орталығы» ЖШС*

ЕГЕУҚҰЙРЫҚТАРҒА ЭКСПЕРИМЕНТ ЖҮРГІЗУ КЕЗІНДЕ ЖҮРЕКТІҢ МОРФОФУНКЦИОНАЛДЫҚ ӨЗГЕРІСТЕРГЕ ҰШЫРАУЫ

Түйін: Бұл жұмыта егеуқұйрықтардың кардиомиоциттерінің гистологиялық өзгерістерінің мәліметтері келтірілген. Биологиялық белсенді қоспаларды ББҚ қолданғандағы гипокинезия кезіндегі жүректің морфологиялық көрсеткіштері зерттелді. Гипокинезия егеуқұйрықтардың қан айналымының бұзылуына, қанның толу түріне, плазморрагияға кейіннен дистрофияға және жасушалық реакцияға әкеледі. Биологиялық белсенді қоспаларды қолдану қан айналымының бұзылуына, дистрофиялық процестердің азаюына ықпал етті. Гистологиялық зерттеулердің мәліметтері арнайыландырылған азықтардың әрекетімен ағзалармен тіндердің құрылымдық-функционалдық сақталуына қолайлы әсер ететіндігін дәлелдейді.

Түйінді сөздер: жүрек, қанның толуы, плазморрагия, дистрофия, кардиомиоцит, арнайыландырылған азықтар, егеуқұйрықтар.

**З.Б. Есимсиитова¹⁻³, А.С. Қожамжарова², Р.Т. Тагирова², С.А. Манкибаева¹,
А.А. Елемес¹, М.У. Айтжан³, И.А. Мырзаханова²**

¹ *Казахский Национальный Университет имени аль-Фараби*

МОРФОФУНКЦИОНАЛЬНЫЕ ИЗМЕНЕНИЯ СЕРДЦА КРЫС В ЭКСПЕРИМЕНТЕ

Резюме: В работе приводятся данные гистологических изменений кардиомиоцитов крыс. Исследовались морфологические показатели сердца при гипокинезии на фоне использования БАДов. Гипокинезия крыс приводит к нарушению кровообращения в виде полнокровия, плазморрагии с последующей дистрофией и клеточной реакцией. Применение биологически активных добавок способствовало уменьшению нарушений кровообращения, дистрофических процессов. Данные гистологические исследования свидетельствуют о благоприятном влиянии специализированных продуктов действием на структурно-функциональную целостность органов и тканей.

Ключевые слова: сердце, полнокровие, дистрофия, кардиомиоцит, специализированные продукты, крысы