INTERNATIONAL JOURNAL ON ORANGE TECHNOLOGY

https://journals.researchparks.org/index.php/IJOT e-ISSN: 2615-8140 | p-ISSN: 2615-7071
Volume: 4 Issue: 9 | September 2022

Reactivity of the Hypothalamic-Pituitary Gonadal System after 10 Minutes of Clinical Death

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Annotation: When modeling a 10-minute clinical death, changes in the reproductive system were studied in white mature male rats with a weight of 180-220 g. Clinical death was modeled according to the method of V.G.Korpachev (1982). The reproductive state in intact and experimental rats was studied using morphological, morphometric, histochemical, cytophotometric biochemical research methods. At the same time, the reproductive system in index rats is in a state of moderate functioning to highlight the synthesis and secretion of testosterone.

During the period of clinical death, there is an increase in the functional activity of d-basophil cells of the adenohypophysis, the content of the Lethinating hormone provided an increase in testosterone secretion.

Keywords: Clinical death, endocrine system, adenohypophysis, follicle-stimulating hormone, lutinizing hormone, testosterone.

Relevance. A number of scientific studies are being conducted all over the world to improve the assessment of endocrine system disorders between anabolic, catabolic and kniteche systems under the influence of various extreme factors. [Zarechnova N.N., Slynko T.N., 2018; Yakimov I.A., Loginova E.S., 2017; Gadaevich K. A. et al. 2021; Karabayev A. G., 2020; Karabayev A. G., Isroilov R. I., 2020].

We know that when exposed to extreme factors in the body, activation of the sympathoadrenal system of the body occurs first of all [Karabaev A.G. 2020]. At the same time, the deterministic excitation of the higher sympathetic centers and neuroendocrine systems, an increase in the concentration of catecholamines, leads to the realization of two interrelated phenomena: activation of the adenylate cyclase system, that is, energy conversion processes and sequential activation of the main processes of renewal of the lipid bi-layer of membranes, i.e. lipid peroxidation, the latter provides dystrophic changes at the cellular level. At the same time, the reproductive and regenerative processes in the cell remain in an unfavorable position. It is known that luteinizing hormone (LH), follicle-stimulating hormone (FSH) and testosterone are responsible for this kind of process [Hernandez-Hernandez J.M. et al., 2021; Bhasin, S. et al., 2018; Mulhall, J.P. et al., 2018; Mirone, V. et al., 2017].

Therefore, without knowing the sequence of dynamic changes in the components of the endocrine system responsible for the cellular reproductive process during the period of post-resuscitation disease, we cannot disclose the causes of changes in the cellular level and the disruption of reproductive standing at the cellular level.

An analysis of the literature shows that studies of endocrine system dysfunction during postrenimation disease, only some glands have been studied. That is, the hypothalamic-pituitary neurosecretory system, adrenal glands, thyroid gland, pancreas in the process of clinical death and post-resuscitation disease have been partially studied (Volkov A.V. et al., 2010; Zarechnova N.N., Slynko T.N., 2018; Yakimov I.A., Loginova E.S., 2017).

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Certain measures are being taken in the world to create a healthcare system that provides a radical increase in the quality and effectiveness of medical care to the population, including early diagnosis, effective treatment, prevention and reduction of complications of various somatic diseases. Based on the identified tasks, it is advisable to conduct scientific research aimed at assessing disorders of the reproductive system in the post-resuscitation period.

The purpose of the study. It will reveal the reactivity of the reproductive system of males during clinical death.

Research objective

Assess the functional state of the vetta and delta basophilic cells of the adenohypophysis, the content of follicle-stimulating hormone (FSH) lutinating hormone (LH), testosterone in the blood of intact rats.

Assess the functional state of the vetta and delta basophilic cells of the adenohypophysis, the content of follicle-stimulating hormone (FSH) lutinating hormone (LH), testosterone in the blood of male rats when simulating clinical death duration of 10 minutes.

Object of research: In connection with the task, a study was conducted on 20 mongrel male rats weighing 160-170 g. of these , it was: 10 intact, 10 experimental rats, in which a study of the reactivity of the reproductive system was conducted in modeling 10 clinical death.

Research methods. To achieve the goal and solve the problem, experimental, morphological, morphometric, histochemical, cytophotometric, enzyme immunoassay methods were used.

The results obtained and its discussion. In the study, β- and d-basophilic cells are scattered throughout the adenohypophysis. They are mainly defined around the vessels. β-basophilic adenocytes have a smaller size compared to d-basophilic adenocytes, in both basophilic adenocytes the glycoprotein is diffusely located, depending on functional activity. The cytoplasm volume in β-basophilic adenocytes is 592.1 ± 17.9 mm3, the cytoplasm volume of d-basophilic adenocytes is greater than that of β-basophilic adenocytes, which are within 812.0 ± 31.3 mm3. When determining the functional activity of β- and d – basophilic adenocytes, the cells are at the stage of different functional activity. At the same time, in β- and d-cells, the number of highly active cells is 10.6 ± 0.4% and 10.8 ± 0.4%. The glycoprotein in them is located mainly in the pericaryon region. The preparation is mainly dominated by cells of moderate functional activity, the glycoprotein in them is scattered throughout the cytoplasm, diffusely and loosely, their number is equal to 70.6 ± 0.4% and 70.4 ± 0.6%, and the number of cells of low functional activity, that is, with a densely located glycoprotein in the cytoplasm is determined within 18.8 ± 0.4% and 18.8 ± 0.4%. The glycoprotein content is determined in the range of 155.8 ± 3.3 units and 156.0 ± 3.1 units (Fig. 1). The nuclei in β- and d-basophilic adenocytes are chromatic, chromatin in them is diffusely located throughout the nucleus, the volume of the nuclei is 127.2 ± 3.5 microns 3 and 126.9 ± 3.5 microns 3, the nucleoli in them are mainly located in the center of the nucleus, their volume is on average 0.88 ± 0.02 microns 3 and 0.87 ± 0.02 microns 3.The value of the nuclear-cytoplasmic ratio in β-basophilic adenocytes is equal to 0.215 ± 0.0009, and in d-basophilic adenocytes, the value of the nuclear–cytoplasmic ratio is less, compared with β-basophilic adenocytes and is equal to 0.156 ± 0.001.

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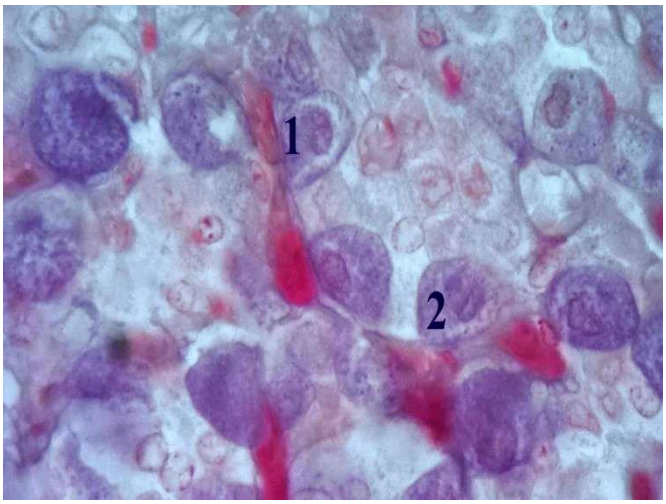

Fig.1. Basophilic cells of the adenohypophysis in intact rats with a densely located glycoprotein. PAF coloring with azan coloring according to Haidengine. Magnification: about 100x, about 15x. The numbers are: 1. d-basophilic adenocytes, 2. β-basophilic adenocytes.

The capillaries in the adenohypophysis have different sizes, they are slightly hyperemic. Their diameter is within 5.9 ± 0.05 microns.

The FSH content in the blood was 0.13 ± 0.015 mlU/ml. LH 0.43± 0.01 mlU/ml. testosterone content 5.04± 0.03 nmol/l

After the onset of clinical death, after 10 minutes, β- and d-basophil cells are clearly detected in the adenohypophysis, an increase in the number of depleted β- and d-basophil cells, that is, cells of high functional activity increased to 20.4 ± 0.5% ($P<0.001$) and 21.2 ± 0.5% ($P<0.001$) (Fig.3.2.6). The number of basophilic cells of moderate and low functional activity in β-cells decreased to 63.4 ± 0.6% and 16.2 ± 1.0% ($P<0.01$), and in d-cells to 62.4 ± 0.9% ($P<0.01$) and 16.4 ± 0.8% ($P<0.05$) significantly compared with intact animals. In actively functioning basophilic cells, the glycoprotein is located mainly around the nucleus. In moderate functional activity, it is loose and scattered throughout the cytoplasm, and in basophilic cells of low functional activity, the glycoprotein is located intensively and densely throughout the cytoplasm. The cytoplasm volume in β-basophilic cells increased to 592.8 ± 19.6 mm3 ($P>0.05$), and in d-basophilic cells to 831.6 ±34.0 mm3 ($P>0.05$) not significantly compared to intact animals.

The nucleus and nucleolus in the basophilic cells of the adenohypophysis are slightly swollen. Their volume in β-cells was increased to 127.7±3.7 mm3 ($P>0.05$) and 0.90±0.02 mm3 ($P>0.05$), and in d-basophilic cells to 128.4 ± 3.8 mm3 ($P>0.05$) and 0.9±0.02 mm3 ($P>0.05$). The amount of glycoprotein in them decreased to 151.7±1.6 units ($P>0.05$) and 150.6±1.6 units ($P<0.05$).

The index of the nuclear-cytoplasmic ratio in β-basophil cells of the adenohypophysis is 0.215 ± 0.0009 ($P> 0.05$), and in d-basophil cells 0.154± 0.0002 ($P>0.05$).

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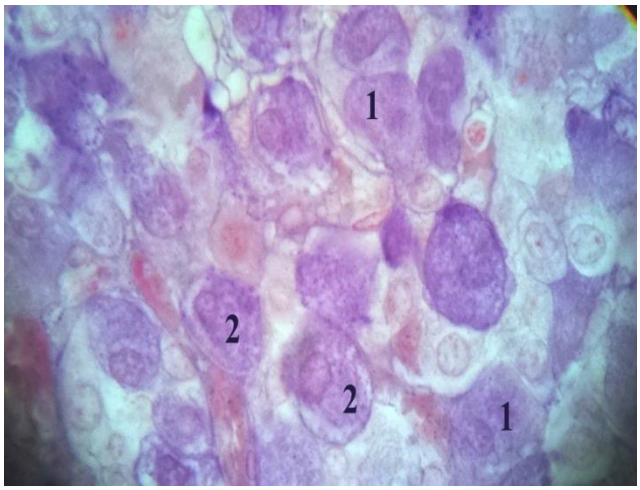

Fig.2. 10 minutes after the onset of clinical death, there is a further decrease in the amount of glycoprotein more in the d-basophil cells of the adenohypophysis. PAF coloring with azan coloring according to Haidengine. Magnification: about 100x, about 15x. The numbers are: 1. β-basophilic adenocytes, 2. d-basophilic adenocytes.

Therefore, it can be said that the functional activity of d-basophil cells of the adenohypophysis is more pronounced compared to β-basophil cells of the adenohypophysis

At the same time, an increase in the FSH content to 0.17 ± 0.02 mlU/ml ($P>0.05$), LH to 0.47± 0.01 mlU/ml ($P<0.05$), the amount of testosterone to 6.15± 0.33 nmol/l ($P<0.05$) was detected in the blood.

If we interpret the data with the data (Karabaeva A.G.2021), the reproductive system in intact rats is in the stage of quiet functioning. And an increase in the functional activity of the activity of d-basophil cells of the adenohypophysis, the content of the Lethinating hormone and the content of testosterone can indicate the activation of a compensatory mechanism aimed at supporting the reproductive activity of the body's cells to support the general and specific reactivity of the body against a subtle kind of stress factor.

Based on the obtained data, it is possible to draw the following conclusions.

1. The reproductive system in intatx rats is in a state of moderate functioning to reflect the synthesis and secretion of testosterone.
2. During the period of clinical death, there is an increase in the functional activity of d-basophil cells of the adenohypophysis, the content of the Lethinating hormone provided an increase in the secretion of testosterone to ensure the reproductive activity of the cells of the body.

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