

DYNAMICS OF CHANGES IN MORPHOLOGICAL STRUCTURES WITH PREPARATIONS OF NUCLEIC NATURE ADMINISTERED

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ABSTRACT

The objective of this study was to determine examine the dynamics in development of morphological structures of small intestine in the offspring of female rats which were NN preparations injected in different periods of pregnancy. It was establish that: Administration of the Vestin preparation in different periods of pregnancy produces positive influence upon the dynamics of forming structural elements in small intestine (villus-crypt) and liver (hepatocyte) in offspring; The Vestin preparation injected to pregnant female animals at early and late stages of fetus bearing exerts positive influence upon the glycogen and RNA content in hepatocytes of the experimental offspring and this demonstrates high level of energy and morphological processes; The detected structural changes in the liver and intestine with the preparation injected provide higher level of adaptative processes in organism.

INTRODUCTION

There in presented is the data on positive influence of preparations of nucleic nature (Vestin), when administered to pregnant female animals, upon morphological structure of bovovels and liver in their offspring.

At the present time it is obvious that to study the issues on adaptation mechanisms of animal organism during ontogenesis is of importance, particularly in the system "Mother-fetus". Undoubtedly, it is under normal functioning of the system that the development of full-value offspring is likely. The knowledge of principles of general mechanisms on fetus formation and development are also an essential factor for the pharmacological correction of an organism by immune tropic preparations.

Permanent exposure to unfavorable ecologic and anthropogenic factors during ontogenesis is capable to cause intensive mobilization of all the systems which provide organism homeostasis. The exposure time often brings about structural and functional changes in organs, decline of general resistance and growth of sickness rate, disorders in fetus intrauterine development and increase of the newborn mortality. With all these accounted, fetus viability is in linear response to the mother organism state and this is the foundation for the study of alternative approaches to solving the problems of prophylactic immune deficiency conditions, extrapolating the development of age pathology and corrections of breakdowns of protective mechanisms in growing animals [3, 7] . Materials of experimental investigations on the influence of the preparations of nucleic nature (NN preparation) upon organism of young and adult animals testify to the occurring RNA (not less than 80%) with immunostimulating effect [1, 2]. Its both in-and direct effect stabilizes parameters of internal medium in the limits of the physiologic norm, increases non-specific resistance and immunologic reactivity of the organism, and stimulates adaptive trophic function of its organs and systems performance [4, 5].

It is no doubt, the dominating role in adaptive reactions in the organism exposed to various impacts is attributed to liver that is a target-body for adaptive hormones and related to detoxifying function of hepatocytes. Liver focuses 30% of elements of reticular endothelial system and greater part of mononuclear phagocytes. During both pregnancy and early postnatal development there arise changes needed for energy supply and organism vitality

maintenance. Over this period there may happen failure in conception, development and differentiation of homeostasis systems of a newborn organism.

Being a nexus between the environment and the newborn organism in the first weeks of life, small intestine performs not only initial stages of digestion and absorption of nutrients but it is first to experience the antigenic impact resulting in the production of immune competent cells as well as synthesis of immune globulins [6].

Thus, both immunologic activity of organism at large and its ability to provide adaptive compensatory processes depend upon the development and functional state of these organs particularly, at early stages of ontogenesis.

The aim of the investigations was to examine the dynamics in development of morphological structures of small intestine in the offspring of female rats which were NN preparations injected in different periods of pregnancy.

KEY WORDS: «Mother-fetus» system; adaptation; preparations of nucleic nature; pharmacological correction; morphological changes

MATERIALS AND METHODS OF THE INVESTIGATIONS

The experiment employed female-rats of Vestar line and their offspring in different periods of postnatal ontogenesis. The NN preparation Vestin was administered to 86 pregnant animals of experimental groups 1, 2 and 3 in the periods of pre-implantation, organogenesis and fetogenesis, respectively. A control female group received physiologic saline.

With the aim to study morphological structures of the organs examined the offspring of the experimental groups were withdrawn from the experiment by decapitation at 5th, 15th and 20th day of life.

For histological study their intestine and liver were fixed in 10% solution of neutral formaldehyde, cuttings obtained were stained with hematoxylin and eosin; polysaccharides and RNA content were detected by SHIK-reaction and acc. to *Brashe*, respectively (*Luppa X.*, 1980). Cytokaryometric examinations were done in the cuttings. The data obtained was processed statistically.

ANALYSES OF THE INVESTIGATION RESULTS

With the preparation incorporated at the early fetus bearing the 5-day baby-rats of experimental group 1 whose hepatocytes had relatively big nuclei were marked to have negligible growth of protoplasm vs. control analogues, the highest indexes being in the villus-crypt system.

Vestin administration at the mid-date of fetus bearing led to active expansion of the protoplasm volume of liver hepatocytes and big size of cell nuclei in the baby-rats (Table 1). The presence of two-nucleus hepatocytes in the liver of the experimental baby-rats of the above age is evidently related to the intensified functional activity of the organ. It may be suggested that this fact is the consequence of the fetus adaptive responses to the conditions of intrauterine effects which influence the rate of the offspring development in postnatal ontogenesis.

In the offspring of Vestin injected females at the late stages of fetus bearing the processes of hepatocytes differentiating were followed by the decrease of their NPR (nuclear protoplasm ratio) due to the active growth of protoplasm vs. nucleus (Table 1). Administering of the NN preparation at 18-day pregnancy is likely to directly supply the fetus organism with extra energy resources. The consequence manifests itself at the subsequent postnatal differentiation of liver cell structures and fast advance of adaptation processes in this period. The similar suggestion is partially supported by the data of histochemical analysis of liver hepatocytes in

the 5-day newborn of this group, the analysis identified homogenously and densely located granules of SHIK-positive substance and detected RNA intensive color in their cytoplasm.

Table 1

Cytometric indexes of liver hepacytes in rats' offspring with the NN preparation Vestin administered

Indexes: nucleus, protoplasm volume (S), mcm ²	Experimental group 1		Experimental group 2		Experimental group 3		Control group	
	5 days							
	M±m	Cv (%)	M±m	Cv (%)	M±m	Cv (%)	M±m	Cv (%)
Nucleus S	384.02± 41.7	59.5	373.4± 41.9	61.5	278± 34.5**	68.1	439.6± 33.9	42.3
Protoplasm S	912.4±140.6*	84.4	1162.7±195.7	92.2	1004.3±144.9	79.1	1417.5±190.2	73.5
NPR	0.52±0.1	60.9	0.5±0.07	88.2	0.3±0.04	69.8	0.5±0.1	84.3
	15 days							
Nucleus S	387.1±30.8	43.6	423.3±31.4	40.7	402.3±28.2	38.4	409.5± 30.4	40.6
Protoplasm S	1532.9±168.3	60.1	1470.9±180.4	67.2	1008.3±109.6	59.6	1238.6±119.9	53.01
NPR	0.3±0.05	77.9	0.4±0.05	73.2	0.5±0.06	59.2	0.4±0.05	65.1
	20 days							
Nucleus S	325.9±21.3	35.8	357±18.9	28.9	321.3±22.2	37.9	300.9± 25.03	45.5
Protoplasm S	808.9±116.7	79	931.1±82.4	48.5	1068.9±116.9	59.9	1118.1±151.8	74.3
NPR	0.5±0.1	60.9	0.5±0.05	63.7	0.4±0.04	57.7	0.4±0.04	59.5

Where * P<0.05; ** P<0.01

By the 15th day of life hepatocyte sizes were marked to substantially enlarge with concurrent decrease of NPR indexes in the offspring of all the experimental groups (Table 1). The similar changes in liver may exhibit themselves as hypertrophic processes. Taking into account the capacity of the NN preparation to encourage protein synthesis, the changes identified in glycogen and RNA content at 15- and 20-day age may testify to intensify energy consumption and improved protein synthetic function in liver. Cytometry established the general tendency of nuclei and protoplasm to grow in the hepatocytes of the experimental groups by the 20-day age vs. the control animals.

All the experimental groups were observed to have a steady tendency of the villus-crypt system to grow throughout the entire experiment (Figure 1). By the 15th day of life the content of goblet cells went up in epithelia of the small intestine villi. By the 20th day the further making and differentiation of structures of small intestine mucus membrane occurred. With all these the depth of occurrence of crypts and height of the villi of small intestine mucus membrane in the experimental groups exceeded the same indexes in the control groups. Cell composition of small intestine mucus membrane in the 20-day baby-rats was presented by prismatic erythrocytes, goblet cells and argentocytes.

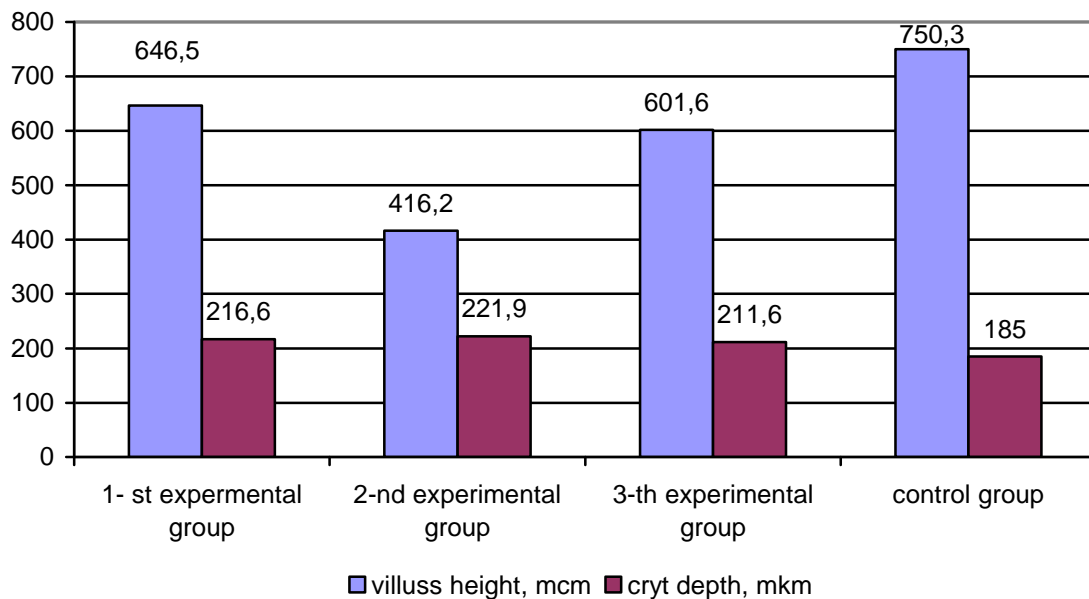


Figure 1. Dynamics of morphometric indexes of the small intestine villi in the offspring of Vestin injected rats

The earlier formation of lymphoid structures of the small intestine in the rats' offspring was observed after the tested preparation injected at 14th and 18th day of pregnancy and these encouraged the making of protective processes.

Thus, the NN preparation both at early and late periods of fetus bearing positively influences the development of the morphological structures of offspring liver and intestine which are responsible for absorption. At this, the expansion of absorbing intestine surface facilitates better permeation of bioactive components of the preparation into the organism of the young experimental animals and provides a more qualitative transition to new living conditions. Therefore, the tested preparation may be recommended as the remedy aimed at providing higher level of adaptation processes in animal organism.

CONCLUSIONS

1. Administration of the Vestin preparation in different periods of pregnancy produces positive influence upon the dynamics of forming structural elements in small intestine (villus-crypt) and liver (hepatocyte) in offspring.
2. The Vestin preparation injected to pregnant female animals at early and late stages of fetus bearing exerts positive influence upon the glycogen and RNA content in hepatocytes of the experimental offspring and this demonstrates high level of energy and morphological processes.
3. The detected structural changes in the liver and intestine with the preparation injected provide higher level of adaptative processes in organism.

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