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CREATION OF THE INFORMATIONAL MODEL OF TOXIC MYOCARDITIS OCCURRED UNDER THE INFLUENCE OF PESTICIDES

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ABSTRACT

Creation of productive knowledge is important whereas on the base of this knowledge we can diagnose morphologic and morphometric properties of vascular stromal tissues of myocardium under toxic myocarditis on the bases of clinical symptoms. Consequence of this is a proper therapeutic strategy that will have a life importance for the patients.

UDC CODE & KEYWORDS

■ UDC: 612.1 ■ Toxic myocarditis ■ Pesticides ■ Stroma-vascular structure of myocardium

INTRODUCTION

Diseases of the cardiovascular system are now a major cause of disability and mortality of the adult population in many countries around the world. Rat heart and human heart are anatomically similar, despite the differences in size and frequency of contractions (Bruneau, 2002; Sedmera, 2005). Therefore, when studying the effect of the impact of environmental factors on the heart and the creation of models of diseases of the cardiovascular system are widely used rat.

At toxic lesion of the heart main quality and muscular and quantity changes occur in stroma-vascular and muscular structures of the heart. As it is an exactly morphologic change of the vessels and stromas that lead to pathological changes in parenchyma of the heart and manifest with appearance of clinical symptoms. (Avtandilov,1990; Isroilov. 2009; Rustamov, 2009), Therefore above characteristics of morphometric state of the vascular stromal tissue and cardiomyocytes ratio should be assessed as a background average. In order to do this, it is necessary to choose such characteristics of morphometry that will provide quantity assessment and this characteristic must express exactly the morphometry of vascular stromal tissue that plays a causal role in developing of toxic damage in cardiomyocytes (Pospelov, 1999; Olsen,1995).

The purpose of this study of morphometric ratios of interstitial and muscular fibers of myocardium under toxic damage.

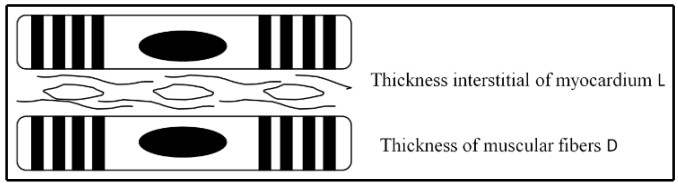
Materials and Methods

We used 42 rat heart specimens dividing them into 3 groups: control group, experimental group under explosion of keenmix and cotorone.

General morphometry of toxic myocarditis is a thickness of vascular stromal interstitial and heart cardiomyocytes. Therefore we measured the average thickness of vascular stromal interstitial of myocardium with the micro-specimen that were stained by hematoxylin-eosin and marked with letter L. Then we measured average thickness of myocardial muscular fibers and marked with letter D.

This is shown on Figure 1.

Figure 1: Measurements of structural elements of myocardium



Source: Author

To eliminate the statistic error of measurement in increasing micro drugs introduced the standard coefficient β that has no dimension.

L - average thickness interstitial of myocardium

D - average thickness of muscular fibers

β-coefficient β =L/D

This characteristic named as β-coefficient for the study of morphometry of the toxic myocardial damage determined by us for the first time. As a matter of fact this coefficient expresses the average background state of morphometric ratios of interstitial and muscular fibers of myocardium under toxic damage.

Results of the research. Calculation results of coefficient β indicated that observed regular changes in defined quantity of observations (n) from 10th to 18th in the groups.

First determined the value of β coefficient on rats in the control group, which is for normal myocardium (Table 1). From table 1 it is clear that average variations coefficient can be assessed with -coefficient which have certain consequences

that appear as clinical symptoms. This property of β - coefficient give us chance to create productive base of knowledge (PBN) for toxic damage of myocardium. PBN is a basis of recognition of morphometry and interstitial morphology and muscular fibers of the heart on the basis of clinical symptoms.

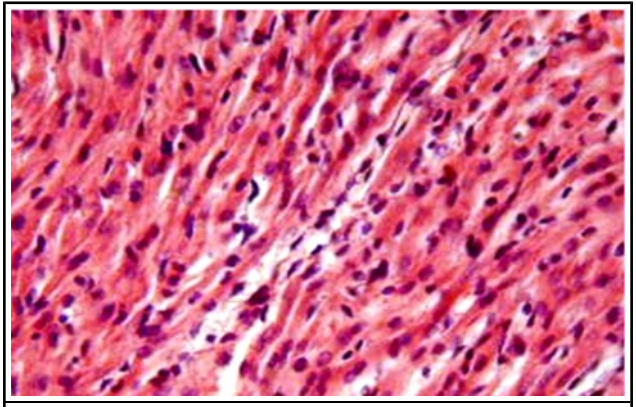
Table 1: Indicators of the coefficient β depending from the types of toxic affect in animals

Group names	N	Бета – β	P
Control animals	12	β = (0,78±0.14).	
1st group injection of keenmax	15	β = (1,48±0.34)	P<0.05
2st injection of cotoranes	15	β = (1,17±0.24)	P<0.001

Source: Author

In the control group coefficient β is equal in average to 0.78±0.14. Under the influence of keenmax and cotorone observed analogical changes in terms of vessels (figure 3). In the small vessels of the heart revealed hyperemia, stasis and diapedetic hemorrhage, which is accompanied by vascular edema, swelling and disorganization of connective tissue stroma. Reactive changes in the venous vessels were distributed in the form of expansion and plethora of them, the development of parivascular edema and diapedetic hemorrhage, which are the result of toxic influences of pesticides that is developed from violation of the micro circulatory channel, toxic venous plethora and increase in vascular permeability.

Figure 2: Posterior wall of left ventricle of rat heart of control group

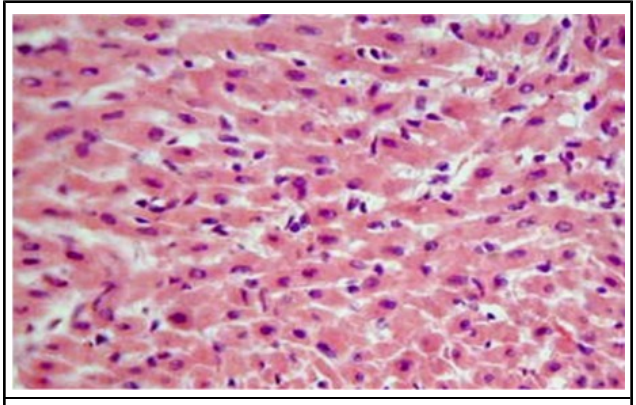


Staining: hematoxylin-eosin
Magnification: OC10, OB20

Source: Author

Increase in micro-vascular permeability of venous vessels were accompanied by the release of liquid part of blood. In a 1st group under the influence of keenmax, when on the vessel walls and interstitial connective tissue developed edema, mucoid, fibrinoid swelling and disorganization of the structural elements, due to which occurs thickening of the vascular stromal interstitial of the myocardium (figure 3) is marked increase in β coefficient indicator up to 2.0 times compared to the norm.

Figure 3: Posterior wall of the right ventricle of rat heart when influenced kotoran

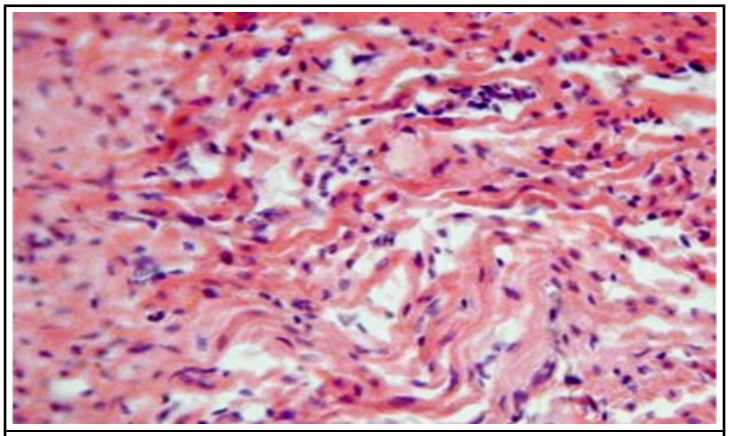


Staining: hematoxylin- eosin
Magnification: OC10, OB20

Source: Author

Reasonable increase of the following coefficient can be considered as a diagnostic indicator and is an evidence of toxic interstitial damage of the heart myocardium. In the 2nd study group with administration of cotorone in animals compared with the first group occurred less pronounced vascular wall changes, by which the coeffitient β consist in average 1,17±0.24.

Figure 4: Posterior wall of the right ventricle of rat heart when influenced ceenmex. Rapid expansion of the interstitium due to toxic edema



Staining: hematoxylin-eosin
Magnification: OC10, OB20

Source: Author

Our conducted experiment indicated that this coefficient is really morphometric criterion in assessing the degree of the heart damage of toxic nature.

CONCLUSION

1. Indicators of β coefficient reflects morphologic and mophometric state of the vascular wall and interstitial in terms of myocardial cardiomyocytes and can be used as a prognostic indicator under toxic myocarditis.

2. Increase in the coeffitient β, compared to the norm indicated of the thickening of the walls of blood vessels and interstitinum that is a prognostic indicator of toxic myocardial damage.

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