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**THE RELATIONSHIP BETWEEN PARAMETERS OF THE PEYER'S  
PATCHES OF THE SMALL INTESTINE IN INTACT RATS**

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**ABSTRACT.** This paper deals with the study of the relationship between parameters of the Peyer's patches of the small intestine in intact rats of different age groups. The correlation analysis revealed the direct relationship between the parameters.

**Keywords:** rats; Peyer's patches; correlation analysis.

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**ВЗАИМОЗАВИСИМОСТЬ МЕЖДУ ПОКАЗАТЕЛЯМИ ПЕЙЕРОВЫХ  
БЛЯШЕК ТОНКОЙ КИШКИ ИНТАКТНЫХ КРЫС**

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**Аннотация.** Изучена взаимозависимость между показателями пейеровых бляшек тонкой кишки интактных крыс разных возрастных групп. В результате корреляционного анализа установлено, что взаимосвязь между параметрами была прямой.

**Ключевые слова:** крысы, пейеровы бляшки, корреляционный анализ.

**Introduction.** The small intestine is a part of digestive system, where the long-term conversion of nutrients takes place, followed by their absorption and distribution between cells in the body [5]. In turn, there is an integration of many body systems (nervous, immune, endocrine, circulatory, lymphatic) in the small intestine that ensures these functions [1]. The immune system responds primarily for their safe operation, as the substances that people receive daily are alien to the body [4, 6]. Therefore, in the course of evolution the Peyer's patches have been formed in the small intestine, which are one of the first barrier to the penetration of substances of different nature from the lumen into the blood or lymph [3, 7, 8].

On that basis, the objective of this study was to determine whether there is a relationship between parameters of the Peyer's patches of the small intestine in intact rats of different age groups.

**Materials and methods.** The study was conducted on 24 3-4 month-old (I group), 5-6 month-old (II), 7-9 month-old (III) and 10-11 month-old (IV) white mongrel male rats. After removal from the experiment, a small intestine was isolated from the rats of different age groups, and the number of Peyer's patches was counted. Their lengths and widths were measured with the calipers. Then, it was fixed in 10% formalin solution and subjected to standard histological dehydration. Sections of 5-6  $\mu\text{m}$  thick were stained with hematoxylin-eosin. Using an automated morphometric complex (a light microscope Olympus CX41, a digital camera and a personal computer with a set of applications), the linear dimensions were measured and the number of nuclei per unit area of the preparation ( $1000 \mu\text{m}^2$ ) in the lymph nodules, germinal center and internodular zone of Peyer's patches was counted. The data were processed by using the correlation analysis with the

calculation of the Bravo-Pearson's correlation coefficient [2], which allowed determining the relationship between: the number of patches and their linear dimensions (length of a patch and width of a lymph nodule, germinal center, and internodular zone); the number of cell nuclei in the germinal center and the length of the patch, as well as between the height and width of germinal center; and the number of cell nuclei in internodular zone and the length of a Peyer's patch, as well as between the height and width of internodular zone.

**Results.** We revealed in 3-4 month-old animals the presence of a strong direct correlation relationship between: the number of Peyer's patches and their length (0.96), the width of germinal center (0.98), internodular zone (0.86); the length of Peyer's patches and width of a lymph nodule (0.90), germinal center (0.94), and internodular zone (0.79). There was a close relationship between the number of the cell nuclei in the germinal center and the patch length (0.87), the height (0.90) and width (0.79) of germinal center, as well as the number of cell nuclei in the internodular zone and the length of a Peyer's patch (0.95), the height (0.94) and width of (0.82) internodular zone.

By 5-6 months of postnatal development, there was a high degree of positive correlation between the number of Peyer's patches and their length (0.88), the width of germinal center (0.91), the length of a patch and the width of a lymph nodule (0.98), germinal center (0.93), and internodular zone (0.85). Similar relationship was revealed between the number of the cell nuclei in the germinal center and the Peyer's patch length (0.87), the height (0.90) and width (0.79) of germinal center, as well as the number of cell nuclei in the internodular zone and the length of a patch (0.99), the height (0.97) and width of (0.89) internodular zone. The average degree of correlation relationship was revealed between the number of patches and the width of internodular zone (0.65).

We revealed a strong correlation relationship in 7-9 month-old animals between the number of Peyer's patches and their length (0.89), the width of germinal center (0.89), internodular zone (0.86), as well as the length of a Peyer's patch and the width of a lymph nodule (0.99), germinal center (0.97), and internodular zone (0.97). A high degree of positive

interrelationship was revealed between the number of the cell nuclei in the germinal center and the Peyer's patch length (0.98), the height (0.87) and width (0.87) of germinal center, as well as the number of cell nuclei in the internodular zone and the length of a patch (0.94), the height (0.85) and width of (0.99) internodular zone.

The rats in the later stages of postnatal development (10-11 months) had a close linear relationship between the number of Peyer's patches and their length (0.93), the width of germinal center (0.95), internodular zone (0.93), as well as the length of a Peyer's patch and the width of a lymph nodule (0.84), germinal center (0.80), and internodular zone (0.82). Similar relationship was between the number of the cell nuclei in the germinal center and the Peyer's patch length (0.96), the height (0.93) and width (0.97) of germinal center, as well as the number of cell nuclei in the internodular zone and the length of a patch (0.94), the height (0.91) and width of (0.91) internodular zone.

**Conclusion.** The correlation analysis revealed that the intact animals of different age groups had a direct interrelationship between the parameters in the range of  $0.65 < r < 0.99$ .

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