

itself without the participation of students! New approaches in education immediately moved to the center of attention of students, and this is already a noticeable achievement. Recent years have passed under the banner of distance learning and highlighted the problems of our education.

Almost every day, when talking with students, teachers hear words of approval for the beginning of classroom classes and students' desire to start acquiring practical skills! And the educational platform helps in this, the student comes prepared for a practical lesson, there is no need to waste this most valuable time on paper tests, oral surveys, etc. [2]. Such a fruitful communication with students is happening for the first time, it is really the beginning of creating an educational environment where the student has a leading role.

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### **IMMUNOHISTOCHEMICAL CHARACTERISTICS OF STRUCTURAL CHANGES IN THE CORTEX AND MEDULLA OF THE ADRENAL GLANDS UNDER THE INFLUENCE OF A FOOD ADDITIVE COMPLEX**

**Introduction:** Nowadays, food additives are widely used worldwide. They allow you to give food a specific taste, store products for a longer time and improve their appearance. Consumers do not even understand or realize the presence of chemical impurities in their products. However, food additives, even in small amounts, can lead to diseases of the organs and systems of the body, and in this case they can affect the functioning of the adrenal glands.

**The aim:** Determination of Ki-67 expression in the cortex and medulla of rat adrenal glands after exposure to a complex of food additive complex (sodium glutamate, sodium nitrite, and Ponceau 4R).

**Materials and methods:** The control group of rats used oral drinking water and physiological saline. Rats from the experimental group were orally injected with a 10% solution of sodium nitrite (E 250); monosodium glutamate (E621) was administered at a dose of 20 mg/kg in 0.5 ml of distilled water; Ponceau 4R - at a dose of 5 mg/kg in 0.5 ml of distilled water once a day. Dosages of food additives were two times lower than the permissible norm in food products. Rats were removed from the experiment after 1, 4-, 8-, 12- and 16-weeks using ether anesthesia followed by euthanasia. For histological examination, pieces of adrenal glands were fixed for 6-8 hours in 10% neutral buffered formalin (Biognost, Croatia). Tissue processing was performed in a LOGOSone histoprocessor (Milestone, Italy). Paraffin sections of adrenal glands (5  $\mu$ m thick) were prepared on an AMR 400 manual rotary microtome (Amos science, Australia), stained with hematoxylin and eosin (Biognost, Croatia) and evaluated using a Nikon Eclipse Ci light microscope (Nikon, Japan) with photodocumentation using Sigeta M3CMOS 14000 digital camera. Immunohistochemical studies were performed on thin formalin-paraffin sections of rat adrenal glands. Recombinant rabbit monoclonal primary antibodies Anti-Ki-67 (Cat. No. ab16667, Abcam, USA) were used to determine cell proliferation. Antibody detection was performed using the Mouse/Rabbit PolyVue™ HRP/DAB polymer system (Diagnostic BioSystems, USA). Sections were stained with hematoxylin M (Biognost, Croatia). The results of immunohistochemical reactions were evaluated by counting the number of positively stained areas. Ki-67 intensity was evaluated by immunohistochemical reaction using a semi-quantitative method. The number of labeled cells with Ki-67 was determined as a percentage, the percentage of cells with the biomarker was counted in ten fields of 100 cells, the average percentage was determined and its indicator was interpreted as the labeling index (LI%). The investigated Ki-67 protein was evaluated in cells of the cortical (glomerular, bundle, reticular zone) and medulla of rat adrenal glands.

**Results:** Ki-67 is a protein marker of cell proliferation or cell division in body tissues. The expression of Ki-67 in cells can indicate how actively they are dividing and growing. The results of these studies can help in medical practice, especially in oncology, to evaluate tumors and determine treatment strategies since tumors with high expression of Ki-67 often grow faster and more aggressively.

According to the results of an immunohistochemical study, it was established that Ki-67 positive cells perform the function of components of the local defense barrier in the cortical and medullary substances of the adrenal glands. The highest number of Ki-67-positive cells was found in the walls of fenestrated capillaries that penetrate the cortex and medulla of the adrenal glands. On the border of the glomerular

and reticular zones, groups of cells showed positivity to Ki-67, the number of which was from 2 to 10 cells.

The total number of Ki-67-positive cells varied during the week of the experimental study. Already from the first week, a sharp increase in the number of cells expressing Ki-67 was observed in the glomerular, fasciculate and reticular zones of the cortical substance of the adrenal glands. In the fourth week of the experiment, the level of Ki-67 positive cells almost reached the control values. However, at week 12, the number of cells expressing Ki-67 increased dramatically in both the cortex and medulla. On the 16th week, the indicators remained at the level of the 12th week, with a further increase in the number of Ki-67-positive cells in the fasciculate zone of the cortical substance of the adrenal glands.

**Conclusion:** the data obtained during the experiment allow us to conclude that the influence of a complex of food additives of monosodium glutamate, sodium nitrite and Ponceau 4R is a mechanism of activation of the focus of inflammation and changes in the structural elements of the adrenal glands and hemomicrocirculatory bed.

According to the data of an immunohistochemical study, Ki-67-positive cells are elements of the local protective barrier in the cortex and medulla of the adrenal glands. The largest number of Ki-67-positive cells was determined in the walls of fenestrated capillaries that permeate the cortex and medulla of the adrenal glands. Ki-67-positive cells formed clusters of 2-10 cells at the border of the glomerular and reticular zones.

The total number of Ki-67-positive cells varied according to the week of the experimental study. Starting from the first week, the number of cells expressing Ki-67 increases sharply in the adrenal cortex's glomerular, fasciculate and reticular zones. In the fourth week of the experiment, the level of labeled cells with Ki-67 reaches almost control values. However, at the 12th week, the number of cells expressing Ki-67 increases sharply in the cortex and the medulla. On the 16th week, the indicators remain within the 12th week, with an increase in the number of Ki-67-positive cells in the fasciculate zone of the cortical substance of the adrenal glands.

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## **STRUCTURAL AND TINCTORIAL CHARACTERISTICS OF CATGUT THREAD**

**Introduction.** One of the factors that lead to the inflammatory process after surgical interventions can be the suture material that remains in the human body, as a foreign agent for the body and over time often causes postoperative aseptic and septic

<b>Янко Н.В., Каськова Л.Ф., Хміль О.В.</b>	<b>182</b>
ПРОБЛЕМИ НАВЧАННЯ ІНОЗЕМНИХ СТУДЕНТІВ НА КЛІНІЧНИХ КАФЕДРАХ У СУЧАСНИХ УМОВАХ	
<b>Baidi Ayman, Bourtal Yassir</b>	<b>183</b>
FEATURES OF POPULATION MORBIDITY AND HEALTH CARE SYSTEM IN MOROCCO	
<b>Vainores Alfonsas, Mintser Ozar P., Potiazhenko Maksim M., Bumblite Inga B., Nevoit Ganna V.</b>	<b>185</b>
NANOLEVEL BIOLOGY: THE ROLE OF BIOPHOTONS IN PHYSIOLOGICAL AND METABOLIC PROCESSES IN THE HUMAN BODY	
<b>Digitiar N., Gerasimenko N., Lavrenko A., Avramenko Ya.</b>	<b>188</b>
INNOVATIVE ISSUES OF IMPROVING THE QUALITY OF THE EDUCATIONAL PROCESS	
<b>Donchenko S.V., Bilash S.M.</b>	<b>189</b>
IMMUNOHISTOCHEMICAL CHARACTERISTICS OF STRUCTURAL CHANGES IN THE CORTEX AND MEDULLA OF THE ADRENAL GLANDS UNDER THE INFLUENCE OF A FOOD ADDITIVE COMPLEX	
<b>Maksymenko O.S., Hryn V.H.</b>	<b>191</b>
STRUCTURAL AND TINCTORIAL CHARACTERISTICS OF CATGUT THREAD	
<b>Oliinichenko Ya. O., Bilash S. M.</b>	<b>192</b>
STRUCTURAL ORGANISATION OF THE RATS' ILEUM	
<b>Tkachenko Olena, Jha Sahil, Bourtal Yassir, Baidi Ayman, Chentir Wassim, Ben Tamarout Syrine, Darkouch Ayman, Abbassi Marouane, Jemai Merouane</b>	<b>194</b>
TO THE QUESTION CONCERNING ASYMMETRY AND TYPOLOGICAL ASPECTS CONTRIBUTION INTO HEREDITARY AND ACQUIRED PATHOLOGY	
<b>Zhukova Maryna, Tkachenko Olena</b>	<b>195</b>
REFLEXY SOME ASPECTS	
<b>Яськів Н.А.</b>	<b>197</b>
FEATURES OF CELLULAR COMPOSITION OF RECURRENT APHTHOUS STOMATITIS LESIONS	