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**Experimental Studies on the Influence of Sefril
on the Duodenum Mucous Membrane**

Badania doświadczalne nad wpływem Sefrilu na błonę śluzową dwunastnicy

Опытные исследования влияния Сефрила на слизистую
оболочку двенадцатиперстной кишки

Cephalosporins constitute an important group of antibiotics with a wide spectrum of antibacterial action and a high degree of clinical efficiency. A specially valuable semisynthetic antibiotic from this group is Sefril (Cephradin), which reaching a high concentration in blood, is marked by small toxicity and can be administered in various ways. After an oral administration it is quickly absorbed from the alimentary duct, reaching therapeutic level in the serum already after 30 min. (3, 4). Not numerous side effects of the drug usually concern the alimentary duct. This is the reason why the influence of Sefril on some histochemical reactions in the small intestine mucous membrane of the rat was to be studied.

MATERIAL AND METHODS OF STUDIES

The investigations have been performed on 8-months' old male white rats, with body weight ca 250 g, from the own culture of the Institute. The animals were divided into two experimental groups and a control one. Each day for seven days the experimental groups were intragastrically administered by means of a probe the watery suspension of Sefril preparation produced by "Polfa". The rats from the Ist experimental group were given the drug in a dose 500 mg/kg body weight, the rats from the IInd experimental group — 2000 mg/kg body weight. After 24 hrs since the last administration of the drug the animals were decapitated and the duodenum was collected for morphological and histochemical investigations. The material was fixed in Carnoy's and Baker's liquids. The paraffin sections were

stained with hematoxylin and eosin and PAS and Brachet's reaction was performed on them. On the frozen sections the activity of acidic and alkaline phosphatase has been discovered by means of Gomori's method.

OWN INVESTIGATIONS

Staining the sections with hematoxylin and eosin proved the correct structure of all the layers of intestine wall in the control group and in both experimental groups.

HISTOCHEMICAL INVESTIGATIONS

Control animals

High pyronine absorptiveness of the cytoplasm has been found in the enterocytes and in the reticular stroma of intestinal villi. The PAS reaction was intensive in mucocytes and upon the area of the whole intestine epithelium. An intensive reaction to the alkaline phosphatase has been observed in enterocytes, and especially in the striated edge, a weaker reaction was showed by connective tissue stroma. A positive reaction to the acidic phosphatase has been obtained in the enterocytes and in the proper mucous membrane. In mucocytes the reaction to both phosphatases was negative.

Experimental animals

Group I. No differences were found in the intensification of Brachet and PAS reaction in comparison with control preparations. In the intestinal epithelium a small weakening of reaction to alkaline phosphatase and an increase in the intensity of reaction to acidic phosphatase in the enterocytes were observed. Neither there was observed an enzymatic reaction in the mucocytes. In connective tissue stroma the reaction was similar as in the control material.

Group II. In comparison with the control group the pyronine absorptiveness of cytoplasm of the intestinal epithelium and stroma has not changed. The intensiveness of PAS reaction in the intestinal epithelium has increased. The number of mucous cells on the lateral areas of villi and in the intestinal glands has increased. A further decrease in the intensity of reaction to the acidic phosphatase in the enterocytes has been observed.

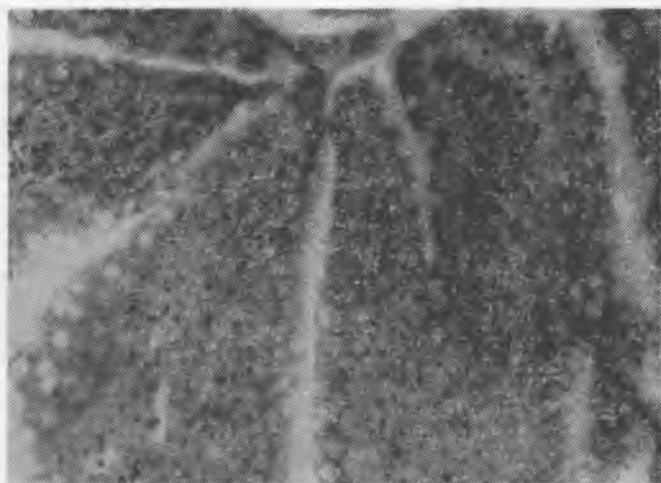


Fig. 1



Fig. 2

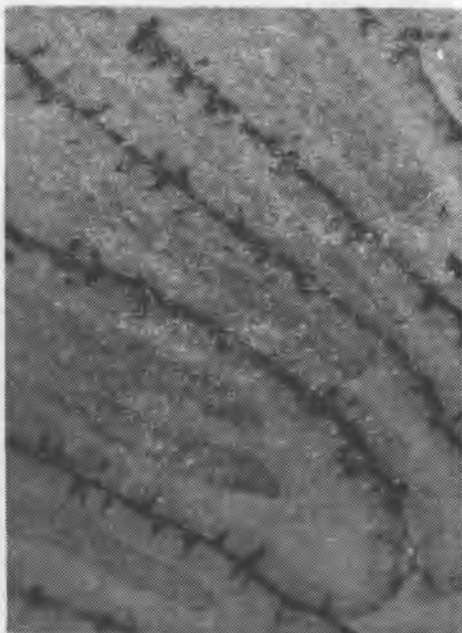


Fig. 3

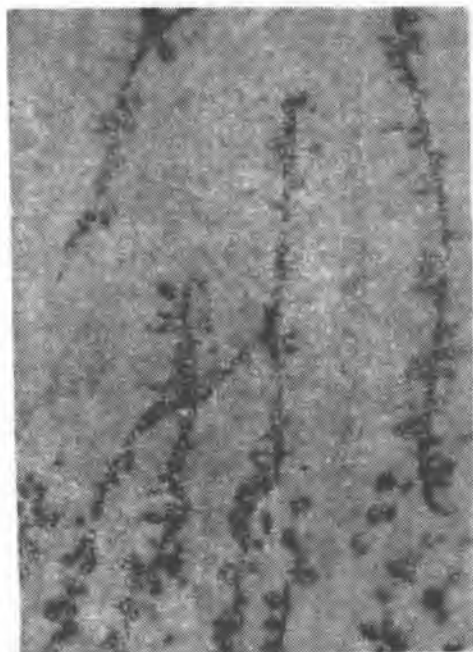


Fig. 4

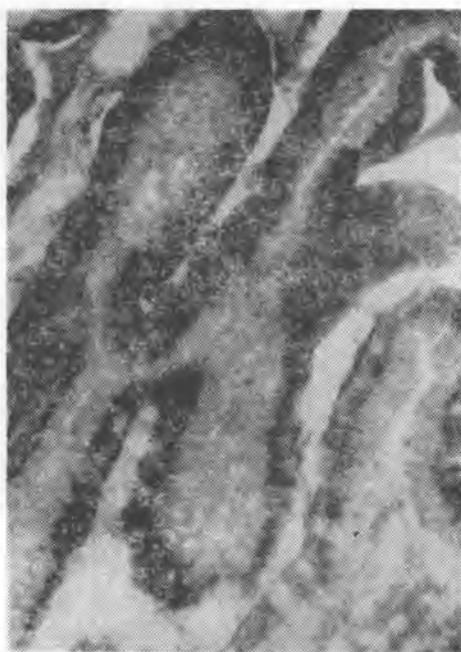


Fig. 5

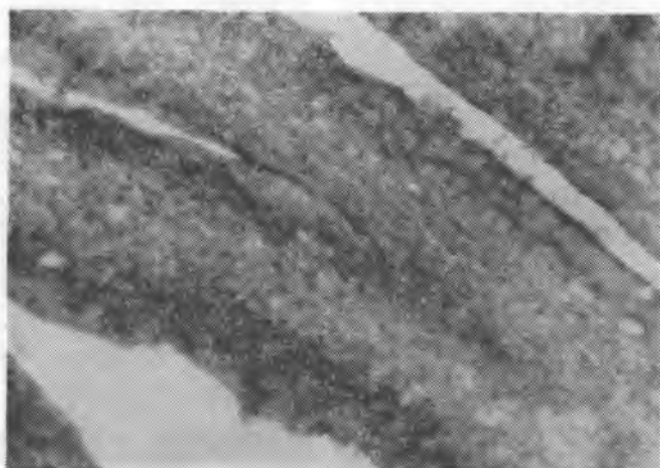


Fig. 6

DISCUSSION OF THE RESULTS OF INVESTIGATIONS

High therapeutic efficiency, short period of treatment, good tolerance of the drug by the organism are the characteristics which distinguish Sefril among the antibiotics belonging to cephalosporins. The oral administration of the antibiotic is the optimum way of using this drug. The performed histological investigations did not reveal any structural changes in the studied section of the small intestine after Sefril administration. Histochemical investigations showed deviations within the range of PAS reaction and enzymatic reactions to acidic and alkaline phosphatase.

The activity of enzymes in the small intestine changes in different physiological stages and in pathology (1, 2, 6, 8). Information on the behaviour of both phosphatases described in this paper in various diseases are contradictory. In our investigations an increased reaction to the acidic phosphatase was observed after administration of the drug. The intensification of the reaction was proportional to the dose of the given antibiotic. The increase in the reaction to the acidic phosphatase proves the activation of lysosomes similar to the one after application of other drugs (7). The activity of reaction to the alkaline phosphatase decreased after Sefril administration also proportionally to the dose of the given drug. This may prove the disturbances in the absorptive function of the intestine (9). An increase in PAS reaction in the small intestine proves that Sefril, alike other drugs (5) stimulates the secretion of mucocytes in the intestine.

However, no influence of Sefril on the content of nucleic acids in the material studied was found.

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EXPLANATION TO FIGURES

Fig. 1. Reaction to the activity of acidic phosphatase in duodenum mucous membrane of the control rat. Magn. ca 200X.

Fig. 2. Reaction to the activity of alkaline phosphatase in duodenum mucous membrane of the control rat. Magn. ca 200X.

Fig. 3. PAS reaction in duodenum mucous membrane of the rat from the I experimental group. Magn. ca 200X.

Fig. 4. PAS reaction in duodenum mucous membrane of the rat from the IInd experimental group. Magn. ca 200X.

Fig. 5. Reaction to the activity of acidic phosphatase in duodenum mucous membrane of the rat from the IInd experimental group. Magn. ca 200X.

Fig. 6. Reaction to the activity of alkaline phosphatase in duodenum mucous membrane of the rat from the IInd experimental group. Magn. ca 200X.

STRESZCZENIE

Przebadano wpływ Sefrilu na odczyn histochemiczne w błonie śluzowej dwunastnicy u szczura białego. Zwierzętom doświadczalnym podawano sondą dożołądkowo przez 7 dni wodną zawiesinę preparatu Sefril produkcji „Polfi”: grupie I doświadczalnej w dawce 500 mg/kg c.c., grupie II doświadczalnej w dawce 2000 mg/kg c.c. Na pobranym materiale wykonywano barwienie hematoksyliną i eozyną, reakcję PAS i Bracheta oraz wykrywano aktywność fosfatazy kwaśnej i zasadowej. Po podaniu Sefrilu w dawce 500 mg/kg c.c. wzrosła aktywność fosfatazy kwaśnej, a uległa osłabieniu aktywność fosfatazy zasadowej. Podanie leku w dawce 2000 mg/kg c.c. spowodowało wzrost intensywności reakcji PAS w porównaniu z kontrolą oraz dalszy wzrost aktywności fosfatazy kwaśnej i osłabienie odczynu na fosfatazę zasadową w porównaniu z grupą I doświadczalną.

РЕЗЮМЕ

Исследовано влияние Сефрила на гистохимические реакции слизистой оболочки двенадцатиперстной кишки белой крысы. Опытные животные получали в течение 7 дней через желудочный зонд водянную взвесь препарата Сефрил производства „Польфа”: I опытная группа в дозе 500 мг/кг в.т. II опытная

группа в дозе 2000 мг/кг в.т. На взятом материале были проведены: окраски гематоксилином и эозином, реакции ПАС и Брашета, а также была обнаружена активность кислой фосфатазы и щелочной фосфатазы. После применения Сефрила в дозе 500 мг/кг в.т. увеличилась активность кислой фосфатазы, а уменьшилась активность щелочной фосфатазы. Препарат в дозе 2000 мг/кг в.т. вызвало повышение интенсивности реакции ПАС по сравнению с контролем, а также дальнейшее увеличение активности кислой фосфатазы и ослабление реакции щелочной фосфатазы по сравнению с I опытной группой.

