MORPHOLOGICAL AND HISTOENZYMOCLOGICAL CHANGES IN DUODENUM OF WHITE RATS TREATED WITH AMINOPHENAZONE (PYRAMIDON) AND SODIUM NITRITE.

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The extensive therapeutic use of aminophenazone, correlated with the high frequency of alimentary products containing nitrates and nitrites, represents an important matter for the public health. Recently, dimethyl-nitrosamine (DMNA) formation was signalled out in gastrointestinal tract, which could exert toxic effects upon the human or animal organism (1, 2, 3, 4). In this work we have investigated the effect of per os treatment with aminophenazone and sodium nitrite on the morphophysiology of rat duodenum.

MATERIAL AND METHODS

For the experiments were used male adult Wistar rats, which received daily, during 20 days, 10 mg aminophenazone dissolved in 0,5 ml water and 10 mg sodium nitrite in 0,5 ml water by aid of intragastric tube. 30 days after the administration of the first dose, the control untreated and the treated animals were killed and a fragment of the duodenum from the distal portion was removed. Histological examinations were made by coloration of the tissue slices with haematoxyline-eosine. Other tissue slices were congelated in liquid nitrogen and sectioned by cryotome. Following enzyme reactions were effectuated using 10 μm thick slices: alcaline phosphatase, acid phosphatase, Mg\(^{2+}\) — adenosinetriphosphatase (ATP-ase), glucoso-6-phosphate dehydrogenase (G6PDH), cytocromoxidase (CyOx), succinate dehydrogenase (SDH) and lactate dehydrogenase (LDH) (5).

RESULTS AND DISCUSSION

Morphological examination of duodenum revealed that aminophenazone and sodium nitrite administration determined marked changes manifested by the presence of lymphatical oedemas in stroma villi, on the end
of central chilifer, and by the infiltration of some strong basophilic cells into central part of short villosities (Figs. 1 and 2).

Cytoenzymological studies revealed two types of changes after treatment. An intensification of the acid phosphatase, alcaline phosphatase, ATP-ase and G6PDH activities, and a strong inhibition of the activity of LDH (Figs. 3 and 4) could be observed. These phenomena are very evident in the case of the epithelium of villosities, but in the case of macrophages only the acid phosphatase reaction was increased. In contrast with these observations, the CyOx and SDH activities remained unchanged.

Some experiments of in vivo or in vitro nitrosation showed that N-nitrosamines formed in animal organism could affect liver, lungs, or central nervous system (1, 2, 3), but our knowledge about their action on the intestinal level is reduced.

Although the liver is the major organ where the metabolism of N-nitroso-compounds takes place, our data obtained showed evident morphological and functional changes on the level of duodenal epithelium when DMNA passes through the intestine.

The formation of lymphatic oedemas after treatment suggests an action of DMNA upon the level of vascular walls, increasing selective permeability for water molecules which accumulate in the top of villosities. DMNA could change permeability of epithelial cell membranes, demonstrated by the increase of alcaline phosphatase and ATP-ase reactions. enzymes which have an important role in the processes of active transport through these membranes. The intensification of the activity of acid phosphatase, without necrotic phenomena suggests higher reactivity of intestinal cells against control, which is due to local action of these substances introduced in organism after per oral treatment. This treatment influenced carbohydrate metabolism, increasing G6PDH reaction and stimulates pentosophosphate shunt. The decrease of LDH reaction showed the inhibition of glycolytic processes.

CONCLUSIONS

The data obtained together with the results referring to other organs (e. g. liver) revealed the importance of experiments concerning the study of the mechanism of action of aminophenazone-like drugs on human and animal organisms.

BIBLIOGRAPHY


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Fig. 1 — Morphologic aspect of the duodenal mucosa in control rats.
Fig. 2 — Morphologic aspect of duodenal mucosa after treatment with aminophenazine and sodium nitrite.
Fig. 3 — LDH reaction in duodenum of the control rats.
Fig. 4 — Decrease of LDH reaction on duodenum of treated rats.