wounds and indolent trophic ulcers [1, 2]. A common feature of all these wounds was the presence of many plasma cells in their tissues. Their large number in granulation tissue formed under dressings is undoubtedly attributed to the considerable microbial contamination of these wounds. Plasma cells are carriers of local immunity, and their presence in large numbers in granulations of wounds treated under dressings often leads ultimately to the rejection of an autograft. Granulations formed in a burn wound during treatment in an abacterial environment are rich in blood vessels and cells even in the early stages of treatment (5th-6th day) and they resemble the granulation tissue formed during healing of surgical wounds. The low bacterial contamination of such wounds and the mild degree of inflammation lead to the presence of a small number of plasma cells in the granulations, and these provide the best conditions for survival of an autograft. Healing of burn wounds treated in a monitored abacterial environment occurred 10-12 days sooner than that of burns treated under dressings. A sterile airflow, drying the scab, evidently inhibits the microflora, reduces the degree of absorption of breakdown products of the tissues of burn necrosis into the body, reduces the severity of the toxic manifestations, and thereby stimulates the processes of cleansing and regeneration of the wound.

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A MORPHOMETRIC TECHNIQUE FOR MEASURING DEFECTS OF THE GASTRIC AND INTESTINAL WALL

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KEY WORDS: technique; morphometry; defects; stomach; intestine.

Morphometric methods are used comparatively rarely in histological investigations of the healing of wounds, ulcers, and other injuries to the wall of the stomach and intestine. Usually, after a very detailed description of the process of tissue reconstruction in the region of the defect, the authors concerned mention only the times of separation of necrotic masses, proliferation of connective tissue, epithelization, and the appearance of the first newly formed glands, villi, and so on [1-4]. Other workers, who have concentrated their attention on proliferation in the tissues at the edges of the defect, mention only values of the index of labeled nuclei or the mitotic index [5-7]. Yet the simultaneous measurement of several general parameters of the defect in histological preparations would allow a more integrated idea to be obtained of structural changes in the region of injury to the stomach or intestine, and this is particularly important when studying the dynamics of healing of defects and assessing the efficacy of different methods used to correct them. This was the aim of the present investigation.

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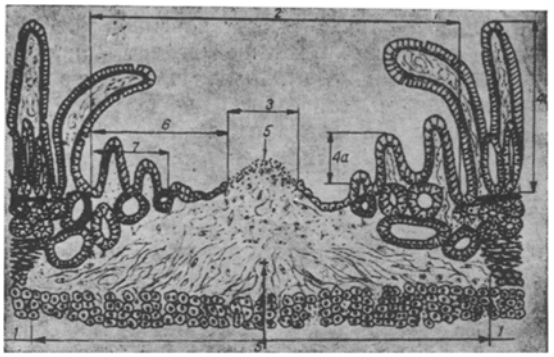

Fig. 1. Morphometry of defects of gastric and intestinal wall, with an acetate-induced duodenal ulcer as the example (explanation in text).

EXPERIMENTAL METHOD

The suggested method was developed and tested on 350 albino rats with models of a chronic (acetate) duodenal ulcer in Okabe's modification and of a stomach wound arising after prepyloric wedge resection of the stomach followed by application of two rows of silk sutures by Albert's method. The region of the defect was studied at different times after injury: from 1 to 30 days in the case of the stomach wounds and from 1 to 137 days in the case of experimental duodenal ulcer. An area of the wall of the organs with the defect to be studied was fixed in 10% neutral formalin solution and embedded in paraffin wax. Serial sections 5 μ thick were stained with hematoxylin and eosin and by van Gieson's method. In sections passing through the center of the ulcer or wound of the organ, a number of parameters of the defect (Fig. 1) were measured by means of an ocular micrometer under magnifications of 35 and 100: the distance between the edges of the residual "old" muscular coat (1) and mucous membrane of the stomach or intestinal wall at the level of the crypts (2), the width of the nonepithelized region of the defect (3), the length of the layer of newly formed epithelium (6), and the length of the "complex" mucous membrane (7) from both sides. (The term "complex" mucous membrane describes that part of the newly formed mucous membrane which contains villi and crypts.) The height of proliferation of the connective tissue in the floor of the defect from the level of the fundus of the "old" glands (5), and in the intestine also the height of the villi of the newly formed mucosa (4a) and of the "old" mucosa surrounding the defect (4b) were measured. The results of the measurements were subjected to statistical analysis.

EXPERIMENTAL RESULTS

On the basis of the initial data some other integral parameters can be calculated: the percentage epithelization of the defect (A = Parameter 2 — Parameter 3/Parameter 2 × 100); the length of the "complex" mucous membrane as a percentage of the total length of the layer of newly formed epithelium (B = Parameter 7/Parameter 6 × 100); the ratio between the length of the newly formed villi and that of the "old" villi, in percent (C = Parameter 4a/Parameter 4b × 100). Depending on the results of the measurements the degree of contraction of the tissues in the region of the defect (parameters 1 and 2), the amount of proliferation of the connective tissue in the floor of the defect (5), the degree of epithelization of the defect (A), and differentiation of the newly formed mucous membrane (B, C) can be judged. The suggested morphometric technique is equally suitable for the investigation of both early and late stages of ulcer healing, a fact which distinguishes it advantageously from the method suggested previously for gastric ulcers [8]. By means of the morphometric technique suggested the time course of healing of an experimental chronic (acetate) duodenal ulcer and of a postresection wound of the stomach in rats and the effect of certain surgical (bilateral subdiaphragmatic vagotomy for duodenal ulcer) and pharmacologic (nandrolone, dextran) methods of treatment can be described quantitatively.

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ULTRACYTOCHEMICAL CHANGES IN THE BRAIN AND LIVER FOLLOWING EXPOSURE TO LOW-INTENSITY NONIONIZING MICROWAVE RADIATION

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KEY WORDS: nonionizing microwave radiations; metabolic processes; brain; liver.

Data in the literature indicate that nonionizing microwave radiations (NMR) may have opposite biological actions on the body. They may depress or stimulate excitation and inhibition in the brain [1, 2, 4, 9], they may induce pathomorphological changes in elements of the nervous system [1, 3, 7], yet at the same time they are used therapeutically [5]. Nevertheless, changes in ultrastructure and biochemical parameters arising in various tissues following exposure of the body to NMR of low intensity have not been adequately studied, so that no solid conclusions can be drawn regarding the harmful and useful action of this type of energy.

The object of this investigation was a combined study of the fine changes in structure and metabolism of brain and liver cells following repeated exposure of animals to low-intensity NMR.

EXPERIMENTAL METHOD

Experiments were carried out on 478 albino rats by morphological and biochemical methods. The morphological methods included electron microscopy, histochemical determination of the content of glycogen, RNA, and DNA in the cells, and of activity of succinate, malate, glucose-6-phosphate, and lactate dehydrogenases (SDH, MDH, G6PDH, LDH), and measurement of the area of the cell nuclei in sections stained with hematoxylin and eosin. The biochemical methods included determination of the oxidative and phosphorylating activity of mitochondria isolated in a substrate containing Tris-sucrose, and determination of activity of the enzymes SDH, G6PDH, and phosphorylase, and of the glycogen content. The results were subjected to statistical analysis.

Animals were exposed to NMR by means of the Luch-58 therapeutic apparatus (wavelength 12.6 cm) under dosimetric control; the animals were kept in an anechoic chamber in special cages. Animals exposed to NMR with an intensity of 50 $\mu W/cm^2$ for 3, 6, or 7 h followed by repetition of this dose on 10 consecutive days or for 2 months, and also animals exposed to NMR with an intensity of 10 $\mu W/cm^2$ for 2 months (40 min per session 3 times a day with intervals of 3-4 h) were used in the experiments. The parameters were determined immediately after the end of irradiation and after 20 and 60 days of the recovery period. Additional loads were used (hypoxic hypoxia in a pressure chamber — raising the animals to an altitude of 8 km,

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