fixed to PCB, the corresponding immunoglobulins can be extracted by means of this immunosorbent from rabbit serum in a yield of 50-70 mg/g sorbent.

The preparations as described above readily allow fluid to flow through them in columns: The volume of liquid flowing through the column per hour is 20 times greater than the volume of sorbent with which it is packed. Saturation of the immunosorbent with antibodies and antigen takes place quickly when the appropriate solutions are passed through, and eluted material comes away from the column in a sharp peak (Fig. 3).

Data for samples of immunosorbents based on PCB tested in column experiments are given in Table 1.

The immunosorbent possesses adequate mechanical strength and is suitable for re-use, although the quantity of antibodies extractable decreases (by 33-50%) toward the 10th cycle.

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EVALUATION OF THE ATRAUMATIC PROPERTIES OF DRESSING MATERIALS

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KEY WORDS: dressings; method of studying atraumatic qualities.

Production of modern dressing materials necessitates the evaluation of their atraumatic qualities. The method of determining the degree of adhesion of materials in the lower layer of dressings on models of the wound surface [1] (Authors' Certificate No. 685292 of 1979), developed in the "Polymers in Medicine" Laboratory, gives results which requires more precise experimental verification.

The object of this investigation was to obtain the fullest and most objective assessment of the atraumatic properties of some specimen dressing materials by cytological analysis of squash preparations from the wound surface and by histological and electron-microscopic investigation of the dressings.

EXPERIMENTAL METHOD

The degree of adhesion of the materials under laboratory conditions was determined as follows: The test samples were glued to the conventional wound surface, dried, and removed with the aid of a mobile dynamometer. The force required to remove the samples characterized the degree of their adhesion. The results were compared with the results of determination of the adhesive properties of regulation medical gauze. The degree of adhesion of the gauze was taken to be 100%. Samples of dressings with better atraumatic qualities than medical gauze were selected for detailed experimental study.

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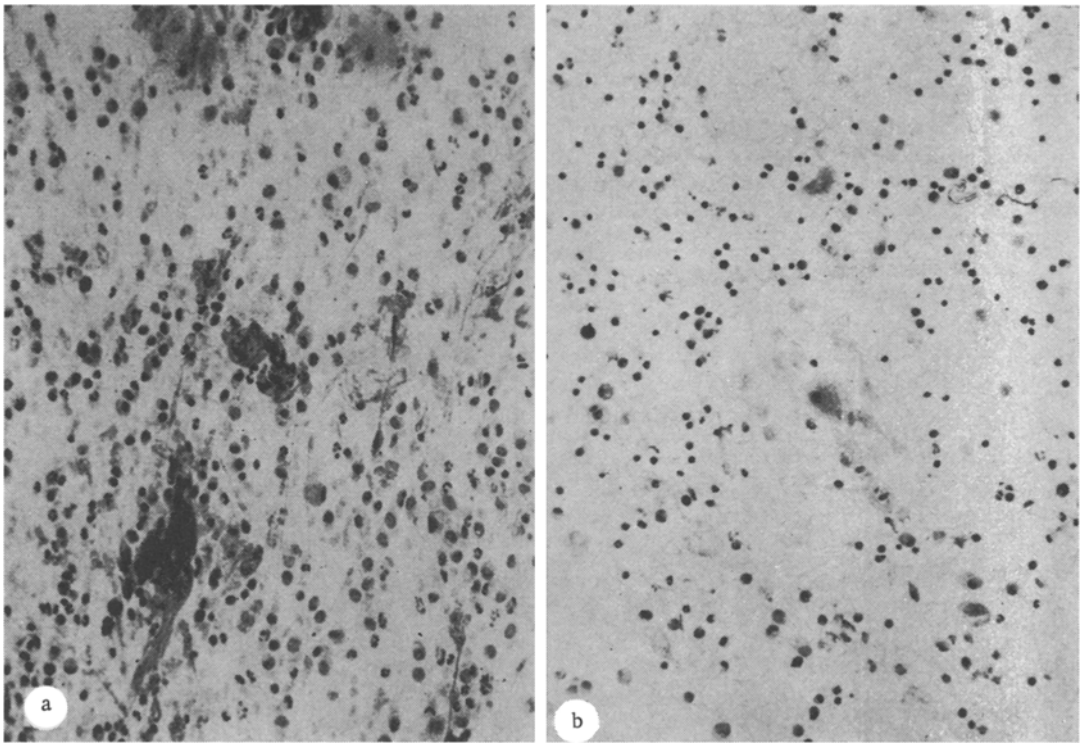

Fig. 1. Squash preparations from wound surface after dressing of wounds with specimens No. 2 (a) and No.3 (b). Hematoxylin–eosin, 160 ×.

An excised wound measuring 1.5 × 1.5 cm was inflicted on 30 noninbred male rats weighing 150–170 g in the interscapular region under ether anesthesia. Dressings were applied immediately after the operation and were removed, also under ether anesthesia, 2, 3, 4, 5, and 7–8 days after the operation. The dressing materials consisted of Soviet specimens of glued nonwoven material with adhesives — acrylic emulsion No. 25 (specimen No. 1) and primal E-358 (from Rohm and Haas, USA; specimen No. 2) the surface of which was covered with aluminum, and also an "Alu-tex Ortman Verbandstoff 1195 Vienna" (Austria; specimen No. 3) were used as dressing materials. Wounds healing under cotton and gauze dressings served as the control.

Squash preparations from the wound surface were obtained by the method in [2] and compared with similar preparations obtained from the surface of the test specimens after removal from the wounds. The preparations were fixed in Nikiforov's fluid, stained with hematoxylin and eosin, and embedded in polystyrene. Histological investigation of the dressings was carried out on celloidin sections stained with hematoxylin and eosin, and also with picrofuchsin by van Gieson's method. Investigation of the type of structure of the specimen dressing materials before and after their use on models of the wound surface was carried out by scanning electron microscopy. Specimens for this purpose were fixed with 3% glutaraldehyde solution in phosphate buffer, dehydrated in alcohols of increasing strength, and dried. The contact surface of the dressings was sprayed with a layer of silver and examined in the ISM-2 scanning electron microscope.

EXPERIMENTAL RESULTS

The laboratory tests showed that the degree of adhesion of specimen No. 1 was 68%, of specimen No. 2 30%, and of specimen No. 3 18% of that of regulation medical gauze.

Examination of squash preparations from the wound surface and of the surface of the dressings after removal from the wounds showed that a decrease in the traumatic properties of the dressing material was accompanied by a decrease in thickness of the squash preparation and also in the number of erythrocytes, the number and size of the foreign bodies, and also the number of macrophages and foreign body giant cells; the leukocytic-necrotic barrier also was reduced in size. These general features were observed when all dressing materials were used in each phase of the wound process, but each particular dressing material left its own imprint on the wound surface. For instance, even though cleansing of the

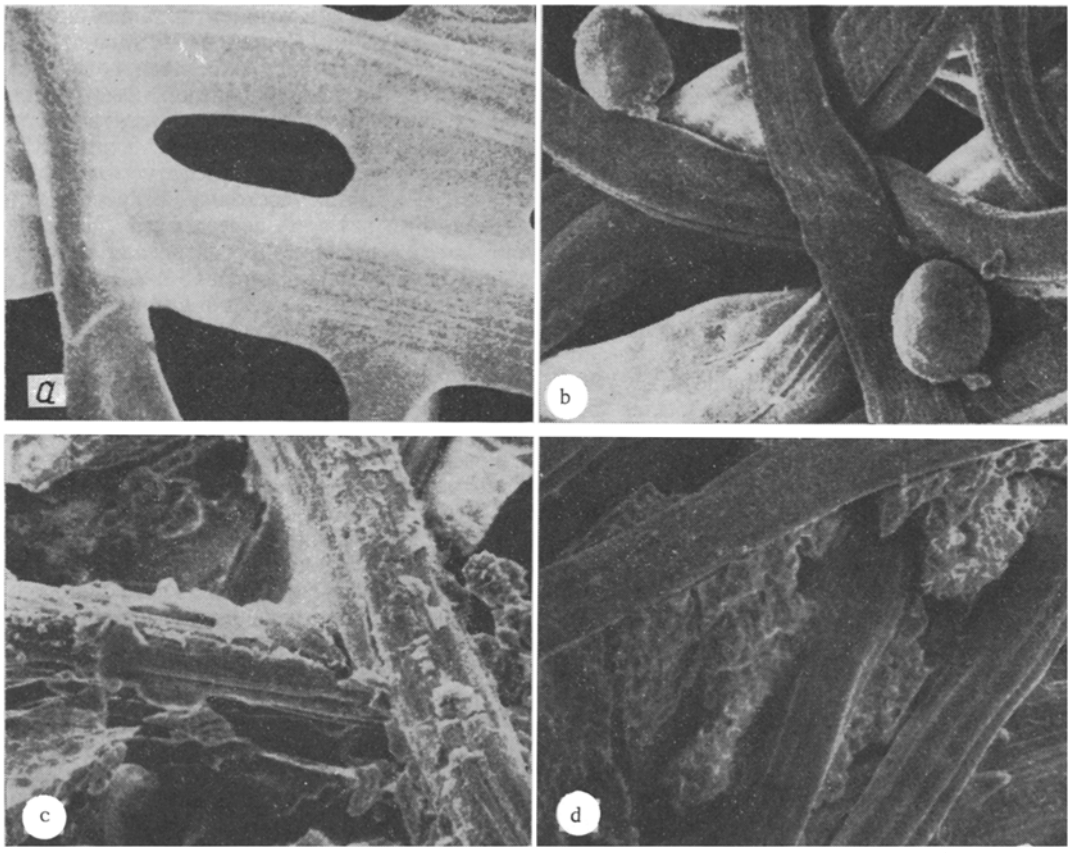

Fig. 2. State of the contact surfaces of specimens No. 2 (a and c) and 3 (b and d). a, b) Original specimens; c, d) after removal from models of wound surface. Magnification 1000 ×.

wound surface took place when the cotton and gauze dressings were changed as a result of mechanical removal of necrotic masses together with the dressing and of capillary bleeding from the wounds, fibrous structures, masses of fibrin, areas of necrosis, and blood cells were found in the squash preparations. During the first 2 or 3 days after the operation blood cells were the dominant cells in the preparations, but a few macrophages were seen and their numbers increased sharply on the 4th-5th day after the operation. At this time the largest number of foreign body giant cells was observed and many cells of polyblast type and mature fibroblasts with long processes of cytoplasm and with juicy oval nuclei containing two or three nucleoli also were present. The number of foreign bodies was less than on the first days. Islets of granulation tissue were found on subsequent squash preparations from dressings, evidence of the marked traumatic qualities of cotton and gauze dressings.

A study of squash preparations from the wound surface and the surface of dressings made from nonwoven materials with metal-coated surfaces showed that the squash preparations themselves were thinner than those from wounds healing beneath cotton and gauze dressings. The foreign bodies were clusters of dark particles and drops of different shapes and sizes, not staining with hematoxylin. These were most probably particles of aluminum and adhesives. The number and size of these foreign bodies in preparations from the wound surfaces and from dressing No. 3 removed from them were less than when specimens Nos. 1 and 2 were used. There were correspondingly fewer foreign body giant cells and cells of the macrophagal series (Fig. 1a, b).

It is evident that specimens Nos. 1 and 2 were more traumatic than No. 3, and this also was confirmed by the results of laboratory determination of the degree of their adhesion to a conventional wound surface.

Histological study of the dressings showed that the number of areas of necrotic tissue were greatest on cotton and gauze dressings and dressings with a degree of adhesion of 68%.

A study of the orignal specimens Nos. 2 and 3 by scanning electron microscopy showed that they differed in the type of distribution of adhesive. The predominant structure in specimen No. 3 was punctate, when most of the adhesive was distributed in the form of punctate zones where the fibers crossed. In specimen No. 2 the adhesive covered the fibers and was distributed in the form of segments in the lattices formed by the crossing fibers. After removal from the model of the wound surface, the structure of specimen No. 3 remained unchanged. However, fibrin clots accumulated in the meshes between the fibers. After removal of specimen No. 2 from the model, separation of the layer of adhesive, loosening of the surface of the fibers, and deposition of fibrin clots on them were observed (Fig. 2a-d). These particular features of the structure of dressing materials affect their atraumatic qualities.

Evaluation of the atraumatic properties of newly developed dressing materials is thus best carried out by the combined use of methods which supplement one another. The simplicity and reliability of the use of cytological study of squash preparations from wounds must be particularly noted.

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USE OF COLLOIDAL LANTHANUM AS AN ELECTRON-MICROSCOPIC TRACER

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KEY WORDS: colloidal lanthanum; membrane permeability; calcium.

Colloidal particles of lanthanum and precipitates of its insoluble salts are electron-dense and so can be used for various purposes in electron-microscopy. Lanthanum nitrate is most frequently used as the original salt for preparing colloid. On titration of an aqueous solution of $La(NO_3)_3$ with NaOH solution, starting from pH 7.6 a colloidal solution of $La(OH)_3$ with a particle diameter of 2 nm is formed. Particles of colloid do not pass through membranes of normal cells but contrast their surfaces and the narrow slits between them clearly. This property was first utilized for studying the structure of intercellular junctions [8]. It was later found that penetration of colloidal lanthanum through the limiting membrane of the cell of contractile muscle can serve as an early morphological sign of injury to the striated muscle fiber following exposure to heat [3]. Similar observations with colloidal lanthanum were made in a study of cardiomyocytes located in the zone surrounding an experimental myocardial infarct [7]. Penetration of colloidal lanthanum into the sarcoplasm of cardiomyocytes in severe ischemia following experimental myocardial infarction is evidence of the development of early irreversible changes in these cells [5].

The use of colloidal lanthanum as transmembrane tracer has a number of distinguishing features. Different modifications of the classical method are used in different laboratories [8]. The modification described below has been developed and is used in the Department of Human Cardiovascular Pathology, All-Union Cardiologic Scientific Center, Academy of Medical Sciences of the USSR.

EXPERIMENTAL METHOD

A 3-4% solution of $La(NO_3)_3$ was made up in boiled deionized water and fresh 0.1 and 0.01 M solutions of NaOH were made, also in boiled deionized water. The $La(NO_3)_3$ solution

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