

of the interatrial septum also continued to have a reduced level of fluorescence at this time (Fig. 2A).

By the end of guanethidine injections the intensity of fluorescence of the single cells was distributed along a declining curve from the orifice of the superior vena cava to the interatrial septum (Fig. 2B). A further fall in the level of fluorescence was recorded in single cells in all regions except the zone of the coronary sinus, where an increase in content of the fluorophore was observed compared with the previous time of observation. The ratio between the levels for individual zones determined during this period, remained the same for the next 3 weeks, during which SIF cells of all zones accumulated the fluorophore (Fig. 2B).

After desympathization, especially in the last 3 weeks of the experiment, an increase in the number of SIF cells with processes was observed in the atria (Fig. 1B).

The use of a single injection of guanethidine to produce a temporary fall in the level of sympathetic mediator in the heart leads to a moderate delayed reaction of part of the pool of atrial SIF cells [1]. The results of the present investigation, confirming the conclusion that there are regional differences in the reaction of the atrial SIF-cell pool to desympathization, at the same time indicate that the response of single SIF cells is similar in character to that of cells organized in clusters and located in the same zone of the heart.

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INTERMEDIATE FILAMENTS IN LUNG MACROPHAGES AND ENDOTHELIAL CELLS IN PATIENTS WITH CHRONIC ALCOHOLISM AND SUPPURATIVE DESTRUCTIVE LUNG DISEASES

V. V. Serov,* S. P. Lebedev,
L. G. Vinogradova, A. S. Mukhin,
and G. K. Sukhova

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Intermediate filaments are thread-like structures in the cell cytoplasm whose mean diameter is about 10 nm. Together with actin microtubules and myosin filaments, the intermediate filaments belong to the principal filamentous system of eukaryote cells [2, 4]. Despite their ultrastructural similarity, these structures in epithelial, mesenchymal, and nerve cells consist of chemically heterogeneous subunits [3, 4].

This paper describes excessive accumulation of intermediate filaments in macrophages and endothelium of lung tissue in patients with chronic alcoholism and with suppurative destructive disease of the lungs.

*Corresponding Member, Academy of Medical Sciences of the USSR.

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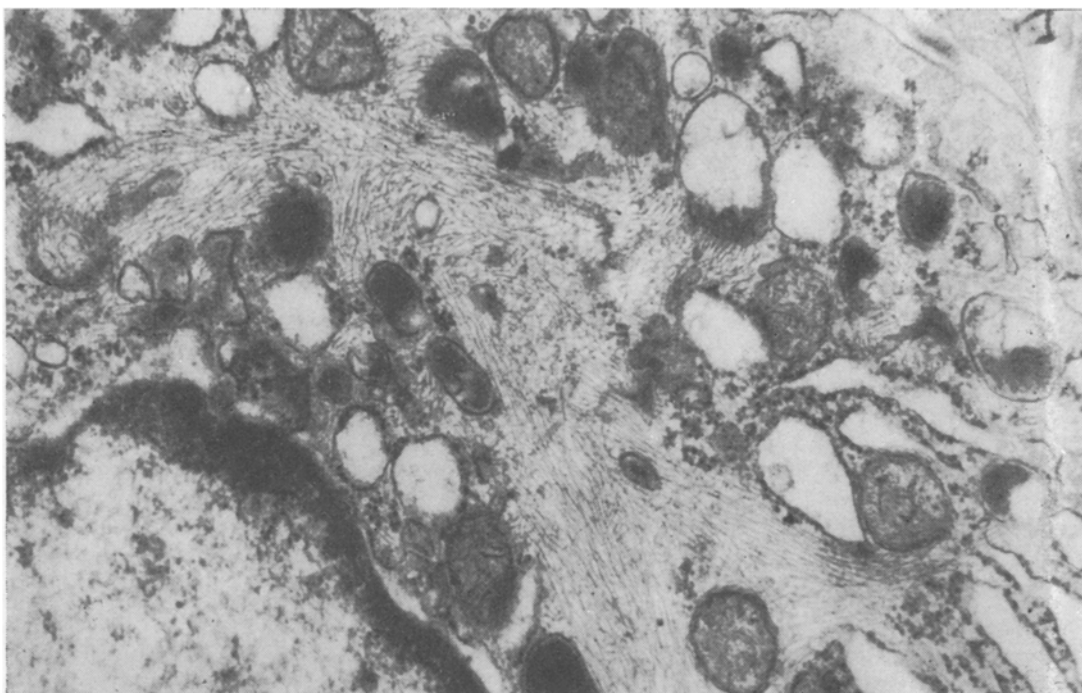


Fig. 1. Cytoplasm of macrophage loaded with filaments (20,000 \times).

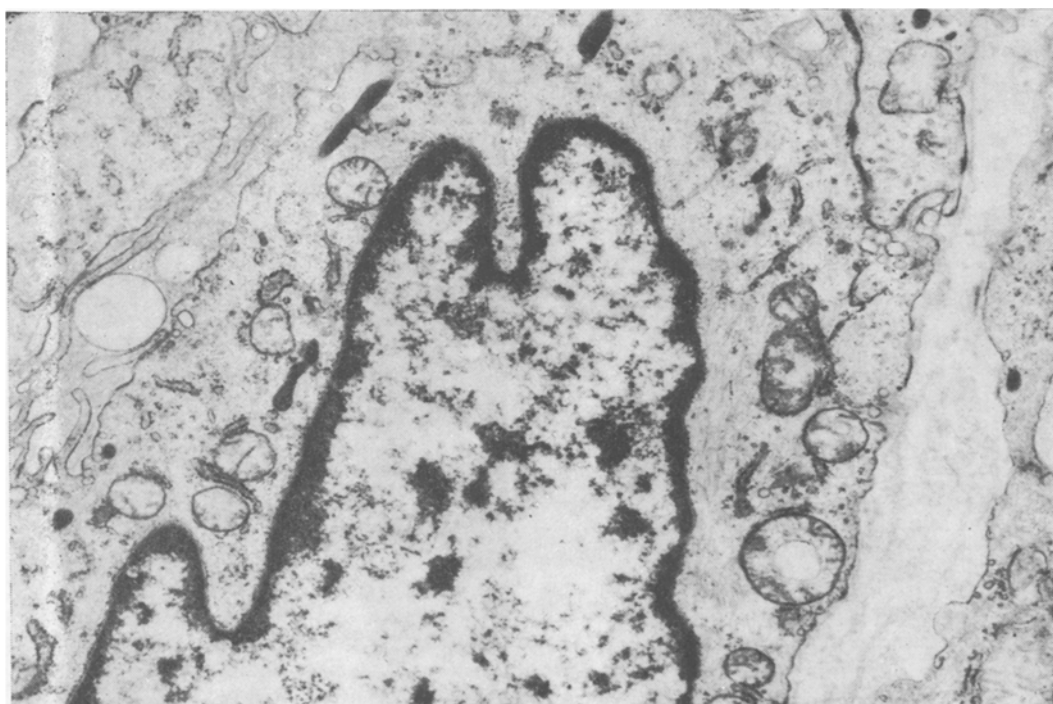


Fig. 2. Many filaments in cytoplasm of an endotheliocyte (10,000 \times).

EXPERIMENTAL METHOD

Lung tissue actually obtained during resection of a lobe of the lung, pneumonectomy, or resection of the pleura of 10 patients with chronic alcoholism and suppurative destructive diseases of the lungs (five with chronic abscess, two with pneumonia complicated by abscesses, three with empyema and destruction of lung tissue) was studied. Lung tissue removed at operation on three patients (two with chronic abscess, one with pneumonia complicated by abscess formation), with no evidence of chronic alcohol intoxication, served as the control.

The lung tissue was fixed in 10% neutral formalin and embedded in paraffin wax; sections were stained with hematoxylin-eosin, picrofuchsin, and by the PAS reaction. Material for electron-microscopic investigation was fixed with 2.5% glutaraldehyde, postfixed with 1% OsO₄, dehydrated, and embedded in a mixture of Epon and Araldite. Sections were cut on the LKB-3 Ultratome, stained with lead citrate by Reynolds' method, and examined with the HS-7 and HU-12 microscopes.

EXPERIMENTAL RESULTS

Histological investigation of the lung of 10 patients with chronic alcoholism revealed chronic abscesses in five patients, bronchopneumonia with a picture of destructive panbronchitis and with foci of carnification and abscess formation in two, and sclerosis and hyalinosis of the pleura with infiltration by polymorphs in three patients. Besides polymorphs, many macrophages and fibrin were found in the exudate present in the lumen of the alveoli and small bronchi. The lung macrophages stained intensely with Schiff's reagent. The capillary endothelium in the alveolar septa was swollen. In two patients in the control group chronic lung abscess was found, and one patient had bronchopneumonia with abscess formation.

Electron-microscopic investigation of the lung tissue of patients with chronic alcoholism revealed many macrophages with cytoplasm filled with fragments 8-10 nm in diameter among the cell components of the exudate. In some cases the whole space between the intracellular organelles from the nuclear to the cytoplasmic membrane was occupied by fibrillary material. Most filaments were haphazardly arranged in the cell, although areas with fibrils with a parallel orientation were found. The fibrils were of uniform thickness and electron density throughout their length (Fig. 1). Swollen mitochondria with electron-transparent matrix, with marked destruction of the cristae in some places, dilated tubules of the cytoplasmic reticulum, and many lysosomes were observed among the fibrillary structures. Macrophages also were often found among masses of fibrin. Fibrils 6-8 nm in diameter, haphazardly arranged or, less often, oriented along the long axis of the cell, were observed frequently in the cells of the capillary endothelium in the alveolar septa (Fig. 2). Fibrils in the endothelium were fewer in number and more loosely arranged than in the macrophages. Fibers were located in the perinuclear zone and also a long way from the nucleus. Swelling of the mitochondria, dilatation of the tubules of the endoplasmic reticulum, and accumulation of lysosomes were observed in the endothelium containing fibrils, just as in the macrophages also. The cytolemma of the endothelium often had many outgrowths.

In the control group only single macrophages and endothelial cells containing a few bundles of fibrils of intermediate type could be found. The number of filaments in these cells in the control group was much smaller than in the main group.

Excessive accumulation of filaments of the intermediate class in the macrophages and endothelium was thus combined with signs of destruction of intracellular organelles and accumulation of lysosomes, reflecting degenerative changes. At the same time there is evidence of the high sensitivity of intermediate filaments to proteolysis [4]. Accumulation of intermediate filaments in macrophages thus evidently indicates lowering of their proteolytic and phagocytic activity. Analysis of the clinical course of suppurative lung diseases in patients with chronic alcoholism revealed a tendency for the disease to run a protracted chronic course in the lung tissue [1]. This may well be connected with the reduction in proteolytic activity of the lung macrophages. Consequently, the appearance of numerous intermediate filaments in the lung macrophages of patients with chronic alcoholism is a morphological reflection of the tendency for suppurative conditions to run a chronic course.

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