

MORPHOLOGY AND PATHOMORPHOLOGY

THE NATURE OF VIRUS-LIKE INCLUSIONS IN HUMAN RED BLOOD CELLS

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A number of papers has recently been published [2-9], reporting the results of examination of the red cells of man and animals suffering from various diseases, by means of the electron microscope.

These authors report that in many cases they have succeeded in finding submicroscopic particles in patients' red cells which are not present in the red cells of healthy persons.

On the films shown by these authors it is possible to see particles, round, oblong or irregular in shape, with ill-defined edges. In some cases the dimensions of the particles varied but little, in others — very considerably (from 100 to 450 m μ in infectious mononucleosis and from 20 to 120 m μ in Hodgkin's disease). In the authors' opinion, these particles resemble viruses.

In view of these findings, we made a comparative study of the red cells of patients suffering from cancer and of healthy persons.

EXPERIMENTAL METHOD

Films were made in accordance with the technique described in a paper by Reagan and his co-workers [5].

To 2 drops of blood, taken from the finger, was added 2 drops of physiological saline containing heparin (10 mg heparin to 10 ml physiological saline). The mixture was kept for 1 hour in the refrigerator and for 10 minutes at room temperature with occasional agitation.

Drops of the mixture were placed on a collodion film and excess fluid drawn off with a pipette. The films were washed with 6-7 drops of distilled water and, after drying, were dusted with nichrome at an angle of 15°.

The total magnification (electron-optic + photographic) of the photographs shown is approximately 8000.

EXPERIMENTAL RESULTS

In spite of the fact that the films had been carefully washed with distilled water, in many red cells there were remnants of hemoglobin in the form of clumps or granules of various sizes.

In some cases the grains of hemoglobin were very reminiscent of the formations described by Reagan, for example, in infectious mononucleosis (it must be remembered that Reagan's illustrations here are negatives). Structures of this type could be seen in both the red cells of patients suffering from cancer (Fig. 1, a) and the red cells of healthy persons (Fig. 1, b).

During hemolysis of red cells with distilled water, defects of various sizes frequently develop in their mem-

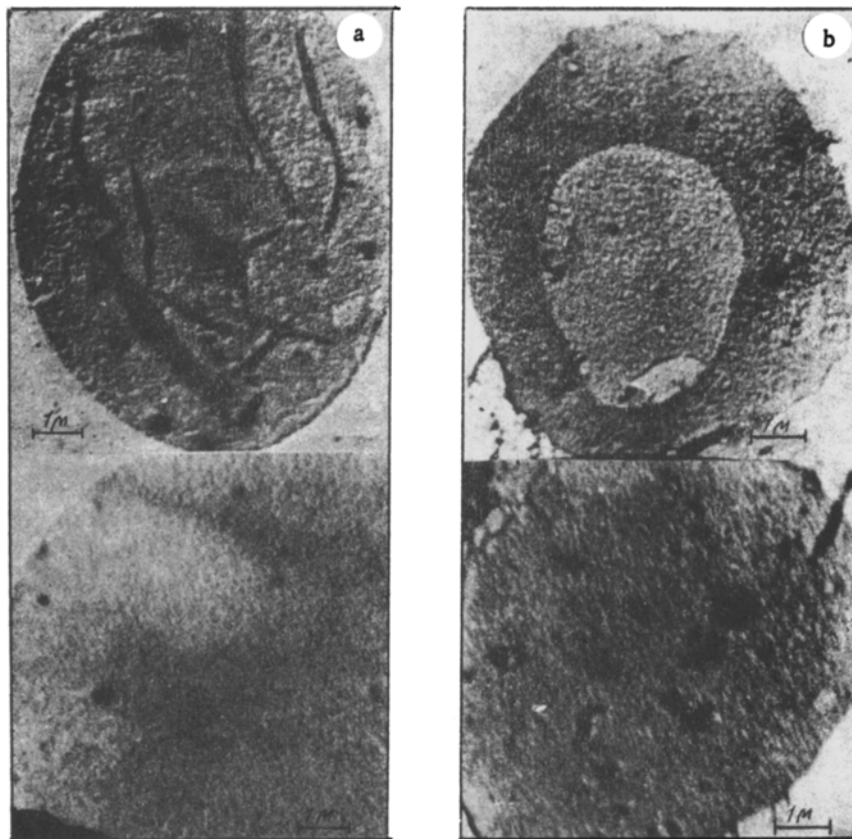


Fig. 1. Hemoglobin granules, capable of being mistaken for virus inclusions. a) red cells of patients suffering from cancer; b) red cells of healthy persons. Magnification approximately 8000.

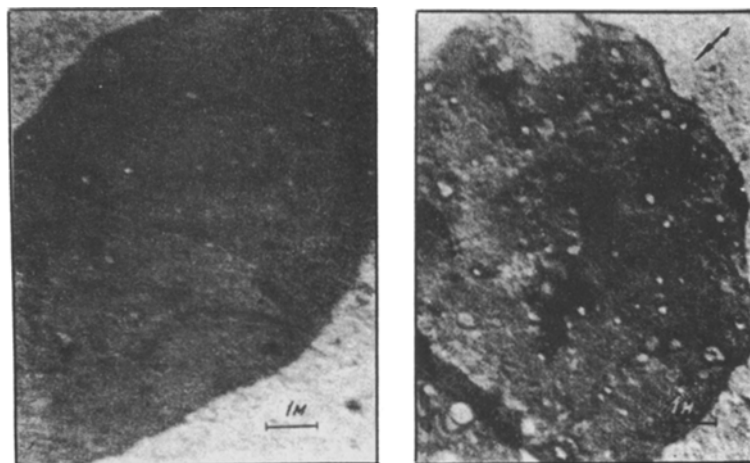


Fig. 2. Defect in the membrane, resembling submicroscopic particles. On the left — red cells of a cancer patient; on the right — red cells of a healthy person. Magnification approximately 8000.

branes (a large defect is seen in Fig. 1, b). Small depressions, after shading, resembled the particles described by Reagan in the red cells in Hodgkin's disease [5], and which had previously been observed by Frajola and his co-workers [1]. Numerous small defects in the membrane of the red cells are seen in Fig. 2, a (red cell from a cancer patient) and in Fig. 2, b (red cell of a normal person).

On the next film the defects are particularly reminiscent of small particles and only from the position of the shadows (the direction of shading is shown by the arrow) can it be seen that these are defects in the membrane.

SUMMARY

The author was unable to discover any difference in the erythrocytes of cancer patients and healthy persons by electron microscopic investigation.

Hemoglobin granules and slight defects similar to the formations revealed by Reagan in erythrocytes of patients suffering from virus diseases were observed in the erythrocytic stroma of both healthy persons and cancer patients.

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* In Russian.