

Tissues, Pathology, and Diagnostic Microscopy

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Scanning electron microscopy of plasma-filter components and erythrocytes in plasmapheresis and laser irradiation

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The interaction of blood cells and especially erythrocytes (E) with the components of apparatus used for hemosorption and plasmapheresis (PPh) causes changes in their shapes. This can be a leading cause of various complications. It can be assumed, even a priori, that the main part of pathologic E would be retained in the meshes and membranes of plasma-filters. Laser influences contribute to reduction of pathologic forms of E. Scanning electron microscopy is the most objective method in studying forms of E and other structures. However, studies of membranes and meshes of plasma-filters in plasmapheresis and laser irradiation (LI) of these circuits with SEM were not performed. This has determined the objectives of performing such work.

Plasma-filters were studied with SEM after Pph, which was performed with laser irradiation of plasma-filters and without it. Laser irradiation was performed on the initial stages of perfusion with "Matrix-VLOK", attached to it irradiating nozzle, which emits waves with length of 0.63 microns (red), output power – 1.5 mW. For SEM purposes, the fragments of meshes and membranes were fixed in glutaraldehyde with their after fixation in osmium tetroxide. SEM samples were dried by processing through critical point in nitrous oxide in "HCP-2" (Hitachi) and ion sputtered in IB-3" (Eiko, Japan), studied with "Hitachi S-405A" SEM and micrographs obtained with attached to SEM Canon camera.

It was revealed that the surface of plasma-filters is even with numerous micropores. Significant accumulations of E with dominating among them pathologic forms are notable after Pph. (Figure.1). The fragments of meshes reveal single discrete complexes, representing mainly pathologically changed E (Figure.2-4). Application of LI leads to restoration of normal discoid shape of erythrocytes and therefore prevents complications.

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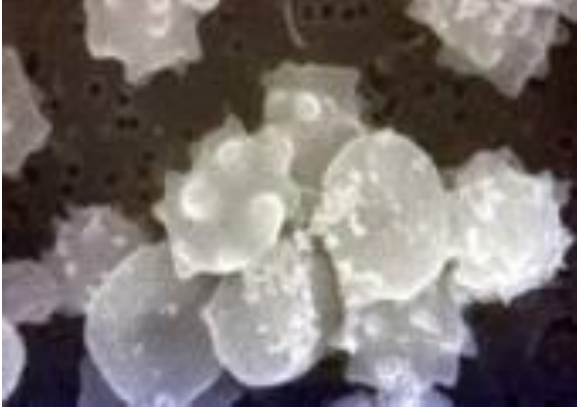


Figure 1. Pathologic forms of erythrocytes on the surface of filter membranes. SEM x2000



Figure 2. Catcher-mesh with single discrete particles SEM x1000



Figure 3. Mesh of plasma-filter SEM x60

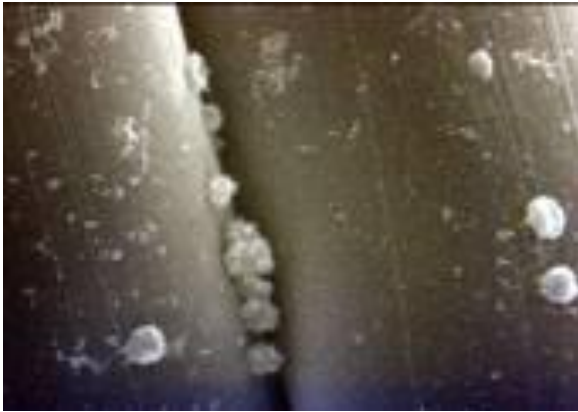


Figure 4. Mesh of plasma-filter SEM x1000