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**LS-1-P-3346 VISUALIZATION OF LIVING BLOOD CELLS - NEW OPPORTUNITIES FOR CELL DIAGNOSTICS**

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Studying structural features and functional full-value of blood cells are extremely significant in solving pathogenesis processes, diagnosis of diseases, and assessment of the treatment efficiency. Conventional microscopic methods do not always meet the growing requirements for sensitivity, low invasiveness, fast activity, and spatial resolution. Therefore, new technologies of cellular visualization are quite topical because they allow performing in the real time the efficient quantitative analysis of the structural parameters and cellular function without image fixation and contrast. Phase-interference methods investigate so called functional images of the cells. The refractivity index studied enables assessment of the inner cellular structure which reflects its function, directly or indirectly.

The informative biotechnology was worked out, based on the device-program complex (DPC) “Biony” for clinical and laboratoty diagnostics with digital image processing and new type biocensors (Westtrade LTD, Russia). The chief DPC module is a computerized phase-interference microscope (CPM) which is a modified Linnick’s interferometer with phase modulation of the bearing wave. Helium-neon laser (λ=633 nm) is a source of light. DPC enables measurement of integral parameters of the phase micro-objects with high sensitivity, and a method of automatic reading of interferograms allows achieving measurement resolution of λ/150, where λ is a radiation wave length if the time of measurement is 15-30 sec. Complex algorithm of the live cells analysis includes topogram, 3D-image, set of profiles, histogram of the phase heights distribution, calculation of morphometric parameters of single cells, integral analysis of the cellular population by signs of measuring, and creation of cytograms.

The authors identified and characterized the vital phase pictures of all blood cells: erythrocytes, neutrophiles, lymphocytes, and thrombocytes. Within the frames of one method, the morphologic features of these cells were estimated as well as their size and functional activity. The regularities of morphologic changes in the blood cells condition in norm and pathology were revealed and quantitatively assessed (with regard for their age-caused peculiarities).

Acquirement of important quantitative information concerning cellular condition using technically available and not very expensive modalities of interference microscopy presents new opportunities for practical application of live functioning cells as prospective biosensors for diagnostic purposes.
Fig. 1: Phase-interference image of living peripheral blood erythrocyte

Fig. 2: Phase-interference image of living peripheral blood platelet

Fig. 3: Phase-interference image of living peripheral blood lymphocyte

Fig. 4: Phase-interference image of living peripheral blood neutrophil