

38. USING OF METHOD OF MULTIPARAMETRIC SPECTRAL-SELECTIVE LASER POLARIZATION AUTOFLUORESCENCE OF BIOLOGICAL LAYERS FOR POST-MORTEM DIAGNOSTICS OF ACUTE ISCHEMIA OF MYOCARDIUM

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Significant prevalence of acute coronary insufficiency (ACI) and its suddenness in the forensic practice gives rise to suspicion of police about violent nature of death. That is why objective precise methods for diagnosis of acute ischemia (AI) of the myocardium requires. However, ACI is difficult to diagnose because of the non-specificity of macroscopic signs and the need for specific coloring methods and the role of the "human factor".

The aim of the study: To develop method of multiparametric polarization and laser autofluorescence microscopy of biological layers by improving methods of traditional polarization and mueller-matrix mapping of optically anisotropic nets for post-mortem diagnostics of foci of AI of myocardium.

Materials and methods: Investigations of 65 samples of the myocardium in case of ACI, 65 with chronic ischemic heart disease (CIHD) and 20 specimens of the control group were carried out. Experimental measurement was carried out in standard disposition of stocks-polarimetry, modified for autofluorescence investigations. The mueller-matrix mapping of the laser autofluorescence of the samples of the myocardium of the studied groups was carried out and the statistical moments of the 1st - 4th order (M_1 - M_4) of the distributions of the Mueller-matrix invariants were calculated.

Results: According to authors, fluorescence is always partially polarized. Anisotropic light excitation allows to separate from a chaotic accumulation of atoms and molecules a certain group. For myocardial tissue with ACI, the concentration of porphyrin is higher than in chronic ischemic heart disease. This fact can be explained by lower degenerative-dystrophic changes. That is why the intensity of the corresponding autofluorescence image is higher. Quantitatively, this manifests itself in the shift of the excess in the direction of greater values.

Sensitive to the presence of ACI were the statistical moments of higher orders - asymmetry and excess (the magnitude of the asymmetry M_3 increases in 1,5 times, and the magnitude of the excess M_4 of Mueller-matrix invariant distribution is reduced by 1.6 times).

Conclusion: Diagnostic efficiency of statistical analysis of coordinate distributions of mueller-matrix invariants of spectral-selective laser polarization autofluorescence on the wavelength 450 for posthumous diagnosis of myocardial infarction with excellent balanced accuracy in 95% is demonstrated. Results obtained during the research allow obtaining modern, substantiated, accurate and objective data on the posthumous structure of the myocardium of the deceased due to ACI.