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VIII ВСЕРОССИЙСКАЯ НАУЧНО-ПРАКТИЧЕСКАЯ КОНФЕРЕНЦИЯ С МЕЖДУНАРОДНЫМ УЧАСТИЕМ, ПОСВЯЩЕННАЯ 50-ЛЕТИЮ ОСНОВАНИЯ ИНСТИТУТА ХИМИИ НЕФТИ

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DIFFERENTIATION OF BREAST NORMAL AND CANCER CELLS BY LASER INTERFERENCE MICROSCOPY

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Currently, there is a tendency to increase the volume of clinical data that many people have hidden tumors that do not develop into cancer. The fundamental problem is why these tumors do not progress into severe cancer. In the field of oncology, approaches are beginning to be considered that take into account the important fact that the occurrence of cancer, its spread and counteraction to this is associated with a change in the mechanical phenotype of cells and tissues caused by damage (cell damage, tissue damage). The aim of this work is to develop methods of multiscale space-time analysis of cell structures using the original data of laser interferometry as a new paradigm in biophysics and biomedicine, namely experimental and theoretical study of damage to biological objects on the basis of "in-situ" registration of data of in vivo dynamics of mechanobiological characteristics of cells to justify the phenotypic markers of cancer. The cell lines of adenocarcinoma and epithelial breast cells MCF-7 and MCF 10A respectively were investigated. Table 1 shows detailed information about the materials of the study.

Table 1. Research materials.

Title	Description	Number of measured/processed cells
MCF-7	human breast cancer cell line	110/93
MCF-10A	human ''normal'' breast epithelial cell line	106/100

Cell dynamics was studied using laser interference microscope MIM-340 based on the method of measurement of optical thicknesses of cells. In Fig. 1 is depicted spatial distribution (Fig. 1,a) and fluctuations (Fig. 1,b) of the cancer cell MCF-7 optical thickness. Processing of the original data of the dynamics of fluctuations of the phase thicknesses of normal and cancer cells justified the use of space-time invariants to assess the quality of changes in healthy and cancer cells associated with damage.

(a) (b)

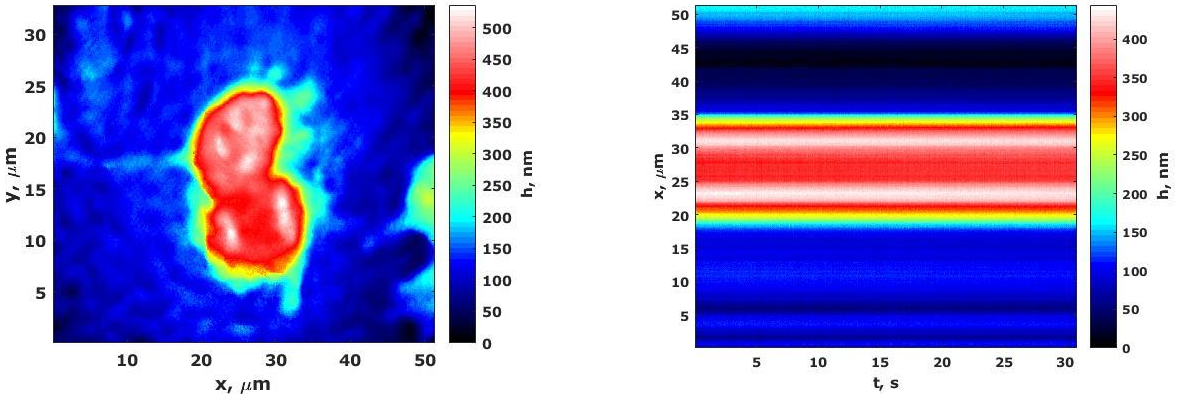

Fig. 1. Cell phase image and track diagram of the MCF-7 cell culture

Standardized algorithms and programs to analyze the dynamics of fluctuations in the cell structures according to laser (interference) microscopy to determine the quantitative parameters of spatial-temporal invariants to determine the change in mechanobiology properties due to damage. These parameters can be used as phenotypic markers determining the stage of cancer development.

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