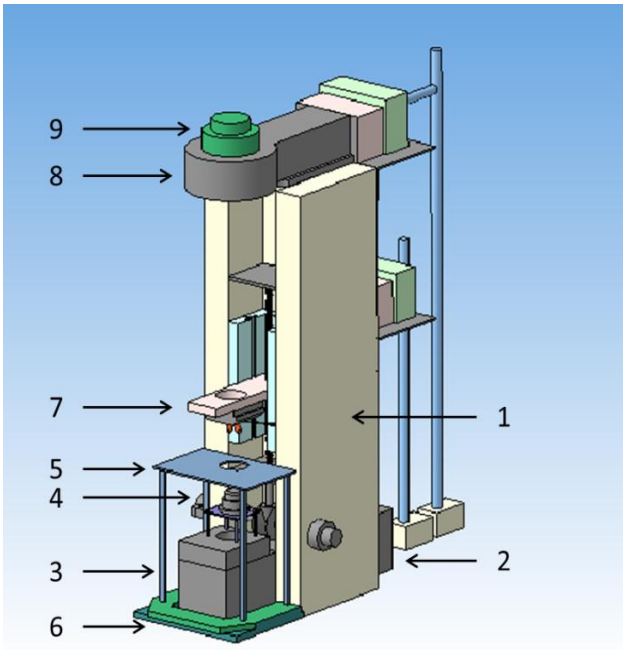
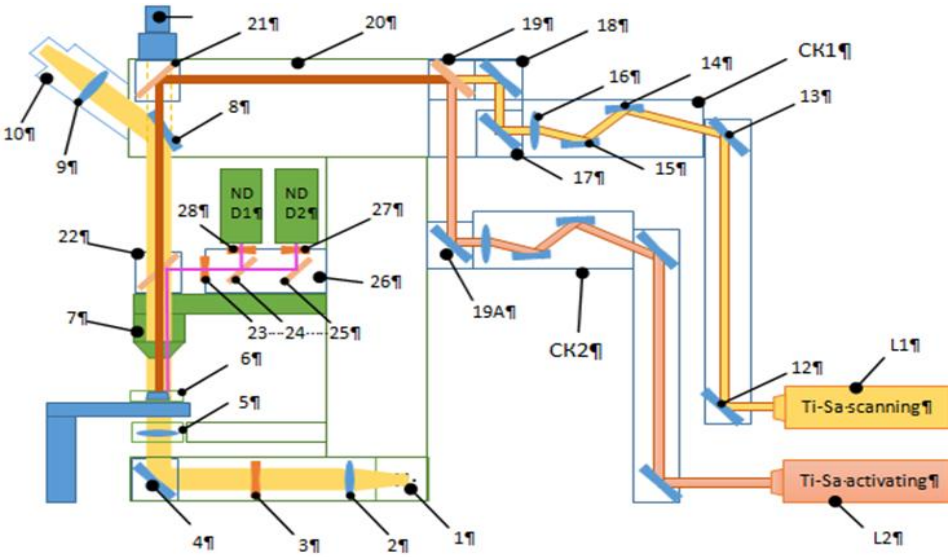


passes onto IR camera (Figure 1, 9) that displays the image on the monitor. Principal scheme of the two-photon microscope system is presented at the Figure 2. As the laser source is using femtosecond IR Ti:Sa laser (Figure 2, L1). The range of the wavelength is from 690 to 1080 nm. The laser beam is starting from the laser aperture and passing the optical path including acousto-optic modulator (AOM) to change the radiation intensity and the Galileo type telescope to changing the diameter of the beam. After that the beam enters into the vertical optical bar with a mirror (Figure 2, 14) which reflect the beam to the next mirror (Figure 2, 13) which deliver laser beam to the desired height.

Further, the beam enters to the resonant scanning unit using a synchronous operation of the mirror and the resonant galvanometer (Figure 2, 14, 15) and the focusing lens (Figure 2, 16) scans the sample. The parameters of the scanner are controlled by the PC. Reflecting by the mirrors (Figure 2, 17, 18) beam achieve dichroic mirror (Figure 2, 19) transmitted the beam falling on it from the scanning laser (Figure 2, L1) and reflects from activating the laser (Figure 2, L2). Then the beam is focusing in the desired plane by the height of objective (Figure 2, 7) and achieve the sample (Figure 2, 6) activating fluorescence at the desired point, and point by point scans the sample. Aperture lens is capturing fluorescent photons (Figure 2, 7) reflected by the dichroic mirror (Figure 2, 22), pass filters (Figure 2, 23, 27, 28) and the falling to the non-descanned detectors (NDD). Distance from the sample to the light detector is about 10 centimeters, which allows to register low level of fluorescence. The optical path of the laser beam from activating laser (Figure 2, L2) is similar to the path from the laser scanning (Figure 2, L1), however in this case using the scanning element including a pair of mirror galvanometers (Figure 2, CK2).



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Correlation Between Muc1, Il-32 Genes Silencing And Fas Mrna Levels In Breast Tumors

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Breast cancer development is associated with changes in expression of genes that involved in regulation of immune responses. Mucin 1 (MUC1) is aberrantly overexpressed in breast tumors. In cancer cells MUC1 gene expression changes, deviations from the normal protein glycosylation and intracellular localization changes is recorded. MUC1 properties changes lead to metabolic reprogramming, new functions appearance and play an important role in the development of tumors. NF-Kβ linking stimulates the release of inflammatory mediators, cytokines such as IL6. MUC1 is associated with the expression of FAS mRNA, which responsible for apoptosis. MUC1 plays an important regulatory role in the transcription of genes associated with tumor invasiveness, metastasis, angiogenesis, proliferation, apoptosis, drug resistant inflammation. The purpose of our study is investigation the relationship of gene expression.

We studied the expression of genes that may influence on inflammation - interleukin 32 (IL32), on cell metabolism - MUC1 and on Fas-dependent apoptosis (Fas).

Tumor samples were collected after surgery from 40 patients with breast cancer. Quantitative reverse transcription PCR (qRTPCR) was carried out to analyze mRNA levels of IL32, MUC1 and Fas. The B2M (Beta-2-microglobulin), UBC (Ubiquitin C), HPRT1 (Hypoxanthinephosphoribosyl transferase 1), YWHAZ (Tyrosine 3 monooxygenase activation protein, zeta polypeptide) house-keeping gene were used as endogenous controls. The levels of gene expressions were measured by comparative Ct-method (ΔΔCt). At first, we assessed stability of house-keeping gene expression in breast tumor samples. Analysis by the BestKeeper computer program shows that B2M is suitable for the normalization of mRNA expression in human breast tumors samples. MUC1 mRNA was detected in 32 (80%) tumor samples, mRNA IL32 – 26 (65%) tumor samples and Fas mRNA in 38 (95%) tumor samples. It has been noted that all MUC1 mRNA-negative samples were IL-32 mRNA-negative which may indicate common mechanisms of gene regulation. Comparison of mRNA levels of MUC1 and IL32 in the breast tumors showed no differences. Importantly, results of our investigation showed a correlation between increased levels of Fas mRNA and gene silencing IL-32 ($r = 0.47$, $p = 0.004$) and MUC1 ($r = 0.57$, $p = 0.002$) in breast tumors. This data show the correlation between gene expression mediating inflammation, metabolism and apoptosis in breast cancer tumors. We propose that common regulation mechanisms through NFk-B pathway may take part in the described processes.

Regulation Of Neuronal Chloride Homeostasis: A New Role For Extracellular Matrix

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Neuronal signaling relies on ion fluxes through membrane-bound channels. Such fluxes are allowed due to the transmembrane ionic gradients created and maintained by membrane transporters. The neuronal gradient for chloride, an anion mediating most of the inhibition in the mature CNS, is the result of activity of two chloride transporters working in opposite directions, NKCC1 moving chloride in and KCC2 moving chloride out of the cell. The KCC2 function may be both up- and down-regulated through a number of mechanisms which allow for the fine-tune adaptation to a varying transporting load which mostly depends on chloride influx through both synaptic and extrasynaptic inhibitory chloride-permeable ion channels such as GABAA- and glycine-receptors.

Besides intraneuronal factors affecting KCC2 function and, thus, the chloride gradient, there is a number of extra-neuronal factors suggested to have a great influence over the distribution of chloride across the neuronal membrane. The very recent experimental findings point to the extracellular matrix as an important player in regulation of intracellular chloride. It has been claimed that large anion groups located within the extracellular matrix set the chloride gradient due to the Gibbs-Donnan effect, thus, effectively sidelining KCC2 as a major contributor to the neuronal chloride homeostasis. However, our own experimental findings concerning chloride homeostasis in anterior hypothalamic neurons suggest quite a different mechanism of involvement of the extracellular matrix.

Changes In The Electrical Conductivity Of The Myocardium Of Isolated Rat Heart Under The Influence Of Verapamil

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Summary. The study was designed to investigate the effect of verapamil on the speed of propagation of electrical excitation in the myocardium. As a result, it was found that verapamil reduces heart rate, the speed of excitation in the