

Using confocal microscopy domination of CD68⁺/RS1⁺ cells were found.

Conclusion: So, low CD68 expression level in ductal gaps tumor structures is associated with the presence of metastatic regional lymph nodes.

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Particular qualities of the expression of markers of sensitivity to cytostatics at patients various solid tumours

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Background: To evaluate the expression of markers of sensitivity to chemotherapy in patients various solid tumors.

Materials and methods: The work includes paraffin blocks NSCLC patients ($n = 486$); CRC ($n = 262$); Breast cancer ($n = 55$); cervical cancer ($n = 19$); kidney ($n = 35$); squamous head and neck cancer ($n = 15$); stomach ($n = 51$); ovarian ($n = 25$); melanoma ($n = 58$); soft tissue sarcomas ($n = 52$). On our panel discussed the spectrum of expression of enzymes DPD, TP, TS, ERCC1, β -tubulin. Measurement of the expression of these genes produced by polymerase chain reaction in real time according to the method developed at the Institute of Oncology. NN Petrova.

Results: The combination of markers of sensitivity to fluoropyrimidine (low levels of DPD, TS, and low/high TP) was observed in patients with NSCLC in 30.9%, 41.9% in colorectal cancer, breast cancer in 31.1%, renal cell carcinoma 41.1%, head and neck carcinoma in 14.3%, of gastric cancer in 42.5% melanoma in 39.5% of cases. Marker sensitivity to platinum drugs (low ERCC1) occurs in patients with NSCLC in 68.8%, 57.1% in colorectal cancer, breast cancer in 55.0%, renal cancer in 70.8% of squamous cell carcinoma of the head and neck 50, 0% of gastric cancer in 87.9% in melanoma 63.6% of cases. Marker, is an indirect measure of sensitivity to taxane drugs (low β -tubulin) in patients with NSCLC diagnosed in 72.7% of cases, in 75% of colorectal cancer, breast cancer in 66.7%, renal cancer in 92.3% of gastric cancer to 86.6%, melanoma in 73.5%.

Conclusion: The expression of markers in tumor tissue is heterogeneous. Significant heterogeneity of expression of predictive marker indicates on one hand the futility of the empirical approach to the choice of therapy, and on the other the need for their determination in all patients. Information about the molecular and genetic features of the tumor can afford to individualize the choice of drug. Objective data about the

informativeness of molecular genetic markers can be obtained on the basis of randomized clinical trials.

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Changes in experimental tumors and surrounding tissue under antitumor influence of magnetite nanoparticles introduced into the peritumoral area

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Background: In previous experiments the self-dependent antitumor effect of magnetite nanoparticles (NPs) injected in peritumoral area in form of magnetic fluid (MF) was shown. Elucidation of the mechanisms of this phenomenon is of theoretical and practical interest. The aim of the study was to investigate the cellular and ultrastructural changes in the tissue tumors regressed under the influence of magnetite NPs, as well as the composition of the cells of the immune system in the peritumoral area.

Materials and methods: The study was carried on white male rats, 180–200 g, with transplanted sarcoma 45 (59) or Pliss lymphosarcoma (50). Special antitumor agents were not used. Magnetite NPs (10 ± 2 nm) were applied in the form of the water-based MF. Original MF (20 kA/m) was diluted with saline in different degree and was injected into peritumoral zone along the tumor borders at a distance of 1.5 cm twice a week in a volume of 0.4–0.9 ml (depending on the animal weight) within 3 weeks. Special anti-tumor agents were not used. At the end of the experiments fragments of the tumor and surrounding tissue were taken for research. The study of changes in the tumor and peritumoral area were performed by the methods of cytology, histology, histochemistry, electron microscopy (microscope JEOL JEM-1011, Japan), flow cytometry, X-ray fluorescence spectroscopy (spectrometer M4 Tornado Bruker).

Results: At a dilution of the original MF in 30 times the treatment was effective in 75% of animals. Complete and partial (more than 2-fold) tumor regression was observed in 2/3 cases. In rats with Pliss lymphosarcoma tumor regression on 70–100% has been reported in 20–40% cases. The results of microscopic examination of sarcoma 45 with partial regression showed significant changes in their immune microenvironment compared with the cases of progressive tumor growth ($p < 0.05$ – 0.01). This was expressed in the increase in the number of lymphocytes and plasmacytes (respectively, in 12 and 2.5 fold), and in the appearance of macrophages and basophils that were missing in tumors with progressive growth. The results of flow cytometry of tissue from the tumor as well as from peritumoral zone indicate the predominance of plasmacytes in the case of inhibition of tumor growth and increasing the proportion of mature T lymphocytes in the cases of tumor regression (more than 1.5 times, $p < 0.05$). By

electron microscopy, it was shown that in the cases of efficiency of the MF in addition to necrosis, observed also in growing tumors, such types of cell death were marked as apoptosis and autophagy. Numerous signs of activation of cell-cell interactions involved cells of the immune system were revealed. Different groups of 2–4 contacting cells (macrophages, lymphocytes, plasmacytes, mast cells, tumor-associated fibroblasts and neutrophils in various combinations) with signs of metabolic activity were marked. X-ray fluorescence spectroscopy preliminary results in rats with Pliss lymphosarcoma regression indicated dense arrangement of magnetite NPs and their aggregates in the peritumoral area and their practical absence in tumor.

Conclusion: The study results reflect the changes in the immune microenvironment of experimental tumors under effective action of magnetite NPs and indicate significant activation of local immune processes caused by these factors.

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A60

Signs of cell-cell interactions and ultrastructural changes in the tumor under the effective impact of the weak microwave radiation on the central nervous system and peritumoral zone in the experiment

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Background: It has previously been shown that additional local electromagnetic impact on the tumor enhances the systemic antitumor effect of low-intensity electromagnetic radiation (EMR) used in the activation therapy regimes designed by Garkavi L.H. et al. (1990–2008). At the same time the question of the influence of weak EMR, applied to the peritumoral area, on the tumor development has not been studied.

The aim of the study was to investigate the changes in the tumor caused by low-intensity microwave electromagnetic radiation of bioeffective frequency that acted on the head and peritumoral zone.

Materials and methods: The effects of resonance radiation (RR) with frequency corresponding to that of one of the water-containing medium radiations – 1 GHz (“SPE-effect”) – were studied on 53 adult male outbred white rats with transplantable sarcoma 45. Special anticancer agents were not used. The power flux density of RR was less than 1 μW/cm², surface area of the emitter – 4 cm², 3–10 min. exposure depending on algorithms of the activation therapy. RR exposure in different groups of animals was localized to the head only, or to the peri-tumoral area only, or successively to the head and peritumoral area (“double” exposure). The course lasted for 4 weeks. The exposure effect was assessed according to the dynamics of the tumor size and results

of the light and electron microscopy analysis of tumor changes (JEOL JEM-1011, Japan).

Results: The effect of RR in different groups of animals depended on the exposure localization. Central systemic exposure was decisive. The group receiving RR localized to the head showed regression of the tumor or inhibition of its growth in 60% of animals – almost complete tumor regression in 10% and tumor growth inhibition by 70% in the rest cases. RR to the peritumoral area did not show significant influence on the tumor development, while it increased antitumor effect of the central exposure ($p < 0.01–0.05$). Antitumor effect was registered in 77% of the animals receiving the “double” RR exposure: 30% – morphologically verified complete regression, 24% – partial regression (tumor shrinkage by 2–2.5 times) and tumor growth inhibition by 40% was detected in 23% of animals. Regressing tumor, unlike sarcoma 45 with an active growth, was characterized by significant thickening of the capsule (by 7 times, $p < 0.01$) and increased intensity of lymphoplasmacytic infiltration ($p < 0.01$). Immune system cells were present in the capsule, subcapsular zone and as leukocytic barrier in peritumoral area of the conjunctive tissue of up to 170 μm width. Different numbers of lymphocytes and plasma cells were noted in tumor cells. Macrophages were found. Migrating lymphocytes were often noted in the vessels among tumor cells. Electron microscopy showed multiple contacts of lymphocytes with the surface of tumor cells through cytoplasmic excrescences. Such lymphocytes had distinct signs of activation. Simultaneous contacts of lymphocytes and macrophages among themselves and with tumor cells were found. Analysis of ultrastructural characteristics of cells in regressing tumors and detection of collagen in intercellular spaces during histochemical examination of tumor tissues showed the increase in the degree of differentiation of some sarcoma 45 cells.

Conclusion: Possibility to increase the systemic antitumor effect of the low-intensity microwave radiation with an additional weak exposure on the peritumoral area was demonstrated for the first time. Damaging effect of RR on tumor was mediated by the changes in composition and activity of elements of the tumor’s immune microenvironment and by the increase in the degree of differentiation of some tumor cells, probably under the influence of bioactive factors of leukocytic origin.

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Mechanics–mathematical models of changing of human cells properties under the cancer action

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Cancer is one of the most common causes of morbidity and mortality in the world. According to the recent estimates, cancer deaths will increase from an estimated 8.2 million annually to