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Potential application of NIPAM polymer gel for dosimetric purposes in BNCT

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Boron neutron capture therapy (BNCT) is based on selective accumulation of ^{10}B inside the tumor cells with subsequent irradiation of tumor using neutron beam. In general, total dose from BNCT can be attributed to four components: the gamma dose, epithermal and fast neutrons dose, the dose from thermal neutron capture in ^{14}N and ^{10}B. The principal method recommended for determining fast and epithermal neutron and gamma dose is dual ionization chamber technique and the dose contribution from thermal neutron capture is calculated from measured thermal neutron flux by applying foil activation technique. Although these methods are commonly used to clinical dosimetry of BNCT but they have some disadvantage such as: 1) dosimetric process is very time-consuming. 2) The thermal neutron doses are not measured directly. 3) require two different dosimetric methods to detect various radiation types and total dose calculation. 4) Ionization chambers need several correction factors. To overcome these limitations, a more efficient and reliable dosimeter is needed. Since the polymer gel dosimeters are normally tissue equivalent and are able to record dose information in three-dimensions with sufficient spatial accuracy, therefore could be a suitable option for dosimetric purposes in BNCT. The study is currently in progress to explore the applicability of NIPAM gel in BNCT.

Keywords: BNCT, NIPAM, Polymer gel.

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Low-intensive laser irradiation does not initiate neoplastic growth

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For more than 50 years, laser irradiation has been used in medicine. Low intensive laser irradiation - LILI has been widely used for the purpose of stimulation of various biologic processes. One of controversial issues in laserology is whether LILI can induce formation of neoplasms. Our 35 year experience of usage of LILI in clinic and experiment gives us ground to answer this question.

The result of several thousand of experiments and clinical sessions of laser therapy were studied with use of light, transmission, scanning electron and luminescence microscopy; radioautography, histochemistry and morphometry. The influences of helium-neon, infrared, ultraviolet, and copper vapor lasers on experimental dermatome wounds, on chronic gastroduodenal ulcers, bone marrow and "laser douching" of Vistar rats were studied. Structural peculiarities of local and of intravascular laser irradiation of blood-ILIB were studied in dermatoses, periodontitis, liver cirrhosis, in bleedings from ulcers and other pathologies. MC was assessed with laser doppler flowmetry.

It was shown, that LILI stimulates cellular proliferation and accelerates cellular differentiation. ILIB normalizes the ratio of discocytes-normal erythro-cytes to pathologic forms of erythrocytes, which becomes altered in various pathologic processes and activates MC. In both experimental and clinical observations there was not even a single incidence of appearance of atypical cells or tumor transformation. This is conditioned by the fact that LILI not only stimulates proliferative activity, cell migration, and MC but also contributes to accelerated differentiation of cells.

Multiple studies allow us to conclude that LILI does not initiate neoplastic growth.

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