ポスター発表
グリオーマ 12

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悪性神経膠腫の加速器ベース中性子捕捉診断と治療：in vitroの効力評価とサンプル内線量測定

Zaboronok, Alexander:1、Sergey, Taskaev:2、中井 啓:3、Dmitry, Kasatov:2、Alexander, Makarov:2、Ivan, Schudlo:2、Olga, Volkova:4、Ludmila, Mechetina:4、Alexander, Taranin:4、Anna, Iarullina:5、Vladimir, Kanygin:2、Vadim, Byvaltsev:5、佐藤 英介:6、山本 哲哉:1、松村 明:1

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Accelerator-based neutron source can help to avoid radiation-related risks of a nuclear reactor and can be placed in the hospital to provide boron neutron capture therapy (BNCT). Golden foils are used to estimate the neutron dose, providing approximate evaluation by the decay of 198-Au isotope with a half-life of 2.7 days. We tested the hypothesis that placing gold (in the form of nanoparticles) inside tumor cells may provide more accurate neutron dose evaluation.

T98G glioma cells were incubated with boron-phenylalanine (BPA, 0, 10, 20, or 40 ppm of boron-10) and gold nanoparticles (GNPs, 50 ppm of gold). GNPs in the cells were observed by transmission electron microscopy. Gold accumulation was assessed by inductively-coupled plasma atomic emission spectroscopy (ICP-AES). The cells were irradiated with 300 million neutrons under the lithium target of the proton accelerator (2.0 to 2.3 MeV, 2 to 3 mA). The activation of gold was assessed by a gamma spectrometer and was used to calculate the absorbed neutron dose. After irradiation, the cells were diluted and seeded for colony formation. 2 weeks after the irradiation colonies over 50 cells were counted and included in the analysis.

Neutron irradiation of 129.8±7.3ug of gold in samples produced 4.02±0.4x10E7 radioactive 198-Au isotopes, and allowed to calculate the absorbed neutron dose for each boron concentration. Our approach in dosimetry for BNCT may open up a new perspective treatment efficacy evaluation, as well as boron distribution analysis in tumor tissue during and after the treatment by modification such methods as isotope scanning and positron emission tomography (PET).