The analyses of bystander effect induced by low-dose radiation in glioma cell

A. Yoshikubo[1], A. Baden[1], S.Wada[1], T.Kakizaki[1], S, Goto[2], K.Sera[3] and N. Ito[1]

[1]School of Veterinary Medicine, Kitasato university
35-1Higashi23bantyo, Towada, Aomori 034-8628, Japan

[2]Takizawa Institute, Japan Radioisotope Association
348-1 Tomegamori, Takizawa, Iwate 020-0173, Japan

[3]Cyclotron Research Center, Iwate Medical University
348-58 Tomegamori, Takizawa, Iwate 020-0173, Japan

Abstract

Recently, it was considered that the cell lethal effect by low dose radiation was due to bystander effect. Cells irradiated low dose radiation secreted something liquid factor that induced lethal effect by signal transduction. So far, we suggested that radiation induced bystander effect is closely relative with sphingomyelinase. To analyze mechanism between activation of shingomyelinase and induction of bystander effect, in this study we investigated divalent metal that are necessary for sphingomyelinase activation using PIXE analysis and mechanism of lethal effect by sphingomyelinase. Extracellular zinc value by radiation (0.1Gy) decreased for 5 min and increased for 15 min after irradiation. On the other hand, fluctuation of extracellular zinc value by treatment of spingomyelinase inhibitor was suppressed. NO and DNA damage were induced in the bystander cells, that were non-irradiated cells culturing with medium of irradiated cells. These results indicate sphingomyeliase is activated by binding zinc element, sphingomyelinase itself function as bystander factor and .induce cell death.