RCNP, OSAKA UNIVERSITY
NUCLEAR PHYSICS SEMINAR

Title	Clinical Aspects of BNCT for Malignant Brain Tumors
Speaker	Shin-Ichi Miyatake (Cancer Center, Osaka Medical College)
Date and Time	Nov 28th (Wed) in 2018 16:30 -
Place	Lecture Room 1 (on the 6th floor of RCNP main building

Abstract

Boron neutron capture therapy (BNCT) is a biochemically targeted radiotherapy based on the nuclear capture and fission reactions. BNCT is a binary approach: A boron-10 (^{10}B)-labeled compound delivers high concentrations of ^{10}B to the target tumor, relative to the surrounding normal tissues. This is followed by irradiation with thermal or epithermal neutrons that become thermalized at a certain depth within the tissues. The short range (5-9 micrometers) of the alpha and ^{7}Li particles released from the ^{10}B(n, alpha)^{7}Li neutron capture reaction makes the micro-distribution of ^{10}B critically important in therapy.

We applied BNCT using nuclear reactors for 171 cases of malignant brain tumors with 190 times neutron irradiation, including recurrent and newly diagnosed malignant gliomas and recurrent high grade meningiomas, from January 2002 to September 2018. Here, we introduce the principle and the clinical results of our BNCT for the above-mentioned malignant brain tumors and describe a novel diagnostic tool, fluoride-labeled boronophenylalanine positron emission tomography.

Recently, we use the antiangiogenic agent, bevacizumab for the treatment and prevention of brain radiation necrosis, which may be caused even by BNCT. Also we introduce the excellent result of simultaneous use of bevacizumab with BNCT, especially for recurrent malignant gliomas.

Finally, we will introduce the recent development of accelerators producing epithermal neutron beams. This development, reported in my talk can provide an alternative to the current use of nuclear reactors as a neutron source, and be able to allow BNCT to be performed in a hospital setting.

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