BNCT for Alzheimer's disease; Synthesis of boron-containing compounds binding to amyloid beta plaques and *in vitro* experimental basis

Imahori Y[1], Takeyoshi T[1], Fushimi A[1], Fujii R[1], Nakamura M[1], Kashihara K[2]

[1] *Cancer Intelligence Care Systems, Inc., Tokyo, Japan*
[2] *Tokyo Radiation Oncology Clinic, Tokyo, Japan*
E-mail: imahori@cics.jp

Boron-containing compounds that selectively bind to amyloid beta (Aβ) plaques were designed and several compounds were synthesized. We also examined in *in vitro* experiments whether these compounds bind to aggregated Aβ and show a ligand effect. Aggregated Aβ was prepared from Aβ (1-42) Human polypeptide monomer to obtain aggregated Aβ of about 245 kDa or more. The aggregated Aβ and each compound were incubated at 36℃, and neutron irradiation was performed using CICS-1 (Tokyo, Japan). The B-10 concentration of each compound and boric acid (as a reference) was adjusted to be 20 ppm. The results showed that several boron-containing compounds fragmented aggregated Aβ by BNCT at 3.0 Gy (physical dose) under *in vitro* conditions. On the other hand, boric acid did not induce the fragmentation. In Alzheimer's disease, it has been suggested in humans that remodeling of neural networks is constantly occurring through the frontal lobe and association areas in order to reconstruct diminished cognitive functions (1,2). We succeeded in the synthesis of ligands with affinity to aggregated Aβ and we also examined its fragmentation effect. The experimental basis is considered to have taken the first step to enable BNCT for advanced Alzheimer's disease.

References

1. Kondo M, *et al*., Aberrant plasticity in Alzheimer's disease, Neuroreport 10(7):1481-1484(1999).
2. Imahori Y, *et al*., Neural features of recovery from CNS injury revealed by PET in human brain, Neuroreport 10(1):117-121(1999).