The possible recovery process of higher brain functions after Amyloid β fragmentation by BNCT in Alzheimer's disease

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Neurologists have experienced many clinical pictures with sometimes improvement along with cognitive impairment progresses in Alzheimer's patients. Recent PET findings also suggest that the neural network is constantly being remodeling via the supra-modal association area [1,2].

We focused on Amyloid β that accumulates outside the nerve cells and we synthesized possible boron-containing ligand with affinity to Amyloid β in order to avoid damages to the cells. Many boron-containing ligands were synthesized based on several potential chemical skeletons. Among them, series of 2-(4'-methylaminophenyl) benzothiazole, which is widely used as a PET tracer [3], is a representative as a candidate chemical skeleton for the boron-containing ligand.

We prepared aggregated Amyloid β (1-42) and used it for neutron irradiation in in vitro experiments. In actual Alzheimer's disease, it is suggested that Amyloid β 40 and Amyloid β 42 are randomly distributed in β sheets having high hydrophobicity in the secondary structure to form mixed oligomers. Therefore, a fragment of Amyloid β 42, which is more toxic in both Amyloid β, was polymerized to form aggregates, and in this experiment, aggregation was performed at 245 kDa or more to conduct fragmentation experiments. We succeeded in the synthesis of some ligands with affinity to aggregated Amyloid β and we examined its fragmentation effect in in vitro experiments. We discuss the possible recovery process of higher brain functions after Amyloid β fragmentation.

References

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