New peptide Drug Delivery System with BSH toward future BNCT clinical application

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In BNCT in GBM, one of the keys to success can depend on the boron compounds. The combination of BSH and BPA in clinical GBM BNCT showed good results and that meant the multi boron use in BNCT was one answer to next step of BNCT. In this time, we showed that the new self-assembling peptide DDS with BSH toward clinical application of BNCT. The self-assembling A6K peptide was found and reported by Dr. Shuguang Zhang, MIT in 1982. The A6K peptide showed self-assembling feature in water, and worked as drug delivery system of siRNA with only mixture. The A6K drug delivery system was clinically approved to breast cancer trial in Japan since2015. In materials and methods, the complex of A6K and BSH was observed with scanning electron microscope in different mixture ratio. Next, we checked the cell toxicity, measured intracellular boron concentration and observed BSH localization in mouse model.

In results, at first, we established the simple A6K/BSH complex making method, as just mixture the BSH and A6K water solution by itself. The BSH/A6K complex with different mixture ratio showed different shape and different diameter of complex in SEM image. Next, we administrated BSH/A6K complex to GBM cells and measured intracellular boron uptake. The concentration with BSH/A6K complex in U87 delta EGFR was 10 times or higher than that with BSH. Finally, we administrated BSH or A6K/BSH complex through mouse tail vein and got brain tumor sample after 12hr. The A6K/BSH mouse brain sample showed specifically accumulated BSH in tumor area. In conclusion, A6K peptide is clinical use in DDS and will spread various drug delivery tool for various clinical fields in future. Our A6K/BSH complex is very promising boron drug for next generation BNCT.