

YANAGIE-1: Boron Neutron Capture Therapy planning for recurrent hepatocellular carcinoma using Boron entrapped Water-in-Oil-in-Water emulsion

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Hepatocellular carcinoma (HCC) is one of the difficult cancers to cure with multidisciplinary treatments. Iodized poppy-seed oil (IPSO) is considered to be useful in intra-arterial chemotherapy treating liver cancer. We have used water-in-oil-in-water emulsion (WOW) as the carrier of anti-cancer agents by modifying IPSO on intra-arterial injections to hepatocellular carcinoma in clinical.

We have developed a ¹⁰B sodium mercaptododecaborate (¹⁰BSH)-entrapped WOW emulsion, and evaluated it as a selective boron carrier for the possible application of BNCT for HCC, which could be an option for patients who cannot be treated with conventional therapies. We prepared ¹⁰BSH entrapped WOW emulsion. The mean ¹⁰B concentration was 10000 ppm in the injected emulsion, and the size of WOW emulsion was controlled to be 70µm. Suzuki et al. had first reported the tumor growth suppression by BNCT with the intra-arterial administration of a boron compound with IPSO. We have also performed clinical BNCT study for recurrence HCC patient using ¹⁰BSH-entrapped WOW emulsion and showed the tumor growth suppression.

We plan to perform clinical BNCT study for recurrence HCC patient using ¹⁰BSH-entrapped WOW emulsion.

(1) Preparing Drug : Na₂ ¹⁰B₁₂H₁₁SH (¹⁰BSH) : M.W.219.872g /mol

(2) Procedure of Pilot Study; 1) The patient come to the registrated hospital from the other hospital with introduction form. 2) Pre performed diagnosis(Detect the indication) with discussion with KURNS stuff by checking the CT images of recurreded tumours. 3) Informed Conccent of the pilot study of BNCT is performed. 4) Simulational CT imaging in the same position at BNCT with marking of the tumour sites 1 week before BNCT. 5) Intra-arterial injection of ¹⁰BSH-WOW emulsion(32.8mg/mL) is performed 3~5 days before BNCT at the registrated hospital. 6) BNCT procedure at KURNS. The boron concentrations in tumour and normal liver tissue during the BNCT are measured by γ-Telescopy. 7) After BNCT, the patient will stay at the hosted hospital in 1week. 8) The effects of tumour suppression is evaluate with the decreasing rate of the tumour by images of CTscan and MRI, and data of tumour markers following RECIST clriteria of Japan Clinical Oncology Groups.

