Difference in 4-borono-2-18F-fluoro-phenylalanine kinetics between tumor and inflammation in rat model

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**Background**

In BNCT for cancer treatment, boron-10 concentration in tumor and normal tissue is critical. Borono-phenylalanine-fructose complex (BPA-fr) is utilized to deliver boron-10 to tumors. In order to predict relative boron-10 concentration in tumor, 4-borono-2-18F-fluoro-phenylalanine (FBPA) PET has been employed.

Fig. 1 shows a typical BNCT protocol. The second FBPA PET is applied for testing BNCT efficacy.

**Materials and methods**

**Animals**

F344 rats with C6 glioma cells 20 days after the transplantation and Wister rats with inflammatory lesions 4 days after the subcutaneous injection of turpentine oil were scanned with micro PET/CT (Inveon, SIEMENS) during 70 minutes post FBPA injection.

**18F-FBPA solution**

30.5±0.7MBq, 16.92±4.72GBq/ml, Radiochemical purity 98.8 %

**Protocol of this study**

Accumulation of FBPA was quantified in the tumor and inflammatory PET images by placing regions of interest with the Image-derived input function method was adopted in this study.

**Results**

Significant differences were observed for the pharmacokinetic parameters. K1, K2 and Vt were 0.48±0.16, 0.29±0.06, and 1.63±0.23 in the malignant glioma, while 0.34±0.05(p< 0.05), 0.49±0.08(p< 0.01), and 0.70±0.02(p< 0.01) in inflammatory lesions, respectively. At 60 min after injection, FBPA SUVmax in malignant glioma and inflammatory lesions were 2.98±1.04 and 1.59±0.02, respectively (p< 0.01).

**Discussion**

The Image-derived input function method was adopted in this study. The contamination from other organs are minimized because FBPA does not accumulate in organs around the heart. The elucidation of a detailed accumulation mechanisms is a subject for future analysis.

**Conclusion**

We investigated the difference in FBPA kinetics between malignant glioma and inflammatory lesions in the rat model with micro PET/CT. These results may be of importance in the clinical application of BNCT because they suggest that boronophenylalanine might localize substantially more in tumor than in inflammation.

**References**


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