ORIGINAL ARTICLE

Annals of Nuclear Medicine Vol. 20, No. 8, 527–533, 2006

Comparison of ^{18}F-fluoromethylcholine and 2-deoxy-D-glucose in the distribution of tumor and inflammation

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Purpose: The distribution characteristics of ^{18}F-fluoromethylcholine (^{18}F-choline) in tumor and inflammatory tissue were compared with those of ^{14}C or ^{3}H-2-deoxyglucose (2DG) as a substitute for fluorodeoxyglucose (FDG). ***Methods:*** A solid tumor model of AH109A in the back of Donryu rats and an aseptic inflammation model of turpentine oil injection subcutaneously in rats were used for experiments. Tissue distribution was examined at 5, 30 and 60 min after injection of a mixture of ^{18}F-choline and ^{3}H-2DG. Double-tracer high-resolution autoradiographs (ARGs) of tumor and inflammation were obtained using ^{18}F-choline and ^{14}C-2DG. Whole body (WB) ARG was performed with ^{18}F-choline. ***Results:*** Tumor uptake of ^{18}F-choline reached a peak at 30 min, when the tumor to blood ratio was 5.1. Both tumor and inflammation uptake of 2DG were higher than those of ^{18}F-choline. ^{18}F-choline uptake by inflammation was lower than that by tumor. The tumor to brain uptake ratio was 5.7 with ^{18}F-choline and 1.2 with 2DG. In the ARG of inflammation, linear or ring-like structures of 2DG uptake were observed in the wall of the abscess, but were not identified with ^{18}F-choline. Photomicrography showed that the uptake was limited to granulocytes, macrophages and fibroblasts, consistent with sub-acute or chronic inflammation. ***Conclusion:*** ^{18}F-choline uptake by inflammation was lower than that of 2DG in the tissue distribution study, and ^{18}F-choline uptake by abscess wall was significantly lower than that of 2DG in the autoradiography study. Our results may suggest the feasibility of ^{18}F-choline-PET imaging for the differential diagnosis of cancer and chronic inflammation in lung and brain.

Key words: ^{18}F-fluorocholine, 2-deoxyglucose, inflammation, tumor, autoradiography