

## 2

EXPERIMENTAL STUDIES FOR CANCER DIAGNOSIS WITH POSITRON LABELED COMPOUNDS AND THEIR CLINICAL APPLICATIONS. H.Fukuda,T.Matsuzawa, Y.Abe.Dept.of Radiol.&Nucl.Med,The Res.Inst. for TB & Cancer,Tohoku University,Sendai.

The features of the cancer detection using positron labeled compounds with positron emission tomography are as follows; 1) Tumor uptake of positron labeled compounds such as [F-18]-2-fluoro-2-deoxy-D-glucose ([F-18]-FDG) or [C-11]-methionine are closely related to glucose or amino acid metabolism of tumor. Therefore, we can find the tumor image as metabolic map. 2) Tumor uptake of these compounds can be estimated quantitatively with positron emission tomography.

The purpose of this paper was to evaluate the validity of cancer diagnosis with [F-18]FDG or [C-11]-methionine. Tissue distribution studies were made using rat and rabbit tumor system, and we found that [F-18]-FDG and [C-11]-methionine were good tracers for cancer detection. The advantages for cancer detection with [F-18]-FDG were as follows: 1) The tumor uptake was very high and increased with time. Whereas, clearance from blood was rapid. 2) Intrahepatic tumors can be positively delineated, because of rapid clearance from normal liver. 3) The uptake of inflammatory tissue was relatively lower than that of tumor and the uptake level did not increase during the study period. The advantages for cancer detection with [C-11]-methionine were as follows: 1) The tumor uptake was high enough to delineate the surrounding tissues such as lung, heart

and brain. Clearance from blood was very rapid. 2) The uptake of inflammatory tissue was lower than that of tumor.

Based on these experimental results, we studied the feasibility of this diagnostic technique in hepatic and pancreatic cancers with [F-18]-FDG. After injection of 4-10 mCi of [F-18]-FDG, serial scanning for every 5 min was performed by positron emission tomography. There were increased accumulation of the radioactivity in both hepatic and pancreatic cancers with rapid clearance of the activity from normal liver. By 40-60 min after injection, positive images of tumors were obtained. The different uptakes of [F-18]-FDG were observed among hepatomas, and also observed between primary pancreatic cancer and the metastatic foci of the liver.

We also studied in lung cancers with [F-18]-FDG and [C-11]-methionine. All of lung cancers were detected positively. Tumor uptake of [F-18]-FDG were increased with time. Whereas, tumor uptake of [C-11]-methionine were constant at high level. [F-18]-FDG uptakes per minutes of squamous cell carcinoma were higher than that of adenocarcinoma. [C-11]-methionine uptakes of squamous cell carcinoma were lower than that of large cell carcinoma. These data suggested that tumor uptake of these compounds could classify the histological typing of the tumors.

We concluded that the cancer diagnostic technique with [F-18]-FDG and [C-11]-methionine can be useful for the detection of tumors, evaluation of tumor viability, and classification of histological tumors.