ORIGINAL ARTICLE

Annals of Nuclear Medicine Vol. 11, No. 2, 115–122, 1997

Carbon-11 labeled ethionine and propionine as tumor detecting agents

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To develop ^{18}F-fluoroalkyl derivatives of methionine (MET) as a tumor detecting agent by mean of clinical PET, a pilot study assessing the potential of their parent compounds, ^{11}C-labeled ethionine (^{11}C-ETH) and propionine (^{11}C-PRO), was performed. ^{11}C-ETH and ^{11}C-PRO were prepared by the reaction of L-homocysteine thiolactone and corresponding ^{11}C-alkyl iodides. After i.v. injection of a mixture of ^{3}H-MET, ^{14}C-ETH and ^{11}C-PRO into mice bearing FM3A mammary carcinoma, the highest FM3A uptake was found in ^{14}C-ETH, followed by ^{3}H-MET and ^{11}C-PRO, while the FM3A-to-brain and FM3A-to-muscle ratios were nearly the same for all three compounds. The FM3A uptake of ^{14}C-ETH and ^{11}C-PRO were nearly equal or slightly higher than the liver uptake. In the pancreas, liver, FM3A and brain tissues, incorporation of ^{14}C-ETH into acid-precipitable materials was much lower than that of ^{3}H-MET, whereas no incorporation of ^{11}C-PRO was found. Brain uptake of all three compounds was significantly reduced by carrier MET-loading (5 min p.i.) or by cycloheximide treatment to inhibit protein synthesis (60 min p.i.), whereas the FM3A uptake was not affected. Incorporation of ^{14}C-ETH into acid-precipitable materials was inhibited by the cycloheximide. The results suggest that ^{11}C-labeled ETH has a similar potential for tumor detection by PET as ^{11}C-MET, and that ^{11}C-PRO has similar properties to those of other artificial amino acids. The development of ^{18}F-fluoroalkyl derivatives of MET is of interest as the next step.

Key words: [^{11}C]ethionine, [^{11}C]propionine, tumor detection, PET