

Evaluation of ^{62}Cu labeled diacetyl-bis(N^4 -methylthiosemicarbazone) as a hypoxic tissue tracer in patients with lung cancer

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^{62}Cu labeled diacetyl-bis(N^4 -methylthiosemicarbazone) (^{62}Cu -ATSM) has been proposed as a generator-produced, positron-emitting tracer for hypoxic tissue imaging. From basic studies, the retention mechanism of ^{62}Cu -ATSM is considered to be closely related to cytosolic/microsomal bioreduction, a possible system for hypoxic bioreductive drug activation. In order to evaluate the characteristics of ^{62}Cu -ATSM, PET studies were performed in 4 normal subjects and 6 patients with lung cancer. ^{62}Cu -ATSM cleared rapidly from the blood with little lung uptake (0.43 ± 0.09 , uptake ratio; divided by the arterial input function) in normal subjects. Intense tumor uptake of ^{62}Cu -ATSM was observed in all patients with lung cancer (3.00 ± 1.50). A negative correlation was observed between blood flow and flow-normalized ^{62}Cu -ATSM uptake in three of four patients. In contrast, ^{62}Cu -ATSM uptake was not related to that of ^{18}F -fluorodeoxyglucose. The negative correlation between blood flow and flow normalized ^{62}Cu -ATSM uptake suggests an enhancement of retention of ^{62}Cu -ATSM by low flow. ^{62}Cu -ATSM is a promising PET tracer for tumor imaging, which might bring new information for chemotherapeutic treatment as well as radiotherapy of hypoxic tumors.

Key words: ^{62}Cu -ATSM, hypoxia, lung cancer, ^{18}F -FDG, PET