

Metabolite analysis of [¹¹C]flumazenil in human plasma: Assessment as the standardized value for quantitative PET studies

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Analysis of carbon-11 labeled metabolites in plasma was carried out during positron emission tomography (PET) studies with a central benzodiazepine receptor ligand [¹¹C]flumazenil ([¹¹C]FMZ) in 24 human subjects (14-76 y.o.) including five normal volunteers and 19 patients with neurological disorders. Arterial plasma samples were obtained at 3, 5, 10, 15, 20, 30 and 60 min after i.v. injection of the tracer, and were analyzed by high-performance liquid chromatography. The rate of plasma [¹¹C]FMZ degradation was associated with a large individual variation, but no significant difference was found in the degradation of [¹¹C]FMZ either between male and female, young and old, or between normal subjects and patient groups. When the mean fraction of unchanged [¹¹C]FMZ at each time point was used instead of individually measured metabolite data for the arterial input function, as much as a 30% error occurred in the distribution volume of the [¹¹C]FMZ binding in the brain. These results indicate that the mean percentage of unchanged [¹¹C]FMZ fraction in subjects cannot be used as the standardized value, and that the analysis of metabolites in plasma is necessary to determine the exact arterial input function for quantitative PET measurement.

Key words: [¹¹C]flumazenil, metabolism, benzodiazepine receptor, human, PET