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Intrasubject correlation between static scan and distribution volume images for [^{11}C]flumazenil PET

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Accumulation of [^{11}C]flumazenil (FMZ) reflects central nervous system benzodiazepine receptor (BZR). We searched for the optimal time for a static PET scan with FMZ as semi-quantitative imaging of BZR distribution. In 10 normal subjects, a dynamic series of decay-corrected PET scans was performed for 60 minutes, and the arterial blood was sampled during the scan to measure radioactivity and labeled metabolites. We generated 13 kinds of "static scan" images from the dynamic scan in each subject, and analyzed the pixel correlation for these images versus distribution volume (DV) images. We also analyzed the time for the [^{11}C]FMZ in plasma and tissue to reach the equilibrium. The intra-subject pixel correlation demonstrated that the "static scan" images for the period centering around 30 minutes post-injection had the strongest linear correlation with the DV image. The ratio of radioactivity in the cortex to that in the plasma reached a peak at 40 minutes after injection. Considering the physical decay and patient burden, we conclude that the decay corrected static scan for [^{11}C]FMZ PET as semi-quantitative imaging of BZR distribution is to be optimally acquired from 20 to 40 minutes after injection.

Key words: [^{11}C]flumazenil, benzodiazepine receptor, static scan, positron emission tomography, pixel correlation