Comparison of early and late images on ^{123}I-Iomazenil SPECT with cerebral blood flow and oxygen extraction fraction images on PET in the cerebral cortex of patients with chronic unilateral major cerebral artery occlusive disease

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Abstract

The aim of the present study was to determine whether early and late/early images on ^{123}I-iomazenil (IMZ) single-photon emission computed tomography (SPECT) correlate with cerebral blood flow (CBF) images and oxygen extraction fraction (OEF) images on positron emission tomography (PET), respectively, in the cerebral cortex of patients with chronic unilateral middle cerebral artery (MCA) or internal carotid artery occlusive disease.In 20 normal subjects and in 68 patients, CBF and OEF were assessed using ^{15}O-PET, and brain SPECT scans were initiated immediately after (early images) and 180 min after (late images) administration of ^{123}I-IMZ. A region of interest (ROI) was automatically placed in the MCA territory in both cerebral hemispheres using a three-dimensional stereotaxic ROI template, and the ratio of the value in the affected side to that in the contralateral side was calculated in each image.Among patients, a significant positive correlation was observed between PET-CBF ratios and SPECT-early IMZ ratios (r=0.797, P<0.0001) as well as between PET-OEF ratios and SPECT-late/early IMZ ratios (r=0.679, P<0.0001). When an abnormally elevated PET-OEF ratio was defined as a value greater than the mean + 2 SD obtained in normal subjects, SPECT-late/early IMZ ratios provided 100% sensitivity and 93% specificity, with 76% positive- and 100% negative-predictive values for detecting abnormally elevated PET-OEF ratios.Early and late/early images on ^{123}I-IMZ SPECT correlate with CBF images and OEF images on PET, respectively, in the cerebral cortex of patients with chronic unilateral major cerebral artery occlusive disease.