Accuracy of ^{123}I-iomazenil uptake/cerebral blood flow single-photon emission computed tomography imaging for detecting misery perfusion in patients with chronic unilateral internal carotid or middle cerebral artery occlusive disease: comparison with a combination of cerebrovascular reactivity to acetazolamide and cerebral blood flow

H. Kuroda[1], K. Ogasawara[1], T. Suzuki[1], K. Aso[1], K. Chida[1], M. Kobayashi[1], K. Yoshida[1], T. Sasaki[2], K. Terasaki[2] and A. Ogawa[1]

[1]Department of Neurosurgery, School of Medicine, Iwate Medical University
19-1 Uchimaru, Morioka, Iwate 020-8505, Japan

[2]Cyclotron Research Center, Iwate Medical University
348-58 Tomegamori, Takizawa, Iwate 020-0173, Japan

Abstract

The aim of the present study was to determine which, ^{123}I-iomazenil (IMZ) uptake/cerebral blood flow (CBF) or a combination of CBF and cerebrovascular reactivity (CVR) to acetazolamide on single-photon emission computed tomography (SPECT), detects misery perfsuion on positron emission tomography (PET) more accurately in patients with unilateral major cerebral artery occlusive diseases. In 64 patients with unilateral middle cerebral artery (MCA) or internal carotid artery occlusive disease, oxygen extraction fraction (OEF), CBF, CVR to acetazolamide and IMZ uptake were assessed using ^{15}O-PET and N-isopropyl-p-^{123}I-iodoamphetamine and IMZ SPECT, respectively. A region of interest (ROI) was automatically placed in the MCA territory using a three-dimensional stereotaxic ROI template. A significant correlation was observed between PET-OEF and SPECT-CBF (r=-0.412; P<0.0006), SPECT-CVR (r=-0.559; P<0.0001) or affected side-to-contralateral side asymmetry on SPECT-IMZ/CBF (r=0.605; P<0.0001). A combination of SPECT-CBF and SPECT-CVR or affected side-to-contralateral side asymmetry on SPECT-IMZ/CBF detected misery perfusion (PET-OEF > the mean +2 SD obtained in normal subjects) with 64% or 70% positive- and 100% or 100% negative-predictive values, respectively. These data suggested that IMZ/CBF asymmetry on SPECT detects misery perfusion on PET as accurately as a combination of CBF and CVR on SPECT in patients with unilateral major cerebral artery occlusive diseases.