

A Comparison between Cerebral Oxygen Metabolism and Benzodiazepine Receptor Binding Potential in Patients with Chronic Cerebral Ischemia -PET Study-

Hirotsugu Yukawa, Kuniaki Ogasawara, Shigeru Yasuda, Masakazu Kobayashi,
Hiromu Konno, Tetsuto Kobayashi, Masayuki Saso, Akira Ogawa,
Kazunori Terasaki*, Toshiaki Sasaki*

Department of Neurosurgery, Iwate Medical University
19-1 Uchimaru, Morioka 020-8505, Japan

*Cyclotron Research Center, Iwate Medical University
348-58 Tomegamori, Takizawa, 020-0173, Japan

Abstract

As GABA receptors are abundant in the cortex, specific radioligands to their subunits, which are benzodiazepine receptors (BZR), may be useful as indicators of neuronal integrity and as markers of irreversible damage. We investigated the relation between cerebral metabolic rate of oxygen (CMRO₂) and binding potential of the BZR ligand [¹¹C] flumazenil using PET in patients with hemodynamic cerebral ischemia. The subjects consisted of 10 patients with severe stenosis or occlusion of either internal carotid or middle cerebral artery. Three regions of interest (ROI) were set on the cortex in the middle cerebral artery territory. Thirty ROIs were obtained in 10 patients. Semiquantitative values of CMRO₂ and flumazenil binding potential to contralateral side were analyzed. In 26 ROIs of 30, flumazenil binding potential was correlated to CMRO₂ ($r=0.757$, $p<0.0001$), but remaining 4 ROIs, flumazenil binding potential did not change whereas CMRO₂ decreased. In conclusion, CMRO₂ resembles flumazenil binding potential in its ability to detect irreversible damage of cortex with hemodynamic cerebral ischemia. However, several exception exists by the influence of diaschisis.