Regional cerebral blood flow and binding potentials of striatal dopamine D-2 receptors and cortical serotonin-S2 ($5HT_2$) receptors in progressive supranuclear palsy, Alzheimer's and Parkinson's diseases: a positron emission tomography study with $H_2{}^{15}0$ and ^{11}C-N-methylspiperone

Hisashi Yonezawa[1)], Satoshi Takahashi[1)], Masako Kudo[1)], Satoko Obara[1)]
Toshihide Shibata[1)], Yasuo Terayama[1)]
Toshiaki Sasaki[2)], Kazunori Terasaki[2)] and Koichiro Sera[2)]

[1)] Department of Neurology , Iwate Medical University
19-1, Uchimaru, Morioka 020-8505, Japan

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

Abstract

[Purpose] Regional cerebral blood flow and binding potential of striatal dopamine D2 and cortical S2 receptors are examined and are compared on the progressive supranuclear palsy,Alzheimer's and Parkinson's diseases in double tracer of $H_2{}^{15}O$ and ^{11}C-NMSP.

[Subjects and Methods] Subjects were 17 patients with probable Alzheimer disease (AD) (4 males and 13 females; 73 ±6 years old, mean ± SD), the diagnosis of AD was made according to the criteria of NlNCDS-ADRDA, and 10 progressive supranuclear palsy (4 males and 6 females; 69 ±8 years old), and 10 Parkinson's diseases (3 males and 7 females; 66 ±9 years old). rCBF, in all cerebral cortex were determined with the bolus injection of $H_2{}^{15}O$, and binding potential of Dopamine D2 and Serotonin S2 receptors were determined with ^{11}C-NMSP by PET study. We analyzed the data using a three compartment model and determined binding potentials calculated from rate constant K3 and K4.

[Results] In the Alzheimer disease, binding potential (K3) significantly lowered in caudate nucleus and putamen. In the meantime, there was no the significant lowering on binding potential in PSP. The regional cerebral blood flow of PSP was significantly lowered as well as reporting ever since, in striatum. In the Alzheimer disease, the lowering of regional cerebral blood flow of striatum was slight.

When the ratio of BP (k3/k4) and regional cerebral blood flow was calculated, it was unexpectedly normally kept in PSP, but it was proven to significantly lower in the Alzheimer disease. Though binding potential of Serotonin S2 receptor in the frontal cortex was no significance in comparison with the normal on PSP, in the Alzheimer disease, there was the obvious lowering. In PSP, rCBF was lowered for the contrariety, and in the DAT, rCBF was normal.

[Conclusion] The dissociation of rCBF and binding potential in frontal cortex is an interesting problem. It is necessary that number of normal and dementia are examined by increasing in future.