VARIATION OF REGIONAL CEREBRAL BLOOD FLOW BY FLUCTUATION OF CROSS CALIBRATION FACTORS AND ARTERIAL ACTIVITY.


Regional cerebral blood flow (CBF) can be measured using positron emission computed tomography (PECT) and the continuous inhalation of C15O2. However, there are many error factors in this technique. Therefore, it must be very carefully to evaluate the PECT data. There are to supply positron emitter from cyclotron constantly, to keep steady state of activity in the brain, to do measurement of cross calibration factors and the arterial blood with accurately, to be measured PECT images with precision. It is also necessary to make an effort for minimized errors.

It is done the arterial blood sampling of two times during the measurement of PECT images. The deviation of the sampled arterial blood activity are 4.3%, 6.2% and 5.8% for CO2, O2 and 02-plasma, respectively. After corrected the blood activity with blood weight, the deviation is improved 1.7%, 3.7% and 2.7% for CO2, O2 and 02-plasma, respectively. It have to do quality control of using devices and all of about this method. In this report investigated variation of CBF by fluctuation of cross calibration factors and measured arterial blood activity. The CBF values change with fluctuation of arterial blood activity compare with fluctuation of cross calibration factors largely.


Two models for calculation of partition coefficient (p) of H2O were proposed. The one is a "combined method", which uses a ratio of the image of the C15O2 steady state inhalation method (BS) to that of the H213O autoradiographic method (BA) and each arterial radioactivity (As and Aa). From the table of (Aa*exp(-kt))/((ba*exp(-kt))dt = k/(k-E/F)*mu for H213O and As where mu is a decay constant of 13O. The other is a "different accumulation time" method, which uses two flow images, k, and k2, from a single H213O autoradiographic study but different accumulation time. p is given as p = (k1-k2)/k1. The other methods resulted in the underestimation of p as 0.5 to 0.6 as a mean value. Main reason of such underestimation seems to be the dispersion in the measured artery curve obtained in H213O autoradiographic study. After correction for the dispersion p values were increased to 0.8 to 0.9. However, these models seemed to be difficult to apply in routine use due to too low signal-to-noise ratio.