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AN IMPROVED APPROACHFOR ESTIMATING LUMPED CONSTANT IN THE DEOXYGLUCOSE MODEL: SIMULATION AND CONFIRMATION

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An improved approach to estimate the lumped constant (LC) in the deoxyglucose model is described. The ratios of deoxyglucose and glucose extraction fraction multiplied by specific activities within the first 10 min were fitted by a non-linear least-squares (NLSQ) method. The values of LC and the rate constants were obtained from the fit. The validity of this approach was also evaluated in a computer simulation by adding noise and considering various input functions. Errors in the estimated LC between this and Sokoloff et al's conventional method were compared. The NLSQ method showed smaller errors than the conventional method. This techniqe was then applied to measure LC and rate constants in cat brain for ^{18}F-FDG. The mean value (standard error of the mean) for LC was 0.443±0.012(N=7),for K =0.124 ± 0.009 and K =0.024±0.001 (N=7). The study also indicates that a more reliable LC value is obtained in a short experimental period using the NLSQ method and without a need for constant arterial plasma tracer level.

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SIMULTANEOUS MEASUREMENT OF CEREBRAL BLOOD FLOW AND GLUCOSE METABOLISM IN ACUTE EPIDURAL HEMATOMA MODEL IN RATS -I- ACUTE COMPRESSION MODEL. S.Tsuji, H.Matsuda, H.Sumiya, H.Oba, H.Terada, K.Imai, K.Hisada, K.Ikeda, K.Shiba, H.Mori and H.Seki. Kanazawa University Hospital, RI center(Kanazawa Univ.), Toyama Med. and Pharm. Univ.

Regional cerebral blood flow(rCBF) and metabolic rate for glucose(rCMRglu) were studied using the I-125-IMP and H-3-DG double tracer method in acute epidural hematoma model rats with compressing right sensory moter area by a rubber baloon. The baloon was inserted into the epidural space of the rat, and inflated with water to a volume of 0.02-0.1ml for 5 minutes. One hour later, the measurements were performed. Autoradiograms were quantified by a digitizer system using a personal computer and CCD camera. Marked decrease of both rCBF and rCMRglu, and the increase of rCMRglu accompanied with the decrease of rCBF were observed just beneath the compressed area and in the adjacent area of the compression, respectively. In the other structures, significant decrease of rCMRglu was observed in the internal capsule and corpus callosum. These findings suggest the remote effect of unilateral localized compression via neuronal pathway.

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SIMULTANEOUS MEASUREMENTS OF CEREBRAL BLOOD FLOW AND GLUCOSE METABOLISM IN ACUTE EPIDURAL HEMATOMA MODEL IN RATS:2 SLOWLY COMPRESSI-ON MODEL. H.Oba,H.Matsuda,H.Sumiya,S.Tsuji, H.Terada,K.Imai,K.Hisada,K.Ikeda,K.Shiba, H.Mori and H.Seki. Kanazawa University Hospital,RI center(Kanazawa Univ.)and Toyama Med. and Pharm. Univ.

Regional cerebral blood flow(rCBF) and metabolic rate for glucose(rCMRglu) were studied using the I-125-IMP and H-3 DG doubl tracer method in acute epidural hematoma model rats with compressing right sensory motor area by laminaria.Laminaria is one of seaweeds which increases in volume by 5 times for 15hrs. About 10 to 15mg laminaria were placed on right sensory motor area for 24 and 48hrs.
A irregular rim of high CMRglu and CBF was observed surrounding compressed area,which was seemed to be a consequence of neovascularization.
In the whole brain CBF was moderately decreased in spite of normal rCMRglu after 24hrs compression,while both CBF and rCMRglu were markedly decreased after 48hrs compression. Thus unilateral focal compressed lesion evoked a wide spread depression of functional activity in the whole brain,which may be related to so-called "remote effect".

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MEASUREMENT OF REGIONAL CEREBRAL BLOOD FLOW USING N-ISOPROPYL-P-(I-123) IODOAMPHETAMINE ;CHANGES BY AUDITORY AND VISUAL STIMULATION.

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The regional Cerebral Blood Flow (rCBF) of 17 volunteers loaded with auditory and visual stimulation was quantified by Single Photon Emission Computed Tomography (SPECT) with intravenously injected N-isopropyl-p-(I-123) iodoamphetamine (IMP) combined with a modified method of arterial blood sampling.

In four normal control, mean rCBF of cerebellar cortex, frontal cortex, temporal cortex, visual cortex and parietal cortex was 47.0, 54.0, 51.7, 49.4 and 44.8ml/100g brain/min, and average of whole-brain CBF was 49.5±4.7ml/100g brain/nin.

In eight subjects loaded with auditory simulation, the accumulation of IMP was not increased in the left temporal cortex.

In another four subjects loaded with visual stimulation using Electro Retinograph, when the variable energy of light was changed from 0.3 Joule to 0.6 Joule, 20 Joule and 40 Joule, rCBF of visual cortex was measured 46.3, 66.7, 67.4 and 70.6ml/100g brain/min. In one subject whose eyes were opened in the examination room, rCBF of visual cortex was 52.9ml/100g brain/min.