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XLIII-9. TRACER KINETICS OF ^{123}I-IMP, Tc-99m-HM-PAO AND Tc-99m-ECD: MEASUREMENTS OF TEMPORAL CHANGES IN ARTERIAL AND JUGULAR VENOUS RADIOACTIVITY

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Introduction: The purpose of the study is to evaluate and compare the tracer kinetics of three SPECT tracers; N-isopropyl-p-I-123-iodo-amphetamine(IMP), Tc-99m d,l hexamethylpropyleneamine oxime(HM-PAO) and Tc-99m ethyl cysteinate dimer(ECD). The comparison between these three tracers were made by measuring the temporal changes of arterial and jugular-venous concentration of the tracer after intravenous injection.

Subjects and Methods: Four normal volunteers and 5 patients with minimal neurological deficits were studied. Catheters were placed both in the artery(A) and the internal jugular vein(JV) and blood samples were withdrawn every 10 seconds during the first 5 minutes following the intravenous injection of the tracer; IMP(3mCi), HM-PAO(15-25mCi) and ECD(25-30mCi). Each blood sample was subjected to octanol extraction to measure the proportion of lipid-soluble component to the metabolites.

Results: Figure illustrates the time-concentration curve after octanol extraction for three different tracers following the intravenous injection. Both arterial (solid line) and jugular (dotted line) concentration are shown. Arterial input curves showed the peak within 30 seconds in all three tracers, but its mean width was 30 sec for IMP, 15 sec for HM-PAO and 15 sec for ECD. IMP showed a very sustained arterial input function. Cerebral extraction-and-retention (first pass extraction) of the tracer calculated from A-JV difference was 86% for IMP, 47% for HM-PAO and 63% for ECD. The JV curve for HM-PAO showed the highest peak and its concentration exceeded the arterial concentration after 45-50 sec suggesting back-diffusion and desaturation from the brain to the circulating blood.
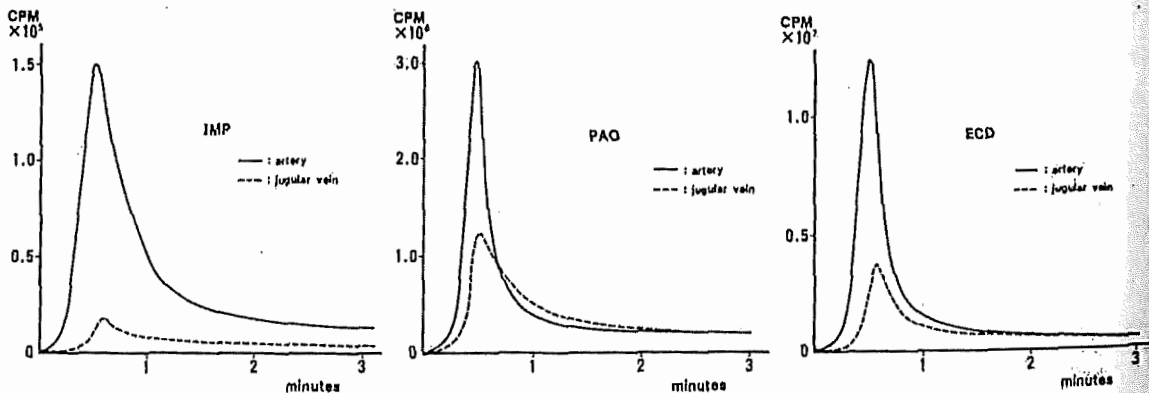
Comments: Results provided additional basis for better understanding of the tracer kinetics for currently available three SPECT tracers suggesting: (1) IMP has very high extraction-and-retention ratio, but it's brain activity is influenced by sustained arterial input of the tracer from the lung, (2) for both HM-PAO and ECD the arterial input becomes non significant after 2-3 minutes but the extraction-and-retention ratio of these tracer, particularly HM-PAO, was low.