RI DATA Processing System for Nuclear Medicine (Report 8)
“Regional Renograms” and Analysis of Their Basic Components

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The conventional renogram has been an indicator of the dynamics of $^{131}$I-hippuran in a whole kidney. The recent advance of a scinticamera and RI data processing system has made sequential analysis of image information possible.

Present study was undertaken to analyze intrarenal RI kinetics. $^{197}$Hg-chlormerodrin renoscintigraphy and $^{131}$I-hippuran camera renography were performed for normal subjects. The data were collected in digital form on M/T at the sampling time of 10 sec. for 20 min. after intravenous administration of $^{131}$I-hippuran. Using $^{197}$Hg renoscintigram displayed on a CRT, rectangular envelope was made around a kidney and each kidney was divided into 4 layers pararell and 3 columns perpendicular to its longitudinal axis, yielding 12 regions per kidney. Digitized regional $^{131}$I-hippuran renograms for 12 regions were calculated by playing back M/T. These patterns, named regional renograms, provide a basis of objective comparison of regional $^{131}$I-hippuran kinetics within each kidney. To extract functional components of the intra-renal RI distribution and investigate functional similarity among the 12 regions, principal component analysis with varimax rotation was applied.

Results obtained were: (1) most cases two main components were extracted from a set of regional renograms of normal subjects. (2) These two components were compared with curves obtained directly from AOIs set in substantial and pelvic regions of a kidney. They showed high correlation respectively (t test 0.1% significant). Therefore, main functional components of regional renograms were RI distribution in the substantial and pelvic regions. As the summation of 12 regions of regional renograms corresponds a conventional renogram, we consider these results agree with the concept that the renogram is delineated as the summation of the substantial and pelvic patterns. (3) For the clinical use of regional renograms, factor loadings of functional components extracted from a varimax method were plotted in a two dimensional plane to exhibit the participitatonal ratio of substantial and pelvic distribution in each region.