Summary

Single-Blood-Sample Method for the Determination of Glomerular Filtration Rate Using $^{99m}$Tc-DTPA in Japanese

Kazuo ITOH*, Satoshi TSUSHIMA**, Eriko TSUKAMOTO*** and Nagara TAMAKI***

*Department of Radiology, **Department of Internal Medicine, JR Sapporo General Hospital
***Department of Nuclear Medicine, Hokkaido University School of Medicine

The study was aimed to evaluate glomerular filtration rate with $^{99m}$Tc-DTPA by means of a single-plasma-sample method in Japanese. Three were 50 patients (29 males and 21 females, age range being 25 to 91 years) with diabetes mellitus of various degree of the renal function. $^{99m}$Tc-DTPA of 300 MBq/2 ml that was prepared in our hospital was injected. Dynamic renal scintigraphy was carried out and 10 blood samples were taken after the injection. Blood clearance (true GFR) of $^{99m}$Tc-DTPA was determined from plasma concentration which was fitted to the biexponential curve by a non-linear least squares method. Plasma concentration (ml/min/1.73 m$^2$) after 75 min-post injection showed very higher linear regression and linear correlation with true GFR than 0.900. The best linear regression and linear correlation was observed with 180 min-sample ($r = 0.989$). As general, the following equation was obtained; $Y = A + B\ln(X)$, $A = 436.1217 - 3.45817t + 0.01205t^2 - 0.000015t^3$, $B = - 212.601 + 1.42518t - 0.04834t^2 + 0.0000062t^3$, $X =$ plasma concentration at sampling time $t$ (%ID/L/1.73 m$^2$), $t =$ sampling time from 75 to 300 min ($r > 0.900$). This is the new equation of single-plasma-sample method for the determination of GFR using $^{99m}$Tc-DTPA for Japanese. The clinical feasibility should be accessed in a field of a nuclear medicine practice.

Key words: $^{99m}$Tc-DTPA, Glomerular filtration rate, Single-plasma sample, Quantitative equation.