Summary

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

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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 m*l* 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 (m*l*/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.