

Accuracy of plasma sample methods for determination of glomerular filtration rate with ^{99m}Tc -DTPA

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The plasma sample method following a single injection of radioactive markers has been proved to be simple and accurate for the determination of glomerular filtration rate (GFR) in clinical practice. The aim of this study was to assess clinical accuracy of single-, two- and multi-sample methods. **Methods:** The study was performed on 50 patients with various degrees of renal dysfunction (29 males and 21 females; aged 27 to 90 years). As a reference the true GFR (GFR_t) was determined by means of the two-compartment model curve fitting 10 plasma samples following a single-injection of ^{99m}Tc -DTPA. The GFR_t was compared to the GFR estimated by the Christensen and Groth's single-sample (GFR_{cg}), two-sample (GFR_{2s}) and multi-sample (GFR_m) between 75 and 300 min after the injection. The GFRs by two- and multi-sample methods were determined with the slope and intercept algorithm and its overestimation was corrected by Brochner-Mortensen's formula. **Results:** In 49 patients with GFR between 12 and 169 ml/min/1.73 m², the standard deviation of difference (95% limits of agreement) between GFR_t and GFR_{cg} at 180 min was 6.513 ml/min/1.73 m² (−16.5 ~ 9.5 ml/min/1.73 m²), which was somewhat closer than 7.311 ml/min/1.73 m² (−12.5 ~ 16.5 ml/min/1.73 m²) in GFR_{2s} in slow clearance phase at 120 min and 240 min. However, the single-sample method tended to show some scattering in GFR below 30 and above 140 ml/min/1.73 m². On the contrary, the 2-sample method tended to be scattered in GFR above 120 ml/min/1.73 m². **Conclusion:** In view of its accuracy and technical simplicity, the single-sample method is first choice in a routine practice. The two-sample method is essential of choice for a patient in whom the GFR is expected to be below 30 ml/min/1.73 m². These two methods may be chosen selectively in dependence on the preserved renal function which is expected at time of the test.

Key words: glomerular filtration rate, plasma sample method, ^{99m}Tc -DTPA