Precision in split renal function assessment from ^{99m}Tc-DTPA renography

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Split kidney function from gamma camera renography with ^{99m}Tc-DTPA is often assessed by the integral-, slope- or uptake-index-methods. The precision of each method was calculated in this study by evaluating the dependence of each method on the regions of interest (ROI's), the chosen time interval for calculations and the statistical noise.

Methods: Three patients, two with unilateral parenchymal disease and one with normal function were studied with gamma camera renography using 100 MBq ^{99m}Tc-DTPA. The effect of variations induced by operator-interactions and the statistical noise on the calculated split kidney function from each renographic study was evaluated for each of the three methods. Renal ROI's were created on six different occasions for each patient (exp. 1). Start and duration of the uptake interval were altered to get six different uptake intervals for each patient (exp. 2). The impact of the statistical noise on the calculation of each method was evaluated from 30 simulated studies with randomised noise (exp. 3).
Precision is given in terms of standard deviation of each calculation set.

Results: The precision of each method regarding the ROI drawing (exp. 1) was 0.8%, 1.5% and 0.7% for the integral, slope and uptake index methods, respectively. The precision regarding interval length (exp. 2) was 0.4%, 1.2% and 0.7% for the integral, slope and uptake-index methods, respectively. The precision regarding the statistical noise (for these patients and 100 MBq) was 1.2%, 5.6% and 2.8% for the integral, slope and uptake-index methods respectively (exp. 3).
Total precision was calculated to 1.5%, 5.9% and 3.0% respectively.

Conclusion: The present study shows that the precision of each of the three commonly used methods for split kidney function assessment is slightly affected by the operator-interactions. The statistical noise is the major error source in all three methods and severely affects the slope method.