



Shaping Tomorrow's Nephrology: Insight-Driven Kidney Care

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Iohexol Plasma Clearance Using Dried Blood Spot Versus Venous Blood Sampling For Measurement Of Glomerular Filtration Rate

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Objectives : Plasma clearance of iohexol is widely used for more accurate measurement of glomerular filtration rate (mGFR). Dried blood spot (DBS) sampling is being tested for its utility, as it involves minute sampling, is less invasive, and samples can be easily stored and shipped to a centralized laboratory for analysis. In this study, we analyzed the performance of the mGFR using iohexol plasma clearance from a DBS sample compared to a venous blood sample.

Methods : Adult participants of either sex, including healthy individuals and chronic kidney disease (CKD), were enrolled in this study. 5 mL of iohexol was administered intravenously. Venous blood and DBS samples were collected at 60, 120, 180, and 240 minutes. Plasma and DBS iohexol concentrations were measured using HPLC and GFR was calculated using the one-pool clearance model. Mean bias, P30, 95% limit of agreement, and 95% CI of bias were used to compare both methods. The agreement was evaluated with the concordance correlation coefficient (CCC), the total deviation index (TDI) and the coverage probability (CP).

Results : A total of 551 participants (245 healthy individuals and 306 patients with CKD) were included. The median age was 47 years, and 53% of the participants were male. The mean plasma mGFR was 62.5 ± 27.8 mL/min/1.73 m², whereas the mean DBS mGFR was 57.0 ± 31.0 mL/min/1.73m². Overall, DBS mGFR underestimated plasma mGFR by 5.1 ± 23.9 mL/min/1.73m², with P30 of 62%. The CCC was 0.67 (0.63–0.71), indicating moderate concordance. The TDI was 39.9%, signifying 90% of the DBS mGFR showed an error ranging from -39.9 to + 39.9 % of the plasma mGFR.

Conclusions : DBS is a promising low-volume method for GFR measurement, but its moderate agreement with plasma mGFR underscores the need for standardized DBS sampling and processing before routine clinical use.

Abstract_DBSvsPlasma_Table1.jpg



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Table 1: Performance of DBS mGFR against plasma mGFR

Parameter (s)	Total (n=551)
Plasma mGFR ₄ (mL/min/1.73m ²)	
Mean±SD	62.5±27.8
Median (25 th , 75 th)	66.4 (37.2, 84.7)
DBS mGFR ₄ (mL/min/1.73m ²)	
Mean±SD	57.0±31.0
Median (25 th , 75 th)	53.3 (33.1, 71.6)
Mean bias (DBS mGFR-plasma mGFR) (mL/min/1.73m ²)	
Mean±S.D.	-5.1±23.9
Median (interquartile range range)	-7.0 (22.2)
95% limits of agreement (mL/min/1.73m ²)	-51.9, 41.7
95% CI of bias (mL/min/1.73m ²)	-7.0, -3.0
Root square mean error	23.8
P30 (%)	61.9 (57.8, 65.9)
CP ±10%	20.9 (17.4, 24.3)
±30%	61.5 (57.2, 65.5)
CCC	0.67 (0.63, 0.71)
TDI	39.9 (36.9, 42.0)