CORRELATION ANALYSIS OF GLOMERULAR FILTRATION RATE VALUES OBTAINED BY NUCLEAR MEDICINE METHOD VERSUS ESTIMATED MATHEMATICAL EQUATIONS IN KIDNEY RECIPIENTS FROM LIVING AND DECEASED DONORS

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Introduction: Glomerular filtration rate (GFR) is a crucial indicator of kidney function and is essential for the diagnosis, monitoring, and management of various renal conditions. Nuclear medicine methods play an important role in accurate assessment of GFR. [1,2] The aim of this study was to make a correlation analysis of measured (mGFR) in kidney recipients from living and deceased donors obtained by three plasma sample method (TPSM) after i.v. application of [99mTc]Tc-DTPA.as a reference method vs. estimated (eGFR) by using the mathematical equations: Chronic Kidney Disease Epidemiology Collaboration (CKD EPI) 2021 and Modification of Diet in Renal Disease (MDRD).

Material and methods:49 kidney recipients from living and deceased donors, from the first to the third year after kidney transplantation, 35 (71.43%) men and 14 (28.57%) women, participated in the study. A correlation analysis were made between the values of mGFR obtained by using the nuclear medicine method with TPSM [3] and eGFR obtained by mathematical equations: CKD epi 2021 and MDRD.

Results: Patients age ranged from 18 to 66 years, their mean age was 42.6±10.6 years. The highest values for GFR were obtained with the GFR method according to CKDepi 2021 (54.57±17.2 ml/min/1.73m2), followed by the GFR method according to MDRD (47.17±16.7 ml/min/1,73m2),and TPSM (46.8 ± 23.0) ml/min/1.73m2), respectivly. (Table 1) The results of the Repeated Measures ANOVA analysis showed that the mean value of GFR was statistically significantly different between at least two of the analyzed methods [(F(dftime 2, dfError (time)96)=27.81 p<0.0001). Posthoc analysis with Bonferoni correction showed significantly higher GFR values obtained by CKD epi 2021 method in corelation to the TPSM values and values obtained by MDRD method (p<0.0001), while the difference between the GFR values obtained by TPSM and MDRD was statistically insignificant (p=1.0). (table 2) Overall between the reference method according to TPSM and GFR according to CKDepi 2021 and MDRD, a statistically significant positive linear correlation and connection was noticed,(r=0.84854 and r=0.85613, p<0.0001, respectively).(Fig.1, 2)

Conclusion: GFR determined by slope-intercept method according to TPSM correlates strongly with



GFR values obtained by mathematical equations (CKD epi 2021 and MDRD) and can be routinely used to for precise GFR values in clinical practice. In the absence of a larger series of subjects, the challenge to accurately calculate GFR without a gold standard remains and no single method can be taken as a valid one to assess GFR.

Figure and Tables



Fig.1 Correlation between GFR values obtained by TPSM and CKD epi 2021

TPSM- Triple plasma sample nuclear method for obtaining mGFR; CKD epi 2021- Chronic kidney disease epidemiology collaboration equation for obtaining eGFR



Fig.2 Correlation between GFR values obtained by TPSM and MDRD

TPSM- Triple plasma sample nuclear method for obtaining mGFR; MDRD- Modification of Diet in Renal Disease for obtaining eGFR.

Statistical parametars for GFR								
	mean \pm SD	min- max	Std. Error	95% Confidence Interval				
				Lower Bound	Upper Bound			
TPSM	$46,79 \pm 17,2$	23 - 103	2,454	41,863	51,729			
CKDepi 2021	54,57 ± 19,6	20-111	2,800	48,941	60,202			
MDRD	$47,17 \pm 16,7$	18,3 - 96,6	2,382	42,384	51,963			

Table 1: Statistical parametars for GFR

TPSM- Triple plasma sample nuclear method for obtaining mGFR; CKD epi 2021- Chronic kidney disease epidemiology collaboration equation for obtaining eGFR; ; MDRD- Modification of Diet in Renal Disease for obtaining eGFR.

	Pairwise Comparisons									
method		Mean	Standard	Sig. ^b	95% Confidence Interval for Difference					
		Difference	Error		Lower Bound	Upper Bound				
TPSM	CKD	-7,776	1,484	0,000	-11,457)	-4,094				
	epi 2021									
· · · · · ·	MDRD	-0,378	1,299	1,000	-3,600)	2,844				
CKDepi	MDRD	7,398	,508	0,000	6,137	8,659				
2021										

Table 2: Repeated Measures ANOVA, Adjustment for multiple comparisons: Bonferroni

TPSM- Triple plasma sample nuclear method for obtaining mGFR; CKD epi 2021- Chronic kidney disease epidemiology collaboration equation for obtaining eGFR; ; MDRD- Modification of Diet in Renal Disease for obtaining eGFR.

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