

Estimated Glomerular Filtration Rate: Do We Measure The Real Renal Function Or Are We Still Groping In The Dark?

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INTRODUCTION

An accurate assessment of renal function is mandatory in the majority of urological and oncological patients to prevent renal impairment and cancer non-related deaths. Nowadays, the large part of clinicians apply CKD-EPI/MDRD formulas or 24h creatinine clearance to determine the glomerular filtration rate (GFR) before and after renal surgery (for cancer, donation, stones and pyelourethral junction stenosis) and in metastatic patients for establish the right oncological treatment. Unfortunately, estimated GFR (eGFR) displays a wide error in reflecting real kidney function with measured GFR (mGFR) and this may lead to important consequences in the correct evaluation of patients.

MATERIAL and METHODS

A retrospective and prospective study based on 200 pts with uro-oncological cancer or renal functional diseases (UOCD) was performed in two different centers to compare eGFR formula with gold standard method renal scintigraphy or iohexol clearance. The agreement between eGFR and mGFR was evaluated using total deviation index (TDI), coverage probability (CP) and concordance correlation coefficient (CCC).

Table 1 Descriptive analysis

Age, year	58
Median	60
IQR	45-72
Gender	
Male	100 (50%)
Female	100 (50%)
Diseases	
UROLOGICAL CANCER	18 (9%)
NON-UROLOGICAL CANCER	21 (10.5%)
CKD	8 (4%)
STONES	34 (17%)
GPU	36 (18%)
ARTERIAL STENOSIS	2 (1%)
TYPE 2 DM	1 (0.5%)
HYDRONEPHROSIS/ URETHERAL KINKING	8 (4%)
KIDNEY DONOR/TPX	28 (14%)
SOLITARY KIDNEY	12 (6%)
NEUROLOGICAL DISORDER	3 (1.5%)
OTHER	29 (14.5%)

Table 3 GFR discrepancy (Classes) between CKD-EPI formula, MDRD formula and Gold Standard Method

eGFR CATEGORY (ml/min/1.73m ²)	MDRD formula	CKD-EPI formula	mGFR gold standard method	CKD-EPI formula/ MDRD formula	CKD-EPI formula/ gold standard method	MDRD formula/ gold standard method
Class1	42-21%	62-31%	86-43%	22-35.5%	14-22.6%	8-19%
Class2	87-43.5%	75-37.5%	48-24%	10-13.3%	45-60%	53-60.9%
Class3a	23-11.5%	15-7.5%	31-15.5%	0	6-40%	14-60.9%
Class3b	31-15.5%	30-15%	27-13.5%	0	17-56.7%	17-54.8%
Class4	14-7%	15-7.5%	8-4%	1-6.7%	12-80%	11-78.6%
Class5	3-1.5%	3-1.5%	0	0	3-100%	3-100%
Total T-test				0.299	0.008	0.0003

CONCLUSION

CKD-EPI and MDRD formulas may over or underestimate mGFR in pts, generating false evaluations in the clinical management and drug therapies for oncological, urological and kidney donor patients. We suggest to use a gold standard technique of mGFR (eg renal scintigraphy, iohexol measurement) in selected cases when GFR is crucial to determine the surgical/therapeutic approach.

RESULTS

The agreement between formulas and mGFR was poor. The TDI for MDRD was 72% and for CKD-EPI was 65%, indicating that 90% of the estimations for both formulas were included within a margin of error from mGFR of about ± 72 to 80%. CCC for MDRD was 0.75 and for CKD-EPI was 0.79, indicating poor concordance between eGFR and mGFR. Moreover, the discrepancy between mGFR and GFR estimated with MDRD formula was of 19% in CKD I, 61% in CKD II, 61% in CKD IIIa, 55% in CKD IIIb, 79% in CKD IV, 100% in CKD V stage instead the discrepancy between mGFR and GFR estimated with CKD-EPI formula was of 23% in CKD I, 60% in CKD II, 40% in CKD IIIa, 57% in CKD IIIb, 80% in CKD IV, 100% in CKD V stage.

Table 2 GFR discrepancy (ml/min) between CKD-EPI formula, MDRD formula and Gold Standard Method

GFR DISCREPANCY (ml/min/1.73m ²)	e-GFR CKD-EPI vs. MDRD		e-GFR CKD-EPI vs. gold standard method		e-GFR MDRD vs. gold standard method	
	Total	%	Total	%	Total	%
0<GFR<10	160	80	75	37.5	75	37.5
10≤GFR<20	29	14.5	32	16	31	15.5
GFR≥ 20	11	5.5	93	46.5	94	47

Histogram 1 Serum creatinine value and creatinine-based estimates of relative GFR from different patients

