Comparison of the Cockcroft-Gault, Modification of Diet in Renal Disease, and the Chronic Kidney Disease Epidemiology Collaboration equations for estimating glomerular filtration rates in cancer patients receiving cisplatin-based chemotherapy: a retrospective study

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Introduction

Although the Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) equation has been recommended for accurate estimated glomerular filtration rate (eGFR), there is little information about comparison of GFR, using Cockcroft-Gault (CG) or Modification of Diet in Renal Disease (MDRD) equations in Asian cancer patients. We investigated the discrepancies in GFR and toxicities, using CG, MDRD and CKD-EPI equations in patients with cisplatin-based chemotherapy.

Methods

A total of 229 patients who received cisplatin-based chemotherapy at Jeju National University Hospital, were retrospectively recruited. eGFR using the three equations classified into three categories with GFR < 10 (group A), 10-50 (group B), and > 50 (group C) mL/min. Data were also sorted by the five stages of chronic kidney disease (CKD). Clinical variables were also evaluated.

Results

The mean eGFR using the CKD-EPI was the highest among the three equations. Estimations using the MDRD and CKD-EPI resulted in reclassifying 42 (71.2%) and 47 (79.7%), respectively, of 59 patients with group B using the CG into group C. Furthermore, 5 (29.4%) of

17 patients with group B using the MDRD were reclassified into group C using the CKD-EPI (Table 1). With respect to CKD stage, the MDRD and CKD-EPI resulted in reclassifying 56 (57.1%) and 64 (65.3%), respectively, of 98 patients with stage 3 as determined by the CG Into stage 1 or 2 (Table 2).

Table 1. Comparisons of eGFR using CG, MDRD and CKD-EPI equations, according to cisplatin dosing guideline

eGFR	MDRD (n=229)		CKD-EPI (n=229)		P-value
	10-50 (n=17)	>50 (n=212)	10-50 (n=12)	>50 (n=217)	
CG (n=229)					<0.001†
10-50 (n=59)	17	42	12	47	
> 50 (n=170)	0	170	0	170	
MDRD (n=229)					0.063‡
10-50 (n=17)			12	5	
> 50 (n=212)			0	212	

Table 3. Comparisons of CKD stages using CG, MDRD and CKD-EPI equations, according to KDIGO guideline

		MDRD				CKD-EPI			
	Stage, n	1 (n=20)	2 (n=158)	3 (n=51)	4 (n=0)	1 (n=48)	2 (n=143)	3 (n=38)	4 (n=0)
CG	1 (n=20)	11	12	0	0	15	8	0	0
	2 (n=105)	9	90	6	0	32	72	1	0
	3 (n=98)	0	52	42	0	1	63	34	0
	4 (n=3)	0	0	3	0	0	0	3	0
MDRD	1 (n=20)					19	1	0	0
	2 (n=105)					29	129	0	0
	3 (n=98)					0	13	38	0
	4 (n=3)					0	0	0	0

Conclusions

The CG and MDRD equations underestimated GFR as compared to the CKD-EPI equation. Therefore, GFR estimated using the CG or MDRD equations could lead to administration of insufficient doses of chemotherapeutic agents, including cisplatin, to Asian cancer patients.