

# Should physicians always rely on estimated glomerular filtration rate without knowing the equation?

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## Dear editor

We read with interest the paper written by Deskur-Smielecka et al<sup>1</sup> who investigated the performance of three equations for valuating renal function in 174 patients, aged 78 years, with different cancer diagnosis. They used Cockcroft–Gault (C–G), Modification of Diet in Renal Disease (MDRD), and Berlin Initiative Study1 (BIS1) equations and found that there is a considerable disagreement between renal function estimation formulas. We also performed two studies evaluating different formulas for the calculation of glomerular filtration rate (GFR) in patients with eating disorders<sup>2</sup> and in those with type 2 diabetes mellitus (DM).<sup>3</sup> In the first study, GFR was evaluated in 55 patients with anorexia nervosa and 44 patients with bulimia nervosa using C–G, Mayo Clinic Quadratic (MAYO), and MDRD equations. Bland–Altman analysis suggested that the three formulae were not in agreement C–G formula was inaccurate when it was applied to obese or cachectic subjects, MDRD equation underestimated renal function in subjects with normal–high GFR, while MAYO equation seemed to be a good alternative to the other equations suggesting correct classification of patients. Subsequently, we evaluated 1,686 type 2 DM patients aged 68 years. GFR was estimated by MDRD, MAYO, Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI), and C–G formulae. The whole population showed a better renal function when it was evaluated with MAYO and C–G formulae, and a worse renal function when it was calculated with MDRD formula. Bland–Altman analysis confirmed that formulae results were not in agreement, especially in the case of high GFR. Deskur-Smielecka et al<sup>1</sup> adjusted C–G equation using total body weight in underweight patients, ideal body weight in patients with normal body weight, and adjusted body weight in overweight and obese patients. They found that GFR estimated with MDRD equation was the highest, and the mean difference with the other two equations varied from 18 to 12 mL/min/1.73 m<sup>2</sup>, confirming our results on the lack of agreement between different equations. However, they found a strong negative correlation between difference in GFR calculated with MDRD and C–G, and BIS1 and serum creatinine values. The correlation explained the worse performance of MDRD formula in subjects with normal serum creatinine levels.

MDRD and C–G equations' performances were compared with measured (125) I-iothalamate GFR in 828 patients with CKD and in 457 potential kidney donors. In CKD patients with GFR <60 mL/min/1.73 m<sup>2</sup>, the MDRD equation performed better than the C–G formula. In the kidney donor group, the MDRD equation significantly

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underestimated the measured GFR when compared with the C–G formula. Moreover, both the MDRD and C–G equations overestimated the strength of the association of GFR with measured serum creatinine. The authors concluded that results derived from MDRD equation could be problematic in healthy individuals.<sup>4</sup>

All data suggest that sensitivity of C–G and MDRD equations in diagnosing CKD is lower when GFR is  $>60$  mL/min/1.73 m<sup>2</sup>.

## Disclosure

The authors report no other conflicts of interest in this communication.

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## Authors' reply

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## Dear editor

The letter from Fabbian et al, in general, supports our findings concerning the disagreement between currently used equations for the estimation of glomerular filtration rate (GFR). We agree that disagreement in the estimation of kidney function was previously found by a number of authors. However, in our paper<sup>1</sup> we describe this aspect in very specific population – geriatric, palliative care patients – with high prevalence of cachexia and substantial muscle mass loss. Our group has shown some similarities (low creatinine generation) to the group of patients with anorexia nervosa and bulimia nervosa studied by Fabbian et al.<sup>2</sup> However, it has to be stressed that patients with anorexia nervosa and bulimia nervosa were much younger, and therefore had much better, mostly normal kidney function. The second population analyzed by Fabbian et al<sup>3</sup> – diabetic patients – also differ from our cohort, as they were better nourished. Regardless of these differences, the conclusions concerning the disagreement of different

methods in the estimation of kidney function are quite similar. Importantly, the disagreement is more clinically significant in older population, including geriatric, palliative care patients, due to much greater prevalence of chronic kidney disease (CKD)<sup>4</sup> that affects adjusting drug dosage.

Fabbian et al in their letter conclude that sensitivity of Cockcroft–Gault (C–G) and Modification of Diet in Renal Disease (MDRD) equations in diagnosing CKD is lower in subjects with GFR >60 mL/min/1.73 m<sup>2</sup>. This statement, however, is controversial, as MDRD formula should not be used for the estimation of GFR >60 mL/min/1.73 m<sup>2</sup>. Moreover, the process of kidney aging that results in the GFR decline moves the threshold level below 60 mL/min/1.73 m<sup>2</sup>, and even 45 mL/min/1.73 m<sup>2</sup> in 80 years old and above.<sup>5</sup>

## Disclosure

The authors report no other conflicts of interest in this communication.

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