

## Ethnic factors of the glomerular filtration rate estimating equation

**To the Editor:** We have read the Nephrologists Sans Frontières by Delanaye *et al.*<sup>1</sup> in *Kidney International* about the estimating glomerular filtration rate (GFR) in Asian subjects with great interest. The ethnic correction factors for the Modification of Diet in Renal Disease (MDRD) Study equation proposed by the Japanese study<sup>2</sup> and the Chinese study<sup>3</sup> are markedly different (0.808 and 1.233, respectively). Difference of muscle mass between both populations, difference of method of measuring GFR, and bias of creatinine assay could contribute to the difference of the two ethnic factors. However, the reasons of the difference have been evaluated from some studies recently.

The same investigators who conducted Chinese studies evaluated that GFR measured by plasma clearance of technetium-99m diethylenetriaminepentaacetic acid (<sup>99m</sup>Tc-DTPA;  $C_{DTPA}$ ) was systematically higher than the GFR measured by inulin renal clearance ( $C_{in}$ ).<sup>4</sup> Clearance measurements were recorded simultaneously according to the original Chinese and Japanese protocols in 53 subjects. Mean values of  $C_{in}$  and  $C_{DTPA}$  were 42.4 and 52.9 ml/min per 1.73 m<sup>2</sup>, respectively.  $C_{DTPA}$  was 25% higher than  $C_{in}$ , indicating that a considerable part of the difference of the correction factors is the method of measuring GFR.

Murata *et al.*<sup>5</sup> reported that mean serum creatinine was 0.91 mg/dl in potential kidney donors in the United States ( $N = 583$ , male gender = 44%, mean age = 45.4 years, mean measured GFR (mGFR) = 98.9 ml/min per 1.73 m<sup>2</sup>). GFR was measured by iothalamate renal clearance, and serum creatinine was measured by enzymatic method. Kakuta *et al.*<sup>6</sup> reported that mean serum creatinine was 0.74 mg/dl in potential kidney donors in the Japanese subjects ( $N = 85$ , male gender = 36%, mean age = 56 years, mean mGFR = 96 ml/min per 1.73 m<sup>2</sup>). GFR was measured by inulin renal clearance, and serum creatinine was measured by enzymatic method. Although there is some difference of male to female ratio, serum creatinine value of potential kidney donors in Japanese is about 20% (0.15 mg/dl) lower than the values in the United States. There was no significant difference of measured GFR between potential kidney donors in Japan and United States. The correction coefficient of the MDRD Study equation or the Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) equation (<1.0) indicates lower serum creatinine levels in Japanese than in White for equivalent levels of GFR. The data of potential kidney donors confirm the lower serum creatinine levels in Japanese, suggesting that lower muscle mass in Japanese compared with White, and not the difference of GFR measurement, mainly contributes to the correction factor <1.0 in Japanese subjects.

Teo *et al.*<sup>7</sup> reported the correction factors of Chinese, Malay, and Indians/other (1.138, 1.072, and 1.027 for the MDRD Study equation and 1.100, 1.032, and 0.996 for the CKD-EPI equation, respectively). They measured GFR by plasma clearance of <sup>99m</sup>Tc-DTPA. Therefore, the correction factor itself must be interpreted with caution because overestimation of GFR may be concerned. We can, however, compare the factors of multiethnic population, because the method of GFR and method of creatinine measurement are the same in the population. From their report, the ethnic factor of Chinese seems to be higher than the value of Malay or Indian/other, suggesting some ethnic difference among the Asian population such as between Chinese and Japanese subjects.

1. Delanaye P, Cavalier E, Mariat C *et al.* Estimating glomerular filtration rate in Asian subjects: where do we stand? *Kidney Int* 2011; **80**: 439–440.
2. Mastuo S, Imai E, Horio M *et al.* Revised equations for estimating glomerular filtration rate (GFR) from serum creatinine in Japan. *Am J Kidney Dis* 2009; **53**: 982–992.
3. Ma Y, Zuo L, Chen J *et al.* Modified glomerular filtration rate estimating equation for Chinese patients with chronic kidney disease. *J Am Soc Nephrol* 2006; **17**: 2937–2944.
4. Dai SS, Yasuda Y, Zhang CL *et al.* Evaluation of GFR measurement method as an explanation for differences among GFR estimation equations. *Am J Kidney Dis* 2011; **58**: 492–499.
5. Murata K, Baumann NA, Saenger AK *et al.* Relative performance of the MDRD and CKD-EPI equations for estimating glomerular filtration rate among patients with varied clinical presentations. *Clin J Am Soc Nephrol* 2011; **6**: 1963–1972.
6. Kakuta Y, Okumi M, Ichimaru N *et al.* Utility of the Japanese GFR estimation equation for evaluating potential donor kidney function. *Clin Exp Nephrol* 2010; **14**: 63–67.
7. Teo BW, Xu H, Wang D *et al.* GFR estimating equations in a multiethnic Asian population. *Am J Kidney Dis* 2011; **58**: 56–63.

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**The Authors Reply:** We thank Horio *et al.*<sup>1</sup> for their comments about our recent publication.<sup>2</sup> Indeed, they confirm that differences between Japanese and Chinese coefficients are due, at least in part, to the difference in glomerular filtration rate (GFR) measurements.<sup>3</sup> The data comparing serum creatinine values of potential kidney donors in the United States and Japan support the notion of lower creatinine generation in healthy Japanese compared with healthy Caucasian populations. Nevertheless, ethnicity factors may be different between healthy and chronic kidney disease (CKD) populations, as it has been suggested in African Americans.<sup>4</sup>