5. Gullquist RR, Fleming JS. Error analysis by simulation studies in renography deconvolution. *Phys Med Biol.* 1987;32:383–395.

John S. Fleming
Southampton General Hospital
Southampton, United Kingdom

REPLY: We wish to thank Dr. Fleming for his interest in our article and his constructive remarks. It is true that creatinine clearance has limited accuracy for estimating the glomerular filtration rate (GFR) but it is still the widely used method due to its availability. The overwhelming majority of clinical decisions are based on the creatinine clearance test (CCT) or simply the serum creatinine value. This is one of the reasons why Gates (*1*) and others compared gamma-camera-based GFR estimates to CCT and not to the gold standard methods, such as inulin or ^{51}Cr-ethylenediaminetetraacetic acid clearance. In our case, the choice of CCT as a reference was predetermined by the initial scope of the study: to validate Gates' method on Elscint gamma cameras and software.

Although we acknowledge that the standard error of estimate (Sy.x) is a more appropriate measure of correlation, it still can be misleading if reported alone. For example, in the simple linear regression procedure we performed comparing CCT with GFR (that we estimated with measured depth correction) in the 14 patients presented in Table 2 (*2*), we obtained a correlation coefficient of $r = 0.87$ with an Sy.x of 10.1 mL/min. When CCT is correlated with the GFR values obtained with the original Gates method (which doesn't measure renal depth, but only estimates it by Tonnesen's formula), $r = 0.51$ and Sy.x = 17.3 mL/min were obtained. This result is worse than the 7 mL/min value published by Gates (*1*). Thus, there is no doubt that the modifications we introduced improved the correlation with CCT, yet the Sy.x in our study has a higher value than in Gates' original study.

We agree that a GFR estimate based on diethylenetriamine pentaacetic acid (DTPA) renal uptake over a short period (between 2–3 min after injection) represents the GFR for only that point in time, but it has proven highly efficient and is widely accepted including in Gates' study—and may be potentially advantageous when studying GFR under pharmacologic interventions such as captopril.

The renal contour should be reliably depicted on lateral views by 20-min post-DTPA injection with some operator experience. The fact that the kidney outline is not the same as it would have been obtained at 2 min, doesn't actually affect locating the geometric center of the renal region of interest (ROI). Our precision of renal depth measurement in the supine position was better than ±1 cm (approximately ±0.5 cm). To obtain these results, certain hardware is required, and some rules are to be observed: lateral views should be acquired in a 256 × 256 matrix (1.6 mm/pixel for a 40-cm field-of-view camera), and the computer must have adequate contrast enhancement and zoom controls to adjust the picture quality so that renal contour and posterior body contour are well visualized. Before any renal depth measurement is performed, the posterior views in the last few frames of the renal dynamic scan should be examined for potential pitfalls as hydronephrosis, missing kidney, etc. Severe tracer retention in one kidney may appear on the lateral view of the other kidney and should be excluded from the lateral renal ROI.

We too believe that GFR determination by tracer disappearance using multiple blood samples is more precise than gamma camera-based methods. The statement that modifying Gates' technique improves its precision to the range of blood sample-based methods refers, rather, to other gamma camera-based methods, some of them using one blood sample at the end of acquisition (*3–5*). We appreciate Dr. Fleming's comments to clarify this point and to bring it to the attention of the journal's readers.

REFERENCES

1. Gates GF. Split renal function testing using Tc99m-DTPA. A rapid technique for determining differential glomerular filtration. *Clin Nucl Med.* 1983;8:400–407.
2. Steinmetz AP, Zwas ST, Macadziob S, Rotemberg G, Shrem Y. Renal depth estimates to improve the accuracy of glomerular filtration rate. *J Nucl Med.* 1998;39:1822–1825.
3. Ginjaume M, Casey M, Barker F, Duffy G. A comparison between four simple methods for measuring glomerular filtration rate using technetium-99m DTPA. *Clin Nucl Med.* 1986;11:647–650.
4. Waller DG, Keast CM, Fleming JS, Ackery DM. Measurement of glomerular filtration rate with technetium-99m DTPA: comparison of plasma clearance techniques. *J Nucl Med.* 1987;28:372–377.
5. Fleming JS, Keast CM, Waller DG, Ackery DM. Measurement of glomerular filtration rate with Tc99m-DTPA: a comparison of gamma camera methods. *Eur J Nucl Med.* 1987;13:250–253.

Adam P. Steinmetz
S. Tzila Zwas
Chaim Sheba Medical Center
Tel-Hashomer, Ramat-Gan, Israel

Mouse Models for Internal Radiation Dosimetry

TO THE EDITOR: The article by Muthuswamy et al. (*1*), "A Mouse Bone Marrow Dosimetry Model," referred to prior work by Hui et al. (*2*) in ways that may have misinterpreted the purpose and discounted the usefulness of our earlier (and simpler) mouse dosimetry model. Muthuswamy et al. described our work as "a model . . . for ^{90}Y mouse bone marrow dosimetry that does not assume local energy deposition of β particles that are emitted inside the marrow . . . this model also computed the dose to marrow from the rest of the mouse body."

It would have been more correct to describe our mouse model (*2*) as a useful tool for calculating β-particle doses to the relatively small volumes of mouse organs and tissues. Our mouse model accounts for β energy absorbed fractions from the activity in small organs and tissues, as well as from the cross-organ β irradiation of organs or tumors by activity residing in adjacent tissues. It also accounts for changes in organ mass over time. The cross-organ dose component in the mouse is particularly important for the high-energy β emitter ^{90}Y, as shown by Beatty et al. (*3*). For example, a substantial contributor to marrow dose is the β-particle dose from ^{90}Y activity deposited on adjacent bone surfaces (*2*). Our model also was extended to other radionuclides, such as ^{131}I and ^{186}Re. These features make our mouse model well suited for experimental radioimmunotherapy studies (*4*).

Muthuswamy et al. attempted to improve on one aspect of our approach by calculating the dose to various regions of the total-body marrow, rather than to merely femoral marrow, as in Hui et al. (*2*). However, Muthuswamy et al. did not show how one would actually determine activity concentrations in those various marrow regions. In addition, they did not include the cross-organ