Procedures of Choice in Renal Nuclear Medicine

TO THE EDITOR: In a recent paper written by Blaufox (*1*) on the procedures of choice in renal nuclear medicine, it was said that "in many areas there may be a lack of consensus."

As a matter of fact, it is probably in the field of uronephrology that the greatest number of different views, methods, and algorithms are encountered in nuclear medicine and it is certainly to the author's credit to have presented a comprehensive synthesis in this field.

There is, however, one point on which it is, in our opinion, impossible to agree, namely, the problem of background correction.

The author considers that background correction is unnecessary for the evaluation of individual renal function. This is based on two arguments:

1. There is no way to choose the true background because it is not known where the true background region is. As a matter of fact, although there is no area that perfectly represents the intrarenal background, much work has been done recently to understand and to evaluate separately the different components of renal background and there is currently a consensus about the way this background should be evaluated (*2–8*).
2. Background correction is responsible for an important variability in the clearance estimation when the test is repeated in the same patient. The reproducibility of the measurements should be better when no background correction is applied, in case of relative good function. In our opinion, this is not true. Particularly for ^{99m}Tc-DTPA, the background component during the second minute of the renogram is important and can easily represent 50%–80% of the total non-corrected renal activity (*6*). That means that if the integral method is used without background correction the "individual renal function" will increase or decrease simply because the renal area includes more or less pixels. There is no way to reproduce exactly the renal regions of interest when repeating a test in the same patient. Moreover, since the background component represents the main part of the activity included in the renal field of view, it is clear that moderate variations of the clearance will be completely masked by the background component. One can hope, by using a radionuclide test for the evaluation of the renal function, to be able to recognize changes in this function and not simply to be satisfied with a "reproducible test."

In conclusion, we do not agree with the author's opinion that background correction "introduces more problems than it solves."

REFERENCES

1. Blaufox MD. Procedures of choice in renal nuclear medicine. *J Nucl Med* 1991;32:1301–1309.
2. Rutland MD. A comprehensive analysis of renal DTPA studies. Theory and normal values. *Nucl Med Commun* 1985;6:11–30.
3. Russel CD. Estimation of glomerular filtration rate using ^{99m}Tc-DTPA and the gamma camera. *Eur J Nucl Med* 1987;12:548–552.
4. Peters AM. Quantification of renal haemodynamics with radionuclides. *Eur J Nucl Med* 1991;18:274–286.
5. Piepsz A, Dobbeleir A, Ham HR. Effect of background correction on separate Tc-99m-DTPA renal clearance. *J Nucl Med* 1990;31:430–435.
6. Decostre P, Salmon Y. Temporal behaviour of peripheral organ distribution volume in mamillary systems. Application to background correction in separate glomerular filtration rate estimation in man. *J Nucl Med* 1990;31:1710–1716.
7. Tondeur M, Piepsz A, Dobbeleir A, Ham HR. Tc-99m-MAG3 gamma camera clearance calculations: methodological problems. *Eur J Nucl Med* 1991;18:83–86.
8. Granerus G, Moonen M. Effects of extra-renal background subtraction and kidney depth correction in the measurement of GFR by gamma camera renography. *Nucl Med Commun* 1991;12:519–527.

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REPLY: I appreciate the comments of Drs. Decostre, Salmon, Ham and Piepsz. I do not believe that there is any real disagreement between us, but rather that the authors of the letter have misinterpreted my statements concerning background correction. In fact, the quotation in their letter is a rearrangement of the wording in my article. I wrote "it is not known what the best background region is, and there probably is no way to choose the true background." I am familiar with the authors' work which is prominently quoted near that statement. Unfortunately, a typographical error in the reference assigns it to the year 1989, when in fact it should be 1990. The remainder of my statement that in patients with relatively good levels of renal function, the integral method is reproducible without background subtraction, is simply a statement of the author's personal experience and may or may not be at variance with the experience of others.

There certainly is no disagreement that in patients with significant impairment of renal function, background represents a very high proportion of the total renal activity. The problem lies in choosing the true background. I will stand by my statement that it is virtually impossible, short of removing the kidney, to determine the true background contribution in any given individual at any given time. Although Dr. Decostre et al. argue that a simple change in the area chosen to represent renal function will lead to a significant change in the apparent measurement because of the inability to exactly reproduce these regions, so too does the background contribution change as regions of interest change and so too does the relative contribution of background to the total renal function. Once again, the authors misquote me in their conclusion since it has quite a different meaning to say that background correction "introduces more problems than it solves" than to say what was actually stated in the text "our study suggests that the use of background subtraction introduces more problems than it solves at relatively good levels of renal function."

Dr. Decostre et al. state that in patients with good renal function, background during the second minute of the DTPA renogram easily represents 50%–80% of the total non-corrected renal activity. In our experience background in 42 patients with a mean GFR of 118 ml/min averaged 53% ± 8%, with a range of 39–84. In patients with impaired renal function, the background is higher. It should be stressed that what all of us are calling background is the relative count rates in the regions of interest chosen. The error in this operation is very great and the subtraction of larger background correction from total counts