Evaluating Penile Blood Flow During Tumescence

TO THE EDITOR: The article by Miraldi et al. (*1*) presents a valuable model and sample data for evaluating penile blood flow during tumescence. There are, however, several points that require clarification.

First, in the results section, the authors state that for normal subjects, " . . . the abrupt change in slope of the washout curve signals a decrease in venous flow as can be seen in Figure 4." We have experience using ^{99m}Tc and ^{133}Xe simultaneously with impotent patients (*2*). In our study, the xenon washout curve of volunteers was bioexponential; it showed a sharp initial decline and then gentle decline after papaverine injection. There was no significant difference between normal volunteers and venogenic patients in the initial sharp decline. However, the second phase of the xenon washout curve following papaverine injection was different in venogenic patients. Thus, we developed the xenon penogram index that depends on the second phase of the xenon washout curve. It has been shown (*3*) that venous outflow increases because of increased arterial inflow in the early period of erection. The article indicates that venous outflow decreases immediately following papaverine injection, contrary to the physiologic findings. Several possible explanations are suggested, none of which can suitably account for the immediate decrease in the observed xenon washout rate. It seems further analysis is required.

Second, the number of patients in the reported study experiencing arterial insufficiency is unclear. Figure 5A shows this number to be five, 5B indicates four, and the Materials and Methods section states that there are three patients with "severe arterial insufficiency."

Lastly, our data (*2*) and that of Haden et al. (*4*) indicate that in some patients the xenon curve is nearly flat prior to papaverine administration. The case shown by the authors (Fig. 3A) demonstrates considerable xenon washout occurring before papaverine. Is this the case for all the patient groups, and what was the degree of variation in the xenon washout rates before papaverine?

REFERENCES

1. Miraldi F, Nelson D, Jones WT, Thompson S, Kursh ED. A dual-radioisotope technique for evaluation of penile blood flow during tumescence. *J Nucl Med* 1992;33:41–46.
2. Esen A, Kitapci M, Erbas B, Bekdik C, Remzi D. Dual radioisotopic study: a technique for the evaluation of vasculogenic impotence. *J Urol* 1992;147:42–46.
3. Tanagho EA, Lue TF, McClure RD. *Contemporary management of impotence and infertility*. Baltimore: Williams and Wilkins; 1988.
4. Haden HT, Katz PG, Mulligan T, Zasler ND. Penile blood flow by xenon-133 washout. *J Nucl Med* 1989;30:1032–1035.

Mehmet T. Kitapci
Medical College of Wisconsin
Milwaukee, Wisconsin

REPLY: Dr. Kitapci is correct in noting that the venous outflow increases after papaverine injection because of increased arterial flow. This is well shown in Figure 4 of our paper. The concern appears to be the small dip with a very fast recovery in venous flow which occurs immediately after the papaverine. As explained in the paper, this decrease in the calculated venous flow results from the abrupt change in the washout curve of the xenon. We noted in our paper that there were several possible explanations for this positive upslope that related to technique and not physiology or analysis. (See Item 1 under Results) We have now determined that the observed upslope in the washout curve is an artifact caused by partial shielding of the base of the penis, which is one of the explanations given. By repositioning the shielding such that the base of the penis is always in the field of view, the washout curve does not demonstrate a positive upslope and the resultant calculated venous flow dip does not occur.

Dr. Kitapci indicates that in his experience some patients have nearly flat xenon washout curves prior to papaverine administration. We have witnessed similar findings in patients with severe disease and note that the variation in xenon washout is quite large. The case we show is a normal patient and does demonstrate a rather significant washout before the papaverine injection. In our initial manuscript we showed curves from all three groups to demonstrate the variation, but the reviewers recommended a reduction in the number of curves. Thus, the final revised paper only contains the single normal case.

The number of patients experiencing arterial insufficiency is 5 as shown in Figure 5A. In Figure 5B there should be two values presented at the lowest point with one patient measuring 2.9 ml/min and the other 2.8 ml/min which would be indistinguishable on our graph. Unfortunately, we did not catch the error by our artist. The error is compounded in the Materials and Methods section where the number of arterial disease patients and venous leak patients were inverted. Thus, the sentence should read "5 men showed severe arterial disease" rather than 3 men, and under venous leak it should read "3 men were diagnosed as having venous leak" rather than 5 men as written. We apologize for the confusion.

We thank Dr. Kitapci for helping us clarify our results.

Floro Miraldi
A. Dennis Nelson
University Hospitals of Cleveland
Cleveland, Ohio

NRC Regulations on Departures from Manufacturer's Instructions

TO THE EDITOR: The Nuclear Regulatory Commission (NRC) recently published a final rule (*1*) to amend its regulations on the recordkeeping requirements for deviation from the package insert in the preparation of radiopharmaceutical reagent kits, elution of radiopharmaceutical generators and use of ra-