Quantification of Myocardial Blood Flow

TO THE EDITOR: I would like to point out an error in the abstract by Kuhle (*1*) published in the Proceedings of the 38th Annual Meeting of the Society of Nuclear Medicine. In the two-compartment model for quantification of myocardial blood flow (MBF) using ^{13}N-ammonia, the relationship K1 = 1-0.607exp(−1.25/MBF) is incorrect. Rather, this is the equation for the first-pass myocardial extraction fraction of 13N-ammonia (*2*). The forward rate constant between the two compartments can be shown to be K1 = E·MBF/(1-E), which reduces to K1 = MBF·[1.65exp(1.25/MBF)-1], where E is the extraction fraction. Curiously, I made the same error in my abstract submitted to the 35th annual meeting (*3*), which described the identical model for myocardial 13N-ammonia kinetics using a different set of animal data. The error was subsequently corrected in the poster presentation at the meeting.

Since my original abstract, the model has been validated using synthetic data to address errors in the calculated value of MBF due to inaccuracies in the assumed volume of distribution, reverse rate constant (k2), and noise (*4*). In addition, the clinical utility of the model was demonstrated both in my original abstract and in patients both using exercise and dipyridamole stress with ^{13}N-ammonia PET scanning (*3,5,6*). Methods to estimate k2 and internal myocardial dosimetry based on the model have also been described (*7,8*). Finally, comparison of calculated MBF from neural network analysis and from the two-compartment model have been reported (*9*). Further work on neural network correlation with the model was rejected by the SNM 1991 Scientific Program Committee.

Congratulations to Dr. Kuhle on his idea to reslice the image data into short-axis projections, obviously the inspiration of a Young Investigator. I look forward to the 39th Annual Society of Nuclear Medicine Meeting so we can "Play It Again, Sam" (*10*).

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Can Iodine-131 Whole-Body Scan Be Replaced by Thyroglobulin Measurement in the Post-Surgical Follow-up of Differentiated Thyroid Carcinoma?

TO THE EDITOR: The study of Ronga et al. (*1*) warrants some comments.

The early discovery of metastases at a stage when x-rays are still normal, is the main prognostic factor for cure (*2*). In a given patient, the increase in Tg level is related to the size of the metastases (*3*) and Tg assays should be sensitive enough to reliably detect low Tg levels (> 1 ng/ml). This has been made possible by the use of IRMA systems using monoclonal antibodies directed against Tg (*4*).

Following total thyroid ablation, Tg is be undetectable in the absence of normal or neoplastic thyroid tissue and any detectable Tg level warrants further investigation, even if there is no other evidence of disease. A whole-body scan (WBS) with a therapeutic dose (100 mCi) of radioiodine permitted the discovery of unknown metastases in a large proportion of patients with detectable Tg levels (*3,5,6*). In the others in whom neoplastic tissue did not take up radioiodine, Tg level was elevated long before metastases became detectable on x-rays (*3,4*). In the series of Ronga et al. (*1*), 9 of the 14 patients with absence of thyroid activity had a significant increase in Tg level following suppression of therapy, which was similar to that of 3 patients with proven metastases. However no post-therapy WBS was performed and it is likely that these patients were misclassified.

In 7 of the 17 patients with residual thyroid tissue, Tg level

TABLE 1
Ultrasound of Residual Thyroid Tissue as a Function of Tg Level

Ultrasound Tg (ng/ml)	Normal	Nodules
≤1	18	0
2–5	3	6
≥6	0	5

Tg was measured during LT_4 treatment at suppressive doses with the Dynotest Tg kit (Henning, Berlin) (*4*).