circulating free levels. In a recent publication, Vining et al. reached the same conclusion, although their T_4 assay lacked the sensitivity to measure salivary T_4 accurately (*2*).

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1. ELSON MK, MORLEY JE, SHAFER RB: Salivary thyroxine as an estimate of free thyroxine: Concise communication. *J Nucl Med* 24:700-702, 1983

2. VINING RF, MCGINLEY RA, SYMONS RG: Hormones in saliva: Mode of entry and consequent implications for clinical interpretation. *Clin Chem* 29:1752-1756, 1983

Re: The Derivation of the Gamma-Variate Relationship for Tracer Dilution Curves

Mr. Davenport should be commended for his elegant derivation of the gamma-variate function for indicator dilution curves (*1*). I have, however, one minor question: Pursuant to Eq. 18, the statement is made, "Since the total amount of tracer injected at the beginning of the vessel is assumed to be unity, we must have

$$\int_0^\infty C(\alpha, \beta, t)dt = 1 \ldots$$

However, since the quantity $C(\alpha, \beta, t)$ is a concentration, should not the integral extend over a volume that in turn is evaluated at $t = 0$? Perhaps the author should have said that, by convention, the area under the gamma variate is taken to be unity.

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1. DAVENPORT R: The derivation of the gamma-variate relationship for tracer dilution curves. *J Nucl Med* 24:945-948, 1983

Reply

Dr. Harpen is correct in pointing out that Eq. (18) refers to a concentration rather than an amount. There are a couple of ways of resolving this discrepancy. One is to stipulate that the area under the curve be unity, as Dr. Harpen suggests. Another would be to multiply by the volume of distribution, V, and set the product equal to unity. Since the initial amount of tracer injected at $t = 0$ is diluted in the volume, V, of a theoretical mixing chamber, the result would be the same.

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Re: New Perspectives in Localizing Enlarged Parathyroids by Technetium-Thallium Subtraction Scan

We read with great interest the recent report by Ferlin et al. (*1*) on imaging parathyroid adenomas by combined technetium and thallium subtraction scans. The relatively noninvasive nature of the combined scanning technique, with its high success rate, offers an attractive imaging modality in these patients. Previous imaging modalities—including barium esophagrams, thyroid angiography, and venous sampling for parathormone levels—have all had varying success rates in locating parathyroid adenomas. Recently, higher success rates have been achieved with high-resolution TCT scanning and high-resolution ultrasound scanning. Intravenous digital subtraction angiography (i.v. DSA) may also prove to be a useful adjunct in parathyroid imaging. Levy et al. reported i.v. DSA to be positive in six of seven patients (*2*). Patient selection may have been responsible for this high success rate. We have evaluated a prospective, consecutive series of 13 patients with parathyroid adenomas, and i.v. DSA identified only four.

In view of these difficulties in imaging parathyroid adenomas, Ferlin's results seem encouraging. We utilized their combined scanning technique to locate correctly a 4-g parathyroid adenoma in a patient with persistent elevated calcium and PTH levels (Fig. 1). However, in reviewing the Methods and Materials section of their paper, we noted that their patients were first given 1 mCi of pertechnetate and then were given thallium. From a purely tech-

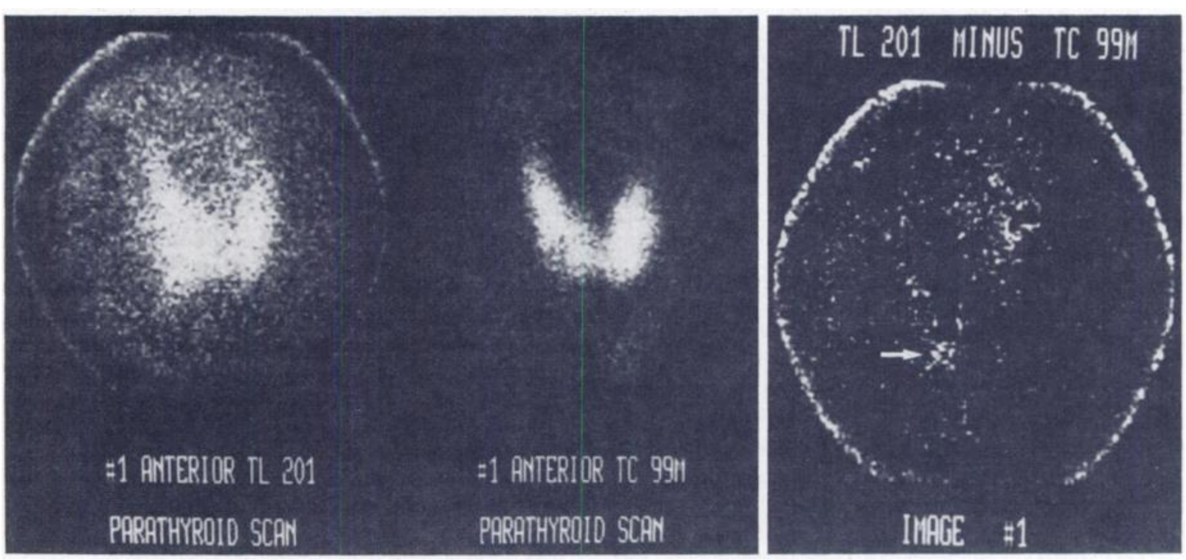

FIG. 1. Thallium pinhole thyroid scan shows increased uptake in right lower pole of thyroid (left). Tc-99m pertechnetate scan shows small defect in same area (center). Subtraction image confirms presence of thallium-avid nodule at lower pole of right lobe of thyroid (right). Surgery confirmed 1.5-cm parathyroid adenoma in this area.