

obtaining end-systolic pressure-volume curves to assess LV contractility in selected patients.

We appreciate the comments of Drs. Siegel and Maurer, for they stimulate a discussion of these techniques. Their comments at this early juncture, however, may be overstated regarding the superiority of their method of obtaining individual attenuation-correction factors to obtain LV volumes, as compared with the method we recently analyzed and published in the *Journal*.

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**Re: Filling of the Gallbladder as Studied by Computer-Assisted Tc-99m HIDA Scintigraphy: Concise Communication**

The report by van der Linden and Kempf (1) on "Filling of the Gallbladder as Studied by Computer-assisted Tc-99m HIDA Scintigraphy" concluded that gallbladder filling was not dependent on contraction of the sphincter of Oddi. Their evidence for this conclusion was threefold: (a) half of the patients showed passage of radioactivity into the duodenum; (b) visualization of the gallbladder was not delayed in those subjects having radioactivity in the duodenum; and (c) the gallbladder was visualized before the distal part of the common bile duct. None of these observations justifies their conclusion that filling of the gallbladder is not dependent upon the sphincter of Oddi. First, they did not specifically describe whether duodenal activity appeared before or after gallbladder activity. However, they do quote the report of Weissmann et al. (2), which indicates that the normal gallbladder will be visualized before activity reaches the duodenum. Second, the fact that radioactivity appeared in the gallbladder at the same time after injection, whether or not radioactivity appeared in the duodenum, does not prove that the sphincter of Oddi was not closed during the filling phase of the gallbladder. Third, they correctly point out that bile already present in the duct may prevent radioactivity from reaching the region of the sphincter before filling of

the gallbladder. Nevertheless, they tend to discard this argument on the basis of studies in patients without gallbladders and the fact that bile present in the gallbladder does not prevent the radionuclide from entering. Such an objection cannot be discarded so easily, because fluids will travel the path of least resistance. The least resistance in this case may well be to the gallbladder. In cholecystectomized patients, resistance to biliary flow would be expected to be similar throughout the biliary ducts and probably controlled by the sphincter of Oddi.

It is unfortunate that the authors did not provide data on the relative rate of filling of the gallbladder and the possible relationship between the rate of filling and the rate of discharge of tracer into the duodenum. Since normal subjects will show filling of the gallbladder before emptying into the duodenum, it is likely that the rate of filling of the gallbladder would be similar in normal patients, at least until radioactivity began to appear in the duodenum (i.e., when relaxation of the sphincter of Oddi occurs).

I believe the authors deserve credit for emphasizing that the motor function of the gallbladder is not quiescent during fasting, as others have shown (3,4). However, they should not conclude, on the basis of their data, that contraction of the sphincter of Oddi has no relationship to filling of the gallbladder.

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## Reply

We thank Dr. Shreiner for his interest in the report (1) in which we presented data suggesting that filling of the gallbladder is not dependent on contraction of the sphincter of Oddi. The theory that filling of the gallbladder is due to the pileup of bile above a closed sphincter was contradicted by our data.

In half of our subjects with normally visualized gallbladders, radioactivity had passed into the duodenum. This we interpreted as showing that the sphincter is not permanently closed during fasting and that its opening does not interfere with normal visualization of the gallbladder. Since our data showed that the activity reached the distal part of the duct after it had reached the gallbladder, and the duodenum is distal to the duct, then passage of activity into the gallbladder must precede entrance into the duodenum.

The data showed that visualization of the gallbladder occurred at approximately the same time after injection, irrespective of whether activity appeared in the duodenum. In other words, in some subjects the sphincter had opened, in others it was closed, but this difference did not affect the time interval needed for visualization of the gallbladder. This finding we interpreted as showing