"tissue equivalent material" apply to human chests is likely fraught with at least as many assumptions and potential sources of error as empirically selecting a value for \( \mu \) equal to the linear attenuation coefficient of water which is then applied to a limited range of depths. The actual value for \( \mu \) determined from CT scans of the chest by Nickoloff et al.\(^1\) was 0.128 cm\(^{-1}\)±0.02 SD. The relationships of patient characteristics, \( eg \), age, sex, height, weight, and body fat content to this range, were not given. It is possible that adult men as we studied with heavier bone and muscle structure than some other categories of patients may cluster above the mean.

One of the major points of emphasis of our article was that indexing the LV region of interest search threshold to the LV phase image resulted in a loose LV edge fit. Therefore, the LV counts which we measured are not at all comparable to those measured by the tight automated edge finders used by Links et al.\(^2\) and also by Maurer et al.\(^3\) Therefore, it is not valid to assume that because our mean transmission factor (\( e^{-\mu} \)) was higher than that of Links et al that we also should have underestimated volumes. Without commenting on whether a horizontally positioned test tube or a petri dish more closely approximates the geometry of the left ventricle, I will say we have found in ten cases that counts emanating from a 7 ml test tube average only 3.69 percent (range: 2.49-4.91 percent) less than those emanating from a petri dish (9 cm in diameter) that contains the same volume of blood (5 ml).

Finally, Siegel and Maurer suggest that they have solved the problem of LV count attenuation by directly measuring attenuation from a point source in the esophagus. Assuming all LV counts arise far posterior from within the esophagus, behind the left ventricle, and at times behind the left atrium as well, will result in an erratically marked overestimation of LV count attenuation. If one assumes the following: 1) the center of the left ventricle is the best place from which to calculate attenuation, 2) \( \mu \) of 0.13 cm\(^{-1}\) and a buildup factor of 1.18 (as suggested by Siegel and Maurer), and 3) normal adult values for LV internal dimensions and posterior wall thickness determined echocardiographically,\(^4\) then one can estimate that with a heart size at the lower limits of normal, the esophagus is approximately 2.95 cm behind the center of the left ventricle (1.85 cm for one-half the LV internal diastolic dimension, 0.60 cm for the posterior LV wall thickness, and another 0.50 cm to reach the esophageal lumen). Adding this cumulative distance to any initial measurement from the camera collimator to the center of the left ventricle will result in a 31 percent overestimation of attenuation of LV counts. A similar calculation for an adult heart at the upper limits of normal in size would result in approximately 43 percent overestimation of attenuation. We have also had experience with Medical Data Systems nuclear cardiology software and conclude that the tight automated edge finder must have largely compensated for this error. Therefore, the last sentence of Siegel and Maurer's letter aptly applies to their own method of estimating LV volumes.

We made it clear in our article that we felt current methods, including our own, being applied to LV volume determinations provide estimations only. Advantages of our method include excellent interobserver and intraobserver variability, a loose automated LV edge finder, and good correlations with volumes calculated from standard angiographic methods.

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REFERENCES


Complex Pulmonary Function Data

To the Editor:

We read with interest the article by Cottrell et al.\(^2\) and the accompanying editorial.\(^1\) The article describes the presentation of the results of pulmonary function tests in graphic form. The editorial highlights this and suggests that it would also be useful to present flow/volume loops plotted at absolute lung volume and to allow the comparison of the predicted, the pre- and the postbronchodilator loops.

We have developed a system similar to that proposed in the editorial, which has been working in a routine patient laboratory for over a year.\(^4\) Presented on the lung function report are patient details, the results of pulmonary function tests in numerical form, and flow/volume loops. The results are tabulated to indicate the range predicted for the patient's age, sex and height, the measured

![Figure 1](http://journal.publications.chestnet.org/pdfaccess.ashx?url=/data/journals/chest/21409/ on 06/24/2017)
value, before bronchodilation, the same expressed as the percentage predicted, the measured values after bronchodilator, and the percentage change. Although this is a large amount of data, we think that the form we have chosen is clear and easy to interpret (Fig 1). Two graphs showing flow/volume loops are given on the report. The first depicts the predicted loop, plotted at predicted lung volumes, with, superimposed, the pre-bronchodilator loop, plotted at the measured long volume. The latter is replotted on the second graph for comparison with the post-bronchodilator loop, again plotted at the measured post-bronchodilator lung volume. Any test not required for a particular patient is left blank. The full report, as shown, is printed by a dot matrix printer in less than 2 minutes using data stored on a floppy disk.

We think that our format, which presents the full range of standard pulmonary function tests, demonstrates that a combined numerical and graphic form can be used to provide a report which is easy to interpret.

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1 Martin RJ. Complex pulmonary function data. The lack of communication. Chest 1983; 84:121

To the Editor:

It is gratifying to see that other investigators are seeking solutions to the problems of pulmonary function test reporting. Certainly Jennings et al have presented the flow volume loop, plotted at absolute lung volumes, as suggested by Dr. Martin. Although this is of significant research interest, it is not applicable to large numbers of patients who neither require, nor have, lung volume determinations.

Their letter also raises the broader issue of the value of the flow volume loop. We can think of no presentation that inspires greater passion, both positive and negative, among pulmonary specialists. We believe that the flow volume loop adds very little information to that already contained in the usual tables of FVC, FEV1, . . . Indeed, since the standards for normal flow volume loops are not as well defined as those of the standard “predicted” parameters, the absolute importance of flow volume loops is in question. There are some findings on flow volume loops, including “saw toothing” and “concavity” which may be important. However, at the present time their significance remains unknown. For the nonspecialist, we suspect that flow volume loops may represent an easier way to assimilate FFT results, although this suspicion remains to be proved.

Therefore, we feel confident in suggesting that an optimal FFT report might combine our “simplified” form with the flow loops of Jennings.

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Figure 1. American Ambulator being used by youth recovering from paraplegia.

Ambulator Mobilization Against Thromboembolism

To the Editor:

It is an axiom that active people, even suffering from serious illness or handicap, develop thromboembolism only under rare circumstances. I would like to share information about a valuable new device for use in mobilization and rehabilitation of difficult to impossible cases.

The American Ambulator (Fig 1) is battery powered, weighs 129 pounds, has a stainless steel frame and ballscrew lift. It is fully adjustable for body build and height. It includes seat, sling or crutch software to raise patients from 4'11" to 6'6" and up to 400 pounds. It is fully powered to allow one small attendant to safely lift a patient from a bed or wheel chair for transport, ambulation, exercise, shower or other desired activities. It is tip-proof and hence of great value for use in patients who are ataxic, prone to syncope or fearful of falling. An alert patient with only minimal hand dexterity can lift himself safely. This is of obvious help when staff personnel is limited, and makes home use possible.

The Ambulator allows early mobilization of postoperative patients, even though morbidly obese. When in bed, these patients often suffer from impaired respiration, hypoxia and peripheral vascular stasis.