LETTERS TO THE EDITOR

Estimates of Left-Ventricular Volumes by Equilibrium Radionuclide Ventriculography (ERNV): Importance of Attenuation and Proper Background Correction

Determination of true left-ventricular (LV) volumes from RNV at equilibrium is hampered by two opposing factors: the true count representing LV volumes (a) is increased by noncardiac radiation from in front, the sides, and behind; and (b) is decreased by absorption in overlying tissues and in LV blood.

In their recent study, Starling et al. (*1*) found an excellent correlation (r = 0.96) of LV volumes comparing results from contrast cineangiography and attenuation-corrected LV count rates in ERNV. The correction was achieved by assessing the distance d' from the gamma camera in the LAO position to the LV. Anatomic landmarks, two different camera positions, and a constant μ for attenuation of Tc-99m photons were used. Background (BG) correction was performed by subtracting counts from a paraventricular ROI uniformly from the the LV counts.

For 3 yr, our group used the same approach (ERNV, blood sample, constant μ) but came to choose a different method of correction to achieve true LV end-diastolic volume (*2,3*). For attenuation correction, we lumped together absorptions from LV blood, LV anterior wall, and thoracic wall into an average from 40 patients, including data from transmission CT for thoracic wall thickness. However, BG correction was done taking into account that the LV is not of cubical but of half-ellipsoidal or parabolic shape. Thus, "parabolic" BG correction was adapted with respect to both LV curvatures (from base to apex and from septum to lateral wall). Figure 1 illustrates the effect of this type of BG correction in comparison with uniform correction. The latter subtraction led to underestimation of the true LV volume. Parabolic correction gave the highest correlation (r = 0.96) and yielded the best estimates.

Therefore, either approach (*1,3*) may lead to the desired result. We experienced problems with the assumption of an average thickness only in very obese patients. Individual determination of attenuation (*1*) seems preferable to such cases. However, in most of the cases, without changing the gamma camera's position, attenuation and BG corrections can be derived from a computer program during the evaluation of the ERNV study (*2,3*).

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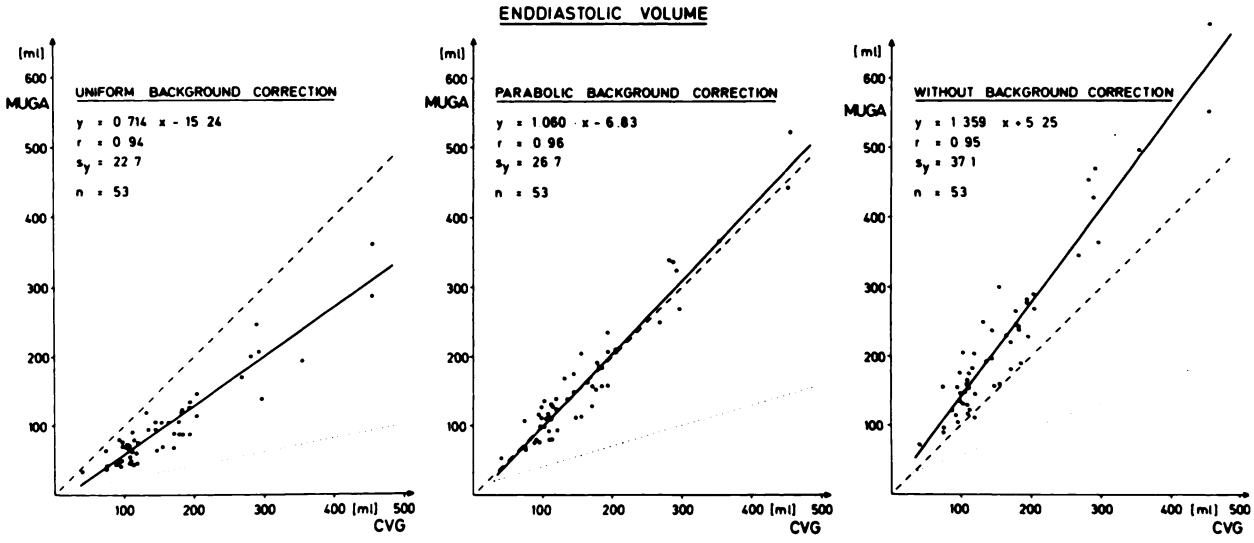

FIG. 1. Relation between LV end-diastolic volume determined with radionuclide method (MUGA = ERNV) and cineventriculography (CVG) for three models of BG correction without (dotted line) or with (solid line) attenuation correction (dashed: line of identity). Equations and correlations refer to solid lines.