

Estimation of cardiac output by first-pass transit of radiotracers

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To evaluate cardiac function with various tracers to be used for radionuclide scintigraphy, we examined the validity of a simplified method to measure cardiac output (CO) by modifying the equation of Stewart-Hamilton in the radionuclide study. After a bolus injection of I-123 or Tc-99m tracer, the total injection dose and count in the pulmonary artery during the first transit of the tracer were measured to calculate the CO Index. The CO Index was obtained from the integral of the first transit of radiotracers in the pulmonary artery divided by the total injected count. CO was estimated from the regression formula which was obtained by comparing the CO Index with CO measured by the Doppler echocardiographic method. There were close correlations between the CO Index and CO measured by Doppler echocardiography both in the study with I-123 ($n = 13$, $r = 0.85$, $p < 0.001$) and with Tc-99m ($n = 17$, $r = 0.88$, $p < 0.001$). The regression formula varied according to the radionuclide used for the study ($CO = 2.29 \times (CO \text{ Index})^{0.634}$ for I-123 and $CO = 3.18 \times (CO \text{ Index})^{0.518}$ for Tc-99m). CO measured by this method is useful for the assessment of cardiac function with various tracers in routine clinical studies, and this simple method may be utilized for assessment of organ blood flow on the basis of the microsphere model.

Key words: cardiac output, first-pass, pulmonary artery, Doppler echocardiography, time activity curve