in the transaxial mode. Resolution is selectable in both the transaxial and 2-D imaging mode from 9 to 18 mm. (15).

The system is calibrated in terms of absolute concentration units with a uniform cylindrical phantom of known radioactivity concentration (15). The system software of the ECAT allows the user to extract region of interest concentrations, window the images, histogram or profile the images and a variety of other post-processing capabilities.

Physiologic Models

In general, the modeling approach we have taken with PT is to employ the type of compartmental models used in autoradiography and also equilibrium or steady state models (7-8).

Cerebral Blood Volume Model: The model for cerebral blood volume (CBV) was initially developed by Phelps et al. (21) for x-ray fluorescence measurements and later applied by Kuhl et al (22) to ECT. This equilibrium model is given by:

$$CBV = \frac{(^{11}CO\text{-}RBC)_T}{(^{11}CO\text{-}RBC)B \times 0.85 \times d} \qquad (1)$$

where $(^{11}CO\text{-}RBC)_T$ and $(^{11}CO\text{-}RBC)_B$ are the cerebral tissue and venous blood concentration of ^{11}CO labeled red blood cells (RBC), 0.85 is a correction accounting for the difference between large vessel and cerebral hematocrit (21) and d is the density of cerebral tissue (1.04 gm/cc). The value in the numerator is determined directly with the tomograph. The term in the denominator is measured from a single venous blood sample with a well counter. The red blood cells are labled by a single breath inhalation of ^{11}CO gas.

Glucose Metabolism Model: Determination of metabolic rate for glucose with (F-18)-2-fluoro-2-deoxy-D-glucose (FDG) as a glucose analog is based