Flourine-18 labeld compounds, e.g. F-18 hexadacanoic acid or F-18 heptadecanoic acid[31,32], may to some degree obviate the necessity for on-site production. The nearly 2 hour half time permits production in a centrally located cyclotron and subsequent delivery to users in nearby medical centers. While initial results with these analogs are promising, e.g. their kinetics in myocardium resemble to some degree that of the physiologic palmitic acid, their ultimate utility for the assessment of myocardial fatty acid metabolism has not been demonstrated yet.

GLUCOSE METABOLISM: We have discussed earlier several of the radionuclides that can be labeled to naturally occuring compounds without affecting their biologic behavior. Accordingly, one could label for example glucose, which together with free fatty acids is a primary energy substrate of the heart. While this can easily be accomplished, the chemical state of this radioactive agent however at any time after intravenous administration remains unknown to the PCT. The measured C-11 tissue concentrations would represent a complex distribution of compounds that further changes with time. Moreover, the rapid turnover rate of glucose in myocardium poses some limitations for obtaining high contrast cross-sectional images.

It is conceivable that ultimately the complex kinetics of some natural compounds cannot be defined sufficiently for accurate measurements of myocardial metabolic rate and that we must resort to substrate analogs that trace only one segment of a metabolic pathway but that can be delineated well and their kinetics expressed in form of a physiologic model and described in mathematical terms. An example of this is the radioactive labeled 2-deoxyglucose which has become available as a substrate analog for the measurement of regional glucose utilization rates. Sokoloff and associates [33] labeled this agent with C-14 and originated a physiologic model that permitted the