

palmitic acid and I-123 heptadecanoic acid (6,10). Recently we also observed a change in kinetics of I-123 heptadecanoic acid in normal man following acute ethanol administration. This signals a change of myocardial metabolism induced by ethanol. Moreover, chronic administration of ethanol in mice was found by us to cause changes of hepatic metabolism of I-123-labeled fatty acids similar to those occurring with C-14-labeled fatty acids.

We therefore emphasize that myocardial metabolism can be evaluated in terms of rate constants also by $^{17}\text{-}[^{123}\text{I}]$ heptadecanoic acid—and possibly other fatty acids—as well as by PET. Since the process of beta-oxidation is rapid, the measured washout curves in man either with C-11 palmitic or $^{17}\text{-}[^{123}\text{I}]$ heptadecanoic acid are taken to relate to the release of fatty acid from intracellular pools into the beta-oxidative pathway.

For the above reasons we believe that current developments in metabolic imaging with fatty acids should clearly include the new single-photon approach and measurement with I-123-labeled fatty acids.

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Reply

Certainly analogs of metabolic substrates labeled with single-photon emitters are of research interest, as indicated by Drs. Feinendegen and Shreeve. However, iodinated compounds can be used to study metabolism only in the same way that thallium-201 is useful for evaluating myocardial perfusion, i.e., as indirect indices of metabolic behavior rather than direct measurements. In addition, a major limitation of single-photon emitters is that these tracers provide only qualitative information because of image degradation due to overlapping anatomic structures, uncorrectable photon attenuation, background scatter, and lack of depth resolution, all of which prevent quantitative data from being obtained (1). It is of course possible to take regional data and process them to improve image quality visually, but such manipulations when applied to thallium scintigraphy, for example, make only modest improvements in the diagnostic capability of the test for coronary disease; they do not make the data suitable for quantitation of regional myocardial blood flow (ml/min-g) (2,3) or metabolism. Similarly, differences in the clearance rates of iodinated fatty acids can be obtained from normal and ischemic areas (4). Unfortunately, the physical limitations of the tracer preclude an accurate determination of the regional metabolic rate (mmole substrate/g-min) and provide only an index of comparison that may be affected by nonspecific conditions.

The intent of my editorial was not to slight the potential use of iodinated tracers. I chose to discuss positron emitters because these agents are better suited for direct quantitation of metabolic imaging. As noted in my editorial, carbon, oxygen, and nitrogen all have positron-emitting isotopes that can be incorporated into analogs that behave as physiologic substrates (5). The high energies and the use of electronic collimation allow measurement of a true regional metabolic rate. The major limitation of positron imaging is the relative scarcity of cyclotrons and tomographic cameras, as pointed out by Drs. Feinendegen and Shreeve. However, I believe it is necessary to understand these metabolic processes in vivo in man and to prove their applicability conceptually by optimal technology rather than to rely on the indirect assessment of metabolic function provided by iodinated tracers.

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