Several generations of practitioners have become accustomed to studying roentgenograms that define cardiac shape and size in their patients. The shadows seen in these studies often proved helpful in diagnosis and follow-up, albeit to a limited degree because they portrayed only surface contours. The recent introduction of a new method changed that. The use of thallium 201, which under certain circumstances accumulates in the myocardium, has made it possible to study that tissue at will. Thallium is a potassium analogue that has been used to study cellular lesions in myocardial tissue, a tissue with a high potassium content. Using radioactive thallium, (thallium 201) for this purpose has been made possible by ingenious (and expensive) technologic developments.

As the excellent report by Melin et al. makes evident, myocardial scintiscans obtained with thallium 201 reflect two distinct processes: (1) blood flow and (2) the uptake of the thallium by myocardial cells, some of which may have experienced damage. When an infarct occurs, the thallium 201 scintiscan shows a defect owing to diminished blood flow (an infarct produced by coronary arterial ligation may still have up to 20 percent of normal blood flow); however, subsequently, the necrotic area exhibits supernormal blood flow; this is counteracted by reduced extraction of the thallium by necrotic damaged cells. Presumably, damaged cells that recover also recover their ability to take up thallium, and the spectacular if fuzzy defect in the thallium scintiscan disappears. Many physicians who use the method assume that they can recognize both acute infarction and ischemia with recovery; however, these assumptions should be accepted cum grano salis until supported by a sufficient number of postmortem studies.

Questions about the usefulness of the method to the physician at bedside concern us here. Will use of the method improve the accuracy or the rapidity of diagnosis in coronary arterial disease? Will information obtained with the method, although not necessarily diagnostic in itself, aid the practicing physician in making decisions concerning treatment? Will the method afford specific (not statistical) prognostic information in patients? We will not offer the lame comment, today made about all sorts of irrelevant technologic approaches, that any such data help us to understand disease. This comment is not acceptable until criteria are defined that distinguish between mere superficial explanation and deep understanding. Such criteria have never yet been brought forward, a fact that casts a cloud over all laboratory research that purports to have clinical connotations.

**Diagnosis of Acute Myocardial Infarction**

Bodenheimer's restrained critique clarified many issues. In patients studied within six hours of the onset of the attack, a defect in perfusion is regularly found; this finding becomes inconsistent later, although the enzymatic studies remain abnormal. These time constraints lower the value of the scintiscan, which may be further diminished by interobserver disagreement regarding interpretation. The test done at rest cannot be interpreted accurately in patients with a proved or suspected history of an old infarct. Moreover, some patients with angina pectoris may show defects in relation to pain that do not signify acute infarction.

Actually, the need to make definite diagnoses of myocardial infarction in patients suspected of it by competent physicians does not appear to be overriding. A minority of patients suspected of having this diagnosis prove to have it, and those in whom it seems to be ruled out by electrocardiographic and enzymatic studies exhibit the same subsequent course, including death, as do those with what is regarded as a proven diagnosis. Under these circumstances, turning to the expensive thallium test in attempting to establish or rule out a definite diagnosis of myocardial infarction seems superfluous.

**Patients with Ambiguous Histories for Coronary Disease**

A considerable number of patients with recurrent
episodic pain in the chest come to physicians for diagnosis. In a search for certainty regarding the presence and severity of coronary atherosclerosis, some physicians succumb to the belief that tests of one kind or another will always afford certainty when clinical criteria do not. Studies of thallium 201 imaging in such cases show that this test may provide useful information, but that this is rarely, if ever, conclusive because of either false-positive or false-negative results. What is particularly troublesome is the discord between the results of the thallium test and that of other methods. Thus, in one series the thallium scan and the exercise tolerance test were discordant in 53 percent of the cases. In patients with normal coronary arteriograms, the thallium test is particularly unhelpful. Discordant findings in individual cases are likely to be buried in statistics that show correlation.

**Single-Vessel vs Multiple-Vessel Disease**

The finding of multiple defects in thallium 201 scintiscans usually indicates multiple-vessel disease, although since the images have a multifactorial mechanism, this statement is not always true. Attempts to relate the visible defects at rest or on exercise to the severity of coronary atherosclerosis and with the presence of single vs multiple areas of narrowing have not given reliable findings.

**Comment**

The spectacular images exhibited by thallium 201 scintigraphy raised hopes that cardiologists would see precisely what they needed to and could shape their beliefs accordingly; however, what was seen could not be believed until it was interpreted. Because thallium 201 scintigraphy involves a number of different mechanisms, it became unclear what interpretations were justifiable. Although in a clinical setting the method is disappointing, the anticipation remains that it may afford a useful research method, particularly with respect to the study of the size of an infarct.

**References**


3. Schroeder JS, Lamb IH, Hu M. Do patients in whom myocardial infarction has been ruled out have a better prognosis after hospitalization than those surviving infarction? N Engl J Med 1980; 303:1-5


