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Myocardial Viability

The major reason why a clinical cardiologist pursues myocardial viability is to reduce cardiovascular mortality. Although there are no data about it, the rationale basis is the preservation of ventricular function by the identification of reversible regional myocardial dysfunction, leading to a lower risk of death, assuming that the better the ejection fraction the lower the mortality. The problem rests on the risk/benefit ratio. The risk is to revascularize through bypass surgery or coronary angioplasty, taking into account clinical condition, inherent procedural complications, mortality and restenosis rates. In the case of coronary angioplasty, low flow conditions may lead to hybernating myocardium. There are widely available data about myocardial viability but none answering the question of how much viable myocardium is worth justifying the risk of the revascularization procedure and a significant increase in ejection fraction. It seems that we have a long way to go because the accepted documentation of viable myocardium is made just *after* revascularization, and there is no "gold standard" method for predicting reversibility of contractile dysfunction. Elhendy et al. (1) in a recent issue of the Journal observed that 14 patients with reversible single-photon emission computed tomographic imaging perfusion defects had no evidence of myocardial ischemia as assessed by wall motion abnormalities on stress echocardiography with dobutamine infusion, a finding commented on by Wackers (2). But in this group of patients, four (28.5%) showed improvement of contraction in the infarcted region, a finding that should be interpreted as an evidence of ischemia if we accept the idea that all ischemic myocardium is viable myocardium. In addition, all patients had documented coronary artery disease (diameter stenosis >50%), leading to the hypothesis that improvement of wall motion abnormalities observed in the infarct area is consistent with the presence of hibernating myocardium.

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Reply

We thank Shibata for his interesting remarks on our study of patients with dobutamine-induced hypoperfusion without transient wall motion abnormalities (1). Among the 14 patients without transient wall motion abnormalities in our study, reversible perfusion defects were confined to dyssynergic segments in 4 (29%). However, only two of these four patients showed improved wall thickening at low dose dobutamine. Improvement was maintained at high dose. These patients were not considered to have ischemia at echocardiography because we used the standard criteria of new or worsening wall motion abnormalities to define an ischemic response. As Shibata points out, myocardial ischemia should also be considered in the presence of evidence of myocardial viability, as in the case of improvement of a dyssynergic segment during low dose dobutamine infusion. Although myocardial ischemia and hibernation are related phenomena, we did not consider the improvement at low dose dobutamine as a definite ischemic response because we have shown (2) that only akinetic segments with a biphasic response to dobutamine have a relatively high prevalence of reversible thallium defects (51% vs. 9% of segments with persistent improvement, $p < 0.005$) as well as a higher prevalence of functional improvement (3) after revascularization (79% vs. 30% of segments with persistent improvement, $p < 0.005$). It is possible that in our study (1), the low rate-pressure product in the group without transient wall motion abnormalities did not allow for the occurrence of a biphasic response, and consequently, dyssynergic segments showed a persistent improvement rather than a biphasic response. This observation supports our recommendation that every effort showed be made to attain a high rate-pressure product to elicit myocardial ischemia at dobutamine echocardiography. The conclusion of our study was that the absence of transient wall motion abnormalities in patients with reversible perfusion defects does not imply less severe ischemia but is associated with a lower rate-pressure product. Inclusion of patients with a previous myocardial infarction in our study did not seem to limit our conclusion because we have recently demonstrated (4) that in patients with infarct-related artery stenosis, the prevalence of periinfarction ischemia at dobutamine stress echocardiography, using the standard criteria of new or worsening wall motion abnormalities, is not significantly different from the prevalence of ischemia according to reversible hypoperfusion on simultaneous 2-methoxy isobutyl isonitrile (MIBI) single-photon emission computed tomography (4).

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Increased Neopterin in Patients With Chronic and Acute Coronary Syndromes

I read with interest the report by Schumacher et al. (1) regarding plasma neopterin levels in acute and chronic coronary syndromes.

Their findings are consistent with previous work suggesting a role for inflammatory mechanisms in the genesis of coronary atheroma and acute coronary syndromes.

The study by Schumacher et al. (1) and previous studies (2–5) have suggested that neopterin represents a marker for immune system activation and may be useful for patient management. However, Schumacher et al. (1) state that "no data are available on neopterin in patients with acute and chronic coronary syndromes." They were unaware of a study (2) from our institution regarding neopterin serum concentrations in acute and chronic coronary syndromes published some months earlier than their report. Our study demonstrated that neopterin serum levels (corrected for creatinine concentration) were elevated in patients with unstable angina (0.13 nmol/μmol) and acute myocardial infarction (0.17 nmol/μmol) but not in those with remote (>6 months) myocardial infarction (0.09 nmol/μmol) and control subjects (0.10 nmol/μmol). The observation in our study (2) that plasma neopterin levels are significantly raised in patients with acute coronary syndromes compared with those with a history of previous myocardial infarction suggests that high neopterin concentrations may be a marker of coronary disease "activity." The data of Schumacher et al. and our findings (2) are somehow complementary. Schumacher et al. investigated patients with acute myocardial infarction and patients with chronic stable angina but not patients with unstable angina. Neopterin concentrations in their study were elevated in patients with "angina" compared with those in control subjects. However, patients with a myocardial infarction had higher neopterin levels than patients with chronic stable angina.

Both our study (2) and that of Schumacher et al. (1) lend support to the notion that inflammatory processes and immune activation may play a role in atherogenesis and the development of acute coronary syndromes. However, it is not known at present whether high neopterin levels are associated with myocardial damage or if they represent a marker of plaque activity. The claim by Schumacher et al. that their findings may have clinical importance in distinguishing acute and coronary syndromes is not substantiated by their observations because in their study, neopterin was increased both in patients with stable angina and in patients with myocardial infarction. Furthermore, do we really need a biochemical marker to distinguish between acute and chronic coronary syndromes when they are so obviously different? I believe that both our study (2) and that of Schumacher et al. (1) have far-reaching implications. Raised plasma neopterin may represent a marker of both disease activity and plaque vulnerability. It is conceivable that increased neopterin levels may help to identify patients with stable angina who are at a higher risk of plaque disruption and acute coronary events and patients with unstable angina who, despite the rapid stabilization of symptoms, develop coronary artery occlusions and serious coronary events soon after hospital discharge (6). However, the true role of neopterin in clinical practice as a risk marker is largely unknown. Large, well designed studies are needed to ascertain whether neopterin measurements have a role in ischemic heart disease.

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