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LETTERS TO THE EDITOR

Concordance Between Actual and Expected Coronary Artery Distribution

I read with interest the manuscript by Ortiz-Pérez et al. (1) regarding the concordance between the 17-segment American Heart Association model (2) and coronary arterial anatomy using contrast-enhanced cardiac magnetic resonance imaging. In 93 subjects with an acute coronary syndrome, the investigators report a moderately good agreement between the actual and model-predicted coronary artery distribution and suggest that the inferior apical, lateral apical, and mid anterolateral segments are most commonly supplied by the left anterior descending coronary artery (LAD), contrary to what the model predicts.

In a previous study assessing the accuracy of a 17-segment model widely used in the nuclear cardiology literature, we projected the actual coronary artery anatomy of 135 patients undergoing coronary angiography onto the 17-segment model (3). We found that in general the model-predicted coronary anatomy was appropriate. There was only 1 segment (the apical lateral) in which the model-predicted coronary anatomy distribution (left circumflex coronary artery) did not match the actual one (LAD). In our previous report (3), concordance between the adjusted (i.e., apical lateral segment assigned to LAD) model-predicted and actual coronary artery anatomy occurred in at least 14 of 17 segments in 90% of the study population (121 of 135 patients). In our cohort, left dominance, occurring in 8% of study subjects, accounted for the greatest number of "misassignments" by the 17-segment model.

The Ortiz-Pérez et al. (1) findings corroborate our data regarding the apical lateral segment. Furthermore, because the 17-segment model that we examined and the American Heart Association model that Ortiz-Pérez et al. (1) evaluated differ regarding the expected coronary artery distribution at the apical inferior segment, the Ortiz-Pérez et al. (1) findings and our findings are in good agreement regarding the vascular supply of this segment, which in most patients was from the LAD. One segment that Ortiz-Pérez et al. (1) and we did not fully agree on was segment 12, which in our cohort was supplied by the left circumflex coronary artery, as the model predicts, and in the study by Ortiz-Pérez et al. (1), it was more commonly supplied by the LAD. In a smaller study, Pereztol-Valdés et al. (4) reported that segment 12 can be supplied by either the left circumflex coronary artery or the LAD.

The disagreement in the 2 reports regarding blood supply of the mid anterolateral segment (segment 12) may possibly be explained by the following factors: the inherent individual variability of coronary artery anatomy, the smaller number of patients in the study by Ortiz-Pérez et al. (1), the different methodology and different segmentation models in the 2 reports, and the existence of significant coronary atherosclerosis and previous scarring in some patients in the Ortiz-Pérez et al. (1) study. However, the agreement in these two studies (1,3) and other reports (4,5) regarding the inferior apical and lateral apical segments, suggesting that the LAD usually supplies segments 15 and 16, is important and should be taken into consideration for a possible revision of the expected vascular distribution in the 17-segment American Heart Association model.

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REPLY

We thank Dr. Danias for his interest in our article (1). Despite the differences in the left ventricular segmentation model applied by Aepfelbacher et al. (2) in their study, we agree that the entire apex more frequently is supplied by the left anterior descending artery (LAD). This finding has also been suggested in other studies in which the authors used nuclear perfusion imaging (3) or coronary computed angiography and magnetic resonance imaging (4). These results reflect the usual distribution of the LAD on angiography which, in most cases, wraps around the apex. Therefore, we agree that these studies should warrant a possible revision of the expected

vascular distribution in the 17-segment American Heart Association model.

The coronary supply of segment 12 (midanterolateral wall) remains controversial. Although Aepfelbacher et al. (2) reported that this segment is supplied by the left circumflex artery, as proposed by the American Heart Association model, we, in addition to Pereztol-Valdes et al. (3), found that this segment is more often supplied by the LAD. The diagnostic accuracy of midanterolateral involvement for a LAD stenosis/occlusion reached 80% in our study and 63% in the Pereztol-Valdes et al. (3) study. As stated by Dr. Danias, differences in methodologies and anatomical coronary variations may explain these disparities. Aepfelbacher et al. (2) included patients with either single or multivessel disease, with 42% of the cohort having previously undergone coronary revascularization. Pereztol-Valdes et al. (3) investigated patients with newly diagnosed single-vessel disease. The inclusion of patients with concomitant significant disease in the LAD and left circumflex territory might preclude appropriate registration in this particular segment.

The patient population used in our study included subjects who presented with an acute myocardial infarction to a single acute coronary occlusion. Additionally, the presence of previous myocardial scar in areas not corresponding and distinct to the infarct related artery was excluded. It should be also stressed that the use of cardiac magnetic resonance imaging allows the identification of the anterior and inferior right ventricular junction points, which in addition to the center of the left ventricular cavity, represent strong landmarks permitting a precise segmentation of the septum and left ventricular free wall. Further hybrid imaging studies that fuse the depiction of the coronary arteries as it courses on the left ventricular wall with functional imaging, like single-emission photon computed tomography/computed tomography, positron emission tomography/computed tomography, or cardiac magnetic resonance imaging angiography/perfusion, are warranted to clarify these disparities.

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Clinical Coronary Chemograms and Lipid Core Containing Coronary Plaques

Recently, the U.S. Food and Drug Administration approved the use of a catheter-mounted near-infrared spectroscopy system (InfraReDx, Inc., Burlington, Massachusetts) for the identification of lipid core–containing coronary plaques. The readouts of chemical composition are called chemograms and lipid-rich areas are represented in yellow. The chemograms are presented as if the coronary vessel has been split open and is presented as a ribbon. The important landmarks such as major branches are

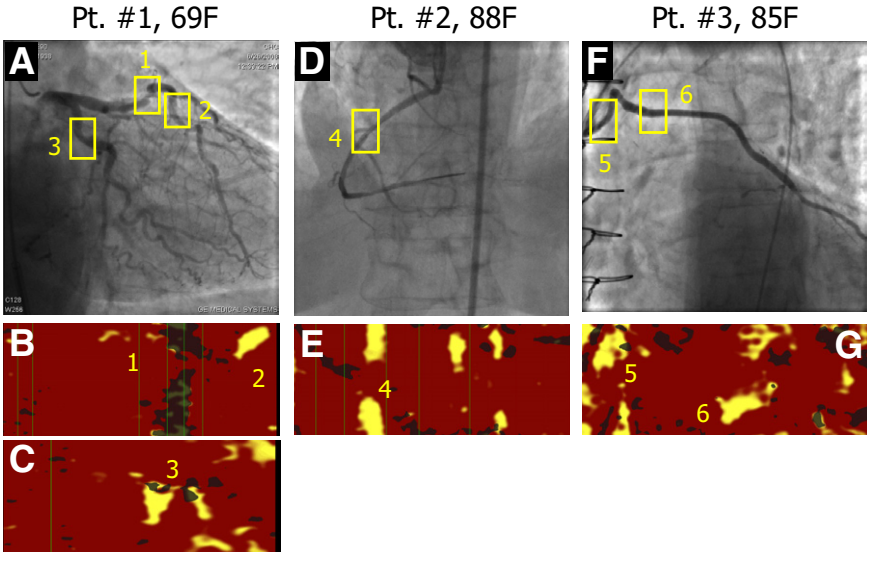

Figure 1. The Coronary Angiograms and Near Infrared Spectroscopy in 3 Patients

Coronary angiograms are presented in **A, D, and F** and spectroscopy results in **B, C, E, and G**. The **brown strip** shows the chemogram of the coronary artery as if it has been split open, wherein the **yellow color** represents lipid cores. The **green vertical lines** are landmarks, such as major coronary branches, for precise localization of lipid cores and comparison with coronary angiograms or intravascular ultrasound. The chemographic results correspond to the coronary lesions enclosed by the **yellow boxes** on coronary angiograms. Patients (Pt.) #1 and #2 demonstrate lipid-rich lesions in relatively mildly stenotic coronary lesions. The severely obstructive lesion does not show a lipid-rich plaque. The lipid-rich lesions were observed to be discrete in coronary vessels. However, the lipid accumulation is diffusely present in a saphenous vein graft in the third patient.