Reviewer's report

Title: The association of spatial T wave axis deviation with incident coronary events. The ARIC cohort.

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Reviewer: Polychronis E Dilaveris

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General
The study by Vaidean G, et al. assesses the association of spatial T wave axis deviation with incident coronary events in the Atherosclerosis Risk in Communities Study (ARIC) cohort. This study elegantly shows the presence of a weak association between the spatial T wave axis deviation and the incident coronary events. The ability of T wave axis to predict coronary heart disease occurrence has been tested in several previous studies. A strong association was found between T wave axis deviation and coronary heart disease in the cohort of the older adults of the Rotterdam study, and in patients admitted with acute ischemic chest pain. Both studies used the frontal plane T wave axis and long-term follow-up of the study participants. The Cardiovascular Health Study (CHS) showed that the spatial T wave axis deviation is an independent indicator for the risk of incident coronary heart disease events in older men and women free of coronary heart disease. On the other hand, the Multiple Risk Factor Intervention Trial (MRFIT) studied a young cohort (35 to 57 years) and failed to show the presence of significant association between baseline spatial T wave axis deviation and incident coronary events. The age range of the study participants in the study by Vaidean G, et al. was 45 to 64 years, that is similar to the MRFIT, but substantially younger than that of the Rotterdam or the CHS study. Therefore, there is significant controversy in the literature concerning the ability of the T wave axis deviation to predict future coronary events. A potential explanation involves true variation between study populations, including different demographic characteristics, different absolute cardiovascular risk levels or different patterns of confounding by other cardiovascular risk factors. It seems that older populations with either clinical history of coronary artery disease or ECG evidence of ischemia usually show the presence of significant association between T wave axis deviation and incident coronary heart events. It seems logical that the evolution of ventricular repolarization abnormalities and the progression of atherosclerotic heart disease are parallel phenomena. Therefore, T wave axis deviation may serve as an indicator of incident coronary heart events in populations with higher prevalence of progressed atherosclerotic heart disease such as the elderly people.

The link between ventricular repolarization abnormalities and propensity to arrhythmia has been previously demonstrated. Neither the study by Vaidean G, et al. nor the previously published population-based studies attempt to associate T wave axis deviation with future arrhythmic events. Nevertheless, abnormalities of the T wave loop morphology seem to be of significant importance. The hypothesis that all information concerning cardiac repolarization is contained in a single T-wave vector most likely is an oversimplification. The vectorcardiographic derivation of a common T-wave vector from a sample number of surface ECG leads may average existing nondipolar contents within cardiac repolarization. However, the spatial descriptors of the T-wave vector loop appear to exhibit several advantages. They can be measured easily, they are not affected by observation biases and are likely to be less susceptible to noise and problems of definition than conventional ECG indices of ventricular repolarization. Future studies should examine the ability of these spatial repolarization descriptors to identify high-risk patients for ventricular arrhythmias.

Major Compulsory Revisions (that the author must respond to before a decision on publication can
be reached)

Minor Essential Revisions (such as missing labels on figures, or the wrong use of a term, which the author can be trusted to correct)

Discretionary Revisions (which the author can choose to ignore)

What next?: Accept without revision

Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Acceptable

Statistical review: No

Declaration of competing interests:

None