# From Electrocardiogram to Magnetic Resonance Imaging – The Quest for Unrecognized Myocardial Infarction

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***Short Editorial related to the article: Detection and Location of Myocardial Infarction Using Electrocardiogram: Validation by Cardiovascular Magnetic Resonance Imaging***

In the article "Detection and localization of myocardial infarction using electrocardiogram: validation by cardiovascular Magnetic Resonance Imaging",[1] the authors systematically and thoroughly analyze the relationship between the presence of pathological Q waves on the electrocardiogram (ECG) and delayed enhancement with an ischemic pattern on magnetic resonance imaging (MRI). Very relevant data on the diagnostic performance of the ECG in detecting and localizing myocardial infarction (MI) are presented, expanding the evidence accumulated in previous studies.

The authors studied two groups of patients: one consisting of patients with a documented history of MI and the other selected from diabetic patients without significant cardiac abnormalities on MRI.

The results of the present study highlight the moderate sensitivity of the ECG in diagnosing MI, in line with the study of Jaarsma et al.[2] but remarkably superior to the 13.2% sensitivity that was found in a recent meta-analysis of prospective cohort studies.[3] It should be emphasized that the ECG showed significantly greater sensitivity for MI with more extensive areas of fibrosis and with a greater number of segments with transmural fibrosis. The higher sensitivity observed in the present study and the study by Jaarsma et al.[2] may be attributed to the selection of patients with larger infarct sizes, as both studies included mostly patients who experienced an ST elevation MI.

Although the presence of pathological Q waves on ECG was initially associated with transmural infarcts, MRI studies challenged this concept, reporting a closer association with the total infarct territory size rather than with transmural scars.[4,5]

The agreement between ECG and RMI to detect the location of the myocardial scar was limited. Of note, the sensitivity of ECG was significantly lower for detecting MI in the lateral wall, a finding that corroborates previous results from smaller studies.[6,7]

Detecting an MI in asymptomatic patients has important prognostic implications since an unrecognized MI confers an increased risk of major adverse cardiovascular events in different populations.[3,8-10]

The prevalence of unrecognized MI varies based on the screening methods and the cardiovascular risk of the studied population. In older adults, the prevalence of unrecognized MI detected by ECG can exceed 5%.[11] However, in a European region with low cardiovascular risk, Ramos et al.[12] reported a prevalence of abnormal Q waves of 0.67%, but only 0.18% of confirmed MI by additional imaging methods.

In the present study, the recruitment of participants was based on patients after clinically recognized MI or with diabetes, which may limit the generalizability of the results to the general population of the country. Furthermore, ECG patterns and diagnostic performance can differ between unrecognized and clinically recognized MI. Therefore, insufficient data is present to acknowledge the use of EGG for widespread screening in non-selected populations.

On the other hand, the use of cardioprotective medications in patients with unrecognized MI was significantly lower than in patients with known MI,[13] so in patients with increased cardiovascular risk, an ECG could be recommended to screen for ischemic changes. However, an ECG without Q-waves may be insufficient for a correct exclusion of previous MI in diabetic and other high-risk populations.[10,14] The use of additional ECG parameters and/or imaging tests in these populations may potentially modify risk assessment and subsequent therapeutic interventions.

Considering the diagnostic limitations of the ECG and difficulties in accessing imaging tests, additional studies are needed to address the clinical benefits and cost-effectiveness of this approach, both in the general population and selected high cardiovascular-risk populations.

## Keywords

Magnetic Resonance Imaging; Myocardial Infarction; Electrocardiography

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