Comparison of model-based and expert-rule based electrocardiographic identification of the culprit artery in patients with acute coronary syndrome

Vivian P. Kamphuis[a], Galen S. Wagner[b], Olle Pahlm[c], Sumche Man[a], Charles W. Olson[d], Ljuba Bacharova[e], Cees A. Swenne[a]

[a]Leiden University Medical Center, Leiden, The Netherlands*
[b]Department of Cardiology, Duke University, NC, USA
[c]Department of Clinical Physiology, Lund University and Skane University Hospital, Lund, Sweden
[d]ECG-TECH Corp, Huntington, NY
[e]International laser Center, Bratislava, Slovak Republic

Introduction Culprit coronary artery assessment in the triage ECG of patients with suspected acute coronary syndrome (ACS) is relevant a-priori knowledge preceding percutaneous coronary intervention (PCI). We compared a model-based automated method (Olson method) with an expert-rule based method for the culprit assessment.

Methods In each of 53 ACS patients scheduled for primary PCI and with an angiographically demonstrated completely occluded culprit artery, the culprit artery location was assessed in the preceding ECG by both the model-based Olson method and the expert-rule based method that considered either visual or computer-measured J-point amplitudes. ECG culprit artery estimations were compared with the angiographic culprit lesion locations. Proportions of correct classifications were compared by a Z test at the 5% significance level.

Results The Olson method performed slightly, but not significantly, better, when the expert-rule based method used visual assessment of J-point amplitudes (88.7% versus 81.1% correct; $P = 0.28$). However, the Olson method performed significantly better when the expert-rule based method used computer-measured J-point amplitudes (88.7% versus 71.7% correct; $P<0.05$).

Discussion The automated model-based Olson method performed at least at the level of expert cardiologists using a manual rule-based method.