

# Comparison Between Man and Machine in the Case of ACS and AMI Detection in a Chest Pain Cohort

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Introduction: Acute myocardial infarction (AMI) is a major cause of death and disability. A rapid and reliable diagnosis is a major clinical need. We wanted to know if man or machine is better at detecting acute coronary syndrome (ACS) and acute myocardial infarction (AMI) by hypothesising that there is no statistically significant difference between man and machine, both blinded to clinical information after the patients initial presentation at the emergency department. Methods: All patients underwent a clinical assessment included clinical history-taking, a physical examination, 12-lead ECG, continuous monitoring, pulse oximetry, standard blood measurement, chest radiography; the 799 patients presented chest pain and angina pectoris at the emergency department. The myocardial enzymes were measured at presentation and in the following. Gold standard of AMI/ACS was defined by two independent cardiologists who reviewed all available medical records including follow-up. For algorithm improvements and scientific performance measurements, a test set with the first 399 patients of the prospective study were selected. Results: Out of 799 patients, 266 patients had an acute coronary syndrome thereof 129 patients were diagnosed with AMI. In the case of AMI, we found an optimal detection level of ST-segment elevation of 100 $\mu$ V with an age dependency for precordial leads. The sensitivity was 9% ( $p < 0.001$ ) with 98% specificity. By lowering this threshold and adding features such as limitation of ST/T, restrictions on R and/or S-range, ST-depression and single-lead criteria, the sensitivity can be improved while keeping a high level of specificity. The sensitivity was 22% ( $p < 0.001$ ) resp. 53% with specificity of 99% resp. 83%. In case of ACS, the sensitivity was 37% ( $p < 0.001$ ) with specificity of 86% using ACC/ESC guidelines and 41% resp. 86% for the algorithm. Conclusions: Using automatic detection of AMI, the algorithm can be designed to match man or to be more specific. In the second case, the sensitivity is statistically significantly lower ( $p < 0.001$ ) but with a statistically significant higher specificity ( $p < 0.001$ ) compared to men. If the algorithms performance is adapted to mans lower specificity, we did not find a statistically significant difference between the detection performance of mans and machines. We could not reject the hypothesis of identical performance in the case of ACS detection, either.