Troponin I testing with 'one hour protocol' in patients with the suspicion of acute coronary syndrome in the emergency department

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Introduction

The emergency department (ED) is the place in the hospital where doctors need to make fast and correct decision regarding the diagnosis and treatment of the patient. In order to make that decision there are different (biochemical) tests available depending on the symptoms, anamneses and observation of the patient. Here, I will focus on the patients with a suspicion of acute coronary syndrome (ACS) and the importance of getting a quick diagnosis to increase the chance of correct treatment. In order to do that I will describe the results of cardiac troponin I (cTnI) of the month of November.

cTnI is one of the most specific markers for ACS. The increase of that specific marker above a certain value may indicate a heart failure. High-sensitivity cardiac troponin assay is the test used to measure the level of cTnI in plasma.

The luminescent oxygen channelling immunoassay (LOCI) is the technology used to test the amount of cTnI. LOCI is based on antigen-antibody reaction. The detection is initiated by excited oxygen particles transferring their energy to other particles which in turn initiate chemiluminescent reaction.(1)

Materials and methods

Troponin I measurements

The heparin tube with gel was taken two times with at least one hour in between. After sending the tubes to the biochemistry lab, the heparin tube with gel with a volume of three ml was centrifuged and put on a clinical chemistry machine (Dimension Vista, Siemens) for the further testing of plasma. The whole analysis was performed automatically.

Troponin I calculations

Both measurements were used to calculate the eventual increase of cTnI in patient's blood. The calculation was performed by subtracting the first value (0t) from the second value (1t). The calculated value was defined as 'Δ troponin I' (Δt). The result of cTnI was expressed in nanogram per litre.

Interpretation of results and reference values

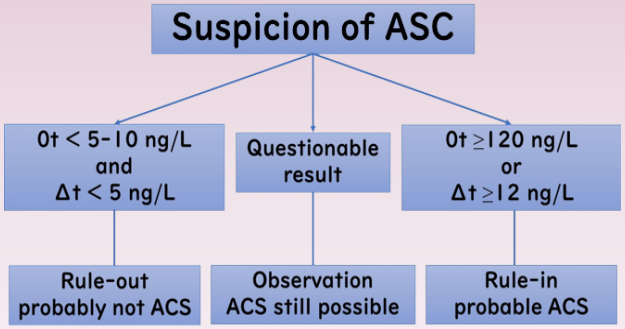


Figure 1: Interpretation of result in case of suspicion of ASC. If the first measurement (0t) was <10 ng/L and Δt <5ng/L the patients were ruled out for suspicion of ASC. If 0t ≥120 ng/L or if Δt ≥12 ng/L the patients were ruled in for probable ASC. If the result of troponin I was none of both possibilities the patients were kept in the hospital for further observation. Adapted from 'TNI', Arlington Ølholm L.

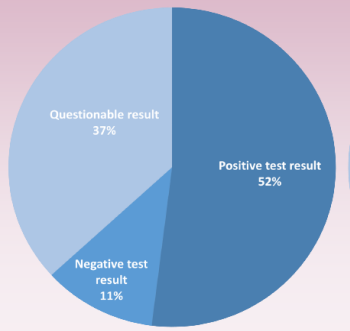
Internal quality control for troponin I test

The product for control was called 'cardiac marker' (BIO-RAD).

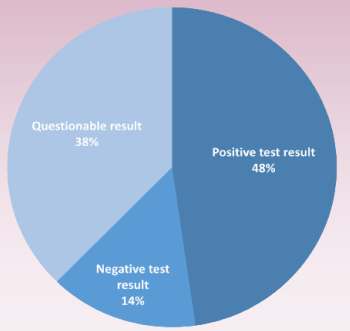
	LEVEL 1	LEVEL 2
Range	2,8 – 5,2 pg/ml	42,5 – 57,5 pg/ml

Results

Female group of patients



Male group of patients



Conclusion

Cardiac troponin I testing with one hour protocol increases the chance of an early detection of acute coronary syndrome because of high sensitivity and quick results. This improves the quality of patient care and flow in the emergency department. Laboratory testing remains the best choice to get a reliable result which is important to start the correct treatment.

Reference

(1) Ullman EF, Kirakossian H, Singh S, Wu ZP, Irvin BR, Pease JS, Switchenko AC, Irvine JD, Dafforn A, Skold CN, *et al*. Luminescent oxygen channeling immunoassay: measurement of particle binding kinetics by chemiluminescence. Proc Natl Acad Sci U S A. 1994 Jun 7;91(12):5426-30. doi: 10.1073/pnas.91.12.5426.

(2) Arlington Ølholm L. TNI [Cited 2023 Jan 17]