

# The investigation of macro-troponin in a 65 year old with heart failure

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**Introduction:** High-sensitivity cardiac troponin assays are key to the investigation of myocardial infarction and are routinely used as a rapid rule-out test in the emergency department. However, spuriously raised troponin results can occur; awareness of this amongst healthcare professionals is important to ensuring the correct diagnosis and patient management.

**Case Study:** A 65 year old female with multiple co-morbidities, including heart failure, Hodgkin's lymphoma and hypertension. Over a period of 6 months the patient was found to have a persistently raised high-sensitivity Troponin-I (93.3ng/L – 130.4ng/L) despite good response to their heart failure treatment.

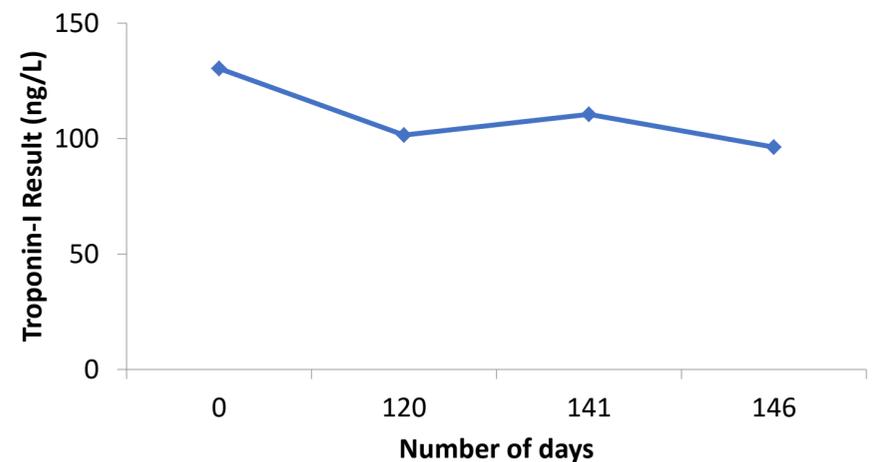


Figure 1 Troponin-I results from the patient in question.

**Materials & Methods:** Polyethylene glycol (PEG) precipitation involved 1:2 dilution of sample with 25% PEG 6000 (w/v). Samples were vortexed for 5 minutes then centrifuged at 3500 rpm for 10 minutes, with the supernatant reanalysed. Linear dilution studies were carried out for both patient and control samples using sera from patients who had previously reported undetectable Troponin-I levels (<5ng/L). Samples were diluted 1:2, 4, 8 and 16, then reanalysed.

**Results:**

Patient Sample 1	Siemens Atellica (99 <sup>th</sup> centile = 45.4ng/L)	Beckman Immunoassay (99 <sup>th</sup> centile = 17.5ng/L)
Troponin (ng/L)	101.5	4.5

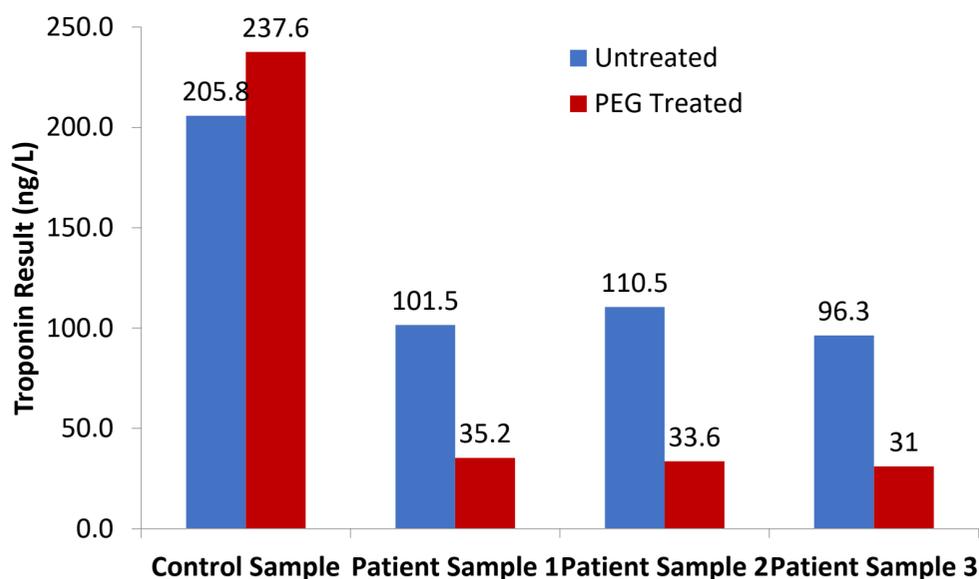


Figure 2 PEG precipitation of patient and control samples. Blue and red bars represent untreated and post-PEG precipitation concentrations respectively with absolute values shown. Average percentage recovery for patient samples was calculated as 32.5% and the control sample was 115.5%.

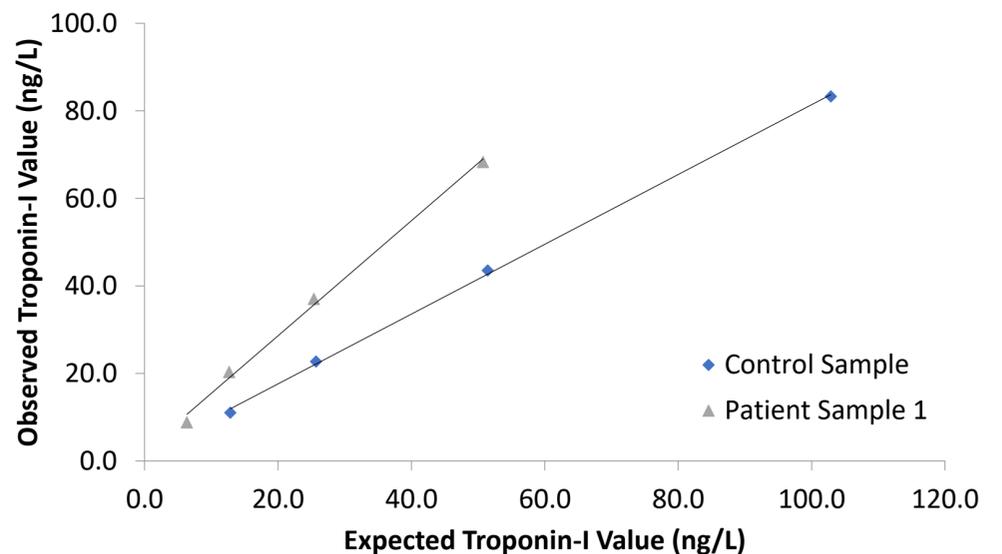


Figure 3 Linear dilution studies of the patient sample 1 and control sample. Triangles and diamond represent patient and control samples respectively. Triangle:  $y = 1.3148x + 2.3217$ ,  $R^2 = 0.9963$ . Diamond,  $y = 0.7975x + 1.6565$ ,  $R^2 = 0.9994$ .

**Conclusion:** Here we describe the investigation of a patient with persistently raised Troponin-I levels, despite a good response to their heart failure treatment. Measurement of Troponin-I on an alternative platform demonstrated a result of 4.5 ng/L (initial result 101.5 ng/L). In addition, PEG precipitation returned an average percentage recovery of 32.5%, whilst dilution studies demonstrating a linear relationship through serial dilution measurements ( $R^2 = 0.99$ ). Together, these results suggest the presence of a macro-troponin within the patient sample. Macro-troponins are usually IgG-complexed molecules which can be clinically insignificant, but can be measured analytically<sup>1-2</sup>. Although macro-troponin cases are not widely reported, this case demonstrates the importance of having a close relationship and regular dialogue with clinicians when investigating laboratory results which may not fit the clinical picture.

**References:** Warner & Marshall (2016) High incidence of macrotroponin I with a high-sensitivity troponin I assay. *Clinical Chemistry and Laboratory Medicine*. 54(11), 1821-1829, Akhtar et al., (2020) False-positive troponin elevation due to an immunoglobulin-G-cardiac troponin T complex: a case report. *European Heart Journal*. 4, 1-5.