Dynamic Changes in High-Sensitivity Cardiac Troponin I Concentration in Response to Anthracycline-based Chemotherapy – A pilot study for the Cardiac CARE randomised trial

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Introduction
Treatment advances have improved cancer-related outcomes and shifted interest towards minimising long-term iatrogenic complications. High-sensitivity cardiac troponin I (hs-cTnI) assays accurately quantify very low concentrations of plasma troponin, and may enable early detection of myocyte injury prior to development of myocardial dysfunction. The short-term kinetic profile of hs-cTnI in response to anthracycline-based treatment has not previously been described.

Methods
A prospective observational study recruiting adults with invasive breast cancer scheduled to receive adjuvant or neo-adjuvant anthracycline-based chemotherapy. Blood sampling was performed before and 24 hours after each cycle with hs-cTnI concentrations measured using the Abbott ARCHITECTSTAT assay.

Results
Between January 2016 and May 2017, 100 women (53.4±9.2 years; range, 31 to 77 years) were enrolled. The median (IQR) cumulative epirubicin dose was 352 (298 to 479) mg/m² over 3 (2 to 6) treatment cycles. The median troponin concentration prior to the first anthracycline dose was 2 (1 to 4) ng/L. When measured 24 hours following treatment, there was a median decrease in hs-cTnI concentration of 33% (p <0.001) (Figure 1). However, troponin concentrations measured immediately prior to dosing increased by a median of 50% (p<0.001) with each successive treatment cycle. Early separation was observed between those patients who had the highest and lowest hs-cTnI concentrations on completion of the course of anthracycline.

Conclusions
Myocardial injury arising from anthracycline therapy is detectable in the earliest stages of breast cancer treatment and is cumulative with each chemotherapy dose. This injury is most reliably determined from blood sampling performed before rather than after each treatment cycle.
Figure 1: Median troponin concentrations immediately prior to each anthracycline dose. Colours relate to tertiles of troponin concentration as determined prior to 6th cycle. Inset boxplot demonstrates distribution of troponin concentrations measured before and 24 hours after each cycle.

hs-cTnI, high-sensitivity cardiac troponin I