

Does QRISK@3 cardiovascular risk score correlate with elevations in Troponin T during anthracycline chemotherapy?

Authors: Michael Mallouppas ^{1, 2}, Robin Chung ^{2, 3}, Alison Macklin ^{1, 2}, Arjun Ghosh ^{1, 3}, Derek M Yellon ², J Malcolm Walker ^{1, 2}

Institutions – 1. University College London Hospitals
2. Hatter Cardiovascular Institute, UCL. 3 Bart's Heart Centre, London



Background

Despite modern advances in cancer therapy, anthracyclines remain an important chemotherapy option for a variety of cancers such as lymphoma, sarcoma and breast cancer. As such, identifying patients with the highest risk of anthracycline cardiotoxicity still remains an integral part of any cardio-oncology service. International guidelines¹ advise screening patients by assessing their baseline risk factors. Furthermore, elevations of cardiac biomarkers such as troponin early during chemotherapy, may predict the development of cardiac dysfunction^{2,4}.

QRISK@3, is a validated risk assessment tool of cardiovascular disease used to estimate future risk of cardiovascular disease and guide therapy such as lifestyle and lipid modification, currently in use mainly in primary care^{5,6}. As QRISK@3 includes some of the baseline patient risk factors associated with anthracycline cardiotoxicity, we investigated whether QRISK@3 correlates with elevations in Troponin T (TropT) during chemotherapy.

Methods

38 patients from our ERIC-ONC study⁷ who have finished their chemotherapy, have had their QRISK@3 score calculated using <https://qrisk.org/>. ERIC-ONC (Effect of Remote Ischaemic Conditioning (RIC) in ONCology) is an ongoing double-blind randomised sham-controlled study investigating the role of RIC as a cardioprotective mechanism in patients receiving anthracyclines. In this study, high sensitivity TropT is taken before and after each chemotherapy cycle. Correlation associations using Spearman's rank correlation coefficient (ρ) between patient's baseline QRISK@3 and their pre-chemo TropT at each cycle were performed to see how their correlation changes with each chemotherapy cycle.

Results

Mean age was 49 (range 22-80) with 45% females. The average QRISK@3 score was 6.8% (range 0.1-33.4%). 50% were non-smokers, 29% ex-smokers and 18% current smokers (3% missing data). 71% had no family history of ischaemic heart disease and 18% had positive family history (11% missing data). 8% had hypertension and 2 patients had diabetes. 31 (82%) patients had sarcoma, 4 (11%) lymphoma and 3 (8%) breast cancer. 24 patients received 6 cycles of chemotherapy, 2 patients 5 cycles, 3 patients 4 cycles, 8 patients 3 cycles and 1 patient 2 cycles. Troponin trends at each cycle are shown in Figure 1 and Table 1.

Figure 1. Troponin trends

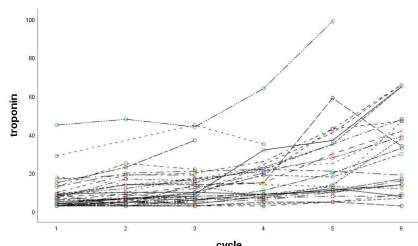
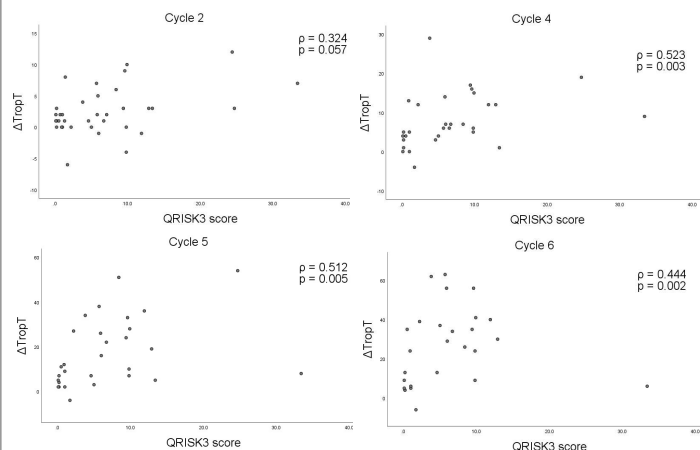


Table 1. Troponin trends

	Baseline (ng/L)	Pre-cycle 2 (ng/L)	Pre-cycle 3 (ng/L)	Pre-cycle 4 (ng/L)	Pre-cycle 5 (ng/L)	Pre-cycle 6 (ng/L)
Mean TropT	8 (range <3-45, n = 38)	10 (range <3-48, n = 36)	13 (range <3-45, n = 38)	16 (range <3-64, n = 31)	25 (range 5-99, n = 29)	32 (range 3-66, n = 27)
% TropT +ve (>14 ng/L)	13% (n = 38)	19% (n = 36)	34% (n = 38)	52% (n = 31)	55% (n = 29)	70% (n = 27)
Mean TropT from baseline (ΔTropT)		3 (range -6 -12, n = 36)	5 (range -6 -22, n = 38)	8 (range -4 -29, n = 31)	17 (range -4 -54, n = 29)	26 (range -6 -63, n = 32)

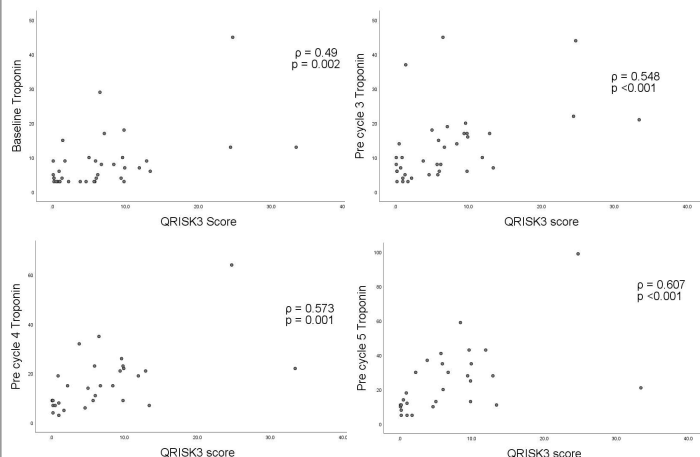
There was a moderate positive correlation between QRISK@3 score and Δ TropT from baseline with $\rho=0.523$ ($p=0.003$), $\rho=0.512$ ($p=0.005$) and $\rho=0.444$ ($p=0.002$) for cycles 4, 5 and 6 respectively (Figure 1).

Figure 1. Scatter plot of QRISK@3 correlation with Δ TropT from baseline



When compared with the absolute troponin value, there was a moderate positive correlation between QRISK@3 and baseline TropT ($\rho=0.493$, $p=0.002$) that became stronger towards the latter cycles of chemotherapy (cycle 2 $\rho=0.523$, $p=0.001$, cycle 3 $\rho=0.548$, $p<0.001$, cycle 4 $\rho=0.573$, $p=0.001$, cycle 5 $\rho=0.607$, $p<0.001$, cycle 6 $\rho=0.522$, $p=0.005$) (Figure 2). Correlation analysis between age and Δ TropT (cycle 4 $\rho=0.632$, $p<0.001$) and age and TropT ($\rho=0.7$ for cycles 4-6, $p<0.001$) show moderate to strong associations suggesting that age may be an important contributor.

Figure 2. Scatter plot of QRISK@3 correlation with TropT (absolute value).



Conclusion

In this cohort, most patients have a positive troponin by the end of their chemotherapy. Correlation associations seem to suggest there is a moderate positive correlation of baseline QRISK@3 score and elevations in troponin from baseline during chemotherapy with anthracyclines (with age potentially an important contributor). Therefore, baseline individual cardiovascular characteristics may be useful to identify patients at risk of future cardiotoxicity.

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