Adult survivors of childhood cancer have significant levels of impaired cardiorespiratory fitness, inflammatory markers and poor quality of life outcomes

C. McCune¹, C. Watson², M. Harbinson¹, A. McCarthy³, R. Johnston³, L. Dixon¹

¹Belfast Health and Social Care Trust, Cardiology, Belfast, United Kingdom of Great Britain & Northern Ireland
²Queen's University of Belfast, Wellcome-Wolfson Institute of Experimental Medicine, Belfast, United Kingdom of Great Britain & Northern Ireland
³Royal Belfast Hospital for Sick Children, Belfast, United Kingdom of Great Britain & Northern Ireland

Funding Acknowledgements: Type of funding sources: Other. Main funding source(s): Heart Trust Fund

Anthracycline chemotherapy is used in approximately two thirds of the 35,000 European children diagnosed with cancer each year. Unfortunately, 1 in 10 will develop symptomatic heart failure at 40 years after therapy. Emerging evidence suggests that anthracyclines exert a significant cardiovascular insult that expands beyond an impaired ejection fraction. Impaired cardiac reserve has been demonstrated in patients treated as adults; however, the impact of cancer treatment in childhood during cardiac development, is less widely described, particularly the long-term effects, several decades post treatment.

Purpose: This study explores quality of life (QOL), cardiorespiratory fitness and imaging outcomes in adult childhood cancer survivors (CCS) treated with >100mg/m² of anthracycline.

Methods: Adult CCS (>18 years) were recruited from our regional cardio-oncology surveillance programme. Anthracycline equivalence dose was calculated according to ESC 2022 guidance. Questionnaires were completed describing exercise habits and QOL (SF36). Outcomes in each domain were assessed against population age/gender matched normative values. A 6-minute walk test was performed and % predicted values adjusted for height/weight/age/gender (6MWT%). CCS with abnormal 6MWT% were referred for CPEX. Cardiac biomarker analysis (wrCRP, NTproBNP and TnT) and cardiac imaging were performed.

Results: Consent was gained from 86 CCS (55% male) mean age 28 (18-53 years). Mean dose was 270mg/m² (108-705). 70% met NHS exercise targets. 13% had an ejection fraction (EF) of <50% and 26% had an abnormal global longitudinal strain (GLS). 34 (40%) of patients had 6MWT% below the lower limit of normal (LLN). CCS scored below the LLN in every QOL domain, with marked abnormalities in general health (20% abnormal), mental health (16%) and physical functioning (13%).

Symptoms were similar in sedentary and non-sedentary patients. Sedentary CCS had abnormal wrCRP (p = 0.002), 6MWT% (p = 0.002) and lower indexed stroke volumes on MRI (p = 0.015). Exercise duration (mins/week) correlated with improved 6MWT%, fractional shortening, septal E/e' (all P<0.05). Vigorous exercise compared to sedentary habits were associated with better 6MWT%, wrCRP, reduced frailty and improved QOL as well as NTproBNP, GLS and EF.

At 20 years post anthracycline, EF was impaired in 7/35 (20%), GLS impaired in 36% and 22% met criteria for frailty/prefrailty.

Conclusion: Childhood cancer survivors display significant impairment in cardiorespiratory fitness and score lower in all quality of life domains. Sedentary behaviour is associated with worse QOL, impaired cardiorespiratory fitness, inflammation and abnormal imaging. Interestingly, reported symptoms did not differ regardless of activity level. Whether sedentary behaviour is secondary to cardiotoxicity or exercise mitigates the effect of cardiotoxicity is still unclear and further research is anticipated in this field.