The ongoing impacts of cancer therapy on the cardiorespiratory fitness of long-term adolescent and young adult cancer survivors

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Introduction

- Cardiovascular disease is major competing cause of mortality and morbidity in cancer patients [1]. Reasons for this in adolescent and young adult survivors (AYA) include exposure to therapies that cause cardiotoxicity and loss of cardiorespiratory fitness during and post-treatment, a key risk factor for cardiovascular disease [2].
- The purpose of this study was to investigate the cardiorespiratory fitness of long-term Australian AYA cancer survivors and compare them to age-matched normative data.

Method

- This explorative cross-sectional study included participants aged 15-25 years at the time of cancer diagnosis and ≥ 5 years post-treatment completion.
- Study participants completed the following assessments; cardiopulmonary exercise testing; and questionnaires to measure physical activity levels (GLTEQ); fatigue (FACIT-F) and HRQoL (AQoL-6D).

Results

- Twenty-two participants were recruited with the following demographics: mean age 27.9 (SD 3.3) years; 54.5% women; mean years post-treatment completion 7.2 (SD 2.2); and predominantly diagnosed with Hodgkin lymphoma (40.1%), AML (13.6%), Sarcoma (13.6%) or Brain (13.6%) cancer.
- Lower cardiorespiratory fitness was identified compared to age-matched norms ($V0_2$peak AYA women: 27.1 mL/kg/min vs 39.1 mL/kg/min, p=<0.0001) and ($V0_2$peak AYA men: 39.7 mL/kg/min vs 45.6 mL/kg/min, p=0.01) [Table 1 & 2].

Table 1: CRF AYA cancer survivors vs normative data [3] FEMALE

	AYA (n=12) Mean (SD)	Normative (n=33) Mean (SD)	P-value
Heart rate and blood pressure			
Heart rate, bpm	78 (14)	62 (10)	<0.0001
Systolic BP, mm HG	117 (11)	115 (12)	0.62
Diastolic BP, mm HG	82 (9)	71 (9)	<0.0001
Graded exercise test			
Max heart rate, bpm	168 (12)	184 (10)	<0.0001
Watts	192 (31)	203 (32)	0.31
Respiratory exchange ratio	1.27 (0.08)	1.2 (0.04)	<0.0001
Anaerobic threshold	20.4 (6.7)	22.8 (4.9)	0.2
$V0_2$peak, ml/kg/min	**27.1 (7.3)**	**39.1 (6.1)**	**<0.0001**
$V0_2$peak % Predicted	82 (20.7)		

Table 2: CRF AYA cancer survivors vs normative data [3] MALE

	AYA (n=10) Mean (SD)	Normative (n=40) Mean (SD)	P-value
Heart rate and blood pressure			
Heart rate, bpm	74.9 (16.1)	63 (11)	0.01
Systolic BP, mm HG	119 (9)	127 (10)	0.02
Diastolic BP, mm HG	79 (9)	76 (7)	0.01
Graded exercise test			
Max heart rate, bpm	170 (11)	189 (7)	<0.0001
Watts	260 (54)	297 (60)	0.08
Respiratory exchange ratio	1.29 (0.08)	1.22 (0.06)	0.01
Anaerobic threshold	26.2 (7.5)	25.1(6)	0.06
$V0_2$peak, ml/kg/min	**39.7 (13.2)**	**45.6 (7.7)**	**0.01**
$V0_2$peak % Predicted	85.6 (22)		

Results continued

- AYA cancer survivors also had lower HRQoL (t[df=465]=-3.5, p=<0.0001), however no differences were observed with fatigue levels (t[df=328]=-0.8, p=0.5) or the proportion meeting physical activity guidelines (36.4 % vs 27.3%, p=0.34) compared to age-matched counterparts [Table 3].

Table 3: HRQoL [4], Fatigue [5] and PA levels [6]

Outcome	AYA Mean (SD) / Proportion (%)	Normative Mean (SD) / Proportion (%)	P-value
AQoL-6D (total score)	77.9 (10.4)	85.9 (7.7)	**<0.0001**
FACIT-F (total score)	38.6 (8)	40.3 (10)	0.45
Physical activity levels			0.34
Met guidelines	36.4%	27.3%	
Did not meet	63.7%	72.7%	

Conclusion

- AYA cancer survivors exhibit lower cardiorespiratory fitness and poorer HRQoL compared to age-matched counterparts.
- Impaired cardiorespiratory fitness may adversely impact everyday functional performance and increase risk of chronic disease development, such as cardiovascular disease.
- Exercise interventions that address these issues early in survivorship, along with routine screening of cardiorespiratory fitness may be beneficial and promote better long-term health outcomes in this population.

References

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