RESEARCH TO PRACTICE 2018
27-29 MARCH 2018
BRISBANE, QUEENSLAND

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**Wednesday, 28 March 2018**
**3:30pm – 5:00pm**

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# Does Low Volume High-Intensity Interval Training Elicit Superior Benefits to Continuous Low to Moderate-Intensity Training in Cancer Survivors?

**Kellie Toohey**[1,2,3], Kate Pumpa[1,2], Andrew McKune[1,2,4], Julie Cooke[1,2], Katrina DuBose[5], Desmond Yip[6], Paul Craft[6], Stuart Semple[1,2,3]

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**Introduction:** Exercise is increasingly being used as part of standard care for cancer survivors. The optimal evidence-based exercise guidelines for cancer survivors are not clear. This study aimed to determine the impact of low volume high-intensity interval training (LVHIIT) and continuous low to moderate-intensity exercise training (CLMIT) on cardiovascular disease (CVD) risk and health outcomes in cancer survivors.
**Methods:** Sedentary cancer survivors (n = 75, aged 51 ± 12 y) within 24 months of diagnosis, randomised into three groups for 12 weeks of LVHIIT (n = 25), CLMIT (n = 25) or control group (n = 25). Exercise intervention involved 36 sessions (three sessions per week). The LVHIIT group performed 7 x 30s intervals, a 60 second rest in between, and the CLMIT group performed continuous aerobic training for 20 min on a stationary bike. Variables were measured at baseline and 12 weeks and analysed using a 3 x 2 (group x time) repeated measures ANCOVA.
**Results:** There was an interaction effect ($p < 0.01$) after 12 weeks for six-minute walk test ($p < 0.01$; $d = 0.97$; 95% CI = 0.36 – 1.56, large ), sit to stand test ($p < 0.01$; $d = -0.83$; 95% CI = -1.40 - -0.22, large ) and waist circumference reduction ($p = 0.01$; $d = -0.48$; CI = -1.10 – 0.10, medium ) in the LVHIIT group compared with CLMIT and control groups. There was an interaction effect ($p < 0.01$) for quality of life for both the LVHIIT (ES 1.05) and CLMIT (ES 0.16) compared with the control group.
**Conclusion:** Low-volume high-intensity training shows promise as an effective alternative to traditional exercise prescription in the cancer population, improving cardio-respiratory fitness and lower body strength and decreasing waist circumference compared with CLMIT. Both LVHIIT and CLMIT improved quality of life. A benefit of LVHIIT is the short duration (3 mins) of exercise, which may entice more cancer survivors to participate in exercise to improve health outcomes, reducing risk of CVD.

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# Exercise during taxane chemotherapy for breast cancer improves indices of cardiovascular autonomic function

**Kelcey Bland**[1], Matthew Lloyd[2], Dave Borrel[2], Josh Bovard[1], Amy Kirkham[3], Tamara Shenkier[4], Margot Davis[1], Don McKenzie[1], Victoria Clayton[2], David Zucker[5], Karen Gelmon[4], Kristin Campbell[1]
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**Introduction & Aims:** Chemotherapy may negatively impact autonomic function and subsequently place breast cancer survivors at an increased risk of cardiovascular disease (CVD). While exercise can improve cardiovascular autonomic function and mitigate CVD risk, whether these benefits extend to patients undergoing chemotherapy is unclear. We evaluated the impact of exercise on indices of cardiovascular autonomic function in women with breast cancer, including heart rate (HR), blood pressure (BP), HR variability (HRV), and BP variability (BPV) at rest, and the HR and BP responses to exercise.
**Methods:** Women with early-stage breast cancer were randomized to 3x/wk supervised aerobic and resistance exercise (EX) or usual care (UC) during taxane chemotherapy. Outcomes were assessed pre- and post-chemotherapy. Continuous beat-to-beat HR and BP (Finapres) were measured during seated rest on a cycle ergometer, two stages of an incremental exercise test (3 min each; 40 and 60 W), and passive recovery. Finapres data were averaged (30 sec) at the end of the rest period and each exercise stage. HR and BP recovery were calculated as the absolute change from peak exercise to 1 min of recovery. High frequency (HF) and low frequency (LF) components of HRV and BPV were evaluated during supine rest using frequency-domain analysis.
**Results:** We enrolled 24 women (EX: 11; UC: 13). By the end of chemotherapy, relative to UC, EX had lower resting HR (EX: 71±2; UC: 77±2, $p<0.05$), lower HR during exercise (stage 1: -15±4 bpm, $p<0.01$; stage 2: -18±6 bpm, $p<0.01$), and greater HR recovery (EX: -53±4 bpm; UC: -40±3 bpm, $p=0.02$). HF HRV increased by the end of chemotherapy in EX only (UC: from 8.4±2.7 to 10.0±2.6%; EX: from 8.2±3.1 to 17.5±3.1%, $p<0.05$). There were no group differences for BPV or LF HRV.
**Conclusion:** Exercise during taxane chemotherapy may improve cardiovascular autonomic function, namely indices of cardiac vagal tone, including HF HRV, and resting and exercise HR responses.

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## Feasibility and safety of exercise during chemotherapy for patients commencing first line treatment for ovarian cancer (ECHO trial; ACTRN12614001311640)

**Rosalind Spence**[1,2], Andreas Obermair[3], Michael Friedlander[4], Linda Mileshkin[5], Alison Davis[6], Monika Janda[2], Elizabeth Eakin[1], Elizabeth Barnes[7], Vanessa Beesley[8,9,10], Louisa Gordon[1,8], Sandra Hayes[1,2]
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**Introduction:** ECHO is a national, phase III, randomised, controlled trial of exercise during chemotherapy for women commencing first line treatment for ovarian cancer. The aim of the study is to determine the effects of exercise on physical function, survival, quality of life, chemotherapy adherence and health service use. ECHO is currently in the recruitment phase (target n=330); we report here preliminary findings of the safety and feasibility of the exercise intervention.
**Methods:** Exercise-related adverse events (EAE, classified as grades 1-5 and serious/non-serious) and weekly exercise dose (minutes, intensity, type) are self-reported by participants to their Accredited Exercise Physiologist (AEP) weekly. Intervention was deemed feasible if ≥150 minutes of weekly exercise was completed by a participant ≥75% of intervention weeks (duration based on duration of first-line treatment).
**Results**: Total sample to date is 113, with 57 (50%) randomised to the intervention group. Approximately, 50% of women reported one or more EAE. Of those reported, >80% are grade 1 (most common EAE: DOMS); none were serious, although two-thirds required exercise intervention modification (e.g., short-term change in intensity or minutes, or longer-term change in type). The median weekly minutes of exercise reported was 210 (range: 80-325), although only 50% of the sample completed ≥150min/week (including ≥2 sessions of resistance-based exercise each week) for ≥ 75% of the intervention duration.
**Conclusion:** Findings suggest that exercise during chemotherapy for ovarian cancer is safe and feasible. However, exercise prescription and expectations of AEPs and women with ovarian cancer need to accommodate fluctuations in treatment-related side effects that may be experienced throughout the cycling nature of the chemotherapy regime. That is, while average weekly exercise minutes throughout chemotherapy may exceed 150 minutes/week, minutes in any given week may fall above and below this goal.

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# Effectiveness and feasibility of a technology-based physical activity intervention to support physical activity maintenance in women with stage II+ breast cancer: a randomised controlled trial

**Ben Singh**[1,2], Rosalind Spence[1,2], Jonathan Peake[2], Sandra Hayes[1,2]
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**Introduction:** Evidence to support effective strategies for longer term physical activity (PA) behaviour change maintenance is lacking in women with breast cancer. Given the rise in popularity of consumer-based PA monitors (e.g. Fitbits), this study sought to evaluate the added benefit they may bring on PA maintenance for women with stage II+ breast cancer.
**Methods:** Fifty-two women with stage II+ breast cancer who, within the past week, completed a 12-week supervised exercise program, were randomised to receive a PA counselling session, either with (PAC+F) or without (PAC) provision of a Fitbit. The PAC session was designed to promote long-term PA maintenance through the use of goal-setting, and discussion of exercise barriers and motivators. PA levels were assessed using Actigraph accelerometers (moderate-to-vigorous physical activity, MVPA) and self-report (Active Australia survey). Secondary outcomes included Fitbit feasibility (assessed via a self-administered questionnaire), quality of life (FACT-B and PROMIS), and exercise self-efficacy (Barrier self-efficacy scale).
**Results:** At 12 weeks, MVPA was significantly higher ($p<0.05$) in the PAC+F compared with the PAC group (median [range]: 34.2 [3.8–77.4] min/day and 17.5 [3.3–72.6] min/day, respectively). Two-thirds of the PAC+F group (64%) were meeting the National guidelines of 150 minutes per week of PA, compared with one-third of the PAC group (33%) at the 12-weeks. Results for the secondary outcomes also support the effectiveness and feasibility of the Fitbit.
**Conclusion:** These findings indicate that the addition of a Fitbit to PA counselling is effective and feasible for PA maintenance after completion of a supervised intervention among women with stage II+ breast cancer. Such novel technology-based options offer an effective, feasible, low-cost and accessible mode to deliver ongoing PA support beyond traditional supervised exercise programs for women with higher stages of breast cancer.

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# Exercise training attenuates the decline in peak aerobic power associated with anthracycline chemotherapy in women with early-stage breast cancer

**Erin Howden**[1], Ashley Bigaran[1,2], Steve Foulkes[3], Rhys Beaudry[4], Kristel Janssens[1], Yoland Antil[5], Sherene Loi[6], Steve Selig[7], Mark J Haykowsky[4], Steve Fraser[3], Andre La Gerche[1]

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**Introduction:** Anthracycline chemotherapy (AC) has been associated with changes in cardiac function and reductions in functional capacity ($VO_2$peak). We examined whether exercise training performed concurrent with AC could attenuate the decline in $VO_2$peak and preserve resting and exercise measures of cardiac function.
**Methods:** 28 early-stage breast cancer patients undergoing AC were recruited into a non-randomised trial and allocated to exercise training (ET; 47±9 yrs, n=14) or usual care (UC; 53±9 years, n=14*).* Prior to and following completion of AC, testing included a maximal cardiopulmonary ($VO_2$peak) test, resting echocardiography (left ventricular ejection fraction [LVEF] and global longitudinal strain [GLS]), cardiac biomarkers (BNP and troponin) and exercise cardiac magnetic resonance imaging to determine the change in stroke volume with exercise (cardiac reserve). The ET group completed a 2/wkly supervised aerobic and resistance exercise training program for 60 min/session.
**Results:** There was a 15% reduction in $VO_2$peak in the UC group (22.0±5.9 to 18.8±5.9ml/kg/min), that was significantly attenuated by ET (27.4±5.7 to 26.3±5.3ml/kg/min, Group×Time *P*=0.024). We observed a modest reduction in resting (LVEF; 63±5 to 60±5%, Time *P*=0.002) and exercise cardiac function (cardiac reserve; ~3%, Time *P*=0.06) following AC, which was not prevented by ET (interaction *P*>0.05). Troponin was increased following AC (2.9±1.3 to 28.5±22.4 ng/mL Time *P*<0.0001), while there were no significant changes in GLS (-20.0±2.0 to -19.6±2.0%) or BNP levels (37.9±34.6 to 38.4±21.5ng/L), and ET did not modify the response (*P*>0.05 for interaction). Correlations between changes in $VO_2$peak and cardiac measures were poor.
**Conclusion:** AC was associated with significant reductions in functional capacity, but only modest changes in cardiac function. ET prevented the functional decline associated with AC; however, in contrast to our hypothesis, this was not explained by preserved cardiac function.

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# Exercise and colon cancer: the current evidence and update on the CHALLENGE trial

**Shelley Kay**[1], Jane Turner[1], Kate Gunningham[1], Lissa Spencer[2], Luke Skinner[3], Kerry Courneya[4], Chris O'Callaghan[5], Christopher Booth[6], Haryana Dhillon[1], Janette Vardy[1]

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**Introduction:** Evidence from as early as the 1980s showed that higher levels of physical activity (PA) are associated with reduced risk of developing colon cancer. Epidemiological data demonstrate that colon cancer survivors with the highest PA levels have reduced risk of recurrence. CHALLENGE is investigating the effects of PA on disease free survival and overall survival.

**Methods:** CHALLENGE is an international randomised controlled trial with centres in Australia, Canada, USA, Israel and France. Eligibility criteria include adults with stage II/III colon cancer after adjuvant chemotherapy, who do not meet current PA guidelines, and complete two stages of a submaximal treadmill test.

Participants are randomised to the Intervention (a structured exercise program (SEP) and behavioural counselling through an adoption, consolidation and 2-year maintenance phase) or control group receiving health education materials (HEM).

Primary outcome is 3-year disease free survival. A planned feasibility analysis evaluated self-reported recreational PA assessed by the Total Physical Activity Questionnaire (TPAQ).

Secondary outcomes included cardiorespiratory fitness, body mass, circumferences and physical function tests (Seniors Fitness Test).

**Results:** The trial has randomised 602 participants of a projected 964, including 213 from 24 Australian sites. One-year interim analysis (n=211) demonstrated a mean group difference in PA of +10.5 MET hours/week (95% CI +3.1-+17.9; $p$ = 0.002). For predicted $VO_2$max, the SEP group increased by 1.6 mL/kg/minute (from baseline to one year) compared to a decrease of 0.6 mL/kg/minute in the HEM group ($p$ = 0.068). The SEP group also improved relative to the HEM group for 30-second chair stand, up and go, sit and reach, and the 6-minute walk.

**Conclusions:** Cancer patients are able to significantly improve PA with a structured exercise program and behavioural counselling. When completed, the results of the CHALLENGE trial will inform practice changes in cancer care.