

The influence of exercise training on indices of autonomic nervous system function among women undergoing paclitaxel chemotherapy for breast cancer

Matt Lloyd^{1*}, Kelcey Bland^{2*}, Amy Kirkham³, Josh Bovard⁴, Tamara Shenkier⁵, Margot Davis⁶, David Zucker⁷, Karen Gelmon⁵, Don McKenzie⁴, Victoria Claydon¹, Kristin Campbell²

*Co-first Authors

¹Biomedical Physiology and Kinesiology, Simon Fraser University, Vancouver, Canada

²Rehabilitation Sciences, University of British Columbia, Vancouver, Canada

³Biomedical Engineering, University of Alberta, Edmonton, Canada

⁴School of Kinesiology, University of British Columbia, Vancouver, Canada

⁵British Columbia Cancer Agency, Vancouver, Canada

⁶Division of Cardiology, University of British Columbia, Vancouver, Canada

⁷Swedish Cancer Institute, Seattle, USA

Antineoplastic therapy may be associated with cardiac autonomic dysfunction and is a potential underlying mechanism for increased cardiovascular disease risk among breast cancer survivors. However, information regarding autonomic dysfunction prevalence during paclitaxel chemotherapy is limited. While regular exercise is a robust modifier of cardiac autonomic control in non-cancer populations, the role of exercise in regulating autonomic function during chemotherapy for breast cancer is poorly understood.

Our aim was to determine the effect of exercise on indices of autonomic nervous system function, i.e. resting heart rate (HR) and orthostatic responses, in women undergoing paclitaxel chemotherapy for early-stage breast cancer.

Women who had received doxorubicin and cyclophosphamide, and were scheduled for paclitaxel chemotherapy, were randomized to exercise or usual care during paclitaxel treatment (8 wks). Supervised aerobic and resistance exercise was performed 3x/wk. HR and blood pressure (BP) were measured (Finometer Pro) for two 20 sec Valsalva maneuvers (VM) and a supine-stand test (10 min supine/standing). Data was collected at baseline (pre paclitaxel), mid point (3-5 days post paclitaxel cycle 3), and follow-up (2 wks post paclitaxel). Repeated measures ANOVA was used to identify interactions between group and time.

Nine women (48±3 years) enrolled. Exercisers (n=4) attended 79±19% of prescribed exercise sessions. Resting HR significantly increased at mid point relative to baseline (+7±3 bpm, p=0.03), and returned to baseline levels at follow-up, with no difference between groups. No changes in resting systolic or diastolic BP, Valsalva ratios or maximum HR and minimum BP responses during supine-stand tests were observed between groups at any time points. However, in both groups a high % of participants had excessive orthostatic hypotension and tachycardia at baseline (86%; 57%), mid point (80%; 60%), and follow-up (50%; 100%).

Overall, no indices of autonomic dysfunction were seen during paclitaxel treatment for breast cancer. However, asymptomatic abnormal orthostatic responses seen at baseline persisted during treatment, with no differences between exercise and usual care. More research investigating maladaptive orthostatic responses during chemotherapy is needed.