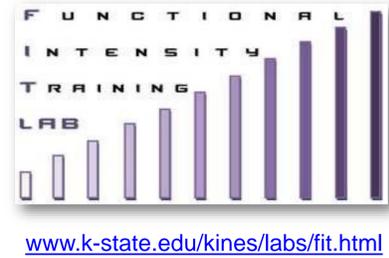


# Is High-Intensity Functional Training Sufficient for Improving Cardiovascular Endurance in Cancer Survivors?

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## INTRODUCTION

- Cancer survivors are recommended to follow the 2008 Physical Activity Guidelines for Americans (PAG): 150 minutes of moderate-intensity, or 75 minutes of vigorous-intensity or a combination, along with 2+ days of full-body muscle strengthening exercises per week [1].
- High-intensity functional training (HIFT) has been shown to take less time to improve metabolic and physiological adaptations than previously tested interventions at moderate-intensities. [2].
- Exercise training in cancer survivors is considered safe and can improve physical functioning and quality of life, however specific guidelines for this population are lacking [3].
- Percentages of maximum heart rate appear to be valid indicators of exercise intensity for cancer survivors. [4]
- To date, HIFT has not been tested among cancer survivors.

## PURPOSE

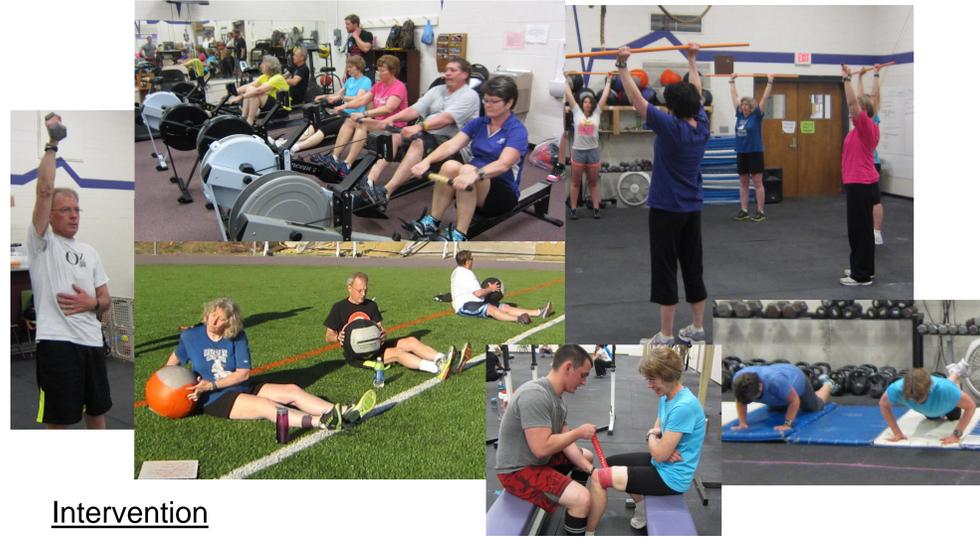
The purpose of this study was to test the effects of HIFT on cardiovascular endurance of cancer survivors as well as compare their workouts to the PAG to determine if it is an adequate exercise program for this population.

## METHODS

- Design
- Single-group pre-test, posttest pilot study
  - 6 (75%) participants completed the study
- Participants (N=8):
- All participants were white and college educated,
  - Age 53.5y (± 5.0), Range=47-60 years, 75% female
  - Cancer stages ranged from I-IV, with breast (n=4), tongue (n=1), non-hodgkin lymphoma (n=1), skin squamous/basal cell (n=1), and unknown primary (n=1).
  - Last cancer treatment within five years, no comorbidity, physician approval was required.

## METHODS

- Measures
- During all exercise sessions
- *Heart rate*: participants wore heart rate monitors each session (Polar RS800CX)
  - Measure of workout intensity
- The week prior to and the week following the intervention
- *Six minute walk test (6MWT)*: a submaximal test of aerobic capacity was used to assess cardiovascular endurance
  - Participants walked on a 200-meter track for six minutes and the total distance walked was measured.

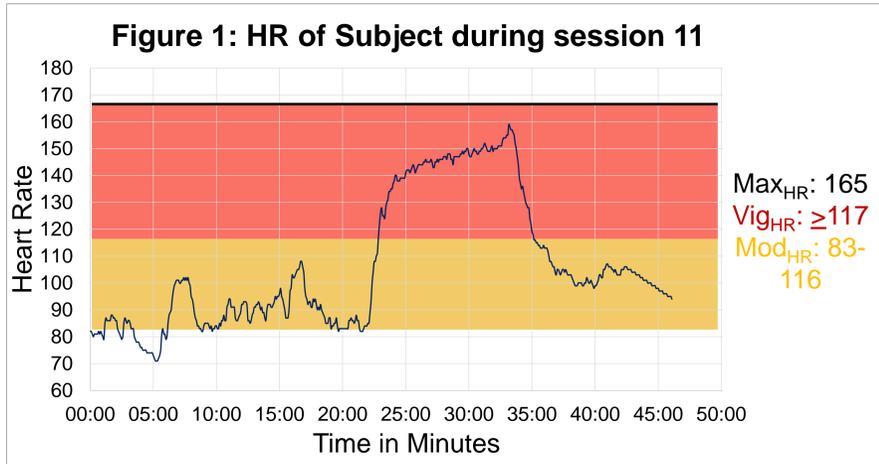


- Intervention
- Duration: 5-weeks, 3 days/week for 60 minutes including warm-up and cool-down
- Pre and post testing sessions
  - 12 group workouts with mobility and stretching exercises
    - Based on CrossFit™ training template
    - Led by CrossFit™ certified coaches
    - Standard warm-up included 3 minutes of aerobic exercise, 5 minutes of dynamic stretching, followed by skill work
    - Varied workouts including aerobic and resistance exercises
    - Individually scaled

- Analysis
- Calculated max heart rate for age ( $Max_{HR} = 208 - 0.7 \times \text{age}$ )
  - Calculated exercise intensity zones: moderate (50-70%  $Max_{HR}$ ), vigorous (>70%  $Max_{HR}$ )
  - Time at vigorous intensity was doubled and added to the time spent at moderate activity to compare to the PAG
  - Paired samples t-test were used to compare pre-test and post-test differences

## RESULTS

- Workout Duration and Intensity
- Total heart rate observations n=63; Two participants dropped out, but their data for completed sessions was included
  - Mean time spent at moderate intensity was 24:43±12:43 min
  - Mean time spent at vigorous intensity was 10:57±10:51 min
  - Figure 1 shows the heart rates of a participant across a workout session
  - Calculated mean and median time spent at moderate intensity: 48:36 min (±13:27) min; 50:40 min
  - Participants completed a calculated average of 145:48 minutes of moderate intensity aerobic activity per week, which is not significantly lower than the recommended 150 minutes. p=0.704
- 6MWT
- Pretest distance: 638±41.2m; Posttest distance: 733±19.1m
  - Participants significantly improved, t=3.53, p=0.039



## CONCLUSIONS

Not only did HIFT improve cardiovascular endurance in cancer survivors, but performing this exercise 3 days a week was sufficient to meet PAG. All participants reached vigorous heart rates with no apparent ill effects. HIFT appears to be a safe and effective exercise option for cancer survivors.

References

1. Physical Activity Guidelines Advisory Committee. Physical activity guidelines advisory committee report. Washington: US Department of Health and Human Services; 2008.
2. Heinrich KM, Patel PM, O'Neal JL, Heinrich BS. High-intensity compared to moderate-intensity training for exercise initiation, enjoyment, adherence, and intentions: an intervention study. *BMC Public Health*. 2014;14:789.
3. Schmitz KH, Courneya KS, Matthews C, Demark-Wahnefried W, Galvao DA, Pinto BM, et al. American College of Sports Medicine roundtable on exercise guidelines for cancer survivors. *Med Sci Sports Exerc*. 2010;42(7):1409–26.
4. Scharhag-Rosenberger F, Kuehl R, Klassen O, Schommer K, Schmidt ME, Ulrich CM, ... Steindorf K. Exercise training intensity prescription in breast cancer survivors: validity of current practice and specific recommendations. *Journal of Cancer Survivorship*. 2015; doi:10.1007/s11764-015-0437-z.