High-intensity functional training improves body composition among cancer survivors

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INTRODUCTION

- There are currently over 14 million cancer survivors in the United States [1].
- Exercise helps combat physical and psychological effects of cancer treatments [2].
- High-intensity functional training (HIFT) is a promising group-based exercise method that utilizes multiple energy pathways by temporally combining aerobic and resistance training exercises.
- HIFT takes significantly less time than moderate intensity exercise due to increased exercise intensity [3].
- Potential benefits of HIFT programs include metabolic and physiological adaptations, such as improvements in body composition through increased post-exercise fat oxidation [4].
- To date, HIFT has not been tested among cancer survivors.

PURPOSE

The purpose of this study was to investigate the effects of a HIFT program on the body composition of adult cancer survivors within five years of last cancer treatment.

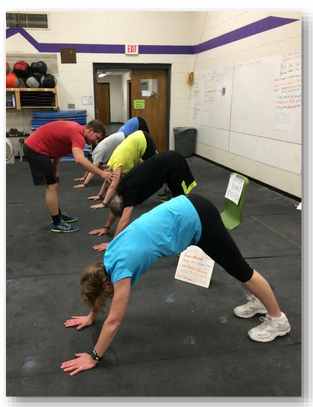
METHODS

Design

- Single-group pre-test, posttest pilot study
- 6 (75%) participants completed the study

Table 1. Participants (N = 8)

Age	53.5y (± 5.0), Range= 47-60y
Education	College Degree (100%)
Ethnicity	White (100%)
Gender	Female (75%)
Cancer sites	Breast (n=4) Non-hodgkin lymphoma (n=1) Tongue (n=1) Skin squamous (n=1) Unknown primary (n=1)
Cancer stage	Range: 1-3
Treatments	Chemotherapy (n=6) Radiation (n=3) Surgery/ removal (n=3)



METHODS

Measures

During all exercise sessions

- *Heart rate*: participants wore heart rate monitors each session (Polar RX800CX)
  - Measure of workout intensity

The week prior to and the week following the intervention

- *Body composition:*
  - Height (stadiometer)
  - Weight (digital scale)
  - Waist and hip circumferences (flexible tape)
  - Dual-energy X-ray absorptiometry scan

- *Dietary Intake:* Online Automated Self-Administered 24-hour recall (ASA24TM)

Intervention

Duration: 5-weeks, 3 days/week for 60 minutes

- 4 testing sessions (functional movement tests)
- 12 group workouts with mobility and stretching exercises
  - Based on CrossFit™ training template
  - Led by CrossFit™ certified coaches
  - Constantly varied to include cardiovascular, body weight, and weight lifting exercises
  - Individually scaled

Analysis

- Calculated max heart rate for age (Max_{HR}= 208 – 0.7 x age)
- Exercise intensity zones included light (<50% Max_{HR}), moderate (50-70% Max_{HR}), vigorous (71-85% Max_{HR}), and very vigorous (>85% Max_{HR})
- Paired samples t-tests

RESULTS

Workout Duration and Intensity

- Average workout length was 12 min (±11.4 sec); Range=5.8-20 min.
- Heart rate data were available for 10 workouts.
- Participants spent 30.4% of the workouts at a vigorous and 36.0% of the workouts at a very vigorous heart rate for age.

Body Composition (Table 2)

- Participant BMI ranged from 20.5-36.0, with 3 normal weight, 2 overweight, and one obese participant.
- Weight, BMI, and waist and hip circumferences did not significantly change.

Table 2. Changes in Body Composition (n = 6)

Measure	Pre-test M (SD)	Post-test M (SD)	% Change	p-value
Height (m)	1.72 (0.08)	--	--	--
Weight (kg)	78.9 (22.3)	79.2 (22.7)	+0.4	0.513
BMI (kg/m^2)	26.4 (5.2)	26.5 (5.3)	+0.4	0.523
Waist Circumference (cm)	91.8 (21.1)	90.1 (15.5)	-0.9	0.515
Hip Circumference (cm)	104.8 (11.7)	104.3 (11.7)	-0.4	0.634
Waist-to-Hip Ratio	0.87 (0.11)	0.86 (0.06)	-0.4	0.740
Lean Mass (kg)	49.1 (10.6)	52.9 (12.2)	+7.5	**0.008**
Fat Mass (kg)	25.8 (13.1)	22.4 (12.5)	-15.0	**0.001**
Body Fat Percentage	33.2 (9.2)	28.5 (9.3)	-15.3	**0.000**

- Statistically significant changes included an increase in lean mass ($t=4.32$, $p=0.008$), and decreases in fat mass ($t=7.91$, $p=0.001$) and body fat percentage ($t=9.39$, $p<0.001$).

Dietary Intake

- Did not significantly change, although average calorie consumption increased slightly from pre-test (M=1956±581 kcal) to posttest (M=2357±823 kcal; t=2.57, p=0.124)

CONCLUSIONS

Five weeks of HIFT training was well-received by most cancer survivors and is a promising method for improving body composition. Future research should compare HIFT with low and moderate intensity exercise options in a larger sample and track body composition changes over a longer time period.

References

1. American Cancer Society. (2014). *Cancer treatment and survivorship facts & figures 2014-2015*. Atlanta, GA: American Cancer Society.
2. Speck RM, Courneya KS, Masse LC, Duval S, Schmitz KH. An update of controlled physical activity trials in cancer survivors: a systematic review and meta-analysis. *J Cancer Surviv*. 2010;4:87–100.
3. 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.
4. Warren A, Howden EJ, Williams AD, Fell JW, Johnson NA. Post-exercise fat oxidation: effect of exercise duration, intensity, and modality. *Int J Sport Nut Exerc Metab*. 2009;19:607-623.