Discordance Between Change in Estimated MET during Supervised Exercise Training and Change in Peak Oxygen Uptake

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Introduction

- Change in metabolic equivalent of task (MET), estimated from exercise training workloads during supervised exercise training (SET), is an accepted outcome measure for cardiac rehabilitation programs.
Introduction

- However, it is not clear how well change in estimated METs during SET correlates to more accurate measures of changes in exercise capacity.
Purpose

- Compare the change in METs estimated from SET workloads to exercise capacity based on measured peak oxygen uptake (VO$_2$) and the 6 minute walk test distance (6MWD).
Methods

- Secondary analysis of data from HF-ACTION trial
  - Patients with chronic NYHA class II-IV heart failure (EF≤40%)
  - Data obtained from NIH BioLINCC
- Analysis limited to subjects in the exercise training arm
- Exercise tests at baseline and 3 mo
  - Cardiopulmonary exercise test (CPET) on a treadmill
  - 6 Minute Walk test
Methods (continued)

- <3.5 mo between randomization to 3 mo CPET
- Analysis limited to SET sessions completed before 3 mo CPET
- ≥12 SET sessions completed
- SET METs calculated for treadmill exercise only
  - ACSM equation for walking
  - Training MET at start = mean of visits 2 & 3
  - Training MET at 3 mo = mean of last 2 visits
Demographics at Baseline (n= 357)

- Age= 59±11 years
- Women= 31%
- NYHA Class
  - II= 70%
  - III/IV= 30%
- Race (white)= 64%
- Ischemic etiology= 52%
- Body mass index= 30±6 kg·m⁻²
- Ejection fraction= 25±7%
- Number of SET visits = 28 ± 6
**Results:** Change in Exercise Training METs vs. Change in Peak VO$_2$ (n= 357)

- **Exercise Training METs**
  - Start= 3.0 ± 0.9
  - 3 mo= 3.7 ± 1.2
  - % change= 29 ± 29

- **Peak VO$_2$ (mL/kg/min)**
  - Start= 15.4 ± 4.5
  - 3 mo= 16.5 ± 4.8
  - % change= 8 ± 18

- **Measured Peak METs**
  - Start= 4.4 ± 1.3
  - 3 mo= 4.7 ± 1.4
  - % change= 8 ± 18

R= 0.12  
P= 0.02  
SEE= 18%
Results: Change in Exercise Training METs vs. Change Exercise Test Duration (n= 352)

Exercise Training METs
- Start= 2.9 ± 0.9
- 3 mo= 3.7 ± 1.2
- % change= 29 ± 29

Exercise Duration (min)
- Start= 10.5 ± 3.7
- 3 mo= 12.9 ± 4.2
- % change= 28 ± 37

R = 0.24
P < 0.001
SEE = 36%
Results: Change in Exercise Training METs vs. Change 6 Minute Walk Distance (n=357)

Exercise Training METs
- Start = 3.0 ± 0.9
- 3 mo = 3.7 ± 1.2
- % change = 29 ± 29

6 Minute Walk (meters)
- Start = 384 ± 90
- 3 mo = 410 ± 97
- % change = 26 ± 67
Results: Subgroup of subjects with $\geq 30$ SET visits (n= 168)

- SET METs vs. peak VO$_2$
  - $R= 0.19$ (P= 0.02); SEE= 20%

- SET METs vs. exercise test duration
  - $R= 0.26$ (P= 0.01); SEE= 45%

- SET METs vs. 6-Minute Walk
  - $R= 0.09$ (P= 0.26); SEE= 23%
Conclusions

- Although significant, change in training METs during SET is poorly related to other common measures of exercise tolerance/capacity.
Conclusions

- Use of training METs as either a valid measure of change in a patient’s exercise capacity (or program performance) warrants further study.