



Published in final edited form as:

*Circ Heart Fail.* 2023 May ; 16(5): e010419. doi:10.1161/CIRCHEARTFAILURE.123.010419.

## Response by Brubaker et al to Letter Regarding “A Randomized, Controlled Trial of Resistance Training Added to Caloric Restriction Plus Aerobic Exercise Training in Obese Heart Failure with Preserved Ejection Fraction”

Peter H. Brubaker, PhD<sup>1</sup>, Benjamin Nelson, MS<sup>2</sup>, Dalane W. Kitzman, MD<sup>2,3</sup>

<sup>1</sup>Department of Health and Exercise Science, Wake Forest University, Winston Salem, NC

<sup>2</sup>Section on Cardiology, Department of Internal Medicine, Wake Forest School of Medicine, Winston Salem, NC

<sup>3</sup>Section on Gerontology and Geriatric Medicine, Department of Internal Medicine, Wake Forest University School of Medicine, Winston Salem, NC

---

We appreciate the comments of Kambic and colleagues<sup>1</sup> regarding the resistance training (RT) protocol we utilized in our recent trial<sup>2</sup>. However, our reported findings do not support their statement of “no additional benefits of RT on maximal aerobic capacity, lower limb muscle strength, and quality of life after 20 weeks of training”. As highlighted in our central figure<sup>2</sup>, 20 weeks of RT did result in significant improvements in lower extremity muscle strength, as well as skeletal muscle quality, demonstrating the effectiveness of the RT protocol we utilized in these older adults with obese heart failure and preserved ejection fraction (HFpEF).

This<sup>2</sup> is the first published randomized, blinded trial to add formal RT to an intervention of a caloric restricted diet (CR) and aerobic exercise training (AT) in older patients with obese HFpEF. We utilized a standard, current, guideline-based RT protocol<sup>3</sup> that was well suited to these older, frail HF patients, and the multi-component (CR+AT+RT) intervention. It began with at a relatively low RT intensity and progressed gradually to minimize risk for injury, excessive fatigue, and potential dropout. The number of RT sets performed (12 total) was designed to control the time spent in RT (~20 min) since this component was being performed after the completion of ~40 minutes of AT. While the RT relative intensity was maintained throughout the trial at a moderate level of 40–50% of the 1 repetition maximum (1RM), the 1RM testing procedure was repeated every 4 weeks to assess strength gains and ensure progression and optimal RT levels<sup>3</sup>.

Our trial result demonstrates both the effectiveness of adding RT in increasing lower extremity strength and improving skeletal muscle quality, as well the safety of utilizing

---

**Corresponding Author:** Peter Brubaker, PhD, Professor and Chair, Department of Health and Exercise Science, Wake Forest University, brubaker@wfu.edu, 336-758-4683.

Disclosures

The authors of the response letter do not have any relationships that could be perceived as real or apparent conflict(s) of interests

in these older patients with obese HFpEF, which had been unanswered questions. As highlighted in our publication “the results of this study suggest that supervised resistance training (RT), when added to CR+AT, appears to have no adverse effect on cardiac or arterial structure and function, is safe, and was not associated with any exercise-related adverse events”. The lack of adverse responses we observed during RT in patients with HFpEF provides a foundation for future trials seeking to test alternative RT protocols to further optimize this important component of the exercise prescription <sup>4</sup>. In that light, we strongly agree with Kambic et al that “RT structure, progression and intensity, should be addressed in future trials”. Furthermore, we agree that our findings should “not discourage clinicians from adding RT into their CR structure for HFpEF” as suggested by Kambic et al. and led to our conclusion that “clinicians should consider adding supervised RT to improve skeletal muscle strength and muscle quality of older patients with obese HFpEF.”

## References

1. Letter by Kambic T, Edelman F, Lainscak M, Regarding Article, “A Randomized, Controlled Trial of Resistance Training Added to Caloric Restriction Plus Aerobic Exercise Training in Obese Heart Failure with Preserved Ejection Fraction” *Circ Heart Fail*
2. Brubaker PH, Nicklas BJ, Houston DK, Hundley GH, Chen H, Molina AM, Lyles WM, Nelson MB, Upadhyaya B, Newland R, Kitzman DW. A Randomized, Controlled Trial of Resistance Training Added to Caloric Restriction Plus Aerobic Exercise Training in Obese Heart Failure with Preserved Ejection Fraction. *Circ Heart Fail*. 2022;0(0). 79 doi:10.1161/CIRCHEARTFAILURE.122.010161
3. ACSM’s Guidelines for exercise testing and prescription. Philadelphia: Lippincott Williams & Wilkins, 2021;11th edition. ISBN: 9781975150181, 197515018X
4. Kambic T, Šarabon N, Hadži V, Lainšak M. Effects of high-load and low-load resistance training in patients with coronary artery disease: a randomized controlled clinical trial. *Eur J Prev Cardiol*. Published online 2022. doi:10.1093/eurjpc/zwac063