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CROSSTALK

Rebuttal from Ulrik Wisløff, Jeff Coombes and Øivind Rognmo

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We appreciate the discussion with Drs Holloway and Spriet about the role of high intensity interval training (HIIT) and moderate intensity endurance training (ET) in risk reduction or treatment of chronic disease (Holloway and Spriet, 2015). Unsurprisingly, we do have a few comments to their views. Firstly, when presenting evidence for the negative effects of HIIT they present data from their single rat study (published across two articles) using a model of hypertension-induced heart failure. From these findings we would agree that HIIT doesn't look advisable for our furry friends. However, other studies in 'furry hypertensive models' indicate that HIIT may be highly beneficial (e.g. Bowen *et al.* 2015). In clinical 'hypertensive-trials' directly comparing ET and HIIT, data suggests that HIIT is a highly potent, and more so than ET, blood pressure lowering drug (e.g. Molmen-Hansen *et al.* 2012).

Secondly, although the majority of studies on HIIT have been undertaken in healthy subjects there exists enough evidence from more than 50 clinical trials in different patient groups to conclude that HIIT may be a very beneficial 'drug' for improved cardiovascular health profile (e.g. Guiraud *et al.* 2012; MolmenHansen *et al.* 2012; Hollekim-Strand *et al.* 2014; Weston *et al.* 2014; Chrysohoou *et al.* 2015). Furthermore, they present comparisons of longer-term ET and HIIT on blood pressure using data from the Osaka Gas Company study. In this observational study people were asked if they did higher intensity exercise not HIIT. We do agree with Drs Holloway and Spriet that there exists no large randomized clinical trial with hard endpoints (e.g. mortality) using both HIIT and ET, and we are doing this now (Stensvold *et al.* 2015). In terms of safety, and the need of a moderate intensity pre-conditioning phase prior to HIIT, more studies are always wanted, but to date there is no evidence that ET is safer than HIIT, or that a pre-conditioning phase improves safety.

Thirdly, and contrary to the authors' statement, there is a myriad of papers describing the cellular effects of both ET and HIIT, in addition to more than 40 papers from our groups the last 15 years (e.g. Wisloff *et al.* 2009). The majority of these studies also suggest that 'HIIT wins over ET'.

In summary, we continue to believe that HIIT does have a role in risk reduction and the treatment of chronic disease and quote O´Keefe and Lavie: 'Regular vigorous exercise is probably the single best step a person can take to ensure robust cardiovascular health' (O'Keefe & Lavie, 2013).

Call for comments

Readers are invited to give their views on this and the accompanying CrossTalk articles in this issue by submitting a brief (250 word) comment. Comments may be submitted up to 6 weeks after publication of the article, at which point the discussion will close and the CrossTalk authors will be invited to submit a 'Last Word'. Please email your comment, including a title and a declaration of interest, to jphysiol@physoc.org. Comments will be moderated and accepted comments will be published online only as 'supporting information' to the original debate articles once discussion has closed.

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Additional information

Competing interests

None declared.

Author contributions

All authors have approved the final version of the manuscript and agree to be accountable for all aspects of the work. All persons designated as authors qualify for authorship, and all those who qualify for authorship are listed.

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