Reviewer’s report

Title: Quantification and Physiological Significance of the Rightward Shift of the V-slope during Incremental Cardiopulmonary Exercise Testing

Version: 0 Date: 21 Feb 2017

Reviewer: Christof Leicht

Reviewer's report:

General feedback and major comments

This is an original investigation on the rightward shift of the V slope during cardiopulmonary exercise testing in a cohort of patients with cardiac disease. It was found that the quantification of the rightward shift offers a more objective measure of physical capacity, as it appears to correlate rather well with the ventilatory anaerobic threshold. This RtShift is thought to be mainly caused by the capacity of muscle fibres to store CO2 in the early stages of exercise. Most parts of the manuscript are well presented, it is a little unclear what the addition of the "substudy" adds to the manuscript - I would be tempted to either provide a little more detail there or to leave it out altogether. Details about the discussed 6-min exercise bouts are also unclear.

For most parts, the study is carefully presented; especially the figures and supplementary material are very clear and well made. The main criticism I have is that there is a mix of information in the subsections, for example the methods section contains a lot of results, and various aspects of the study are discussed in the wrong sections. Some arguments need to be reworded as they are a little unclear, see specific comments (even though on the whole the English language is excellent given that this is a second language to the author team).

Specific comments

Abstract

Line 60/61: it

is unclear what you mean with "vertical" vector for VAT. For RtShift I can see that it was determined based on the horizontal distance from the line formed by R=1, but as VAT is determined visually I don't quite see what you mean with the notion of a vector in this context. Line 76: "unique" may not be the appropriate word here. Do you want to say that it is a further advantage of RtShift?
Methods

Line 110: delete "consecutive" (also in abstract)

Table 1: how were LVEF and LVDd determined? Include details of these procedures (device used for example)

Line 133: what was the start load? zero watts?

Line 134: what was the warmup intensity? This is crucial as it appears that the warm-up data had been included in the analysis

Lines 159-161, 163-169: there are some results reported here (whenever p values are reported) - these should be given in the results section.

Line 168-169: what are the limits of agreement analyses based on? Were the VATs determined by two people independently and the variation between VATs assessed? Or what do the limits of agreement refer to?

Line 177: this is confusing - In my view, in figure 1, VO2 at "c" equals to VCO2 at "c"... Please clarify this.

Line 181: "vertical component": this is confusing - there is a horizontal component in both A and B (VO2 increases in both cases as VCO2 increases)

Line 184-185: this is results section information

Line 185-190: this is discussion section information

Line 192: this must be described in methods section: with which participants was this performed? You mention a sub-study, but this was only done with different ramps (?)

Line 197: again, what power output for the warm-up? so warm-up values were included in analysis?? and also resting values? how many minutes worth of the resting data were included?

Line 205: but you also refer to a third method (visual) - this should be mentioned here.

Line 216: more detail is needed on how you quantified this visually.

Line 223: which values were used to determine this? only the ones below VAT? or all values?

Line 225-229: this is a repetition from lines 140-142

Line 230: I don't think this was mentioned in the methods section (also bearing in mind that the statistics itself are part of the methods section)...

Line 234-237: this should be mentioned in the discussion section
Results

Table 2: give more detail on the IQR (report lower and upper quartile separately)

Line 258: "congruent": better: "correlated well"?

Line 261: "failure rate": how was this defined?

Line 269-271: this is methods information

Line 275: more detail needed (how was this assessed statistically - report in methods section), and improve sentence construction

Line 281: ANOVA: no need to repeat this here - this is methods section information

Discussion

Line 304-306: it is unclear what you are referring to here (not the graded exercise that you performed?)

Line 309-310: I do not understand what is meant with this. Can this be reworded?

Line 317: S1: is this the "slope" of S1? make this clearer early on in the manuscript.

Line 329-330: make clearer why these results are contrary to the results of the current study. It is unclear how you relate the findings of the O2 deficit with the findings of your study.

Line 338: the "phenomenon" is not necessarily aerobic, but it can be observed at submaximal ("aerobic") exercise intensity

Line 338: did you assess VO2peak and the correlations? in the substudy? I don't think there is any mention of this in the manuscript.

Line 341-343: as mentioned earlier, it is unclear what is meant with this (horizontal and vertical components).

Line 343-344: RtShift and VAT analysis: 10%. what is this based on? Make this clearer!
Are the methods appropriate and well described?
If not, please specify what is required in your comments to the authors.

No

Does the work include the necessary controls?
If not, please specify which controls are required in your comments to the authors.

Yes

Are the conclusions drawn adequately supported by the data shown?
If not, please explain in your comments to the authors.

Yes

Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?
If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

I am able to assess the statistics

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Please indicate the quality of language in the manuscript:

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