Letter to the Editor

Letter to the Editor: Measurement of \( \dot{V}O_{2\text{max}} \) in clinical groups is feasible and necessary.

Response to: Measurement of the maximum oxygen uptake \( \dot{V}O_{2\text{max}} \): \( \dot{V}O_{2\text{peak}} \) is no longer acceptable

(Poole and Jones, J Appl Physiol, 122: 997 – 1002)

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Short Title: \( \dot{V}O_{2\text{max}} \) and clinical application

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We commend the recent CORP statement by Poole and Jones (1) where they advocate the use of a supramaximal bout to verify maximal oxygen uptake (\( \dot{V}O_{2\text{max}} \)) obtained during incremental exercise. The authors cite research that supports this approach, particularly in clinical populations, where exercise testing provides important prognostic information, such as individuals with cystic fibrosis (CF).

However, subsequent correspondence from van Breda et al. (3) concluded that ‘the short constant-work rate verification phase after the steep-ramp test…is, at least in a clinical setting, unrealistic and unethical in certain patient populations’ (pp. 1370). We disagree with this statement, as evidence has consistently shown that a verification phase is crucial if clinicians are to have confidence in the determination of \( \dot{V}O_{2\text{max}} \). In paediatric patients with CF, we have shown that a further increase in \( \dot{V}O_2 \) can be elicited by performing supramaximal verification (2), which also improves test-retest reliability and eliminates dependence on secondary criteria (heart rate, respiratory exchange ratio, blood lactate etc.). Our group has been utilising cardiopulmonary exercise testing (CPET) with supramaximal verification in our routine adult and paediatric clinical practice for over five years. It is included in our portfolio of annual review investigations and we have performed 110 in the last 2 years. We are aware that the two-stage protocol is preferred in a further three UK CF Centres, and others have expressed interest in adopting the same methodology. The supramaximal protocol is affordable, accepted by patients and most importantly safe when performed correctly. We have not had any adverse events with any of our CPET testing across a full range of clinical severity.

Given the prognostic value of \( \dot{V}O_{2\text{max}} \), being able to discriminate between ‘day-to-day variation’ and clinically meaningful changes, due to disease progression and/or therapeutic intervention, is essential. Indeed, previous clinical studies have suggested their own conclusions may be limited by the lack of supramaximal verification testing, highlighting the need to heed the advice presented in the CORP statement (1).

We agree with van Breda et al. (3) that “the concepts of aerobic/anaerobic and ventilatory thresholds encompass important clinical information”. However, it should be noted such parameters should be normalised to a percentage of \( \dot{V}O_{2\text{max}} \), which therefore warrants accurate determination.
In clinical practice, tracking changes in aerobic capacity over time will have more precision and meaning if the most accurate methodology is used. It is for this very reason that our group and associated clinical teams fully support the methodological recommendation of utilising supramaximal verification as part of CPET.

References

1. Poole DC, and Jones AM. Measurement of the maximum oxygen uptake \( \dot{V}O_{2\text{max}} \). \( \dot{V}O_{2\text{peak}} \) is no longer acceptable. *Journal of Applied Physiology* 122: 997-1002, 2017.


3. van Breda E, Schoffelen PFM, and Plasqui G. Clinical \( \dot{V}O_{2\text{peak}} \) is "part of the deal". *Journal of Applied Physiology* 122: 1370, 2017.