LETTER TO THE EDITOR

Reply to Cooper's letter in reference to: Cardiopulmonary exercise testing with supramaximal verification produces a safe and valid assessment of VO_{2max} in people with cystic fibrosis.

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We thank Prof. Cooper for his comments (2) on our recent article (1), in which he questions the rationale for conducting supramaximal verification (S_{max}) and, indeed, cardiopulmonary exercise testing (CPET) in people with cystic fibrosis (CF). Whilst he should be commended on his vision to further develop the exercise testing toolkit for use in a clinical setting, this is disparate to the aims of our investigation. Specifically, our study focused on the added value of using S_{max} to improve confidence in the measurement of maximal parameters during incremental CPET, a procedure recognized and advocated by the European Respiratory and CF Societies (3), due to its functional and prognostic evaluative ability.

Several of Prof. Cooper's viewpoints are worthy of challenge. Firstly, Prof. Cooper misinterpreted our article, to surmise that inaccuracies during incremental testing "can be 'corrected' by an additional test in which the participant exercises to exhaustion at a supramaximal constant work-rate" (2). To reiterate the premise of S_{max}, this recognized concept (5) enables us to *1)* confirm a maximal effort has been provided or, importantly, *2)* demonstrate that an incremental exercise test effort was submaximal. Given the reported validity concerns surrounding secondary verification criteria (4), this is a simple extension that may "improve the practitioner's confidence that a true maximal effort has been given by the participant" (1). Indeed, we reported a case whereby S_{max} elevated $\dot{V}O_{2peak}$ 24.4% higher than the preceding 'exhaustive' incremental cycling test. We acknowledge that the cut-off criteria used was based on the typical error for $\dot{V}O_{2max}$ in children and adolescents with CF, this threshold (9%) is comparable to the 10% used in Prof. Cooper's calculations, and the data suggested by his simulation model would still not account for such a large increase in exercise capacity.

Prof. Cooper also raises concerns about the safety of S_{max}. We acknowledge within our paper that cases of hypoxemia did occur during S_{max}, however, the pertinent finding was that its addition did not significantly increase the frequency or magnitude of desaturation compared with incremental cycling alone. Given the pulmonary consequences of CF, cases of exercise-induced hypoxemia will of course occur. However, CPET allows us to identify the exercise intensity at which this occurs, which can be "useful in managing their daily life activities and benefiting their health", a recommendation advocated by Prof. Cooper.

Lastly, we acknowledge Prof. Cooper's viewpoint that "adding uncomfortable procedures to an already challenging and time consuming test is not likely to advance CPET in clinical research or practice". However, as the evidence supporting the value of S_{max} continues to grow (5), we feel this additional time (of ~ 20 minutes) is time well spent. Furthermore, considering patients' feedback, data from our research group demonstrated that the majority of young people with CF (75%) enjoyed CPET with S_{max}, and completing the test empowered 50% of them to seek advice regarding physical activity (4). Therefore, we would conclude that CPET with S_{max}, when interpreted correctly, may actually fit the criteria Prof. Cooper recommends for modern exercise testing (2).

(500 words)

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