THE UTILITY OF THE OXYGEN UPTAKE EFFICIENCY PLATEAU AS A SUBMAXIMAL EXERCISE BIOMARKER IN INTERSTITIAL LUNG DISEASE

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Introduction

Aerobic fitness (represented by VO_{2peak}), derived from cardiopulmonary exercise testing (CPET), is a biomarker predictive of mortality in interstitial lung disease (ILD). However, CPET requires elicitation of maximal responses, which may not be feasible for some patients due to clinical contraindications. Therefore, suitable submaximal exercise-based biomarkers are required. The oxygen uptake efficiency plateau (OUEP), defined as a 90 second average of oxygen uptake relative to minute ventilation (VO_2/V_E), is one submaximal parameter that has been previously investigated in patients with cystic fibrosis and heart failure. Currently, there are no data for ILD.

Objectives

To determine if OUEP is a viable biomarker in ILD by 1) characterising OUEP in a cohort of patients with ILD, and 2) establishing relationships between traditional pulmonary function biomarkers (FVC and DL_{CO}), OUEP and VO_{2peak}

Methods

24 participants with ILD (69.7 ± 7.6 years) underwent CPET, via cycle ergometry, to identify VO_{2peak} and OUEP. Pulmonary function data were retrospectively obtained from patient records. OUEP as a percentage of time to exhaustion (TTE), and VO_{2peak}

were identified. Pearson's correlation coefficients were established between VO_{2peak}, OUEP, FVC and DL_{CO}.

Results

21 participants (15 male/6 female) produced a valid CPET as per existing guidelines. Mean (± standard deviation) VO_{2peak} and OUEP were 1.40 ± 0.36 $L{\cdot}min^{-1}$ and 27.4 ± 4.6 $mL{\cdot}L^{-1}$ respectively. OUEP occurred at 37 ± 22 % of TTE, representing 60.1 ± 14.0 % VO_{2peak}. FVC held non-significant correlations with VO_{2peak} (r = 0.16, p = 0.48) and OUEP (r = 0.31, p = 0.17). In contrast, DL_{CO} held significant and stronger correlations with both VO_{2peak} (r = 0.59, p =0.006) and OUEP (r = 0.71, p < 0.001). VO_{2peak} and OUEP significantly correlated with one another (r = 0.73, p < 0.001).

Conclusions

OUEP was successfully determined and identified in all participants. It correlated highly with VO_{2peak}, the current gold-standard measure from CPET. It also correlated highly with DL_{CO}, to a greater magnitude than VO_{2peak}. As OUEP occurred at ~60%VO_{2peak}, it is submaximal in nature, and may therefore be a viable biomarker in ILD, particularly for those patients who cannot exercise to volitional maximal exhaustion.