FEASIBILITY OF CARDIOPULMONARY EXERCISE TESTING IN IDIOPATHIC PULMONARY FIBROSIS

Rebecca L. Wollerton1, 2*, Owen W. Tomlinson1, 3*, Bridget A. Knight2, 4, Anna Duckworth2, Alexander Spiers1, Craig A. Williams1, 3, Michael Gibbons1, 2, Chris J. Scotton2.

*equal contribution

1. Royal Devon and Exeter NHS Foundation Trust Hospital, Barrack Road, Exeter, EX2 5DW, United Kingdom.
2. University of Exeter Medical School, University of Exeter, Heavitree Road, Exeter, EX1 2LU, United Kingdom.
3. Sport and Health Sciences, University of Exeter, Heavitree Road, Exeter, EX1 2LU, United Kingdom.
4. NIHR Exeter Clinical Research Facility, Royal Devon and Exeter NHS Foundation Trust Hospital, Barrack Road, Exeter, EX2 5DW, United Kingdom.

Introduction: Idiopathic pulmonary fibrosis (IPF) is a chronic, progressive interstitial lung disease of irreversible declining lung function. Reductions in forced vital capacity (FVC) and diffusion capacity for carbon monoxide (DLCO) are the common clinical endpoints for prognostic monitoring and assessing treatment outcomes. The use of cardiopulmonary exercise testing (CPET) in IPF remains largely unexplored.

Objectives: To explore the feasibility of CPET as a clinical measure in IPF and identify associations with established clinical variables.

Methods: Seventeen patients with IPF were approached, and fifteen (88%) were recruited (13 male, 68.1 ± 7.5 years). Incremental exercise testing to exhaustion was undertaken via electronically braked cycle ergometer. Variables included: peak oxygen consumption (VO2peak), peak work rate (WRpeak), nadir SpO2, ventilatory drive (VE/VCO2), alongside standard clinical pulmonary function tests of FVC and DLCO. Pearson’s correlation coefficients established relationships between variables.

Results: One participant was excluded (high baseline systolic blood pressure). Eight out of fourteen (57%) participants reached volitional exhaustion. Five CPETs were terminated early due to desaturation (SpO2 < 88%) and one to an exercise-induced right bundle branch block (recovery within minutes of ceasing exercise). Mean (± SD) pulmonary and exercise results were: FVC, 84.9 ± 17.0 %; DLCO, 56.5 ± 11.4 %;
VO$_{2}\text{peak}$, $1.4 \pm 0.4$ L·min$^{-1}$, $16.5 \pm 5.5$ mL·kg$^{-1}$·min$^{-1}$; WR$_{\text{peak}}$, $104 \pm 42$ W; SpO$_2$, $90 \pm 3$%; $V_E/VCO_2$, $27.1 \pm 6.4$. Significant correlations were identified between: FVC and SpO$_2$ ($r = 0.58$, $p = 0.032$), DL$_{CO}$ and $V_E/VCO_2$ ($r = 0.81$, $p < 0.001$) and WR$_{\text{peak}}$ ($r = 0.58$, $p = 0.03$). Body-mass relative VO$_{2}\text{peak}$ held moderate, but not significant relationships with FVC ($r = 0.44$, $p = 0.11$) and DL$_{CO}$ ($r = 0.53$, $p = 0.51$).

**Conclusions:** Initial findings from this study have found CPET to be acceptable to patients with IPF and potentially feasible as a testing measure. Preliminary results identified common exercise desaturation, suggesting less conservative SpO2 termination criteria (e.g. 80% cut-off) could be considered. Although exercise parameters held limited relationships with FVC and DL$_{CO}$, results from VO$_{2}\text{peak}$ identifies potential additional and dynamic prognostic information and warrants further investigation.