ANNUAL CHANGES IN AEROBIC FITNESS ARE BIASED BETWEEN NORMATIVE EQUATIONS IN CHILDREN AND ADOLESCENTS WITH CYSTIC FIBROSIS

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OBJECTIVE

Peak oxygen uptake (VO_{2peak}) is an important prognostic parameter in CF. Three equations are recommended by the ECFS to characterise VO_{2peak} as a percent of predicted ($\%_{Pred}$) – Jones (1985), Orenstein (1993) and Werkman (2014), with previous cross-sectional research showing poor agreement between equations. However, longitudinal agreement between equations is unknown and therefore explored in this analysis.

METHODS

Two years of sequential cardiopulmonary exercise testing (CPET) data were retrospectively analysed in 18 children and adolescents (<18 years) with CF (11 male, 13.9 ± 2.2 years). Agreement between equations in annual change in VO_{2peak} ($\%_{Pred}$) was classified discretely based upon direction of change (i.e. increase/decrease). Only 4/18 patients were characterised using the Jones equation (requires age ≥ 15 years). All 18 patients were characterised using the Orenstein and Werkman equations (requires age <18 years).

RESULTS

Absolute VO_{2peak} increased by 0.19 $L \cdot min^{-1}$ ($p = 0.031$), whereas VO_{2peak} relative to body mass did not (0.31 $mL \cdot kg^{-1} \cdot min^{-1}$, $p = 0.83$) in the year between CPETs. Direction of VO_{2peak} ($\%_{Pred}$) varied (mean ± SD, range): -2.2 ± 3.5 %, -0.2 to -7.5% (Jones); +2.2 ± 10.4 %, -17.3 to 21.3% (Orenstein); +1.2 ± 23.6 %, -33.7 to 77.5% (Werkman). Between the Jones and Orenstein equations, 100% of directional changes were in agreement (all reported reductions in VO_{2peak}). Between the Jones and Werkman equations, 50% of directional changes were in agreement. Between the Werkman and Orenstein equations, there was 72% agreement.

CONCLUSION

This analysis highlights discrepancies in characterising direction of annual changes in VO_{2peak} as $\%_{Pred}$ in children and adolescents with CF, which could impact upon treatment options if

VO_{2peak} is wrongly over- or under-estimated, dependent upon use of differing equations. Standardised reporting of CPET data is an imperative focus for CF teams and a single equation should therefore be selected for use.