The Modified Shuttle Test (MST) is an externally paced, incremental, field exercise test with 15 levels. It has been shown to be a reliable, repeatable and sensitive measure of exercise capacity in adults with cystic fibrosis (CF). In our clinic, however, 6% of patients exceed the 15th level of the test. Furthermore, 31% of age-matched healthy adults exceeded the 15th level. This limits the utility of the MST as a measure of exercise capacity in studies comparing participants with CF to healthy control participants. The purpose of this study was to assess the reliability of the MST with 25 levels (MST-25).

**Method:** The MST was extended by 10 levels, with the number of shuttles increased by one at each additional level. 15 participants (10 healthy, 5 CF) performed the MST-25 on two occasions within one week. All participants were clinically stable (<10% variation in FEV1 from the best during the previous 6 months). All participants wore the SenseWear Pro3 Armband (BodyMedia, USA) — a physical activity monitor that integrates accelerometry and physiological sensors to estimate energy expenditure. Total step count, Borg Dyspnoea Score and heart rate were recorded at the end of the test.

**Results:** There was a significant and strong correlation between the two MST-25 test days for distance completed (Pearson’s r = 0.99), SpO2 at peak (r = 0.99), energy expenditure estimated by the SenseWear Pro3 Armband (r = 0.97), and total step count (r = 0.97). Correlations were less strong for dyspnea (r = 0.76) and heart rate (r = 0.78) at peak exercise.

**Discussion:** The MST-25 shows good test-retest reliability and can be used for patients and healthy controls whose peak exceeds the MST. We are now investigating the sensitivity of the MST-25 to clinical change.

**Objectives:** Peak oxygen uptake (VO2peak) derived through maximal cardiopulmonary exercise testing (CPX) is impaired in children with Cystic fibrosis (CF), and is a measure of disease severity. Our aim was to compare the profile of oxygen uptake (VO2) during recovery following CPX in children with CF and controls.

**Methods:** 19 children with CF and 19 controls matched for age, sex and maturity performed CPX on a cycle ergometer to exhaustion. Pulmonary gas was measured continuously by an on-line metabolic gas analyser using a 10 s moving average, during and for 10 min after CPX. Following CPX, the fast component of VO2 falls in an exponential manner that can be mathematically modelled, using a mono-exponential model including a delay term, with the formula; VO2(t) = A[1 − exp(−(t−TD)/τ)] where; VO2(t) is VO2 at a given time point; A is the constant, the time taken to reach 63% of the amplitude of the fast component of VO2 recovery. Disease severity in the children with CF was quantified by the Shwachman score.

**Results:** VO2peak was reduced in children with CF compared to controls (35.1±8 versus 44.4±12 mL kg⁻¹ min⁻¹, P < 0.01). Furthermore, the τ was significantly longer in children with CF compared to controls (44.9±1.8 versus 38.5±6.0 s, P < 0.05), and related to disease severity (r = −0.75, P < 0.01). The τ was not significantly correlated with VO2peak in either the children with CF or controls. Therefore, the τ can not be reliably predicted by VO2peak.

**Conclusions:** The pattern of decline in VO2 during recovery after CPX differs between CF and controls and is related to disease severity. Recovery measures may enhance our objective assessment of exercise impairment in CF.

**Objectives:** Peak oxygen uptake (VO2peak) derived through maximal cardiopulmonary exercise testing (CPX) is impaired in children with Cystic fibrosis (CF), and is a measure of disease severity. Our aim was to compare the profile of oxygen uptake (VO2) during recovery following CPX in children with CF and controls.

**Methods:** 19 children with CF and 19 controls matched for age, sex and maturity performed CPX on a cycle ergometer to exhaustion. Pulmonary gas was measured continuously by an on-line metabolic gas analyser using a 10 s moving average, during and for 10 min after CPX. Following CPX, the fast component of VO2 falls in an exponential manner that can be mathematically modelled, using a mono-exponential model including a delay term, with the formula; VO2(t) = A[1 − exp(−(t−TD)/τ)] where; VO2(t) is VO2 at a given time point; A is the constant, the time taken to reach 63% of the amplitude of the fast component of VO2 recovery. Disease severity in the children with CF was quantified by the Shwachman score.

**Results:** VO2peak was reduced in children with CF compared to controls (35.1±8 versus 44.4±12 mL kg⁻¹ min⁻¹, P < 0.01). Furthermore, the τ was significantly longer in children with CF compared to controls (44.9±1.8 versus 38.5±6.0 s, P < 0.05), and related to disease severity (r = −0.75, P < 0.01). The τ was not significantly correlated with VO2peak in either the children with CF or controls. Therefore, the τ can not be reliably predicted by VO2peak.

**Conclusions:** The pattern of decline in VO2 during recovery after CPX differs between CF and controls and is related to disease severity. Recovery measures may enhance our objective assessment of exercise impairment in CF.

**Introduction:** In patients with cystic fibrosis (CF) exercise capacity is related to disease severity, nutritional status, lung function, quality of life, morbidity and mortality. Reference values of maximal oxygen uptake (VO2max) of healthy children are available however these are unsuitable for CF children as height-for-age and nutritional status are regularly reduced and onset of puberty is frequently delayed. CF specific reference values will give better insights in disease-related normal deterioration of exercise capacity. Therefore, the aim of the study is to create disease-specific reference values for VO2max in relation to age, sex, anthropometric values and lung function in CF children.

**Methods:** Data were acquired from a database (1998–2008). VO2max was measured during CPET. Anthropometric variables are expressed as weight and height and lung function as the forced expiratory volume in 1 second (FEV1). Data were analyzed with the GAMLSS method.

**Results:** 1109 CPET results were used of 277 CF children (146 boys; 131 girls) with a mean (SD) age of 11.84 (3.63) years, mean (SD) weight of 39.19 (14.64) kg and mean (SD) length of 147.80 (20.07) cm. FEV1 of predicted ranged from 21 to 151 with a mean (SD) of 89 (20) %. VO2max ranged from 0.30 to 3.80 with a mean (SD) of 1.66 (0.61) l min⁻¹. Final reference equations will be presented.

**Conclusion:** CF-specific reference equations allow clinicians to compare exercise capacity of individual patients with those of their peers with CF. This might improve generalization of future CF clinical trials by setting entry criteria that are equitable across sex and age ranges. The new reference equations may serve as a useful adjunct to conventional ones for healthy children.