



## ***Fatigue index reproducibility in isokinetic testing***

Paulus, J.1, Bosquet, L.2, Gremeaux, V.3, Maquet, D.1, Forthomme, B.1, Nowak, N.1, Lehance, C.1, Croisier, J.-L.1

1: ULg (Liege, Belgium), 2: UP (Poitiers, France), 3: uB (Dijon, France)

### ***Introduction***

The isokinetic testing is a reference in muscular performance evaluation. Isokinetic device is mainly used to assess maximal strength using short length protocols. In some cases, such as to evaluate an athlete who mainly uses the lactic anaerobic metabolism, clinicians increase the lengthening of the protocol in order to investigate more specifically the fatigability profile. Bosquet et al. (2010) studied the effect of the lengthening of the protocol on some indicators of fatigue.

However a great deal of indices can be provided by the machine and there is no real consensus about the index to be used in clinical applications. The aim of this study was to determine the most reliable index calculated either from peak torque or maximal work parameters.

### ***Methods***

17 moderately active men performed a fatigue protocol on three occasions with one 7-10 days recovery between each session. Isokinetic protocol consisted in 30 reciprocal maximal contractions at the concentric angular velocity of 180°/s.

Flexors and extensors peak torque and maximal work were computed for each repetition and subsequently used to calculate 52 different indices (among others best performance, total or partial sum and various index based on a performance normalization quotient).

Their reliability has been assessed through interclass correlation coefficient calculated from results of repeated measures ANOVA.

### ***Results***

Indicators computed for the knee extensors were frequently more reliable than those computed for the knee flexors. The most reliable indicators were:

- by order, the best performance among 30 repetitions, cumulated value of first 5 repetitions, of first 10 repetitions and of the 30 repetitions for the extensors peak torque and extensors maximal work;
- the sum of the 30 repetitions for the flexors peak torque and flexors maximal work.

All extensors and almost all flexors index based on a performance normalization quotient showed respectively at best a moderate reliability and a low reliability.

### ***Discussion***

Because of excellent reliability for extensors maximal work and high reliability for extensors peak torque and flexors, the sum of 30 repetitions appears to represent the fatigability indicator with best compromise between reliability and specificity. It should be noticed that maximal work is yet more specific to isokinetic fatigability protocol than peak torque for the sum of 30 repetitions.

On the basis of our results, almost all isokinetic index based on a performance normalization quotient must be at least used carefully by clinicians due to their low reliability.

### ***References***

Bosquet L., Maquet D., Forthomme B., Nowak B., Lehance C., Croisier J.-L. (2010). Int J Sports Med, 31(2), 82-88.

### ***Contact***

julien.paulus@doct.ulg.ac.be