

## **A field-test for force-velocity profiling in older adults: feasibility and relationship with Appendicular Lean Mass Index.**

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### **PURPOSE**

The Appendicular lean mass (ALM) adjusted for height (i.e. ALM index, ALMI kg/m<sup>2</sup>) is used for the diagnosis of sarcopenia, a highly prevalent medical condition in older adults. The purpose of this study was to validate an easy field-test for the characterisation of muscle function in older adults and to assess its possible association with ALMI.

### **METHODS**

Forty-seven older adults (47% females, 67±7 years, 73±12 kg, 1,67±0,99 m) were asked to perform five Sit-to-stand movements (STS) on a force platform at Body weight (BW), BW+12,5% and BW+25%, in randomised order. Two subjects (5%) were unable to complete the trials >BW and were excluded. For each subject and trial, the mean velocity was calculated from the vertical displacement and the time of the concentric portion of the STS. Then, the individual force-velocity profile of the lower limbs was determined for the extrapolation of the maximal isometric force (L0), corresponding to the null velocity. In addition, ALMI, was calculated based on the quantification of appendicular muscle mass with the Dual-energy X-ray Absorptiometry (DXA). Simple correlation between individual characteristics, L0 and ALMI were determined; then a step-forward multiple linear regression model was identified to estimate ALMI (<sub>est</sub> ALMI). The correspondence between <sub>est</sub> ALMI and measured ALMI was evaluated by paired t-test, correlation, and Bland-Altman analysis.

### **RESULTS**

The group mean value of L0 was 174,8 ± 43,97 Kg and that of ALMI was 7,37 ± 1,23 kg/m<sup>2</sup>. Only BW, Sex, and L0 were significantly correlated with ALMI (r=0,78, r=0,68, r=0,66, respectively). The step-forward multiple linear regression excluded sex as a predictor and the following final formula was identified: ALMI = 0,209 + (0,0789 \* BW) + (0,00793 \* L0), (r<sup>2</sup> 0.83, SEE 0.5). <sub>est</sub>ALMI (7,37 ± 1,18 kg/m<sup>2</sup>) was not significantly different from (p=0.985) and highly correlated with (r<sup>2</sup>=0.83) ALMI, with a non-significant bias (-0.002 kg/m<sup>2</sup>) and an imprecision of 0.5 kg/m<sup>2</sup> (7% of ALMI).

### **CONCLUSION**

The modified STS test proposed in our study is a feasible, simple, submaximal, time-efficient test to characterise muscle function of the lower limbs in older adults. Moreover, maximal isometric force, as estimated from STS (i.e. L0), in conjunction with body weight, allows an accurate and precise prediction of ALMI, one of the reference markers of the sarcopenic condition in older adults.

1. Alcazar J, Losa-Reyna J, Rodriguez-Lopez C, et al. The sit-to-stand muscle power test: An easy, inexpensive and portable procedure to assess muscle power in older people. *Exp Gerontol.* 2018;112(August):38-43. doi:10.1016/j.exger.2018.08.006
2. Cruz-Jentoft AJ, Sayer AA. Sarcopenia. *Lancet.* 2019;393(10191):2636-2646. doi:10.1016/S0140-6736(19)31138-9