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The relationship between peak power and leg size in mountain bike cyclists

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Title: THE RELATIONSHIP BETWEEN PEAK POWER AND LEG SIZE IN MOUNTAIN BIKE CYCLISTS.

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Introduction: Recent literature has suggested that complex anthropometrics, such as area and volume are better predictors of sporting performance, than traditional anthropometrics of length, breadth and girth[1]. The aim of this study was to determine the relationship between peak power and leg size, both girth and volume, in mountain bike cyclists.

Method: This study was an observational, cross sectional investigation of 13 recreationally competitive mountain bike cyclists (age 33 ± 6 years; stature 1.83 ± 0.10 m; body mass 80.28 ± 3.16 kg). In accordance with the International Society for the Advancement of Kinanthropometry (ISAK) five anatomical locations on each leg were manually palpated and marked. Three-dimensional (3D) images of the lower body were captured using a high precision commercially available surface imaging system, 3dMD (3dMD Inc., Atlanta, GA, USA). The 3D images were manually digitised using bespoke software developed in-house (KinAnthroScan). ISAK Girth anthropometrics; thigh girth and calf girth, and volume anthropometrics; lower leg volume and upper leg volume, for each leg were exported. To acquire peak power, participants completed four, six second all out sprints against randomly assigned loads (7.5 % BW, 9% BW, 10.5% BW, 12% BW) from a seated stationary start on an electromagnetically braked cycle ergometer (Lode Excalibur Sport with Pedal Force Measurement, Groningen, Netherlands). Each sprint was separated by 5 minutes rest (4 minute active recovery + 1 min rest). These data were collated and the relationship between leg size and peak power explored using linear regression analysis.

Results: All anthropometrics demonstrated a significant ($p<0.05$) and strong positive correlation ($r>.50$) with peak power. Volume anthropometrics demonstrated a greater contribution to the variance in peak power ($R^2 = 0.66$, $p=0.05$) compared to girth anthropometrics ($R^2 = 0.57$, $p=0.11$).

Conclusions: This study suggests that volume anthropometrics provide a better predictor of peak power than girth anthropometrics, in mountain bike cyclists. Future kinanthropometry studies on mountain bike cyclists should consider the use of volume anthropometrics.

References:

1. Schranz N, Tomkinson G, Olds T, Petkov J, Hahn AG. Is three-dimensional anthropometric analysis as good as traditional anthropometric analysis in predicting junior rowing performance? *Journal of Sports Sciences*. 2012 Aug 1; 30(12):1241-8.

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