



UEL Research & Knowledge Exchange Conference 2013

Call for Abstracts

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| Name & Title of Presenter: | Dr David Stephensen |
| School: | School of Health, Sport & Bioscience |
| Co investigators: | Wendy I. Drechsler, Oona M. Scott |
| Title of Abstract: | Altered muscle strength and architecture influences motor performance in boys with severe haemophilia and ankle joint haemarthrosis |
| Key Theme/ Key words: | Haemophilia; muscle strength; muscle architecture. |

Abstract (No more than 400 words):

Introduction: Haemophilia is an inherited disorder in which the blood does not clot normally and is characterised by recurrent spontaneous and traumatic bleeding into muscles and joints. In children it is managed by a regime of high cost prophylaxis with clotting factor concentrates, yet bleeding still occurs particularly at the ankle joint. It has been shown that the muscles of young haemophilic boys with a history of ankle joint bleeding are smaller and weaker than their unaffected peers. Alterations in balance and gait have also been reported. This study explores the influence of muscle architecture of the lateral gastrocnemius (LG) muscle on ankle plantar flexor (APF) muscle strength and biomechanical walking patterns in 19 typically developing boys (G1), aged 7-12 years and 19 age and size-matched haemophilic boys (G2). **Methods:** LG cross-sectional area (CSA), thickness (MT), fascicle length (FL) and pennation angle (PA) using ultrasound imaging, APF strength utilising an isokinetic dynamometer and function of the knee and ankle during walking using a 3D motion-capture system was recorded. **Results:** CSA and MT of LG together with strength of the APF were significantly smaller in G2 when compared to G1. Strength correlated most strongly with BMI in G1 ($r=0.62$, $p<0.05$) and with age in G2 ($r=0.65$, $p<0.01$). Associations between MT and ankle joint motion differed between groups at the beginning ($p<0.05$) and end of stance ($p<0.05$). Reduced FL was associated with larger knee flexion moments in G2 but smaller moments in G1 ($p<0.05$). Relationships between reduced APF strength, ground reaction forces and knee flexion moments were significantly stronger in G2 than G1 ($p<0.05$). **Clinical Relevance:** Biomechanical function of the ankle and knee joints of haemophilic boys who have a history of ankle joint bleeding appears to be related to APF muscle strength deficits and adaptations in muscle architecture. Key findings from this study could be used to develop quantitative clinical measures of musculoskeletal function in this group of high cost patients and to identify those boys at risk of developing chronic joint arthropathy.