

O30: Functional Assessment Of The Musculoskeletal System In Juvenile Idiopathic Arthritis

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Purpose: Using peripheral quantitative computed tomography (pQCT) it has been shown, that bone mass deficits in juvenile idiopathic arthritis (JIA) mainly relate to abnormalities in bone geometry which to a large extent can be explained by a reduction in muscle mass. To better understand the muscle bone interaction and develop effective therapeutic strategies, it is important to analyze muscle function. Physically, muscle function can be described as muscle force and power. The aim of the present study was to measure muscle force and power in children with JIA and relate it to parameters of bone density and bone geometry.

Methods: In a cross sectional study, parameters of bone density and bone geometry were assessed in 51 JIA patients (n=19 oligo, n=23 poly and n=9 systemic) by pQCT at the tibia and the non-dominant forearm. In addition, standard manoeuvres were performed on a recently developed ground force reaction plate (Leonardo™) which can selectively determine muscle force and power. Results of both measurements were calculated as Z-scores, i.e. standard deviations of patients' results as compared to age-matched and height-matched reference groups.

Results: Cortical density was normal with a Z-score of 0.15 in the oligoarticular patients and increased at 0.39 and 0.89 in the polyarticular and systemic patients. Trabecular density was normal in oligoarticular and reduced at -0.51 and -1.10 in polyarticular and systemic patients respectively. The most prominent changes were an alteration of cortical geometry with a reduction of cortical area and thickness in all groups together with a reduction in muscle cross sectional area. Muscle power was reduced at a Z-score of -0.63 in the oligoarticular, -1.19 in the polyarticular and -1.39 in the systemic patients. Muscle force was similarly reduced. A strong correlation between muscle force and muscle cross sectional area at the tibia with R=0.95 as well as muscle force and cortical are at the tibia with R=0.91 was found.

Conclusions: This study combined a detailed assessment of muscle force, power and parameters of bone density and geometry; Our previous findings of alterations in bone geometry in JIA were confirmed. The strong correlation between muscle force and cortical area also provides further evidence that the muscle bone interaction is essentially functional in JIA. It might therefore be most important to objectively monitor muscle force and power in JIA. Using devices like the Leonardo™ platform, this can be accomplished without radiation, requires little time and is non-invasive. Identification of patients who show deficits will allow specific interventions aiming at muscle force or power. This in turn might have huge impacts on the daily function but also the long term outcome of the musculoskeletal system.