**REVISED FULBRIGHT STUDY**

**Motivation:**

Pivoting after landing from height is a frequent and necessary manoeuvre undertaken during many sports, such as Australian Rules Football, soccer, basketball and netball. However, for individuals with femoroacetabular impingement (FAI) syndrome, this manoeuvre may exacerbate symptoms such as pain. Despite increasing knowledge of the aetiology and natural history of FAI syndrome, the impact of FAI syndrome on human biomechanics during dynamic sports-related weightbearing tasks is poorly understood. The step-down-and-pivot task mimics the action of pivoting after landing in a controlled manner, that may facilitate analysis of biomechanics in the presence of hip pain and functional impairment due to FAI syndrome. The biomechanics of this task has not been well quantified in both healthy or pathological individuals. As such this study has 2 objectives:

**Objective 1:**

To understand *if and how* individuals with FAI syndrome undertake the step-down-and-pivot task differently to asymptomatic controls. The findings will be valuable in extending our knowledge of the natural history of this condition, specifically, with respect to altered biomechanics during movement.

*Primary outcome measures:* joint angles, joint moments

*Effect modifiers:* sex, pain severity

*Method:* OpenSim IK + ID, or IK + Moco using torque-driven model

*Analysis:* SPM{t}, by group, sex and severity

*Roles/Authorship*: Pras, Carmichael (NMBL mentor), Jen (NMBL supervisor), Scott (NMBL sponsor), […additional FORCe investigators involved in experimental data collection…], Kay Crossley (LASEM Director, FORCe CI)

**Objective 2:**

To explore how individuals with FAI syndrome *should* undertake the step-down-and-pivot task in a manner that minimises the symptoms of FAI syndrome, using biomechanical simulation. The findings may help identify potential modifications to kinematics or muscular coordination that may reduce symptoms, and that could be applied to coaching or rehabilitation programs for athletes with FAI syndrome.

*Primary outcome measures:* joint angles, joint moments, muscle forces, joint forces

*Effect modifiers:* magnitude of hip joint angles, hip joint forces

*Method:* Moco, initially develop framework using walking, then attempt step-down-and-pivot

*Analysis:* TBD

*Roles/Authorship*: Pras, Carmichael (NMBL mentor), Jen (NMBL supervisor), Kay Crossley (LASEM Director, FORCe CI), Scott (NMBL sponsor)