**Protocol**

1)  **Title:** Correlation of Functional Movement Screen™ Score and Injury History in National Football League Scouting Combine Attendees

**Investigators:** Blake Shockley M.D, Marty Lauzon ATC PT, Jeff Fish, and Spero Karas M.D. (PI)

**Draft Date**: -

2) **Abstract:**

The Functional Movement Screen™ (FMS) is an increasingly used screening tool that aids the clinician in assessing the fundamental movement patterns of an individual. This assessment tool consists of seven basic movements used to generate a “screen score” and to discern asymmetries in motion between the participant’s left and right sides. The test is often used in pre-participation screenings to evaluate individuals in a dynamic and functional capacity. It seeks to identify compensatory movement patterns- or movement “asymmetries”- that may lead to an increased risk of future injury. The FMS is used to assess all athletes at the National Football League (NFL) Invitational Scouting Combine and is currently used by several NFL teams to track individual movement patterns and asymmetries in their athletes.

We plan to retrospectively review the FMS scores and injury histories of all attendees of the NFL National Invitational Scouting Combine from 2008-2012. A statistical analysis of these data will attempt to discern correlations between certain FMS asymmetries and injury.

3) **Introduction and Background:**

The FMS is an evaluation tool that is used to assess the fundamental movement patterns of individuals. It is comprised of seven fundamental movement patterns that require a balance of mobility, stability, and proprioceptive abilities. This assessment tool is used to identify any compensatory movement patterns or asymmetries during pre-participation screenings. These asymmetries can result in biomechanically disadvantageous movement patterns and ultimately the potential for injury. The FMS may be an effective screening tool to quickly identify any deficits in mobility and stability that can lead to injury. Once these deficits are identified, prevention strategies can be initiated to optimize movement patterns and potentially reduce the risk of injury.

4) **Objectives:**

The aim of this study is to determine the effectiveness of the FMS is identifying injury susceptibilities from NFL Scouting Combine attendees over a four year period.

5**) Study Design and Methods**:

The study will be a retrospective review. The screening tool is used routinely to evaluate all attendees at the NFL National Invitational Scouting Combine. All subjects have previously undergone baseline testing. We will then evaluate whether the FMS is an effective screening tool for identifying injury susceptibilities. There will be a potential benefit as we will know if asymmetries identified in the screening leads to an increased risk of injury. Information we will collect will include age, FMS score, number and type of injuries, and length of time missed due to injury. There will be no specimens collected, no randomization, and no blinding. The data will be saved in a spreadsheet document on a password protected computer. The data will be stored in a de-indentified format.

Descriptive statistics (mean ± SD or median or percentage) will be given for all variables. Mann-Whitney test will be used to compare FMS score between the injured group and non-injured group for each of specific injuries or any type of injury. Chi-square/Fisher exact test will be used to test whether a significant relationship between asymmetry and any specific injury or any type of injury. A logistic model with variables like FMS score, asymmetry, or age as the predictors may be used for the prediction of injury. Comparisons were considered significant at a p level of less than 0.05.

6) **Participant Selection**:

All athletes who attended the NFL National Invitational Combine from 2008-2012 (approximately 1,300 athletes) and received a FMS score will be evaluated.

8) We are not performing any interventions thus adverse event reporting is not required.

References:

1. Kiesel K, Plisky PJ, Voight ML. Can Serious Injury in Professional Football be Predicted by a Preseason Functional Movement Screen? *N Am J Sports Phys Ther.* 2007 August; 2(3): 147–158.
2. Cook G, Burton L, Hoogenboom B. Pre-participation Screening: The Use of Fundamental Movements as an Assessment of Function- Part 1. *N Am J Sports Ther.* 2006 May; 1(2): 62-72.
3. Cook G, Burton L, Hoogenboom B. Pre-participation Screening: The Use of Fundamental Movements as an Assessment of Function- Part 2. *N Am J Sports Ther.* 2006 August; 1(3) 132-139.
4. Onate JA, Dewey T, Kollock RO, Thomas KS, Van Lunen BL, DeMaio M, Ringleib SI. Real-Time Intersession and Interrater Reliability of the Functional Movement Screen. *J Strength Conditioning Research*. 2012 February; 26(2): 408-415.
5. Schneiders AG, Davidsson A, Horman E, Sullivan SJ. Functional Movement Screen™ Normative Values in a Young, Active Population. *Int J Sports Phys Therapy*. 2011 June; 6(2): 75-82.
6. Knapik JJ, Bauman CL, Jones BH, Harris JM, Vaughn L. Preseason Strength and Flexibility Imbalances Associated with Athletic Injuries in Female Collegiate Athletes. *AJSM*. 1991; 19(1): 76-81.
7. Lephart SM, Pincivero DM, Giraldo JL, Fu FH. The Role of Proprioception in the Management and Rehabilitation of Athletic Injuries. *AJSM*. 1997; 25(1): 130-137.