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Methods for assessing segment kinematics and EMG activity in sprinting: challenging, simple or simplistic?

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Compelling evidence suggests that some kinematic patterns and muscle coordination strategies increase the risk of hamstring injuries. Segment kinematics is significantly affected by the coordination of several muscles that operate in a complex system. Regarding kinematics, increased pelvic tilt, lateral trunk flexion, forward leaning posture, and kick-back mechanism are some examples which have been associated with hamstring injuries with varying levels of evidence. In sports settings, simple yet valid methods are essential for monitoring kinematics.
Muscles in the lumbopelvic region have the capacity to affect hamstring strain and, consequently, injury risk. The distribution of electromyography (EMG) activity between muscles and metabolic activation within some muscles have been related to hamstring injuries. Additionally, proficient coordination may be required for superior sprint performance.
In the first part of this presentation, the advantages and limitations of the methods used to assess segment kinematics will be discussed, supported by the novel results from our research group. In addition, the first version of a novel markerless motion analysis software will be introduced. In the second part of this presentation, methods to assess muscle activation (metabolic and neural) will be compared. This presentation will discuss the challenges of collecting high-quality EMG signals in highly dynamic movements, such as sprinting. Suggestions will be made regarding data collection and data processing. These will be based on personal experience in EMG data collection from ~100 elite athletes in the FULGUR project (INSEP, Paris). Additionally, the advantages of high-density EMG for data acquisition with improved signal quality during sprinting will be discussed.
This presentation will be relevant to those interested in understanding muscle coordination activation strategies during sprinting. A broader audience interested in how to acquire and process EMG signals in dynamic movements will also benefit.

Topic: **Biomechanics**

Presentation **Invited**