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Human movement represents the ongoing interaction between the neural control system, the musculoskeletal system, and the environment. Often the overall movement performance criteria are in direct conflict with effective load distribution to avoid tissue or joint injury. Musculoskeletal injuries (e.g. bone, ligament, joint) associated with activities involving whole body regulation of momentum and effective load distribution during foot contact with the ground are costly, directly influence the quality of life, limit physical activity and/or earning potential, and are likely to lead to more chronic problems (e.g. joint instability, degenerative joint disease) over time. Insufficient control of joint motion during weight bearing activities has been associated with a high incidence of musculoskeletal acute and over use injuries, particularly in tasks involving impact or quick changes in movement direction. Current research challenges include:

1) quantifying internal loading experienced by an individual performing physically demanding tasks performance in a realistic context,
2) determining control strategies that are advantageous from a performance and/or load distribution perspective,
3) characterizing current state of the musculoskeletal and neural system components (e.g. account for ongoing adaptations)
4) prospectively identifying individuals at risk of experiencing mechanically induced acute and/or over use type injuries during realistic physically demanding activities.
5) identifying effective mechanisms for translating knowledge to lasting improvements in performance.

The study of well-practiced goal-directed tasks involved in daily living provides a window for studying subject-specific priorities of their control system at the whole body, subsystem, joint, and tissue levels. Knowledge regarding the distribution of mechanical load to individual structures, however, is limited by the challenges associated with directly measure load experienced *in vivo* during realistic movements. Modeling how an individual anticipates and controls reaction forces under various circumstances, allow us to simulate mechanical loading scenarios under hypothetical conditions, independently modulate variables that cannot be manipulated experimentally, and quantify variables that cannot be measured *in vivo*. Development and validation of a dynamic model of sufficient accuracy and complexity allows us to investigate various strategies for effective load distribution so that individuals can avoid scenarios associated with injury. This approach often involves the need for effective cross disciplinary collaboration with experts in whole body biomechanics, tissue mechanics, neural control, and multilink dynamic modeling.

As director of an interdisciplinary research lab and graduate program that integrates both experimental and dynamic modeling approaches to whole body movement in realistic context, I see the need for creating academic cultures and funding mechanisms that fosters and values a) collaboration between disciplines, b) integrative training of graduate students, c) development of experimentally validated research tools and reporting standards (e.g. 3D kinematics, kinetics, EMG, medical imaging, and dynamic modeling) to solve problems involving realistic human movements. As President-Elect of the American Society of Biomechanics, I also look forward to engaging the membership to take active roles in building the bridges essential for creating a lasting framework for advancing biomechanics research at multiple levels.