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As field, biomechanics started in the late 1800's off a bet on a horse race. It started with one camera alongside a track. Over 130 years later, we are still doing the same thing, despite the fact our computational and technological power has at least doubled every 3 years for the past 10 years. It would appear to the outsider that though we have made significant gains in understanding, we are under utilizing our technologies.

Moreover, as a field, we are what is important to most patients – they want to move as they used to (e.g., pre-injury, pre-surgery, or before the aging process stepped in). With that being said, it is my belief that biomechanics research should be highly collaborative among the other fields. We should explore biomechanics, not just for the macro level (by what we can see), but by the micro level, and explore how the gross movements affect the cellular actions and structure. Correspondingly, biomechanics should explore how movement occurs from top-down, meaning we should take an active interest in understanding how electrical and neuronal signaling ultimately ends up determining the joint action. We should seek out collaborative efforts that promote our discipline, while our research explores the mechanisms behind movement. I believe that if we can gain insight into the mechanistic approach of movement, we will be better suited to work effectively with clinicians and provide better treatment and outcome strategies.

RECOMMENDATION 1:
Develop translational models of research through understanding micro to macro biomechanics (e.g., develop models that show how joint angles and action affect cellular responses).
Biomechanics literature tends to focus on either macro biomechanics (gross movements) or micro biomechanics (cellular actions). As a field, the literature is generally lacking substantial translational work between the macro actions and cellular actions. While it is understood that certain joint actions over time lead joint degeneration, such as repeated loading at the knee can lead to osteoarthritis, the exact mechanisms between loading and degenerative changes are less clear. This is where modeling between micro and macro actions is needed to further elucidate how loading effects change the cellular environment and actions.

RECOMMENDATION 2:
Promote a mechanistic and holistic approach to movement (e.g., research should examine the neurological and physiological relationships between movement).
Biomechanics, as field, started with exploring kinematics and basic observations of joint angles and movements. As the field grew and technology improved, we were better able to measures of joint angles and actions. While at the functional level this is important, at the researcher and clinician level, it is more important to understand what is causing the changes in joint actions and movements, from both a physiological and neurological perspective. This means biomechanists have to willing to delve into not just the joint actions, but the signaling that is causing the joint actions. This includes not just electromyography, but it may include technologies such as electroencephalogram (EEG) to determine how the brain's signaling is affecting the muscular activity and to joint actions. As we seek to improve the research in biomechanics, we must also seek to integrate new technologies and measurement techniques into our research.

RECOMMENDATION 3:
Establish biomechanics core competencies for curriculum development and training.
A key to developing strong biomechanics understanding and promoting the field is through building the knowledge infrastructure. There is currently a strong push for increased STEM (science, technology, engineering, and mathematics) education, and biomechanics can easily position itself within the STEM disciplines and show its viability as a STEM field. This will also promote biomechanics understanding among the government and public, which can solidify the need for increased funding and provide a springboard for enhanced educational opportunities for biomechanists-in-training. This will enable students and researchers to learn new and emerging technologies to push the research agenda, while developing new biomechanics leaders.

In summary, the field of biomechanics is growing and is poised to become leader in clinical and research settings. The value biomechanists provide for athletes, clinicians, trainers, and patients is paramount to improving quality of life. In understanding how to develop translational and mechanistic research, biomechanics can be to position itself as a research- and patient-oriented field. This will further be enhanced through proper education and training of biomechanists that supports a holistic approach to movement.