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Joint biomechanics, even when explored at an isolated spatial scale, has provided the pathway for basic and translational knowledge to understand load sharing between tissues, explore injury mechanisms, design joint replacements, and identify surgical and therapeutic interventions to accommodate joint and tissue dysfunction. For such investigations, we tend to simplify, sometimes radically, the role of the body/organ and tissue/cell level mechanics on joint function. This appears to be a necessity for translational applications and clinics oriented research, during which the answers should be provided in an expedited fashion. However, even at the single spatial scale of the joint, translation of scientific knowledge to engineering and medical practice is not a routine activity. Limited access to patient-oriented, streamlined, and rapid modeling and experimental approaches for clinical examination; disease-specific data; and trained research engineers that can work in the field under pressure (with limited resources and time constraints) are many issues waiting for resolution.

Joint biomechanics has the potential to naturally bridge functional body scale studies and basic science in the mechanobiology of tissues and cells. If joint level experimentation and models are coupled with clinical measurements conducted at the neuromuscular and musculoskeletal domains, we have a chance to understand the influence of skeletal and muscular loads on joint and tissue function, and to clarify the relationship between tissue mechanics and motor control. It will be possible to design an intervention employed at the musculoskeletal level but targeted at reducing or inducing tissue stress. Similarly, if joint level experimentation and models are coupled with scientific findings obtained through tissue and cell scale studies, there is the potential to understand the influence of daily loads on microstructural function, e.g. on the role of extracellular matrix and cell mechnobiology, and also to establish the effect of microscopic changes on body level function. Nonetheless, multiscale approaches in biomechanics may suffer from oversimplification, particularly during the exploration of concurrent coupling between macro and micro systems. This is not surprising since multiscale investigations, experimental or simulation-based, are challenging. A multidisciplinary approach is required, dictating collaborations between multiple laboratories. While collaborative work in computational approaches is not difficult (thanks to the Internet), multiscale experimentation on same subjects and/or specimens, can be a logistical difficulty, particularly if the tests are required to be conducted at multiple sites. Facilitated means to share equipment and specimens among institutions, and safekeeping of physical samples for future testing may be worth exploring.

Regarding the social aspects of our work; investigations, if conducted in an open fashion, can stimulate large collaborations. Early dissemination of data and models, and utilization of tools accessible by many can make crowd-sourcing a possibility to resolve challenging problems in biomechanics. For sharing data and models, many infrastructures are available (federally funded and/or institutional). However, bringing the scientific knowledge into a reusable, well-documented (and potentially standardized) form is a challenging task for the individual investigator. Resource limitations, time commitments, and the pressure for scholarly publishing and academic achievement may hinder this process. Traditional publishing system may not keep up with the pace, the required detail, and the desired open access approach (good working examples of open access journals exist) compatible with open collaborative work. Academic promotion system is also not helpful since it strongly couples success with scholarly publishing; demoting the value of reusability, which is likely to prevent repetition.

Based on my opinions outlined above, my recommendations pertaining the future of biomechanics are

1. to focus on training personnel for **collaborative field work** to support decision-making,
2. to establish **confidence** on the role of experimental and modeling studies on clinical decision-making and on certification of medical device design,
3. to establish **guidelines** for simulation-based and/or experimental coupling of the biomechanics of the body, organs, tissues, and cells,
4. to provide support mechanisms (federal and institutional, time and resources) for **individual investigators** to conduct **detailed documentation** and **early dissemination**, with the ultimate goal to promote **open collaborative science** and sharing of data, analysis tools, and models,
5. to establish **databases** on anatomical and biomechanical function of cells, tissues, and joints to prevent repetition of biomechanical investigations and to promote reusability,
6. to support data collection efforts in **concurrent multiscale experimentation** both for healthy and diseased states, and
7. to establish **new measures of merit** for rating and review of scientific work, compatible with high-pace, distributed, and collaborative nature of $21^{st}$ century science.