Biosketch

ILSE JONKERS

From my PhD (2000) onwards, I successfully bridged from a classical human movement science and physical therapy profile towards an integrated biomedical science and biomedical engineering profile, exploiting maximally the use of 3D motion capture and multi-body simulation techniques to advance the understanding on pathological movement. The two-year postdoctoral stay at the bioengineering department at Stanford University (Prof Delp) was a pivotal experience in this process. To date, I am a professor at the Human Movement Biomechanics Research Group and affiliated with the Tissue Homeostasis and Disease Laboratory at KU Leuven.

My group is conducting internationally highly competitive research on the quantification of whole joint loading using multi-body simulation. Its work is known for the development of subject-specific musculoskeletal models containing a high level of anatomical detail, especially in the context of cerebral palsy. More recent research activities relate to the development of a multi-scale modelling framework of bone and cartilage adaptation and advanced medical imaging of cartilage to understand degenerative joint diseases. In this context, I aim to elucidate the role of mechanical loading in cartilage homeostasis and disease using multi-axial bioreactor experiments. I am passionate about this new, highly multi-disciplinary research line combining biomedical sciences (human movement science, musculoskeletal modelling, cartilage biology and imaging) and engineering sciences (multi-scale modelling).

'Science beyond experimental measurements'
Where simulations meet clinical questions…

The use of integrated 3D motion capture is currently well-accepted to study locomotor function in subjects with musculoskeletal disorders and evaluate the impact of treatments on movement disorders. Gradually, the concept of supplementing this experimental data with model- and simulation-based approaches is explored, not only in a research context, but also within the clinical-decision making context.
Indeed, combining experimental data with modeling and dynamic simulation approaches, we now have access to parameters which today cannot be measured non-invasively (e.g. muscle contributions to movement, joint loading and tissue strain). In the research field on degenerative joint disease, there is the ambition and proof of concept to use these techniques to contribute to patient stratification and consequent prescription of targeted rehabilitation strategies. Likewise, the potential in defining effective treatment approaches to optimize gait function in children with CP is becoming more and more accepted.
In my presentation, I will present our insights on the potential of model-based insights in understanding and optimizing locomotor performance. I will conclude with addressing current challenges of transferring this work into a clinical setting and will set out a roadmap to facilitate clinical adaptation through dedicated cross-disciplinary initiatives.

DOI : 10.34814/sofop-2023-012