Ilse Jonkers

Biosketch

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 and head of the Human Movement Biomechanics Research Group 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 multi-scale modelling 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) to optimize exercise regimes for cartilage health.

'Degenerative joint disease: where movement modelling meets biology'

To design and adapt therapeutic approaches that successfully regenerate native joint cartilage, it is indispensable to understand how articular cartilage is loaded during locomotion. Furthermore, the local cartilage loading needs to be related to the molecular response of the chondrocytes. In my presentation, I will identify biomarkers of early OA during locomotion (using multi-scale modeling), relate the mechanical loading to experimentally measured cartilage deformations (using high-field MRI) and identify the effect of the local mechanical cues to constituent expression (using bioreactor experiments). Through careful documentation of the mechanobiological response, we will be able to design future rehabilitation approaches and preventive exercise programs that optimize cartilage health.