

Soft tissue biomechanics for pressure ulcer prevention: what challenges for Artificial Intelligence?

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Abstract:

This invited talk will address the use of subject-specific biomechanical Finite Element models of human soft tissues (buttock, sacrum, foot) in the context of pressure ulcer prevention. Estimating internal strains within soft tissues could help to evaluate the risk of pressure ulcer. A subject-specific biomechanical model could be used to assess such internal strains from measured skin surface pressures. However, any realistic 3D non-linear Finite Element model (including layers of tissue materials such as skin, fat and muscles) requires somewhere between minutes and hours to compute, therefore forbidding its use in a real-time daily prevention context. During this presentation, we will discuss the bottlenecks that we are still facing if we target a clinical use of such Finite Element models and therefore the challenges opened for artificial intelligence. The computation time can indeed be drastically decreased with the use of reduced order modeling techniques (ROM). The generation of subject-specific models in a time-line that is compatible with the clinical constraints will also be discussed during this presentation.