Development of an Image-Based Biomechanical Model for Assessment of Hip Fracture Risk

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Abstract : Low-trauma hip fracture, usually caused by fall from standing height, has become a main source of morbidity and mortality for the elderly. Factors affecting hip fracture include sex, race, age, body weight, height, body mass distribution, etc., and thus, hip fracture risk in fall differs widely from subject to subject. It is therefore necessary to develop a subject-specific biomechanical model to predict hip fracture risk. The objective of this study is to develop a two-level, image-based, subject-specific biomechanical model consisting of a whole-body dynamics model and a proximal-femur finite element (FE) model for more accurately assessing the risk of hip fracture in lateral falls. Required information for constructing the model is extracted from a whole-body and a hip DXA (Dual Energy X-ray Absorptiometry) image of the subject. The proposed model considers all parameters subject-specifically, which will provide a fast, accurate, and non-expensive method for predicting hip fracture risk.