

Publication

A framework for the in vivo pathomechanics of osteoarthritis at the knee

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The in vivo pathomechanics of osteoarthritis (OA) at the knee is described in a framework that is based on an analysis of studies describing assays of biomarkers, cartilage morphology, and human function (gait analysis). The framework is divided into an Initiation Phase and a Progression Phase. The Initiation Phase is associated with kinematic changes that shift load bearing to infrequently loaded regions of the cartilage that cannot accommodate the loads. The Progression Phase is defined following cartilage breakdown. During the Progression Phase, the disease progresses more rapidly with increased load. While this framework was developed from an analysis of in vivo pathomechanics, it also explains how the convergence of biological, morphological, and neuromuscular changes to the musculoskeletal system during aging or during menopause lead to the increased rate of idiopathic OA with aging. Understanding the in vivo response of articular cartilage to its physical environment requires an integrated view of the problem that considers functional, anatomical, and biological interactions. The integrated in vivo framework presented here will be helpful for the interpretation of laboratory experiments as well as for the development of new methods for the evaluation of OA at the knee.

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