People

Lawrence Bonassar

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Dr. Bonassar's research group focuses on the regeneration and analysis of musculoskeletal tissues, including bone and cartilage. The approach involves a multidisciplinary strategy using techniques in biomechanics, biomaterials, cell biology, and biochemistry. Applications of this technology include the repair of articular cartilage, intervertebral disc, trachea and craniofacial defects.

At the cellular level, this work focuses on understanding the interactions of chondrocytes, fibroblasts and stem cells with biomaterials. This includes grafting of cell adhesion peptides to polymers and characterizing the effects of these alterations on the way in which cells sense their environment. Of specific interest is the extent to which intrinsic mechanical properties and externally applied forces control chondrocyte matrix assembly.

This work feeds into studies of the generation of biological structures at the tissue level, where cell-biomaterials interactions include understanding the way in which materials processing techniques affect cell behavior. This has led to the development of techniques known as tissue injection molding and cell-mediated sintering, whereby living implants are formed under conditions that support cell viability. Extensions of this work are aimed at fabricating composite tissues with heterogeneous structures and anisotropic properties.

The third focus area of the group is understanding structure-property relationships in native and engineered tissues. This involves experimental correlation of tissue mechanical properties with biochemical composition as well as mathematical modeling of tissue assembly processes and structure-property relationships.

Dr. Bonassar joined Cornell University in 2003 after five years on the faculty of the Center for Tissue Engineering at the University of Massachusetts Medical School. He completed postdoctoral fellowships in the Orthopaedic Research Laboratory at the Massachusetts General Hospital and in the Center for Biomedical Engineering at the Massachusetts Institute of Technology. He currently serves on the editorial board of the

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