

The Regenerative Engineering Future: The Role of Biomaterials

Cato T. Laurencin, M.D., Ph.D.,
University Professor
University of Connecticut

The next ten years will see unprecedented strides in regenerating musculoskeletal tissues. We are moving from an era of advanced prosthetics, to what I term regenerative engineering. In doing so, we have the capability to begin to address grand challenges in musculoskeletal regeneration. Tissues such as bone, ligament, and cartilage can now be understood from the cellular level to the tissue level. We now have the capability to produce these tissues in clinically relevant forms through tissue engineering techniques. Our improved ability to optimize engineered tissues has occurred in part due to an increased appreciation for stem cell technology and nanotechnology, two relatively new tools for the tissue engineer.

Critical parameters impact the design of novel scaffolds for tissue regeneration. Cellular and intact tissue behavior can be modulated by these designs. Design of systems for regeneration must take place with a holistic and comprehensive approach, understanding the contributions of cells, biological factors, scaffolds and morphogenesis.