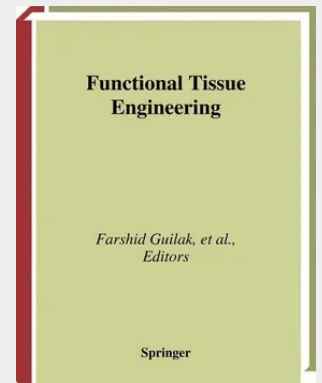


Functional Tissue Engineering

Tissue engineering is an exciting new field at the interface of engineering and biology that uses implanted cells, scaffolds, DNA, proteins, protein fragments, and inductive molecules to repair or replace injured or diseased tissues and organs. Tremendous progress in biological and biomaterial aspects of this field have been accomplished to date, and several engineered tissues are now being used clinically. However, tissue engineers face major challenges in repairing or replacing tissues that serve a predominantly biomechanical function. To meet this challenge, the United States National Committee on Biomechanics in 1998 adopted a new paradigm termed functional tissue engineering (FTE) to emphasize the importance of biomechanical considerations in the design and development of cell and matrix-based implants for soft and hard tissue repair. Functional tissue engineering represents a relevant and exciting new discipline in the field of tissue engineering. Since many tissues, such as those of the musculoskeletal, cardiovascular, and dental systems, are accustomed to being mechanically challenged, tissue-engineered constructs used to replace these tissues after injury or disease must certainly do the same. Of course, tissue engineers must also attempt to return normal biological activity in order for the construct to truly integrate with the surrounding tissues. Thus, the term functional can have many meanings, such as restoration of metabolic function. The primary focus of this text is on the role of biomechanical function in tissue engineering.

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