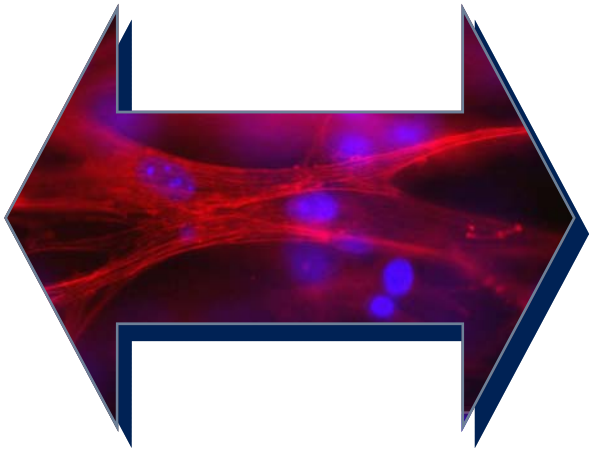
Tissue Engineering

Formation of tissues in vitro that are structurally and functionally viable requires several basic conditions, such as 1) cells 2) matrix 3) media and growth factors and 4) mechanical stimulation. These conditions are linked to each other and act in conjunction to form a structurally robust tissue that can withstand biomechanical forces.

To generate a tissue in vitro that is more or less equivalent to the native tissues, one should create an environment that would mimic the in vivo conditions. Culturing cells in a mechanically active environment increases cell metabolism and alters cell shape and other properties. In addition, culturing cells in a 3D environment more closely simulates the native environment.

Trapezoidal shaped 3D cell -seeded hydrogel made with the Tissue Train® system.

Culturing cells



in a mechanically active environment

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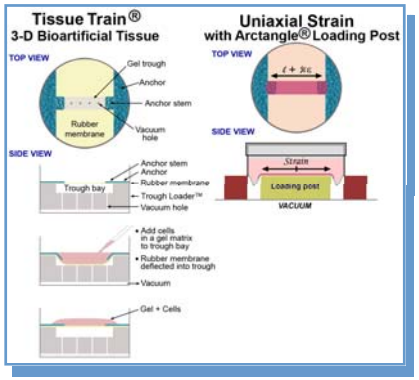
TISSUE TRAIN® CULTURE SYSTEM
& TISSUE ENGINEERING

3D cell culture in a gel matrix with or without cyclic uniaxial tension

Flexcell® Tissue Train® System

The Tissue Train® culture system is a stand-alone 3D culture system that allows investigators to create 3D geometries for cell culture in a matrix gel or allow the cells to build a self-assembled matrix that connects to the anchors in a Tissue Train® culture plate. Flexcell® currently has molds and/or plates for creating three different shaped hydrogels: linear, trapezoidal, and circular.

The FX-5000™ Tension System provides the investigator with a tool to apply regulated uniaxial or equibiaxial strain to the growing bioartificial tissues. A user can define a frequency, elongation and duration of strain in a regimen that simulates the strain environment of the native tissue in the body.

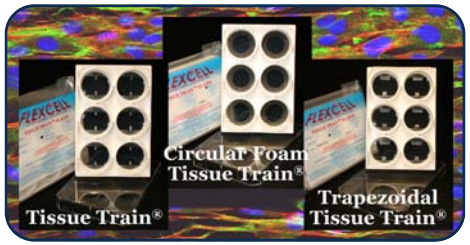


Bioartificial tissue development and uniaxial strain application with the Tissue Train® system

Flexcell® Tissue Train® System

ScanFlex™ with XyFlex™

A measure of cellular remodeling of the extracellular matrix is gel compaction over time. ScanFlex™ is an automated image collection system that allows users to periodically scan items placed on a scanner bed. The ScanFlex™ software controls a digital scanner and allows users to program the number of times and the time intervals when digital scans are taken. When used in conjunction with Tissue Train® culture plates, ScanFlex™ can be used to determine the change in area of a bioartificial tissue (BAT). Furthermore, the area of a BAT can be measured using the XyFlex™ image analysis software. XyFlex™ software allows the user to automatically measure the BAT area in a large sequence of images.



Tissue Train® Culture Plates

ScanFlex™ with XyFlex™

Tissue Train® System includes:

- Host computer with monitor
- FlexSoft FX-5000™ software
- FX5K™ Tension FlexLink®
- Accessory package:
  - ◊ BioFlex® baseplate and four gaskets
  - ◊ Tissue Train® Trough Loaders™
  - ◊ Arctangle® Loading Stations™
  - ◊ Four Tissue Train® culture plates
  - ◊ Drying filter, water trap, vacuum tubing, and grease/lubricant

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