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Volume Exclusion Agent to Enhance Formation of Extracellular Matrix

Researchers at the University of South Florida have developed a method of enhancing the formation of extracellular matrices in culture through promoting the production of collagen.

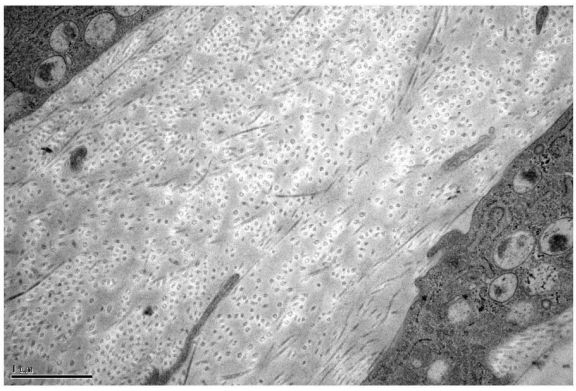
Collagen is a long, fibrous structural protein that is a main component of connective tissue. Collagen provides for the tensile strength and structural integrity of tissues. Cells in culture make very low levels of collagen but can be stimulated to make higher levels of collagen, in the form of procollagen, with the addition of growth factors. Also, cells in culture do not efficiently process procollagen to collagen. As a result, even if collagen synthesis is stimulated, almost all of the procollagen is released into the media and little or no collagen is assembled into fibrils associated with the cells. These complications illustrate a growing need for improvements in techniques used to facilitate collagen development for matrix deposition and formation.

Our inventors have addressed this need by creating a method to improve the formation of extracellular matrices in culture. The technique involves the addition of certain growth factors and the addition of a thin layer of a certain volume exclusion agent that will dramatically enhance the conversion of procollagen to collagen. This will increase the amount of collagen and extracellular matrix associated with the cells. In addition, it will yield a more normal cell topography in bioengineered tissue. This invention advances bioengineering of connective tissues for medical applications that require an extensive and functional extracellular matrix with high tensile strength such as those in the corneal stroma, skin, tendons, ligaments, articular cartilage and the intervertebral disks.

ADVANTAGES:

- **Bioengineers tissues with a normal cell topography**
- **Increased formation of collagen fibrils and extracellular matrix**
- **Higher tensile strength and better structural integrity of cells in culture**

An authentic scaffold for bioengineering tissue



Transmission electron micrograph of keratocytes grown in an authentic scaffold. Arrows indicate collagen fibrils. (KP– keratocyte process)

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University of South Florida | Technology Transfer Office
813.974.0994 (office) | 813.974.8490 (fax)
patents@research.usf.edu
http://www.usf.edu/research-innovation/pl/