ELECTROSPINNING OF FIBRINOGEN NANOFIBERS

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Introduction:

Electrospinning has been recognized as an efficient technique for the fabrication of polymer nanofibers. It uses an eletric field to control the deposition of polymer fibers onto a target substrate. This electrostatic processing strategy can be used to fabricate fibrous polymer mats composed of fiber diameter mostly between 100 nm and 3 μm. In this study we describe electrospinning of fibrinogen nanofibers in an attempt to create biomimicking tissue in vitro for use as a tissue scaffold.

Materials and Methods:

We have used lyophilized human fibrinogen of the product Tisseel® VH (Baxter AG, Austria) to demonstrate fibrinogen electrospinning. Fibrinogen dissolved in 1,1,1,3,3,3-hexafluoro-2-propanol and sodium chloride solution was electrospinned under various conditions. Electrospun fibers of fibrionogen were processed for scanning electron microscopy (SEM) evaluation and analyzed by native gelelectrophoresis.

Results and Discussion:

The SEM evaluation showed that formed fibers were flat and had large diameter distribution from 120-1000μm resulting in approximate fiber diameter of 550μm. With some conditions bead formation occurred.

The efficacy of this process, as well as the final fiber product, are affected by many factors, including, but not limited to solution polymer concentration, viscosity of solution, voltage between solution and ground electrode, the distance between the Taylor cone and the ground electrode, and environmental conditions such as humidity and temperature. Nano fiber similarity in size to native extracellular matrix components and the 3-dimensional structure allows cells to attach to several fibers in a more natural geometry. In summary, the electrospinning process is a simple and efficient technique for the fabrication of 3D structures composed of fibrinogen fibers.