

# Manufacturing of fiber scaffolds and cell seeding

Created on: 13-03-2019 - Last modified on: 08-11-2019

## SCOPE OF THE METHOD

<b>The Method relates to</b>	Human health
<b>The Method is situated in</b>	Basic Research
<b>Type of method</b>	In vitro - Ex vivo
<b>This method makes use of</b>	Human derived cells / tissues / organs
<b>Species from which cells/tissues/organs are derived</b>	human skin stem cells

## DESCRIPTION

### Method keywords

fiber scaffolds  
electrospinning  
polycaprolactone  
electrospun fibers

### Scientific area keywords

three-dimensional culture systems  
in vitro cell culture  
tissue engineering

stem cell culture  
differentiation  
skin stem cells

### **Method description**

Polycaprolactone (PCL) fiber materials are fabricated using an electrospinning method. Molecular weight of PCL is 45 000 Da (Sigma-Aldrich). The electrospinning process is performed using 18wt% PCL solution dissolved in chloroform:ethanol at a ratio of 9:1. Two high-voltage sources are used to generate positive and negative potentials. The positive source is connected to a syringe needle, whereas the negative source is connected to a collector. Voltage applied to the syringe needle is 20 kV, as well as voltage of the collector. Distance between syringe needle and collector was approximately 20 cm. Obtained 3D PCL fiber materials can be stored until use. From the bulk material of electrospun nanofiber mats, small discs with areas of approximately 15 cm<sup>2</sup> are cut out and placed in 24-well plastic cell culture plates. Scaffolds are sterilized by gamma sterilization in 70% filtrated ethanol for 30 minutes and further left under UV-light for 30 minutes. All scaffolds are incubated in cell culture medium at 37°C in a humidified 5% CO<sub>2</sub> incubator for 1 hour prior to cell seeding to facilitate cell attachment onto the nanofiber. Human skin derived precursors (hSKP) are seeded and cultured on the on fiber scaffolds for 7 days.

### **Lab equipment**

Electrospinning machine ;  
Cell culture laboratory ;  
Laminar air flow.

### **Method status**

History of use

### **PROS, CONS & FUTURE POTENTIAL**

#### **Advantages**

The fiber mesh mimics features of the biological extracellular matrix, leading to potential improvement of cell morphology and functionality.

The scaffolds fit any cell culture plate dimensions, it is handy and easy to use and it is applicable to many cell types.

### **Challenges**

Cells might not infiltrate the fiber mesh and grow on the surface of the scaffold.

### **Future & Other applications**

Improvement of stem cells differentiation potential.

## **REFERENCES, ASSOCIATED DOCUMENTS AND OTHER INFORMATION**

### **References**

M. Rampichová, M. Buzgo, J. Chvojka, E. Prosecká, O. Kofronová, and E. Amler, "Cell penetration to nanofibrous scaffolds: Forcespinning®, an alternative approach for fabricating 3D nanofibers," Cell Adhes. Migr., vol. 8, no. 1, pp. 36–41, 2014

### **Associated documents**

## **PARTNERS AND COLLABORATIONS**

### **Organisation**

**Name of the organisation** Vrije Universiteit Brussel

**Department** Pharmaceutical and Pharmacological Sciences (FARM)

**Specific Research Group or Service** In Vitro Toxicology and Dermato-cosmetology

**Country** Belgium

**Geographical Area** Brussels Region

*Coordinated by*



*Financed by*

