ELECTROSPINNING OF POLYSIALIC ACID AND ITS DERIVATIVES FOR TISSUE ENGINEERING SCAFFOLDS

Ulrike Assmann, Robert H. Schuster, Yvonne Stark, Stephanie Bruns, Thomas Scheper, Silke Berski, Gerald Dräger

There has been an intense interest in nanofibers as scaffolds for tissue engineering because of the huge surface-to-volume ratio and the high porosity of the fibre network, which is important for growth and mass transport of nutrients and wastes to and away from the cells.
Electrospinning is a versatile tool to produce nanofibers, which is able to fabricate continuous nanofibers from a huge range of materials like polymers, composites, semiconductors and ceramics. The electrospinning process makes use of electrostatic forces to stretch a solution as it solidifies. The Na-salt of polysialic acid (colominic acid) was spun in combination with polyethylene oxide to nanofibers. However they could not be used as scaffolds for tissue engineering because of their water solubility. To solve this problem we used two different ways: (i) Water-insoluble C1-amide of polysialic acid was spun in combination with cellulose acetate. (ii) A water-soluble N-pentenoyl of polysialic acid was used to cross-link the electrospun fibers by UV-light under argon atmosphere. In the second situation a photoinitiator and an acrylate were added to the polymer solution before electrospinning. In this study the concentration of the photoinitiator and the acrylate were varied to investigate the cross-link reaction and the effect of cross-linking onto cell seeding and growth behaviour. Cell tests were done with all obtained nanofibers and comprised (i) Testing of cell morphology by light microscopy. (ii) Adhesion of cells to fibers by fluorescence microscopy and (iii) viability of the cells in the MTT assay. So far our results indicate that polysialic acid based nanofibers provide a well tolerated scaffold material for cell adhesion and growth .

Dipl.-Chem. Ulrike Assmann (EC)
am DIK seit 10/2006

- Herstellung und Charakterisierung von Fasern durch Elektrospinning (FT- IR, REM, Viskosimetrie)
- Fasern als Gerüstsubstanz für artifizielle Gewebe
- Elastomerbauteile mit adaptiven Eigenschaften
- Verstärkung von Mikrobauteilen durch Elektrospinning