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Comparison of nanofibers scaffolds and acellular porcine dermis in wound healing – experimental study M. Dubský[1,2], A. Jirkovská[1], S. Kubinová[2], J. Sirc[3], L. Voska[1], V. Fejfarová[1], R. Bém[1], J. Michálek[3], V. Holán[4], E. Syková[2]
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Background and Aims: Nanofibers for biomedical applications consist of a highly porous structure resembling the structure of extracellular matrix which has been shown to support the adhesion, proliferation and differentiation of various cells. The aim of our study was to assess gelatin and poly-ε-caprolactone (PCL) nanofibers and acellular porcine dermis (APD) as appropriate scaffolds for cell growth and as material for wound healing on full thickness skin wounds in an animal experimental model. **Methods:** Nanofibers were prepared by the nanospider technology, based on a rotating spinning electrode. We first evaluated viability, adhesion and proliferation of human mesenchymal stem cells, human dermal fibroblasts and human keratinocytes. Wound healing was assessed by area defect reduction and histological findings in 10 wounds in each group of rats (gelatin, PCL, APD) and the effect was compared with control group (sterile gauze). Full-thickness excisions were created by punch biopsy on the upper back of the animal under sterile conditions. Histology of the wound bed was assessed after 5 and 10 days by the linear and polygonal epithelial gap, the thickness of granulation tissue and semiquantitatively presence of inflammation and angiogenesis. **Results:** All materials were proven to be good potential scaffolds in terms of cell viability and adhesion; only cell proliferation on APD was significantly lower than on gelatin after 1 day ($p < 0.01$) and 3 days ($p < 0.05$) of the culture. We observed significantly faster wound closure in gelatin ($p < 0.01$) and APD group ($p < 0.05$) in comparison with control group after 5 and 10 days; there was no significant difference between PCL and controls. Histological analysis showed significantly shorter epithelial gaps ($p < 0.01$) and thicker granulation tissue ($p < 0.05$) in gelatin and APD group compared to PCL and control. **Conclusion:** According to our study, gelatin nanofibers produced by the needleless industrial scale electrospinning technology as well as acellular porcine dermis revealed good wound healing potential and promotion of cell adhesion and growth; these materials can be utilized as wound dressings and also in tissue engineering of advanced medical products. *Supported by MZO 00023001.*