Fabrication of nanofibrous hydroxyethyl cellulose/ poly (vinyl alcohol) scaffolds for skin tissue engineering.

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In this research we have developed biocompatible nanofibrous mats with hydroxyethyl cellulose (HEC) blended with poly(vinyl alcohol) (PVA) using water as the only solvent. Electrospinning of hydroxyethyl cellulose (HEC) (5 wt%) with poly(vinyl alcohol) (PVA) (15 wt%) at different weight ratios 50:50, 40:60 and 30:70 was carried out and evaluated for optimal tissue engineering scaffolds. The nanofibrous mats were cross-linked using glutaraldehyde and characterized by scanning electron microscope (SEM), Fourier transform infrared spectroscopy (FTIR), differential scanning calorimetry (DSC) and thermogravimetric analysis (TGA). SEM images showed that the mean diameters of blend nanofibers were gradually increased from 241±17.03 to 320±27.17 nm with the increased of PVA content. Thermal characterization indicated the stability of HEC/PVA nanofibers was increased with the decreased of PVA content. Studies on cell-scaffolds interaction was carried out by culturing human melanoma cells (A375) on HEC/PVA nanofibers by assessing the growth, proliferation and morphologies of cells. The SEM results shows that A375 cells differentiated and spread well on all HEC/PVA nanofibrous scaffolds with globular morphology after 7 days culturing which exhibit excellent biocompatibility and enhancement of cell penetration and growth within nanofibrous mats. The cellular adhesion profiles and stability results promises that these fibrous mats are potential scaffold for skin tissue engineering.

[1] G. Jin, M. P. Prabhakaran and S. Ramakrishna, Acta Biomater., 7, 3113 (2011).

[2] X. Wang, Q. Li, X. Hu, L. Ma, C. You, Y. Zheng, H. Sun, C. Han, and C. Gao, J Mech Behav Biomed., 8, 204 (2012).

[3] H. Lu, H. H. Oh, N. Kawazoe, K. Yamagishi, and G. Chen, Sci. Tech. Adv. Mater., 13, 064210 (2012).