Highly porous of hydroxyethyl cellulose biocomposite scaffolds for tissue engineering

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ABSTRACT

This study is focusing to develop a porous biocompatible scaffold using hydroxyethyl cellulose (HEC) and poly (vinyl alcohol) (PVA) with improved cellular adhesion profiles and stability. The combination of HEC and PVA were synthesized using freeze-drying technique and characterized using SEM, ATR-FTIR, TGA, DSC, and UTM. Pore size of HEC/PVA (2–40 µm) scaffolds showed diameter in a range of both pure HEC (2–20 µm) and PVA (14–70 µm). All scaffolds revealed high porosity above 85%. The water uptake of HEC was controlled by PVA cooperation in the polymer matrix. After 7 days, all blended scaffolds showed low degradation rate with the increased of PVA composition. The FTIR and TGA results explicit possible chemical interactions and mass loss of blended scaffolds, respectively. The T_g values of DSC curved in range of HEC and PVA represented the miscibility of HEC/PVA blend polymers. Higher Young's modulus was obtained with the increasing of HEC value. Cell-scaffolds interaction demonstrated that human fibroblast (hFB) cells adhered to polymer matrices with better cell proliferation observed after 7 days of cultivation. These results suggested that biocompatible of HEC/PVA scaffolds fabricated by freeze-drying method might be suitable for skin tissue engineering applications.

KEYWORDS:

Hydroxyethyl cellulose; Porous scaffold; Skin tissue engineering