202b Spontaneous Formation of Gelatin-Polycaprolactone Matrices for Tissue Engineering

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Polyclaprolactone (PCL), a synthetic biodegradable polymer, has been a candidate material for tissue engineering due to its tunable mechanical properties and low melting point (60,,aC). However, weak support for cellular processes restricts its use. Gelatin has favorable biological properties but lacks mechanical properties required to be used in tissue engineering scaffold. We questioned whether they can be blended to obtain optimal tissue engineering scaffolds. Gelatin and PCL were dissolved in a common solvent containing acetic acid and water. Amount of PCL was set by its solubility limit in the solvent mixture (~10% w/v in pure acetic acid) which decreased with increased water content and gelatin content was varied. Then, using water, ethanol, or sodium bicarbonate bath, these polymers were spontaneously precipitated into smooth membranes or porous scaffolds of various shapes. Scanning electron microscopy analysis showed porous structure in the scaffolds formed in NaHCO3. Formed matrices were hydrophilic unlike hydrophobic PCL surfaces. Analysis of the tensile properties showed values similar to PCL membrane properties. In vitro degradation studies showed faster resorption of the matrices. To understand whether the blends support cellular activity, human umbilical vein endothelial cells were seeded and evaluated for spreading characteristics using actin staining. These results showed good support for cell adhesion and spreading. In conclusion, PCL-gelatin scaffolds have a promising potential for tissue engineering applications.