Process Development of an Acellular Dermal Matrix (ADM) for Biomedical Applications

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Abstract

The object of this study was to compare the extent of decellularization at each critical step of processing porcine skin to produce an acellular dermal matrix (ADM) for biomedical applications. The results demonstrated that the removal of epidermis using treatment with 0.25% trypsin for 18 h and 0.1% sodium dodecyl sulfate (SDS) for 12 h at room temperature was beneficial for the subsequent treatment to remove cells in the dermal structure. Lengthy incubation in 0.25% trypsin (12 h) and then 560 units/l Dispase (12 h) at 25 degrees C of small pieces of porcine skin from which the epidermis had been removed efficiently removed cells and cellular components from the skin. Histological examinations revealed that the epidermis, dermal fibroblasts, and epidermal appendages were completely removed by these treatments, and the basic dermal architecture of collagen bundles was that of a loose meshwork. Examinations by TEM showed that the characteristics of collagen fibers in the ADM were retained after complete removal of cells present under optimal conditions defined in this study. SDS-PAGE and size-exclusion HPLC revealed that collagen fibers in the ADM were mostly type I and showed two typical component peaks identified as oligomers and monomers, respectively.