

# **Biodegradable Honeycomb Collagen Scaffold for Dermal Tissue Engineering**

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Tissue engineering requires a mechanically stable, biocompatible, and biodegradable scaffold that permits cell adherence and proliferation, allows preservation of cell-specific properties, and suitable for surgical implantations. In this study, honeycomb collagen sheet was used for three-dimensional (3D) cultures of human skin fibroblasts and characterized as an effective and suitable scaffold for dermal tissue engineering. About 1-mm-thick honeycomb collagen sheets, prepared from bovine dermal atelocollagen, cross-linked by UV-irradiation, and sterilized by heat, were placed on the proliferating fibroblasts on day 3 of the culture. The cells attached quickly to the collagen scaffold, proliferated inside the honeycomb pores, and formed a structure similar to dermis within 60 days. On day 60, total cellular DNA content of the 3D cultures was 12-fold higher when compared with the 2D control cultures without the scaffold. Measurement of procollagen type I in the media demonstrated a 20-fold increase. Scanning electron microscopy of the 3D cultures showed a well-formed structure similar to dermis and biodegradation of the honeycomb collagen scaffold. Our study proved that honeycomb collagen sheet is a mechanically stable, biocompatible and biodegradable scaffold for dermal tissue engineering, and also potentially useful for other cell based therapies and tissue engineering applications.

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