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Surface Characteristics of Porcine Dermal Collagen Membranes and Tissue Integration with Adjacent Tissue

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ABSTRACT

The purposes of this study were to investigate the phenomenon of tissue integration of porcine dermal collagen membrane (PDCM) in vivo. In this experiment, 3% glutrarldehyde (GA)-PDCM was implanted in the upper jaw of 20 Wistar rats. The specimens were harvested from 2 rats each 1, 2, 3, 5, 7, 10, 14, 21, 28, and 42 days after surgery. Specimens were immediately frozen and processed for immunohistochemical staining (ABC method) to localize the distribution of variable molecules including integrin α_2, integrin α_3, integrin $\alpha_6\beta_1$, and adhesion protein CD11b of macrophages or polymorphonuclear cells. The results indicate positive reactions of integrin α_2 and integrin α_3 in specimens during the entire period of this study. On the 14th day, there was an obvious positive reaction of integrin $\alpha_6\beta_1$. This suggests that 3% GA-PDCM began to achieve neovascular formation by the 14th day. At the beginning of the study, most of the CD11b+ cells were polymorphonuclear cells. On day 5, instead of PMN, the predominant CD11b+ cells were composed of mononucleated macrophages. There were no significant pathologic reaction or evidence of tissue damage adjacent to the PDCM. In conclusion, these results indicate that PDCM possesses good quality surface characteristics to achieve tissue integration with adjacent connective tissue. It fulfills one of the requirements of a biomaterial, tissue integration, for use in GTR techniques. (N. Taipei J. Med. 2001; 3:171-175)

INTRODUCTION

Scantlebury claimed that biomaterials which are going to be used in guided tissue regeneration (GTR) techniques should fit the following criteria: (1) biocompatibility; (2) cell separation; (3) manageability: (4) space making; and (5) tissue integration.[1] Accordingly, we started sequential research on porcine dermal collagen membranes (PDCMs).

In 1992, we used gastric pepsin to remove the major antigenic determinant of a PDCM in order to improve the biocompatibility of this material in our laboratory.[2] PDCM was reconstituted with different concentrations of glutrarldehyde (GA) and to change its physiochemical properties, the biodegradation rate, and immunogenicity. One of our in vivo studies showed

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