The Effects of Burn Blister Fluid on Keratinocyte Replication and Differentiation

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Previous studies have shown a variety of potentially toxic products in burn blister fluid. However, these studies have not determined the effect of blister fluid on the healing rate of the underlying burn. Because changes in keratinocyte replication or maturation might alter reepithelialization beneath the blister, we studied these processes in a tissue culture system.

Burn blister fluid was collected sterilely from a series of patients with 2-48% burn, and stored at -70°C. Keratinocytes were grown from healthy adults undergoing reconstructive procedures or from excised hypertrophic scars. Triplicate samples of keratinocytes were plated in 30mm dishes and allowed to attach. The following morning, media was changed to control (MCDB 153), 10% human serum, or 10% blister fluid. Preliminary invitro dose studies indicated that 10% blister fluid was optimal for these studies. At 48 hours cultures were photographed and pulsed with
1 uCi/ml 3_H-thymidine for 4 hours. Cells were harvested by mechanical scraping in 6% TCA. DNA fraction was obtained by 3% PCA precipitation. Data was compared as cpm 3_H label/ug DNA. Differentiation was determined by blinded gradiation of photomicrographs.

Nine blister fluids tested against four keratinocyte strains showed a variably ability to suppress replication ranging from 0 to 76%. Each cell population appeared to have a characteristic level of suppression. In no case was replication increased. BF induced differentiation in all cases to a variable degree. Neither the age of the patients nor the %TBA predicted the BF effects. Normal human serum induced a similar pattern of response.

Inhibition of cell proliferation and differentiation are contrary to the responses optimal for early wound closure. This study provides further evidence that burn blister fluid does not improve the ability of a burn to heal. The advantages of an intact blister can be easily replaced with an occlusive dressing.

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