Effect of a Lipidocolloid Dressing on Extracellular Matrix Synthesis

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INTRODUCTION

Urgotul®, a lipido-colloid dressing, showed a stimulating effect on fibroblast proliferation. During wound healing, the function of fibroblasts is to reconstitute the extracellular matrix network consisting of collagens, elastin, glycosaminoglycans (GAGs), fibronectin, etc. The aim of this study was to investigate the effect of Urgotul® on the extracellular matrix synthesis.

MATERIALS AND METHODS:

Normal Human Dermal Fibroblast (NHDF) were cultivated at 37°C in DMEM supplemented with 10% fetal calf serum to confluency. A piece of dressing or a reference compound (positive control) were applied onto the cell layers for 72 hours. Neosynthesis of total GAGs was measured by [3H]-glucosamine incorporation in GAG fraction and sulphated GAGs by 35S-sulfate incorporation; collagen and fibronectin were quantified using specific ELISA assays; matrix organization was visualized by immunofluorescence according to two protocols, one with permeabilisation of cells before labeling (for the detection at the same time of the proteins in cells and of those already secreted and associated for forming the extracellular matrix) and the other without permeabilisation focused on only the extracellular proteins.

Fig. 1 - Effects of Urgotul on the production/release of soluble (pro)collagen I and fibronectin; ELISA essays

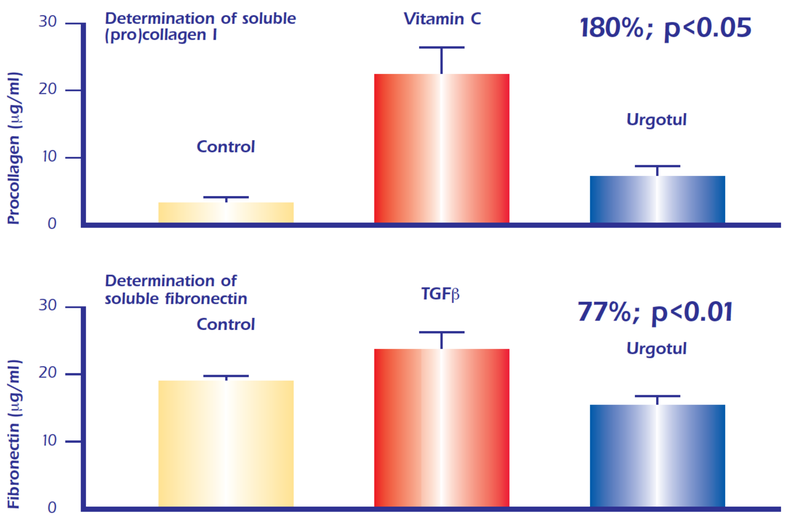
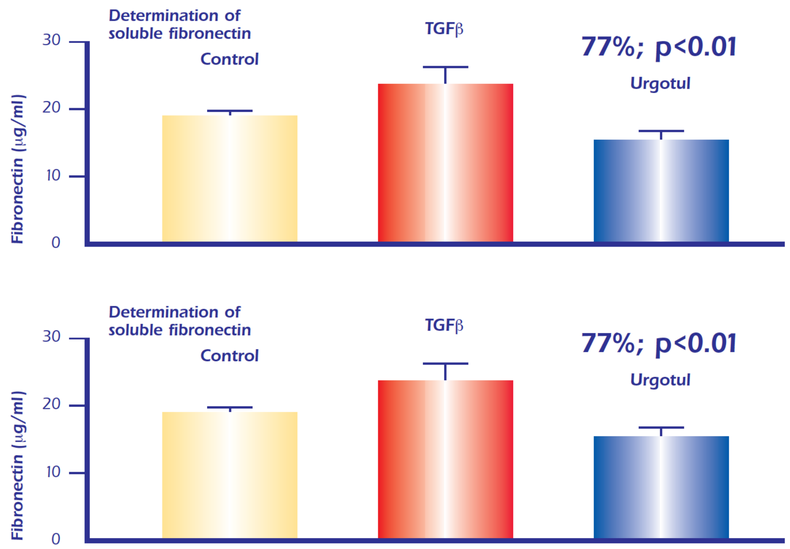


Fig. 2 - Effects of Urgotul on the neosynthesis of total GAGs (glucosamine incorporation in the GAGs fraction) and sulfated GAGs (sulfate incorporation in the GAGs)

* not statistically significant because of a rather high level of fluctuation and a strong stimulation observed with the reference compound (TGFβ)



RESULTS

In all these experiments, Urgotul® did not significantly modify the overall viability of the confluent fibroblast cultures (MTT assays, not shown). Neosynthesis of some components of dermal matrix were stimulated or modified.

Urgotul® stimulated the production/release of soluble (pro) collagen I significantly.(Fig. 1)

Urgotul® moderately stimulated the neosynthesis of glycosaminoglycans by fibroblasts since it stimulated both glucosamine and sulfate incorporation into GAGs from total (soluble + layer) cultures. (Fig. 2)

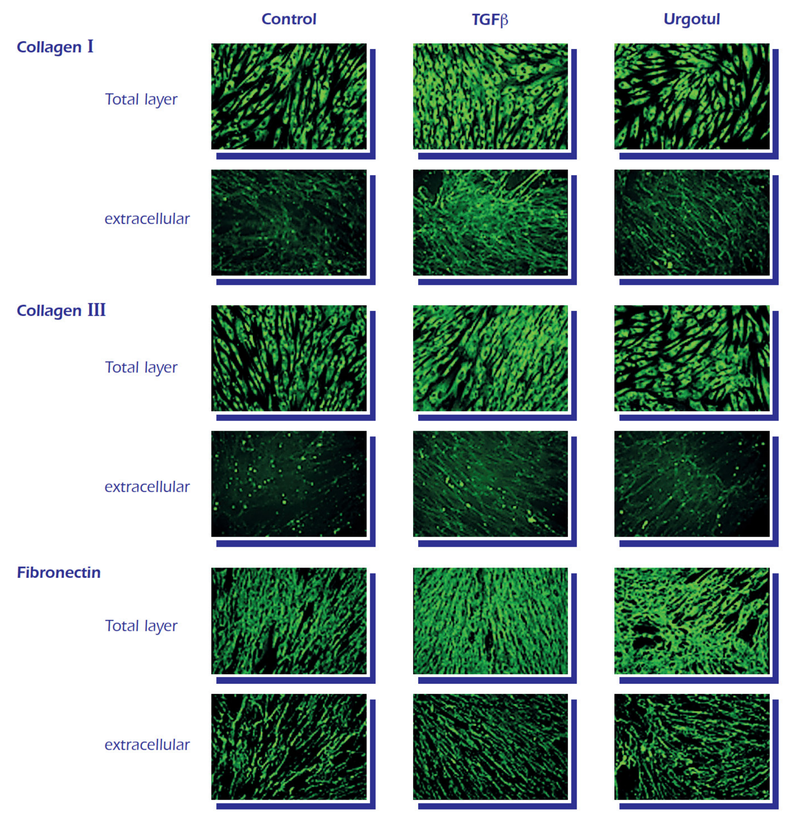
In contrast, the concentration of soluble fibronectin was shown reduced after Urgotul® application. (Fig. 1)

These differences suggested a possible modification of the extracellular matrix produced by the cells after Urgotul® treatment. Fig. 3 shows immunolabelling of selected markers in cell layers. Acccording to the protocol with cells permeabilisation, no clear effect of Urgotul® could be observed.

RESULTS CONT'D

According to the other protocol, Urgotul® seemed to increase the density and the organization of collagen fibres, especially collagen III. In addition, Urgotul® could increase the amount and labelling of fibronectin molecules associated to extracellular matrix. This last result could be in relation with the decrease in soluble fibronectin molecules observed previously. These visual results should be confirmed and precised in further studies.

Fig. 3 - Immunolabelling of cell layers after treatments; for each marker, first row shows total layers (extracellular matrix & incellular proteins; protocol 1, cell permeabilisation); second row represents the label of the extracellular proteins only (no permeabilisation, protocol 2)



CONCLUSION

Urgotul®, a contact layer used in acute and chronic wounds, stimulates fibroblast proliferation and has an influence on dermal matrix synthesis; both activities are potentially crucial for an optimal promotion of wound repair.