

IMPROVEMENT OF SKIN WOUND CLOSURE AND QUALITY OF WOUND HEALING WITH A NEW ECOBIOLOGICAL ACTIVE COMPLEX USING A SCAFFOLD-FREE 3D SKIN EQUIVALENT

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INTRODUCTION

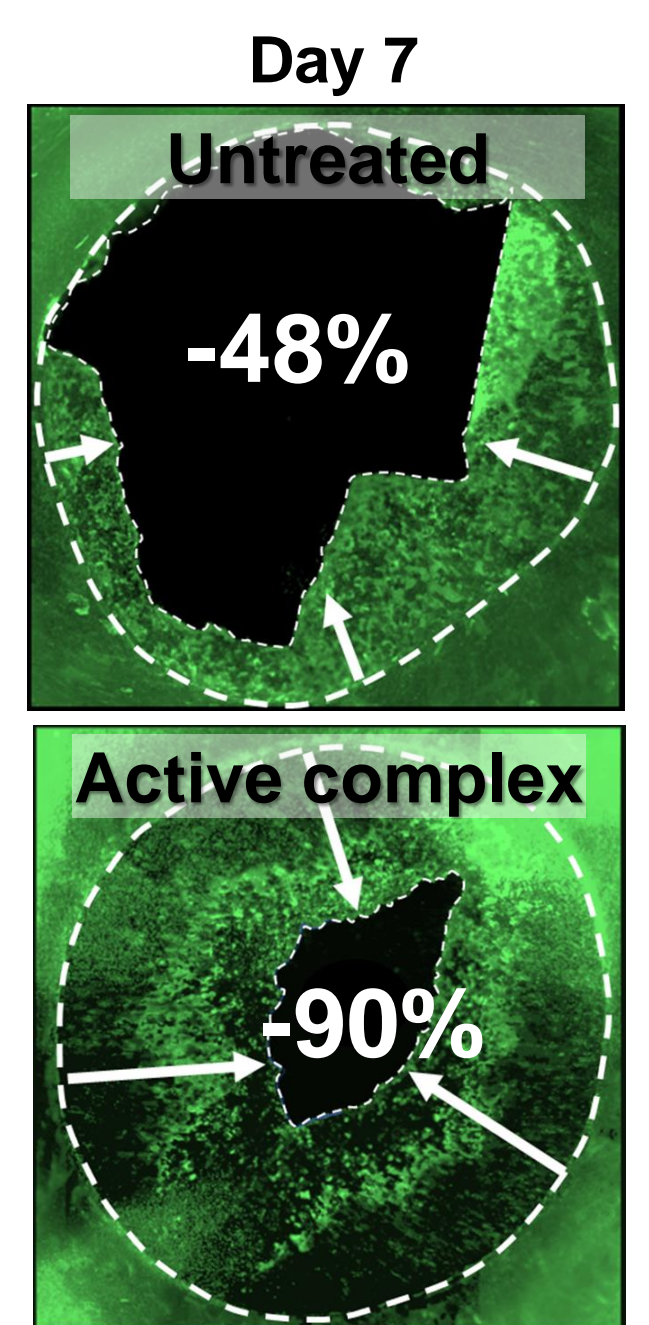
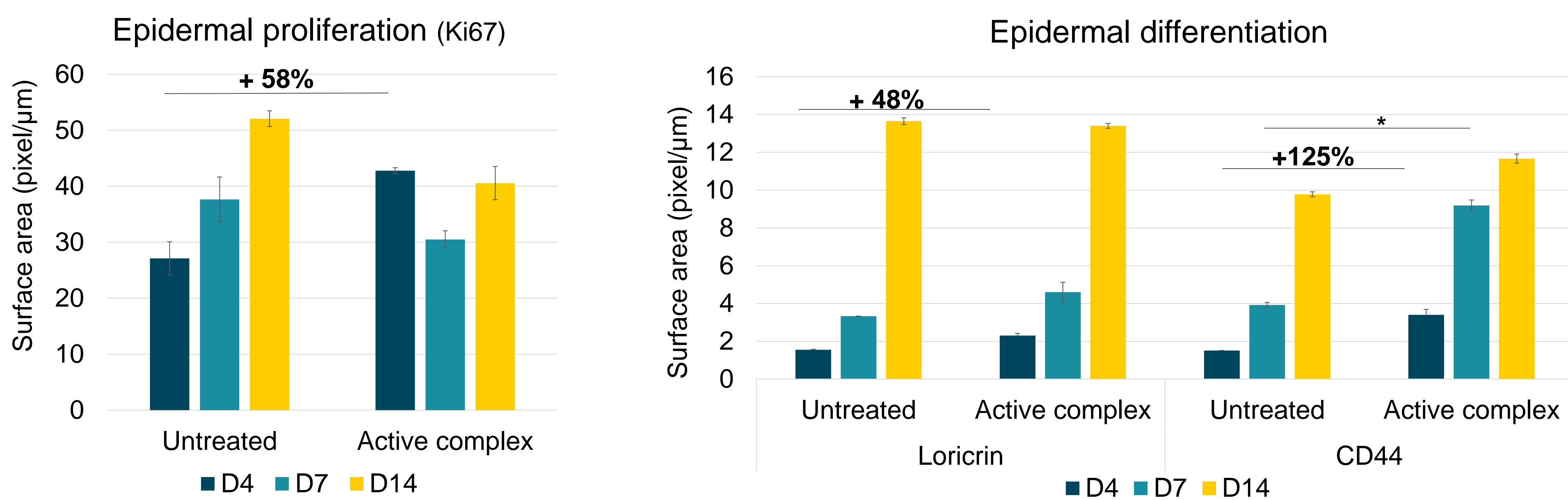
Restoration of skin after injuries is crucial for life and its alteration can lead to persistent scar. We developed an active complex composed of 3 ingredients bio-inspired from components naturally present in the skin, to restore and optimize the natural skin wound healing process in accordance with the ecobiological approach. Ecobiology considers the skin as a living ecosystem interfacing with its environment and preserving its natural biology to act lastingly.

MATERIALS & METHODS

The efficacy of this new patented active complex (patent application filed) was assessed using a unique 3D human bilayered skin equivalent wound healing model. This model is made up entirely of human fibroblasts embedded in their own extracellular matrix, on which epidermal cells were seeded. After full epidermis formation, this scaffold-free 3D skin equivalent was injured with a biopsy punch, creating a 3 mm wound that extended through both epidermis and dermis. The active complex was then topically applied for 14 days. The wounded region was investigated for up to 14 days (D14) on re-epithelialization and dermal remodeling by using histological and immunohistological analysis. Statistical tests were performed with a paired Student's T tests.

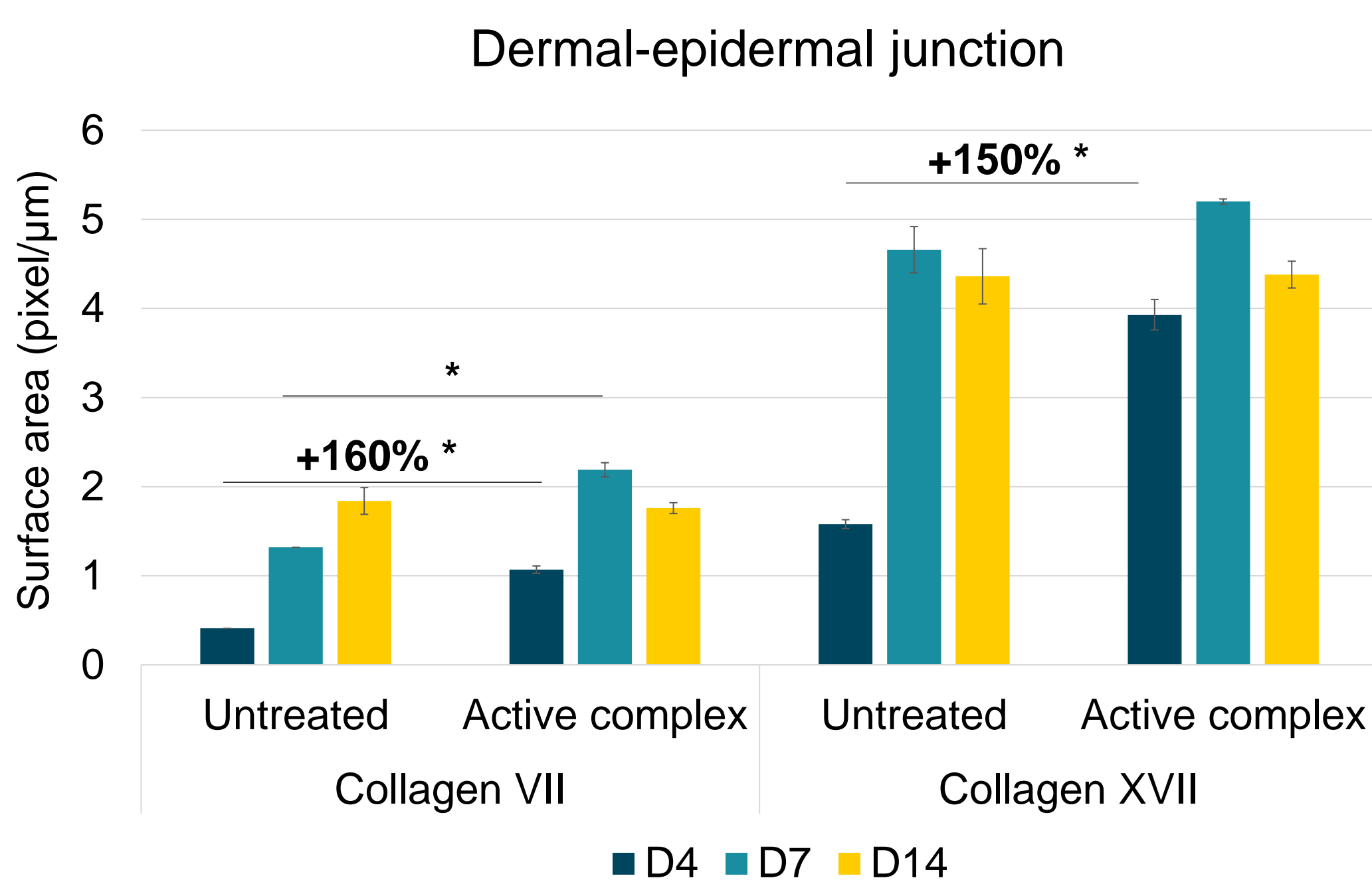
RESULTS & DISCUSSION

Advanced epidermal regeneration



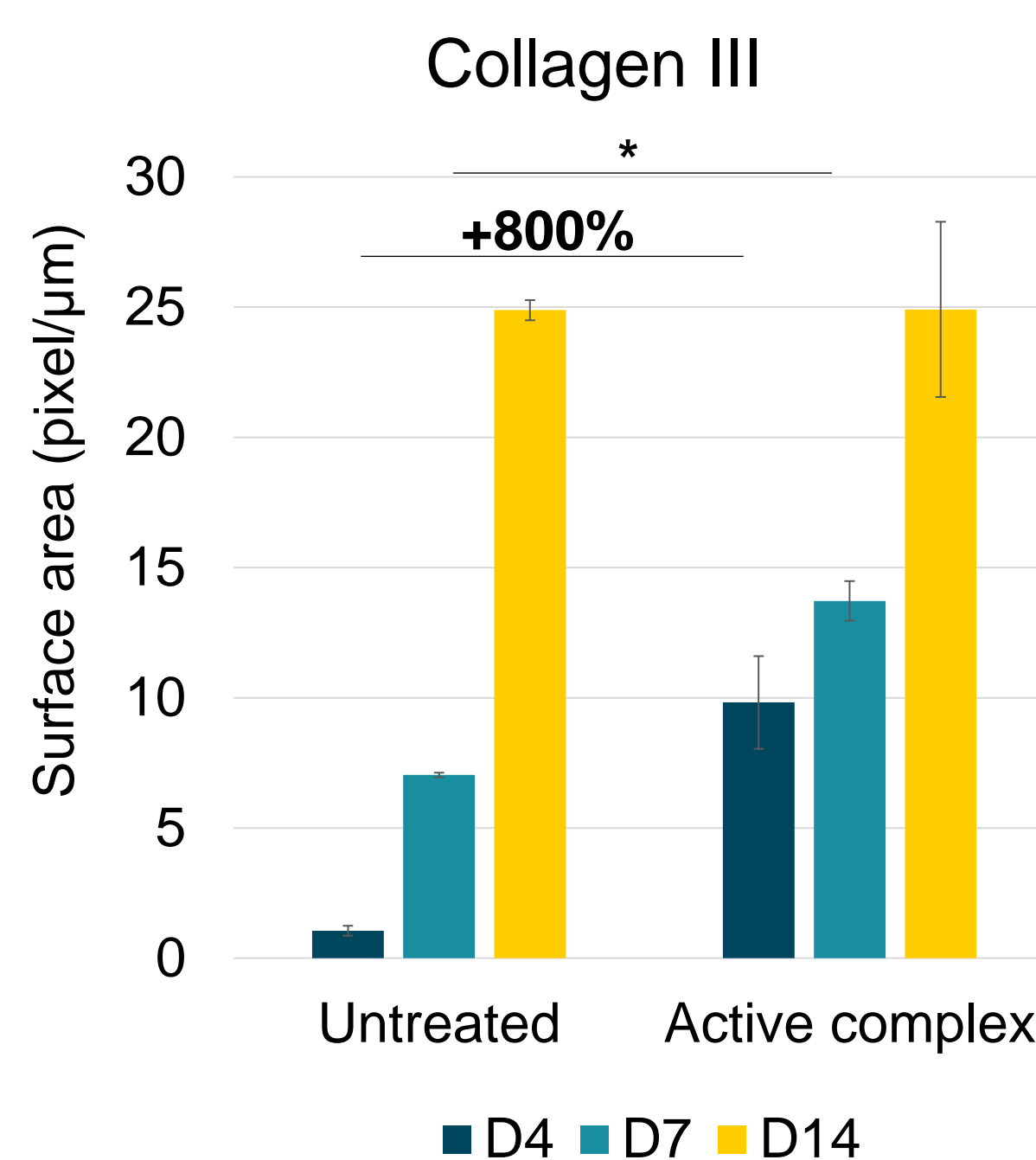
➤ Improved keratinocytes proliferation and differentiation from Day 4 with active complex compared to untreated, contributing to **better epidermis closure** at Day 7

Improved DEJ structuration



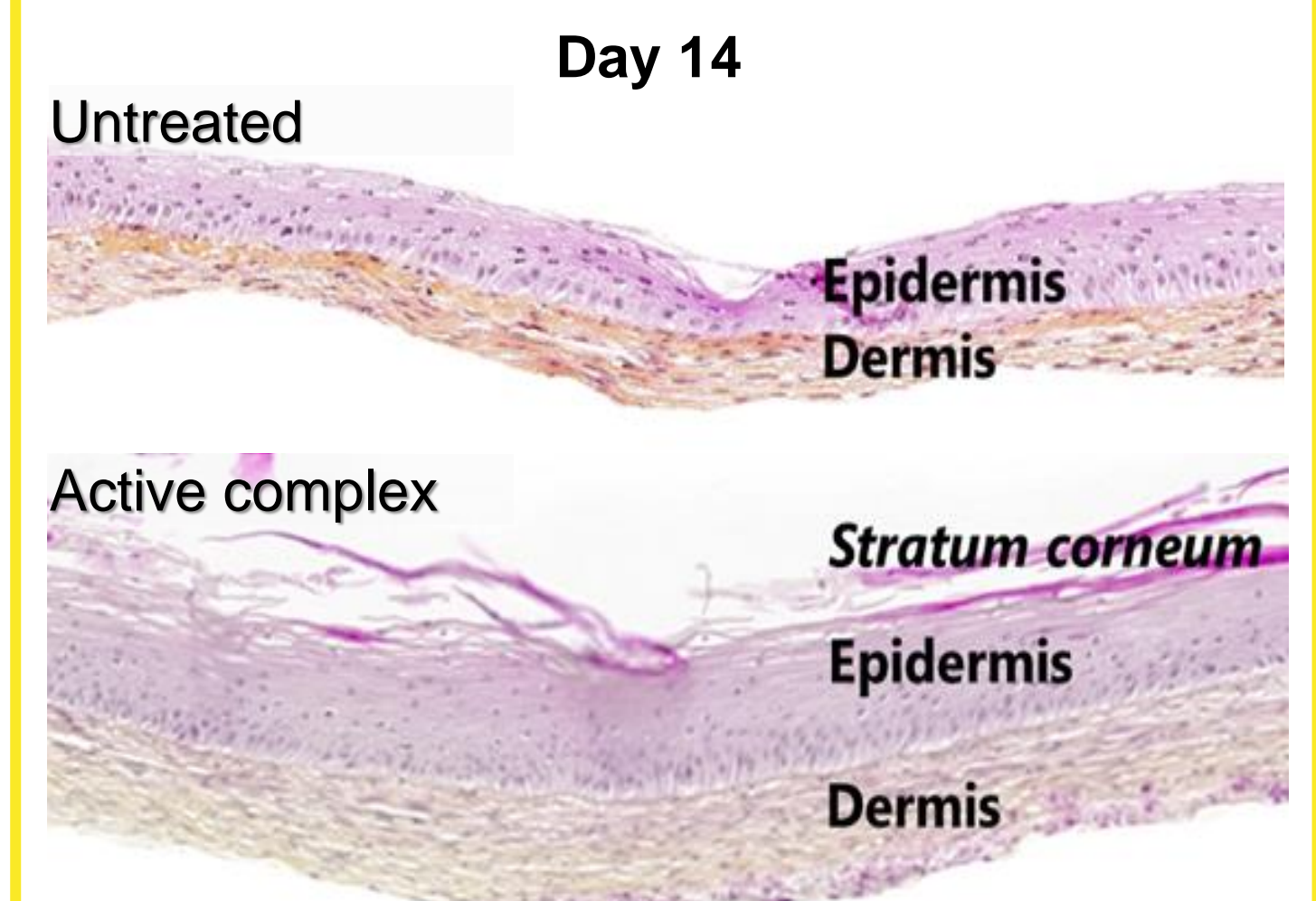
➤ Collagens XVII and VII participate in the regeneration of the epidermis and epidermis/dermis tissue cohesion, respectively. Their increase from Day 4 with active complex compared to untreated **could contribute to epidermal advanced reconstruction.**

Enhanced dermal repair



➤ Collagen III highly increase from Day 4 with active complex compared to untreated **could contribute to improved dermis volume and newly formed skin quality.**

Better skin repair at all levels



➤ The wounded skin treated with active complex conditions showed a **complete re-epithelialization of the wound at Day 14**, resulting in a contiguous and well-organized epidermis, **fully stratified** including terminally differentiated *stratum corneum*, in contrast with the untreated wounded skin still in an immature stage.

CONCLUSION

Thus, this study demonstrated a beneficial effect of the active complex on wound healing process including re-epithelialization, culminating in improvements in both the speed and quality of wound healing. An ongoing *in vivo* evaluation of a cream containing this active complex shows promising preliminary results in scar prevention.