

EVALUATION OF THE BIOLOGICAL EFFECT IN DNA DAMAGE REPAIR OF A HIGH BROAD SPECTRUM CONTAINING NICOTINAMIDE AND PANTHENOL IN ACTINIC KERATOSES AND FIELD CANCERIZATION

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INTRODUCTION

Nicotinamide is the precursor of NAD (nicotinamide adenine dinucleotide), an essential coenzyme in the production of ATP (adenosine triphosphate), the main source of cellular energy. Previous studies in mice showed that oral consumption or topical application of nicotinamide prevents immunosuppression and reduces the number of tumors induced by UV radiation. In humans, topical application of 5% Nicotinamide prevents immunosuppression caused by solar UV radiation, but not burns. Furthermore, oral Nicotinamide reduces the diagnosis rate of new non-melanoma skin cancers and actinic keratoses in high-risk patients. It has been suggested that one of the mechanisms by which Nicotinamide may protect against photodamage is by increasing ATP production which enhances DNA repair. Additionally, nicotinamide acts as a PARP1 inhibitor. Extensive DNA damage leads to overactivation of PARP1 which can lead to NAD depletion. Thus, cells are unable to enter apoptosis, since the process requires a large amount of energy. Using a high broad spectrum UVB-UVA sunscreen containing Nicotinamide and Panthenol can help reverse chronic sun damage to the DNA of skin cells.

OBJECTIVES

The aim of this study was to determine the biological effect of a high broad spectrum UVB-UVA sunscreen containing Nicotinamide and Panthenol, on DNA damage repair by measuring the presence of 6-4 PD by immunohistochemistry in patients' biopsies and indirectly by measuring the expression of p53, p21, PCNA and DIMTIM p53,p21, PCNA and DIMTIM in biopsies of actinic keratoses (AK) and field cancerization (FC).

MATERIALS & METHODS

In this prospective, single-centre study, 14 patients with AK or FC aged between 50 and 70 years were included. Four lesions on the scalp of each patient: 2 AK and 2 FC were selected. During the screening visit a biopsy of one AK and of one FC was performed. After 8 weeks of applying a high broad spectrum UVB-UVA sunscreen containing Nicotinamide and Panthenol, twice a day, another biopsy of the two remaining lesions and a direct comparison between AK and FC pre-treatment and post-treatment for each immunohistochemistry (IHC) techniques was performed. Among those IHC techniques that showed nuclear improvement, the number of high positive nuclei and positive nuclei in a region of 50 nuclei for AK and FC pre-treatment and post-treatment was evaluated.



Biopsies Pre-Treatment

Biopsies Post-Treatment

AK Field cancerization

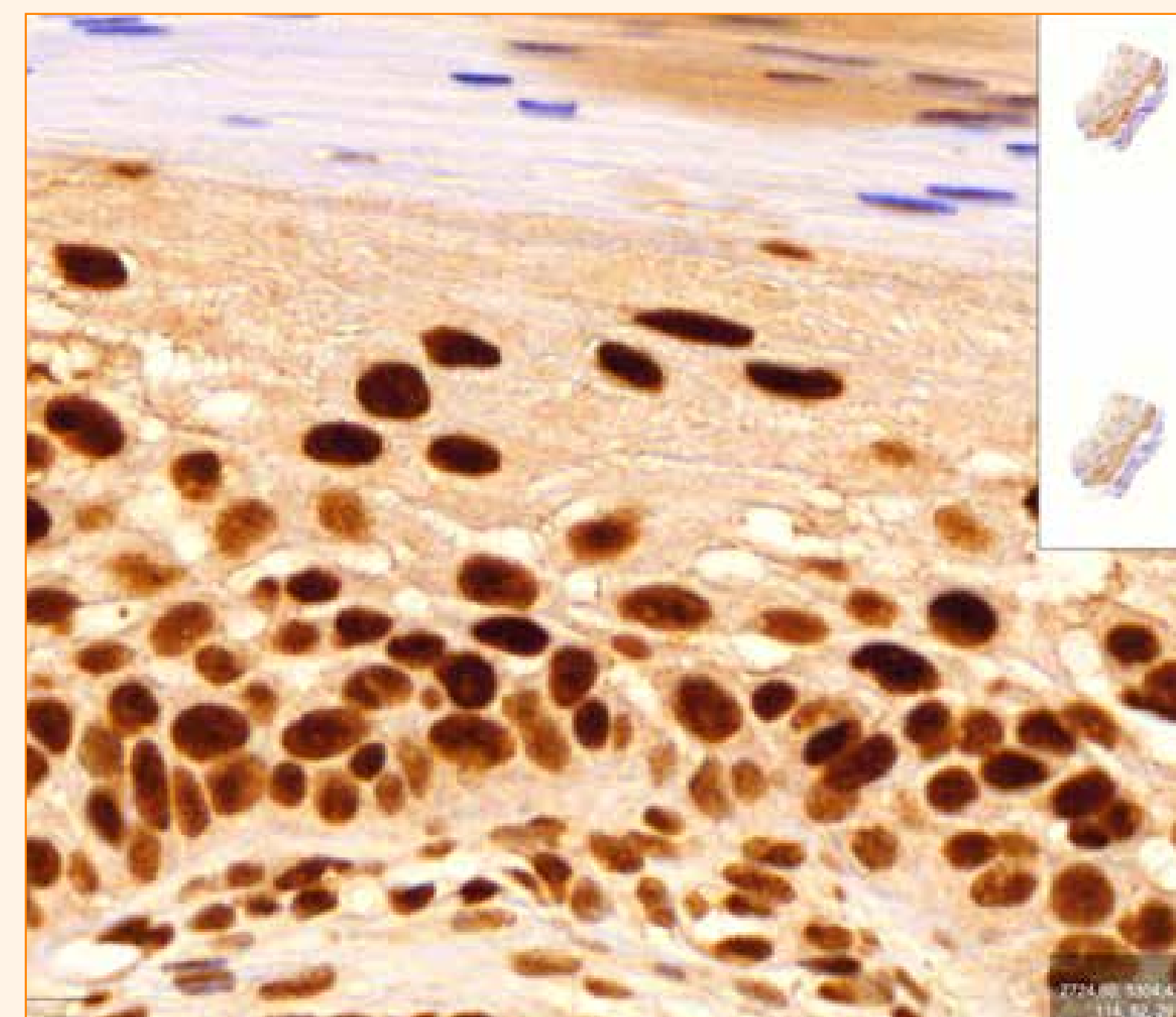
RESULTS

Statistically significant differences comparing p21 and DIMTIM high positive nuclei per 50 nuclei in AK and FC lesions pre and post treatment were observed. In addition, statistically significant differences comparing p21 positive nuclei per 50 nuclei were found. All the other IHC markers (p53, 6-4PPS and PCNA) did not show a nuclear improvement pre and post treatment.

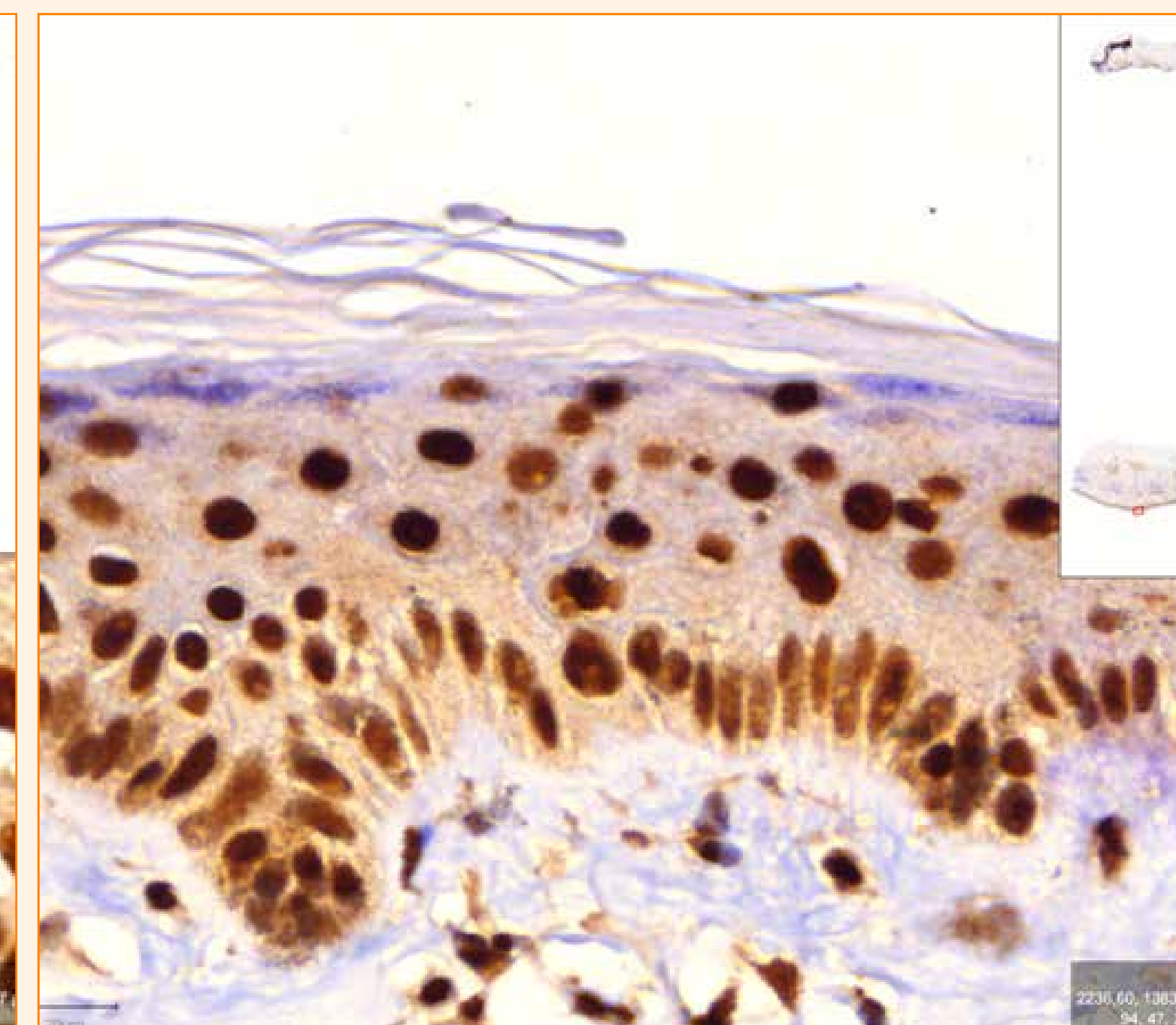
IHQ p21

Dicotomic evaluation of Improvement comparing pre and post treatment: YES

D1 AK-F

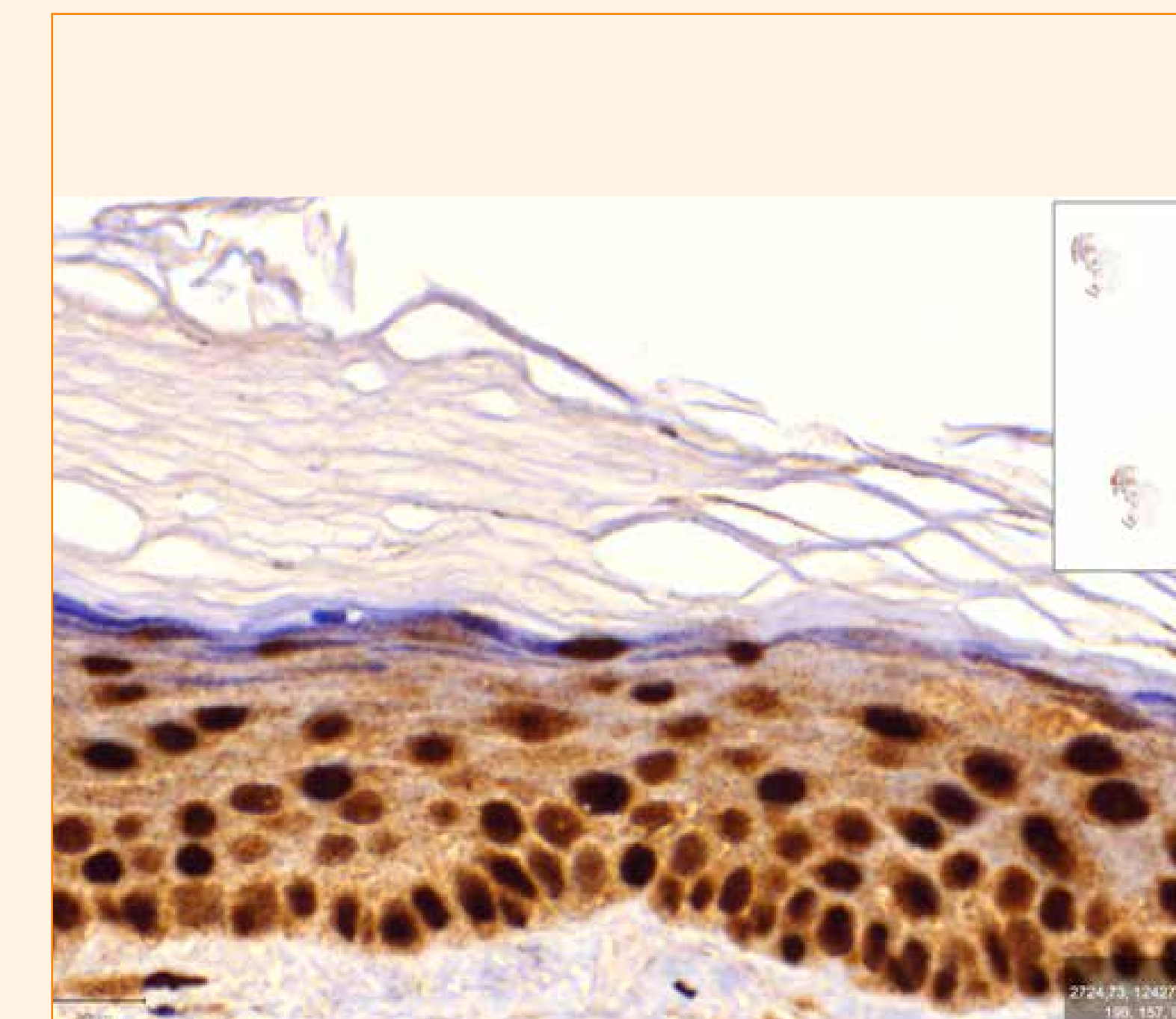


D60 AK-F

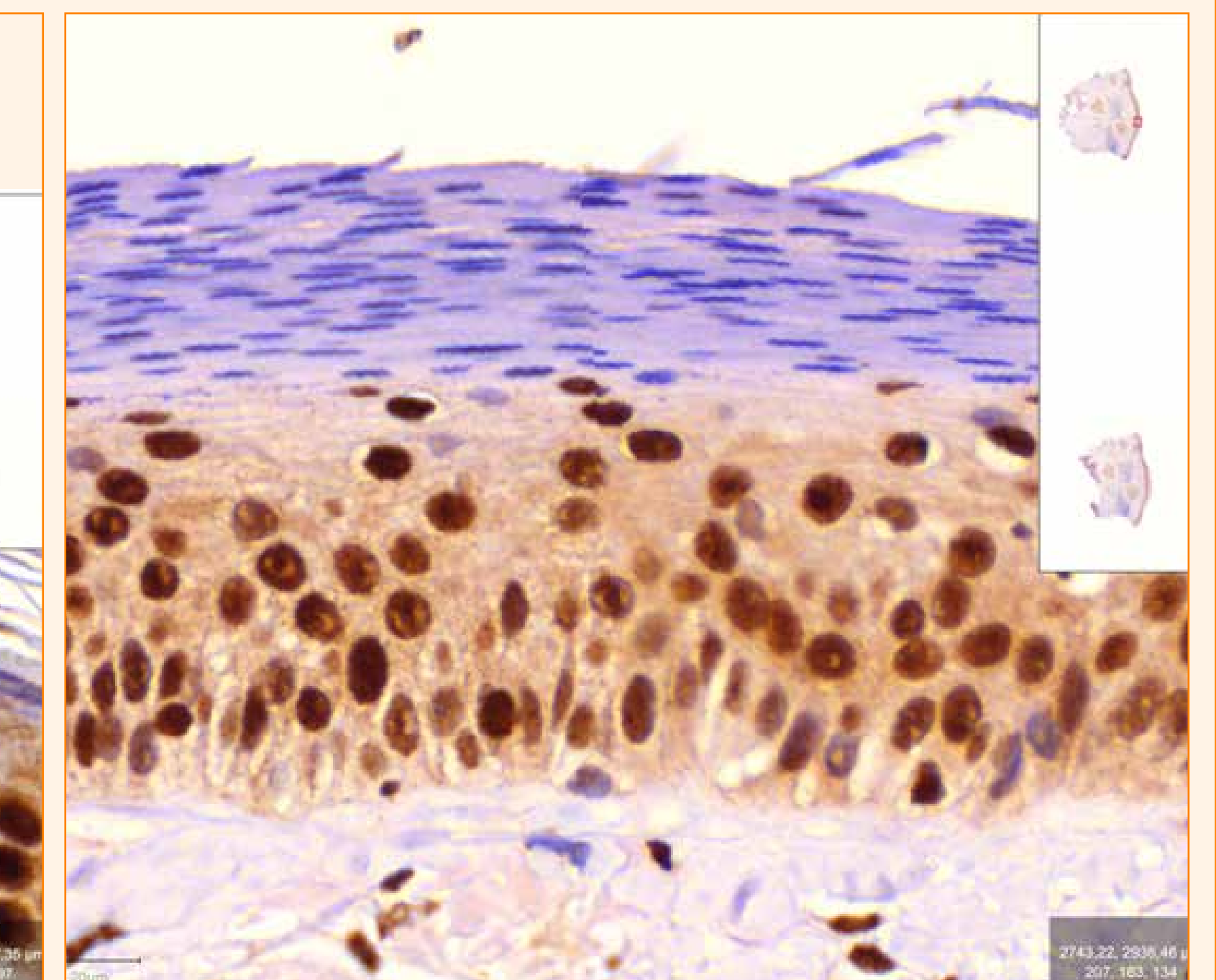


Dicotomic evaluation of Improvement comparing pre and post treatment: YES

D1 FC-F



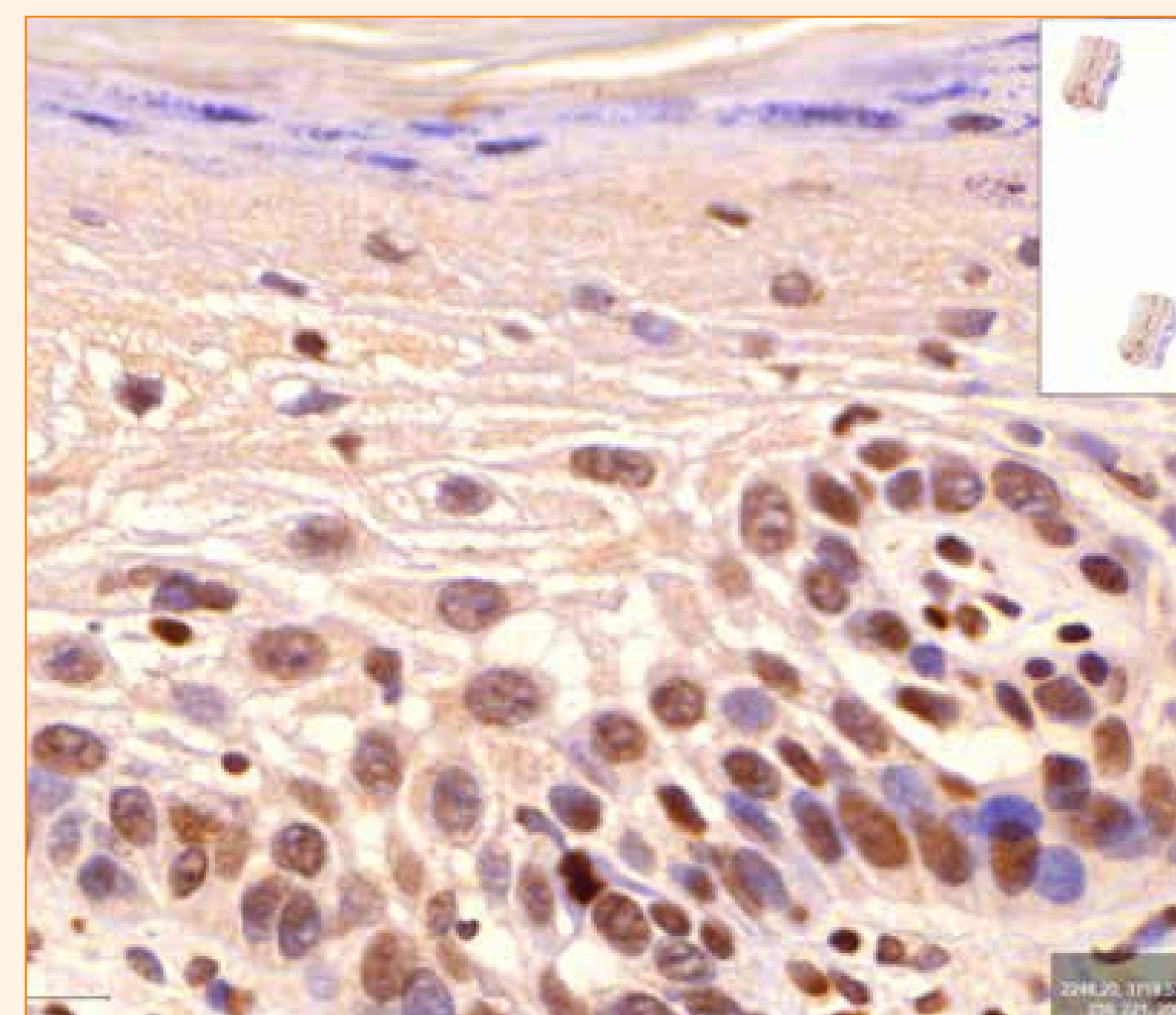
D60 FC-F



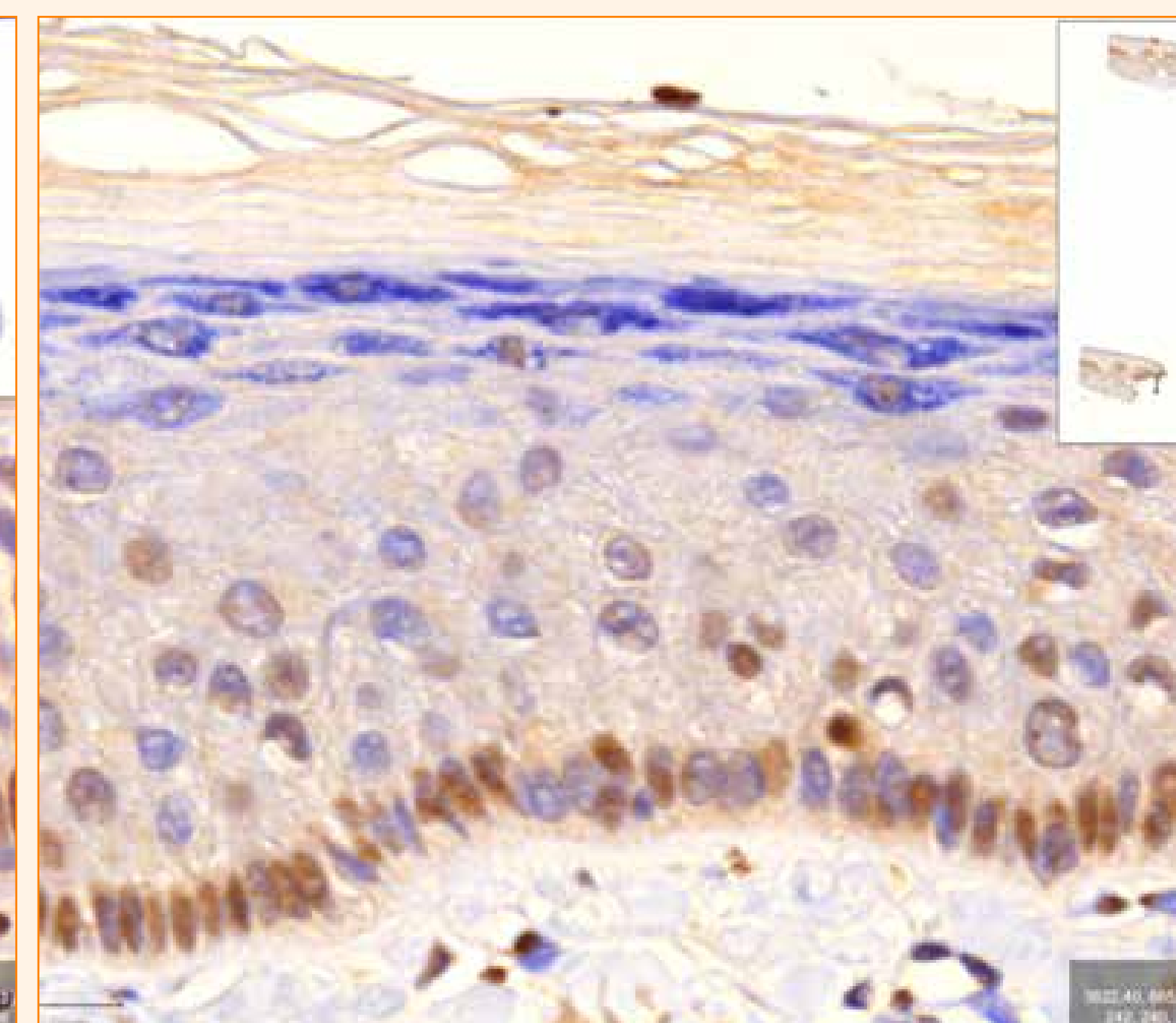
IHQ DIMTIM

Dicotomic evaluation of Improvement comparing pre and post treatment: YES

D1 AK-F

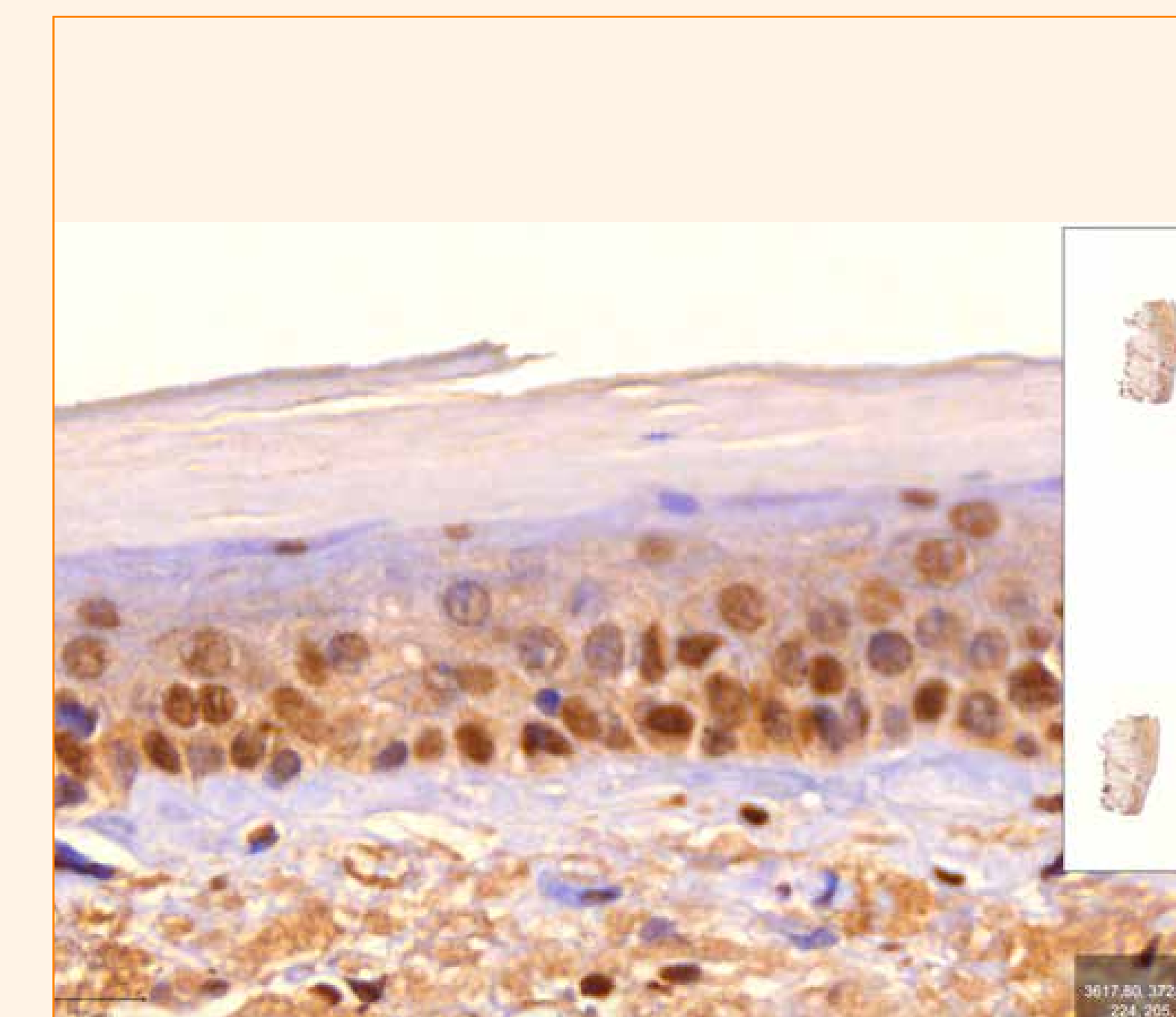


D60 AK-F

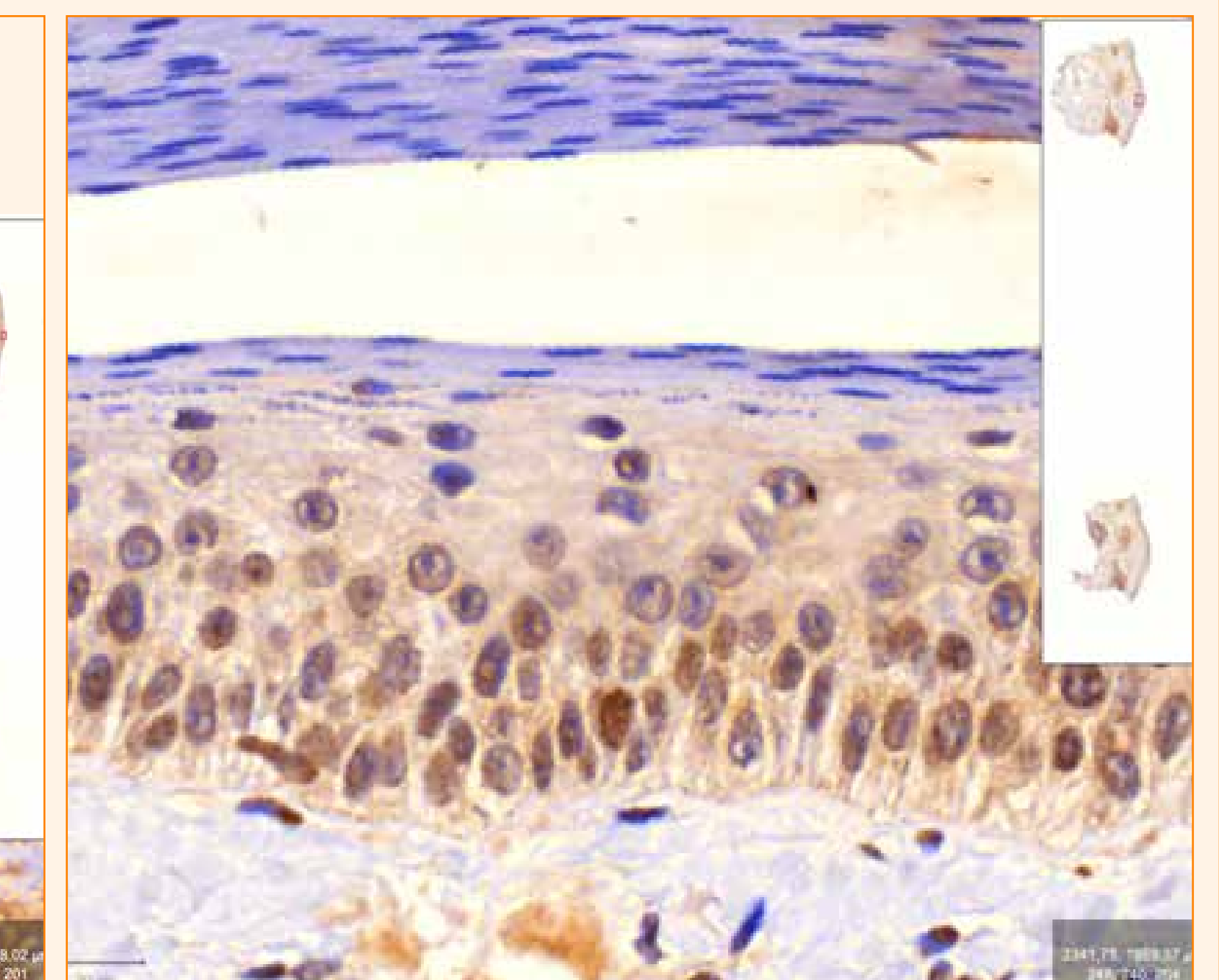


Dicotomic evaluation of Improvement comparing pre and post treatment: YES

D1 FC-F



D60 FC-F



CONCLUSION

A high broad spectrum UVB-UVA sunscreen containing Nicotinamide and Panthenol has shown a significant decrease of direct DNA lesions measured by DIMTIM, as well as a significant decrease of p21 marker. Therefore, this sunscreen with niacinamide might help reverse chronic sun damage to the DNA in skin cells.

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