Enhanced Follicular Delivery of Salicylic Acid In Vivo by a Novel Microgel Technology

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INTRODUCTION
Excessive sebum production and hyperkeratotic infundibulum contribute to the formation of keratinous plugs that obstruct the follicles and result in the formation of microcomedones, which are the precursors of acne. It is thus essential to break through the sebum barrier to effectively target delivery of actives such as salicylic acid, a well-known keratolytic agent, into the follicles where acne begins. A novel synergistic microgel technology has previously been shown to promote sebum solubilization in vitro and enhance deposition of salicylic acid into the pilosebaceous unit.1-2 Utilizing follicular biopsies and a newly developed two-dimensional fluorescence imaging method, we have shown that the microgel complex promotes salicylic acid penetration into the follicles in all three distinct formulation bases, which indicates not only its efficacy, but its compatibility with various formulation bases.

STUDY MATERIALS
• 2-in-1 cleanser mask (CM) with and without MGC, both with 1% SA.
• A scrub with and without MGC, both with 2% SA.
• A leave-on spot treatment gel (STG) with and without MGC, both with 2% SA.

STUDY METHODS
Follicular Biopsy
Modifications were made to the follicular biopsy method by including a larger sampling area of the nose, between rhinion, the tip defining point, and alar sidewall, to improve the quality and quantity of extracted pore plugs. (Fig. 1).

Fig. 1 – Blue Fluorescence Image of a Pair of Follicular Biopsy Slides From the Nose

The follicular horns fluoresce as greenish-white areas, and with the presence of P.acnes porphyrins, the horns fluoresce as orange red areas.3-4

HPLC Analysis
Pore plugs were carefully harvested from the follicular biopsy slides. Methanol mobile phase was added to the collected pore plugs. The extract was filtered and injected into a phase column. The amount of salicylic acid was then determined from the peak absorbance at 305nm.

RESULTS

Deeper Salicylic Acid Pore Deposition by the Microgel Complex

(A) Spot Treatment Gel with MGC

(B) Spot Treatment Gel without MGC

(C) Scrub

(D) Cleanser mask with MGC

(E) Cleanser mask without MGC

Fig. 3 – Visible and fluorescence images of pore plugs treated with STG (A) with and (B) without MGC. Cleanser mask treated pore plugs (C) with and (D) without MGC. The images are shown with the slide (or skin side) on the top and the root of the pore plug on the bottom.

Fig. 4 – Microgel complex increased amount of salicylic acid deposition by (A) 243% in STG, (B) 203% in CM, and (C) 141% in Scrub. For all three different formulation bases, the level of salicylic acid deposition was significantly higher in the pores treated with MGC.

REFERENCES

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