

A COMPARATIVE CLINICAL STUDY OF DANDRUFF: EVALUATING BARRIER FUNCTION, CERAMIDE LEVELS, AND MICROBIOME COMPOSITION ACROSS ETHNICITIES

Ariana Bitton¹, Jolanta Idkowiak-Baldys², Amina Bouslimani², Eddy Hsi Chun Wang², Jyotsna Paturi², Ying Chen², Cecile Clavaud³, Nada Baalbaki¹

1. CeraVe, L'Oreal USA, New York; 2. L'Oreal Research and Innovation, Clark, NJ; 3. L'Oreal Research and Innovation, Aulnay-sous-Bois, France

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1 INTRODUCTION

- Dandruff is a common scalp condition affecting a significant portion of the post-pubescent population globally
- Current research points towards a connection with a dysbiosis in the scalp microbiome, specifically, an overgrowth of *Malassezia* and *Staphylococcus*
- Malassezia* can contribute to dandruff through disrupting the keratinocyte layers, metabolizing sebum into inflammatory compounds, and producing indole derivatives like malassezin that can influence scalp inflammation and barrier disruption
- Ceramides are crucial lipids in the SC, and changes in their composition and quantity are linked to various skin conditions
- This study explores an impact of ethnicity on dandruff scalp characteristics: ceramides and microbiome

2 MATERIALS & METHODS

Scalp assessments were conducted along hair partings in zones representing the distribution pattern of dandruff (IGA) in 106 healthy and 106 dandruff subjects across four ethnicities (White, Black, Asian, and Hispanic/Latino). Ceramides were collected from subject's scalp by tape stripping and were analyzed by mass spectrometry methods. Microbiome samples were collected by scalp surface swabbing and processed by quantitative PCR or whole genome sequencing.

SKIN CONDITION

Mild to Moderate Dandruff (IGA 2-3)



DESIGN:

Cell 1: Dandruff (IGA 2-3) N = 106
Cell 2: 'Healthy' (no history of dandruff in last 3 yrs) N = 106

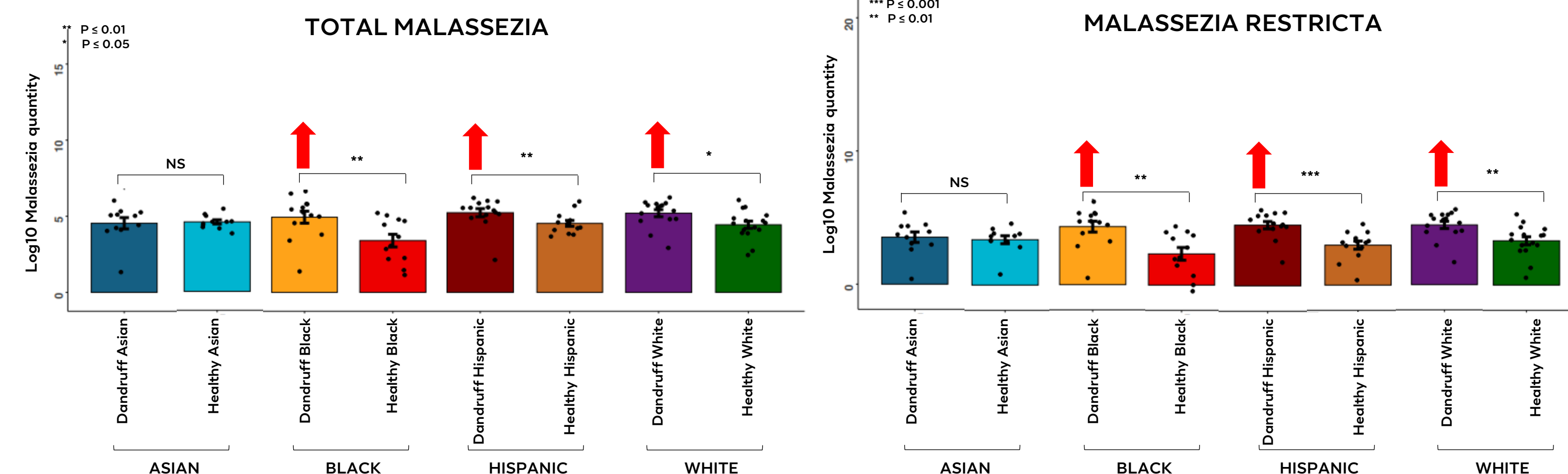
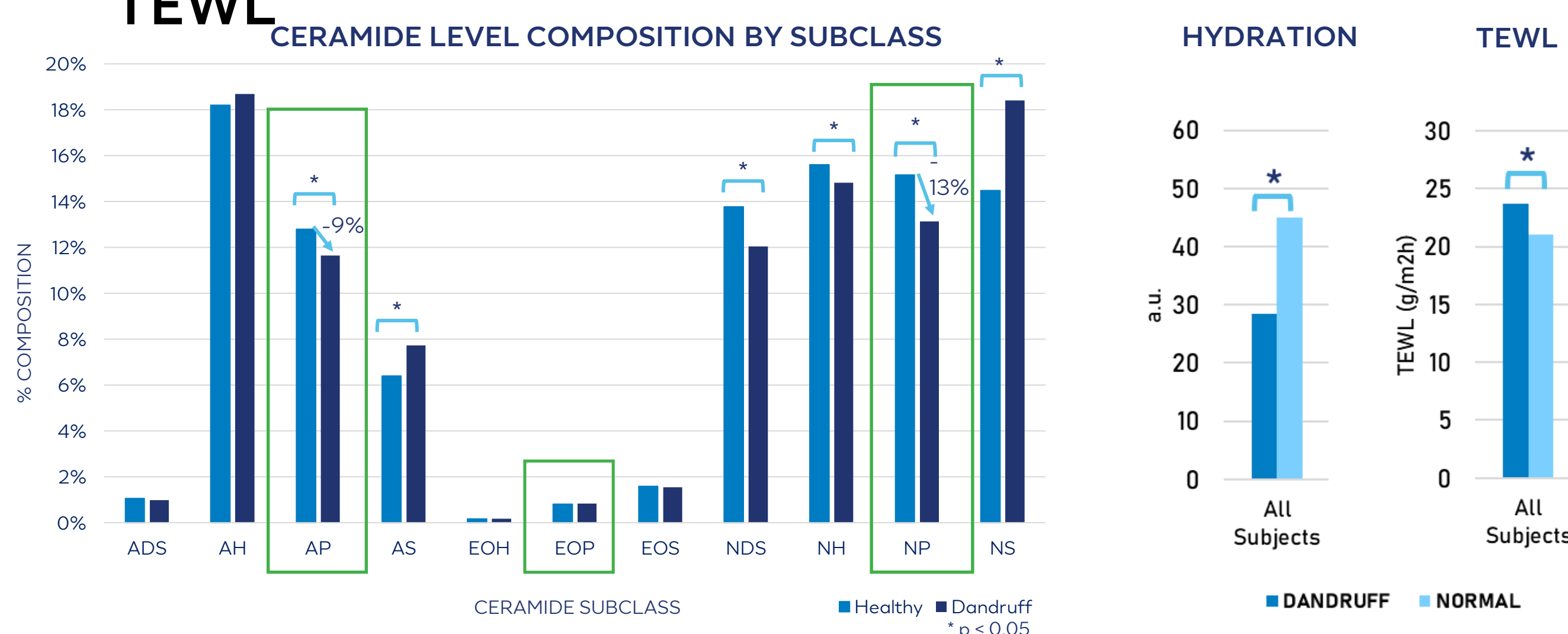
INCLUSION CRITERIA

Body Site: Scalp
Gender: Female & Male
Ethnicities (at least 20% each): African American, Asian American, Latin/Hispanic, Caucasian
Fitzpatrick Types: All Fitzpatrick Types (at least n=5 of each)

3 RESULTS & DISCUSSION

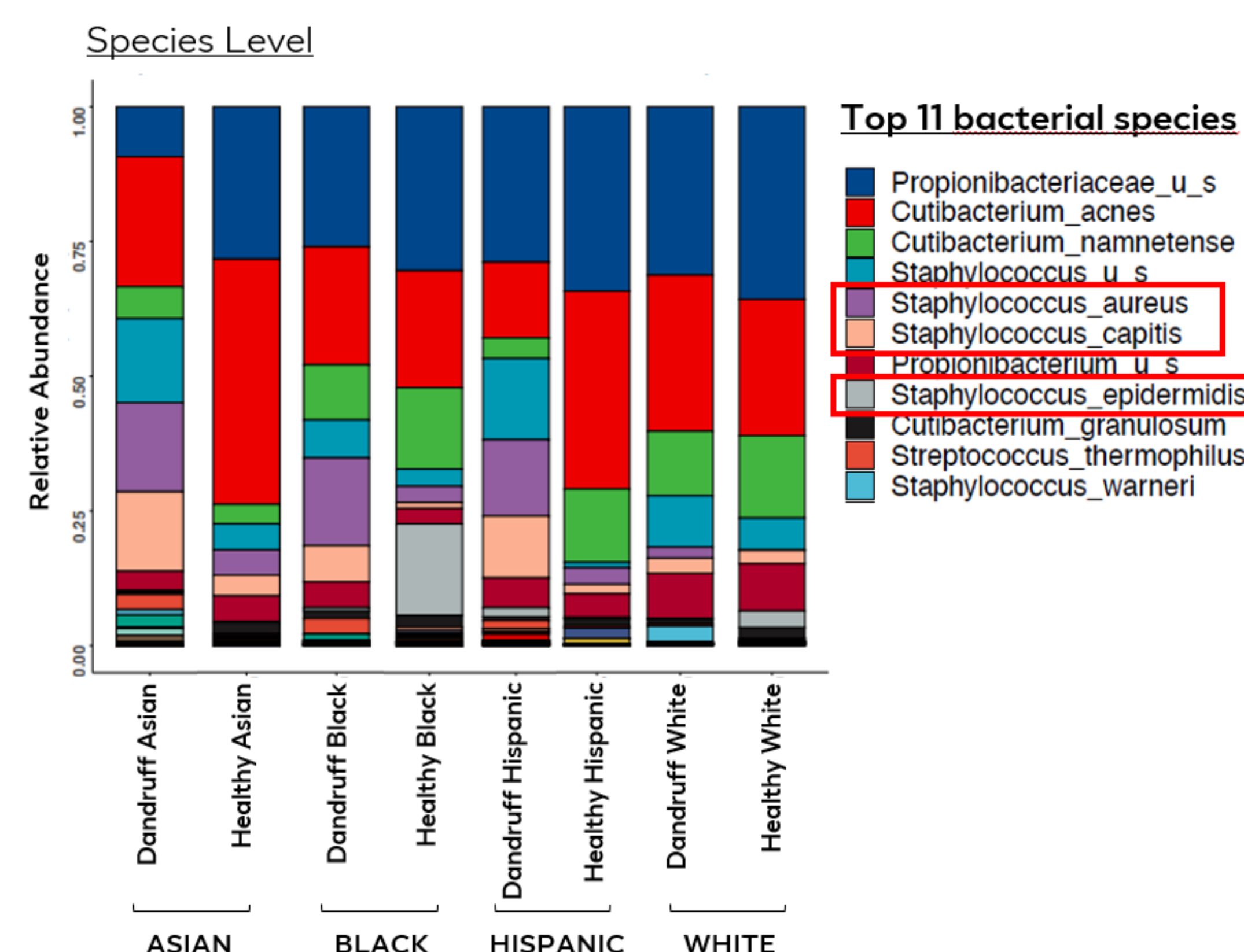
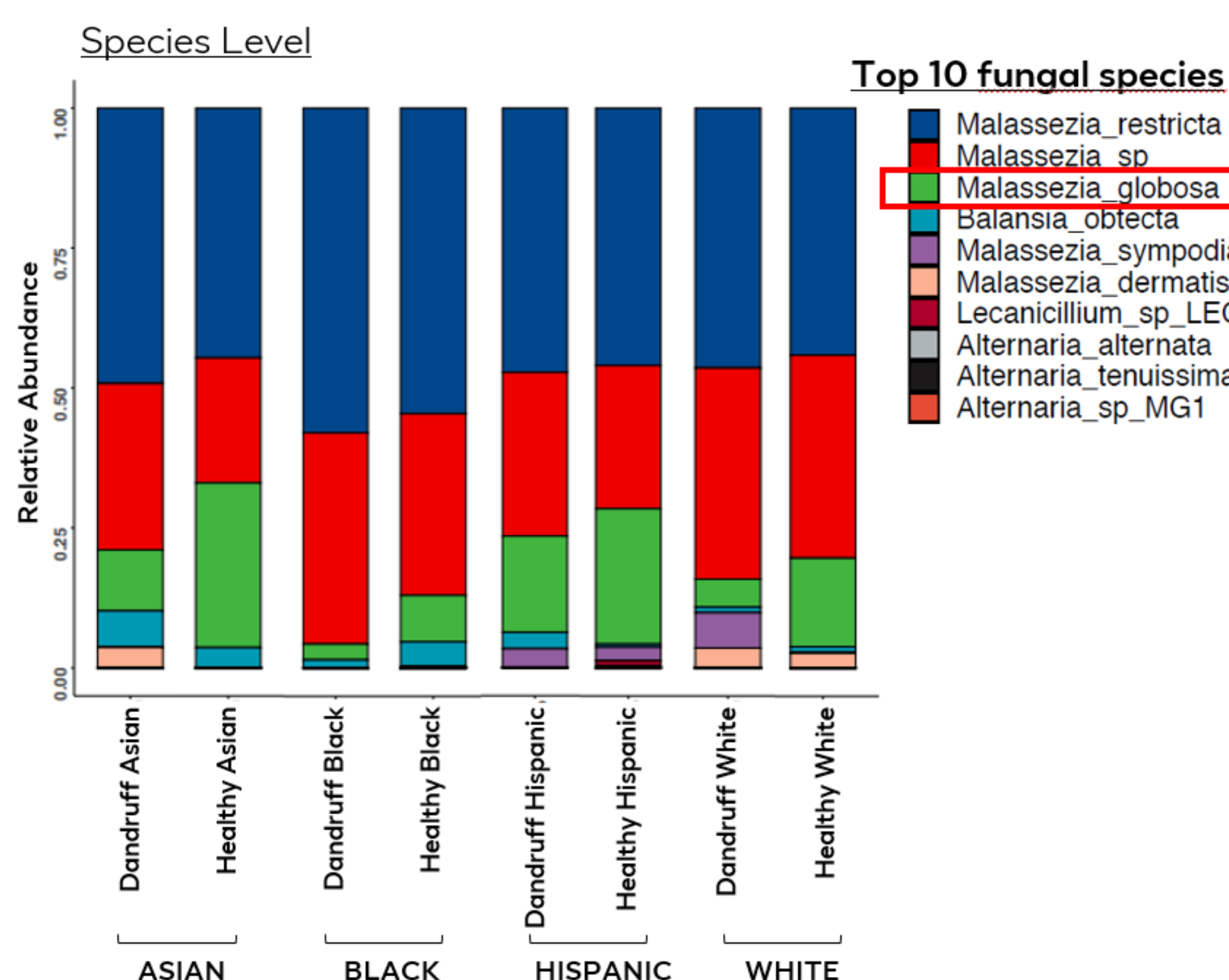
1/ SIGNIFICANT REDUCTION IN CERAMIDES NP AND AP WAS OBSERVED IN DANDRUFF SCALPS CONSISTENT WITH LOWER HYDRATION AND ELEVATED TEWL

2/ INCREASED TOTAL MALASSEZIA AND *M.RESTRICTA* LOAD IN DANDRUFF VS HEALTHY - EXCEPT ASIAN GROUP



3/ SCALP FUNGAL PROFILE (WGS): *M. GLOBOSA* ABUNDANCE- IS LOWER IN DANDRUFF ACROSS ALL ETHNICITIES

4/ SCALP BACTERIAL PROFILE (WGS): *S. AUREUS* AND *S. CAPITIS* ARE PREDOMINANT IN DANDRUFF ACROSS ALL ETHNICITIES



4 CONCLUSIONS

- Dandruff scalps in the studied populations showed significantly lower levels of ceramides NP and AP compared to healthy scalps, with ceramide NP reduction observed across all ethnicities.
- Higher *Malassezia* and *M. restricta* loads (except in Asians) and differing *Malassezia* species distributions were also noted in dandruff.
- Bacterial profiles varied by ethnicity, with *S. aureus* and *S. capitis* increasing in dandruff across all ethnicities.
- These results suggest that the efficacy of dandruff treatment can be enhanced through a multi-pronged strategy taking into account ethnic variations in scalp biology.

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