



A new ERA for global Dermatology 10 - 15 JUNE 2019 MILAN, ITALY

HAIR DISORDERS

## SCALP MICROBIOME AND THE UNHEALTHY SCALP

Jim Henry<sup>(1)</sup> - Arvind Venkataraman<sup>(2)</sup> - Pin Hu<sup>(2)</sup> - Mirjana Parlov<sup>(2)</sup> - Dawn Yeoamans<sup>(2)</sup> - Duane Charbonneau<sup>(3)</sup> - Jay Tiesman<sup>(2)</sup> - James Schwartz<sup>(1)</sup>

The Procter & Gamble Company, P&g Beauty, Cincinnati, United States<sup>(1)</sup> - The Procter & Gamble Company, P&g Biosciences, Cincinnati, United States<sup>(2)</sup> - The Procter & Gamble Company, P&g Microbiology, Cincinnati, United States<sup>(3)</sup>

Dandruff/ affects more than 50% of the adult population and is characterized by excessive flaking, dryness and itch. Dandruff is an inflammatory condition with a compromised scalp barrier. The resultant unhealthy scalp also negatively impacts the quality of the hair. Three factors initiate the inflammation associated with dandruff: 1) individual sensitivity, 2) Malassezia and 3) sebaceous lipids. Recent learnings have documented two bacterial components, Staphylococcus sp., Propionibacterium sp, disrupted in subjects with unhealthy scalp. The present work was undertaken to better understand the changes to the broader scalp microbiome that are associated with an unhealthy scalp.

Metagenomic analysis was completed for bacteria and fungi from the scalps of dandruff (ASFS > 24, n=30) and non-dandruff subjects (ASFS, <8, n=18). Overall, scalp microbiomes appear to be comprised primarily of three organisms: Staphylococcus sp., Propionibacterium sp., and Malassezia. Statistically significant differences (p < 0.05) are observed in relative abundance of the bacteria S. capitis and P. acnes with dandruff. The relative abundance of S. capitis is higher (dandruff 27% vs. non-dandruff 3%) and that of P. acnes is lower in dandruff subjects (dandruff 70% vs. non-dandruff 96%). While S. capitis is the most frequently found and abundant Staphylococcal species, S. epidermidis is detected in some individuals, however the abundance of S. epidermidis does not change statistically significantly with dandruff. Although these is a direction decrease, there was no statistically significant difference in the relative abundance of Malassezia spp with dandruff. Taken together, these observations agree with recent studies that have also demonstrated dysbiosis of the scalp microbiome in persons with an unhealthy scalp condition and build upon this work with species-level detail. Further work is needed to better understand what role the changes in bacteria have in the initiation of an unhealthy scalp and what changes occur with the treatment.



24<sup>TH</sup> WORLD CONGRESS OF DERMATOLOGY MILAN 2019



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