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What's New in Robotic Hair Transplantation

Does the use of implanters affect the quality of grafts?

What is a hair transplant megasession?

In Memory of Dr. Jonathan L. Ballon

The Role of the Scalp Microbiome in Health and Pathogenesis

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INTRODUCTION

There is significant scientific and industrial interest in human-associated micro-organisms, the “human microbiome,” even being listed by the World Economic Forum among the “Top 10 Emerging Technologies – 2014.” Furthermore, the skin microbiome is increasingly implicated in many common diseases, with global direct/indirect costs estimated as >\$20 billion USD. The consumer skin and hair care markets of >\$350 billion USD/year are also strongly affected by skin microbiology. On careful consideration, a significant fraction of all consumer care markets are impacted by the skin microbiome—the surfactant and softeners deposited on clothing fabrics, the lining of diapers, both cloth and disposable, and all soaps and detergents, at a minimum. Understanding the skin microbiome therefore represents both a chance to improve human health and a compelling economic opportunity.

So far, limitations of sampling skin and the genetic complexity of eukaryotes (including fungi) have limited human microbiome investigations primarily to gut and bacteria, leaving the skin microbiome, and particularly the eukaryotes, poorly understood. This crucial knowledge gap needs to be addressed, as fungi have key roles in common skin conditions such as seborrheic dermatitis (likely *Malassezia*) and diaper rash (*Candida*). Importantly, skin fungi metabolize lipids and considerable data implicate lipids in skin homeostasis and disease. This makes the face, scalp, breast, and central back high potential sites for unfavorable conditions generated by the lipid metabolizing skin microbiome.

“Dandruff” and “seborrheic dermatitis” are disorders characterized by flaking and itching of scalp.¹ More than 50% of adults are afflicted, and everyone harbors the *Malassezia*, which cause the problems.^{2,3} The anti-dandruff shampoo business alone is >\$10 billion USD per year. Dandruff research is in the midst of a resurgence, re-invigorated by the discovery of the causal fungal species (*Malassezia globosa* and *restricta*) and recent availability of multiple complete *Malassezia* genomes.³

WHAT IS DANDRUFF?

Normal scalp has few flakes and healthy appearing, smooth skin. Dandruff is characterized by loosely adherent flakes and itching. Specifically, dandruff has no inflammation and is confined to the scalp, while seborrheic dermatitis has yellowish, piled adherent flakes that can extend beyond the scalp to beard, moustache, and eyebrows accompanied by visible inflammation.¹ Seborrheic dermatitis is more than superficial flaking, including hyperproliferation, excess lipids, and poorly differentiated corneocytes across the scalp.⁴ Dandruff requires three factors: fungi (*Malassezia*), sebum, and individual susceptibility. While there remains much debate in the current medical literature, upon review, the vast majority of evidence points at the very least to a fungal “initiator,” most likely *Malassezia* fungi.⁵

The microbiome

The role of microbes has been defined by “Koch’s Postulates,”⁶ developed in 1890 to guide researchers to understand the role of microbes in disease, as the following:

1. The microorganism must be found in abundance in all organisms suffering from the disease, but should not be found in healthy organisms.
2. The microorganism must be isolated from a diseased organism and grown in pure culture.
3. The cultured microorganism should cause disease when introduced into a healthy organism.



Check out more memories from the beginning of the ISHRS— pages 121–123.

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