

## New preparations in *Malassezia Sympodialis*-induced Psoriatic and Scalp Keratin disorders: the ultimate role of Keratin.

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### PERSPECTIVE

*Malassezia* is a common yeast that has been associated with several types of skin disorders in mammals, together with *Tinea Corporis* or *Tinea Capitis* (the latter in Scalp), and *Candida Albicans*. All of the above-mentioned, have also been detected systemically, but only after they've somehow gained access to the hematic compartment.

Several studies show that all such fungi manage to spread and cause disease due to keratinocyte accumulation locally (on the site of the spread); generally, small tears in the skin favor their access, and particularly adhesion to the skin, to then form biofilms, but keratinocyte disorders have been observed to be typical of all skin disorders associated with fungal skin infestations, and particularly those induced by *Malassezia*, such as psoriasis, dandruff and some forms of dermatitis, like Atopic Dermatitis (AT).

*Malassezia* invasions in humid regions, i.e. lowlands, reach a peak in the cold seasons, i.e. fall and winter, due to lower sun exposure, because "sporeal" dissemination becomes harder to manage in those areas than in other ones, in the environment, due to harsh conditions such as excess moisture, rain, and winds that favor the transportation of spores, and in us due to vitamin deficiency and immunosuppression, that induce skin dryness and by contrast excessive fattiness (acidity) on the skin, as a feedback mechanism. Nonetheless, although these two known conditions are contributors to

fungal attacks in the skin, they are not the primary author of them, as the main cause remains the production of excess keratinocytes, and thus keratin that accumulates in regions of the skin that has been damaged by harsh weather, wind, excess in ultraviolet light (UV) exposure, deficiency in (UV) light exposure (fibroblast repair is delayed, leading to “faster” keratin replacement roles) and ultimately provokes the formation of a “gathering” of keratin on site.

Of note is the fact that, fungal colonies act parasitically due to necessity, as they access the skin, driven by two main reasons, 1) they feed on keratin whose production is increased on damaged skins, 2) they want to access our organism further as it provides enough moisture and protection, at systemic level.

The breakdown of keratin or keratinocytes by fungal infestations, leads to scaly, dry, itchy and patchy skin, as dysfunctional keratin biproducts become themselves entrenched in microbial biofilms, and are in fact employed as adhesives (glue) that help the spread of more spores. We notice such scenarios in the common *Malassezia* infections, wherein rashes or seasonal “flare-ups” are extremely uncomfortable for patients; an exposure of skin to toxins also favors colonizations again by irritating the skin and thus breaking down epidermal cell barriers, provoking accumulation of keratinocytes for the purpose of repair thus leading to cyclic adhesions.

The evolution of dandruff and scalp-disorders to psoriasis, if left untreated, is schematized below:

Dandruff → Acute Dermatitis → Chronic Dermatitis → Keratinocyte mutations → Psoriasis

### **Genetics studies**

Carrying out genetic studies, I have found that Keratin provides a serine- and glutamine-rich sequences for fungi, such as *Malassezia*, that are quite fond of and in fact need for survival and preservation of certain structures, specifically the ethanol-producing and temperature-resistant alternate sequences of Gln403-Leu404-Ser405-Gln406-Ile407-Gln408-Ala409-Gln410-Ile411-Ser412 and again. By converting water into ethanol, again, this keratin sequence is perfect for “fermenting yeast” such as *Malassezia*, that need it to incorporate within them, and exist in anaerobic environments, thus keratin represents “a gold mine” for “nomadic” fungal spores.

## Shampoos or hair lotion preparation

Frequent washing, i.e. on a daily basis, generally helps curb dandruff worsening in the majority of the patients that live in moderately humid areas, particularly in the summer or spring time, however, in highly humid regions, drastic hygiene isn't always enough, as dandruff can form daily, with or without hair drying.

The standard pH of 5.5 for shampoos is not recommended for patients with keratin disorders, but a higher more basic pH is probably a much better solution, i.e. around 6.5, that appears drier, acting as an unwelcoming solution for the “fungal *niche*”.

Synthetic hydrolyzed keratin additions have already been employed in the cosmetic industry as replacements for the wellbeing of scalp, due to the common observation that keratinocyte excess is present in scalp disorders, nonetheless, they alone are not sufficient to cure keratin disorders. The employment of a wide range of terpenic essential oils is highly advised. Antimycotic preparations are also contraindicated in fertile men, and herbal “natural” remedies are often sought after when patients present themselves for advice.

Proposed ingredients for a Shampoo formulation for patients with keratin disorders, skin test are always indicated for individuals with a propensity for floral or plant allergies and ultra-sensitive skins:

### Main Ingredients:

Aqua (Water)

PEG, Cocamidopropyl Betaine, EDTA

*Thymus* (thyme extract), *Pinus Silvestris* ( $\alpha$ -Pinene, pine extract), Limonene, Linalool, Rosmarinus Officinalis (rosemary extract), Mentha Piperita (Mint extract), Geraniol, Lavander oil, *Camellia Sinensis* (Chamomile extract), Olea Europaea (Olive extract), *Theobroma Cocoa* (Cocoa Seed butter extract), Avocado oil, Green Tea extract, and Hexyl Cinnamal.

Caprylic/Capric Triglyceride, Hydrolyzed Keratin, Coconut oil.

The shampoo can then be combined with any moisturizing hair lotion®, containing Mint and Rosemary, whilst for domestic mammals, fur lotions with a Catmint (catnip) and olive base can help.