

Anti-Dandruff Treatment

Dandruff, or medically termed pityriasis simplex or furfuracea capitis, is characterized by white to whitish yellow, dry, loose scaling and mild pruritus of the scalp, and some would argue that it is a mild form of an inflammatory skin disease (seborrheic dermatitis). Dandruff is an abnormality of the exfoliating process of the skin which is strictly confined to the scalp. This cosmetic type of dandruff (rather than the disease type) is relatively common in the population. Both the prevalence and severity of dandruff are greatest in young men, whereas in women dandruff occurs less frequently. Children and elderly people suffer only very rarely. A seasonal influence has been reported with an exacerbation during winter time.

Nature of Dandruff

Research suggests that dandruff is a subclinical inflammatory scalp disorder resulting in a disruption of connection between the cells within the top layer of the skin. This abnormality may only be episodic, but can also be a permanent condition. Often such kind of mild scalp inflammation is accompanied by varying degrees of pruritus. The dandruff scale is an aggregate of horny skin cells which have retained a large degree of cohesion with each other and become detached in clusters from the surface of the upper layer of the skin. The size of the scales is heterogeneous at a given site of the scalp, and their abundance may vary from one site to another and over time.

Causes of Dandruff

The scalp is known to be extensively colonised by microorganisms. Their density is between 1000 and 100'000 organisms per square millimetre and they include a variety of microorganisms, but in particular staphylococci, propioni bacterium and yeasts of the Malassezia group. Among these microorganisms, the relative proportion of the yeast Malassezia is multiplied by a factor of 1.5–2 in dandruff, thereby representing almost 75% of the flora of the scalp. At present it is thought that the proinflammatory and immunogenic effects of the yeast are the most relevant pathogenic factors causing dandruff. Consequently, a critical quantity of yeasts is usually required to make dandruff become clinically apparent. Even higher concentrations of this yeast can be found in more severe forms, called seborrheic dermatitis. It cannot, however, be completely ruled out that other mechanisms, including the production of yeast toxins, are also implicated.

A dandruff condition without a primary or original fungal involvement is, however, also conceivable. The most obvious example is desquamation of the scalp following excessive exposure to light. There is evidence that UV light can disrupt the connections between the horny skin cells. The same phenomenon may occur in minimal chronic irritation of the scalp which may be caused by certain cosmetic hair products, as well as airborne substances from the environment.

Treatment of Dandruff

Therapy of dandruff may include three different basic principles (see table).

Principles of Dandruff Treatment

Symptomatic Treatment

- Reduction of itching (pruritus)
 - Reduction of scale formation (desquamation)
- Symptomatic treatment is often achieved by frequent hair washing with normal shampoo that does not contain any active ingredients. The effect is due to the surfactants in the shampoo but is usually only transient.

Causal Treatment

- Reduction of Malassezia yeast
 - Reduction of inflammation of the scalp
 - Reduction of proliferation of skin cells
- Causal treatment includes the repeated use of anti-squamolytic agents and anti-fungal agents. Anti-squamolytic agents include salicylic acid and coal tar which both reduce skin proliferation and promote desquamation. The most frequent anti-fungal agents are tea tree oil, piroctone olamine, zinc pyrithione, selenium disulphide, terbafine, and ketoconazole. All are active against yeast and reduce inflammation of the scalp.

Prevention of Relapse

- Prevention of regrowth of Malassezia yeast
- Regrowth of yeast on the scalp can be avoided by using of anti-fungal shampoos at regular intervals (e.g. 1-2 times a month).

Depending on the active agent used and the frequency of hair shampooing the success rate of these treatments are usually high. Frequent cleaning of the scalp with a standard shampoo containing just surfactants but no active ingredients is often sufficient to control minimal dandruff.

In fact, the surfactants in hair shampoos are themselves therapeutic agents since they detach the superficial horny skin cells including the microorganisms inhabiting them. Surfactants can therefore be regarded as dispersing agents for fine dandruff. However, although surfactants provide immediate results, the effect remains weak to moderate and is only transient. This effect of surfactants can further be increased by using 'harsher' shampoos (change from a 'mild' to a 'normal' hair shampoo) which are able to eliminate dandruff almost completely. However, shampoos with harsher surfactants are more irritant resulting in a contrary effect since they promote inflammation of the skin. A vicious circle is then established.

The addition of squamolytic agents such as salicylic acid or tar derivatives have been advocated and used very successfully. Coal tar is most frequently being used. As an added bonus, coal tar has a natural conditioning effect, which adds softness and shine without adding the oils contained in conditioning products.

A vital stage in dandruff treatment was reached with the use of antifungal agents including zinc pyrithione, piroctone olamine, selenium disulphide, terbafine, and ketoconazole. Ketoconazole has demonstrated its superiority in terms of antifungal activity against Malassezia.

Use of Active Ingredients

	Concentration
• Coal Tar	0.5 - 5.0 %
• Zinc Pyrithione (rinse-off)	0.3 - 2.0 %
• Zinc Pyrithione (leave-on)	0.1 - 0.25 %
• Salicylic Acid	1.8 - 3.0 %
• Selenium Sulfide	1.0 %
• Selenium Sulfide (micronized)	0.6 %
• Sulfur	2.0 - 5.0 %

Data obtained from FDA

It has been shown that tea tree oil is active against a wide range of microorganisms including Malassezia and thus may also be effective in dandruff. In fact, a study has shown that the use of a 5% tea tree oil shampoo resulted in a 41% improvement in the dandruff severity core compared with 11% in the placebo group. Significant improvements were also found in the itchiness and greasiness.

Sources:

Pierard-Franchimont C, et al. From axioms to new insights into dandruff. *Dermatology* 2000; 200: 93
Satchell AC, et al. Treatment of dandruff with 5% tea tree oil shampoo. *J Am Acad Dermatol* 2002; 47: 852

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