Chapter 39

Shampooing and Shampoos

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The importance of a causally effective treatment for scalp seborrhoea and dandruff results from the high incidence of these conditions. For such treatment, shampooing is of crucial importance. This chapter discusses the effects of shampoos on sebaceous secretion and on the hydrolysis of triglycerides and the relevance of this for scalp seborrhoea, and the effect of antimitotic and keratolytic agents. The pathophysiological basis of and testing methods for this kind of topical therapy is also demonstrated.

1 Defatting of Scalp and Hair by Shampooing and Effects on the Refatting Process

1.1 Physiology of Lipid Restitution

As every shampoo contains detergents, the use of a shampoo leads not only to cleansing of scalp and hair but also to defatting. The extent of defatting depends on the kind and the amount of surfactants applied. Figure 1 demonstrates that shampooing with a standard surfactant solution removes about 80% of scalp and hair lipids (Gloor et al. 1973 a). This proportion of lipid reduction is likely also to apply roughly to customary commercial shampoos. The two curves in Fig. 1 are based on two different measurements: the upper curve represents measure-
ment of scalp lipids and the lipids in the proximal 4.5 cm of hair, determined together, and the lower curve represents that of lipids in the distal part of hair. Lipid restitution is seen to be rapid at first but gradually to slow until the original lipid level is reached. In the distal part of hair these processes are generally similar to those on the scalp and in the proximal parts except that process of lipid restitution is delayed for about 1 day in distal parts of the hair shaft. Both curves show that the original lipid level is reestablished between the 3rd and 7th days.

Essentially the process of refatting is similar to that on hairless skin. The major difference lies in the amount of time required for lipid restitution: hairless skin takes a few hours and the scalp several days. In very long hair the restitutions of lipids probably takes much longer (Le Duc et al. 1978). Saint-Leger and Leveque (1982) maintain that the slower lipid restitution on the pilous scalp than on the hairless skin of the forehead is due to the fact that the lipid reservoir of the hair follicle on the scalp is considerably smaller than that in the forehead skin.

Studies by Gloor and Kohler (1977a) revealed new aspects of the lipid restitution process in scalp hair. These authors measured the level of scalp lipids and lipids in the distal 4.5 cm of hair; the level of lipids replaced 5 days after defatting with shampoo were taken as absolute values for comparison to values measured before shampooing (Fig. 2). As expected, the higher the initial lipid level, the greater was the secretion of sebaceous glands. Thus seborrhoea of the scalp results partly from an increased activity of the sebaceous glands. Moreover, these authors determined the percentage substitution of lipids removed by shampooing on the 5th day after shampooing (Fig. 3). The results show that the higher the initial lipid level is, the lower the percentage of refatting on the 5th day. It follows that a seborrhoeic person reaches the initial lipid level later than does a sebostatic one. Lipid restitution after shampooing in seborrhoeic persons is therefore not only increased but also prolonged.

The influence of the hair itself on the process of refatting has been disputed. Studies by Eberhardt (1976) suggest that there is no suction effect of the hair on sebaceous gland lipids. However, Le Duc et al. (1978) maintained that under physiological conditions a capillary suction effect may well exist.

The level of scalp and hair lipids depends on both genetic and environmental factors. Genetic studies of scalp and hair lipids have not been carried out, but skin

![Fig. 2. Relationship between the amount of scalp and hair lipids before shampooing and that replaced 5 days after shampooing (in men). The higher the initial lipid level, the greater is the extent of lipid substitution.](image-url)