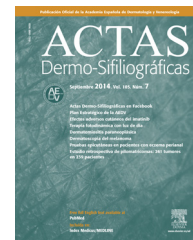




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## REVIEW

### Hair Cosmetics: Dyes<sup>☆</sup>



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#### KEYWORDS

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Hair;  
Scalp

**Abstract** Hair plays a significant role in body image, and its appearance can be changed relatively easily without resort to surgical procedures. Cosmetics and techniques have therefore been used to change hair appearance since time immemorial. The cosmetics industry has developed efficient products that can be used on healthy hair or act on concomitant diseases of the hair and scalp.

Dyes embellish the hair by bleaching or coloring it briefly, for temporary periods of longer duration, or permanently, depending on the composition of a dye (oxidative or nonoxidative) and its degree of penetration of the hair shaft. The dermatologist's knowledge of dyes, their use, and their possible side effects (contact eczema, cancer, increased porosity, brittleness) can extend to an understanding of cosmetic resources that also treat hair and scalp conditions.  
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#### PALABRAS CLAVE

Cosméticos capilares;  
Tintes;  
Eccema;  
Cáncer;  
Pelo;  
Cuero cabelludo

#### Cosméticos capilares: tintes

**Resumen** El aspecto del cabello juega un papel significativo en la imagen corporal. Dado que se puede cambiar con relativa facilidad sin necesidad de recurrir a procedimientos quirúrgicos, los cosméticos y técnicas con dicho fin se usan desde tiempo inmemorial. La industria cosmética ha conseguido productos eficientes que actúan sobre el cabello tanto en estado de salud como para mejorar enfermedades del pelo y cuero cabelludo concomitantes.

Los tintes son cosméticos capilares decorativos que tienen como finalidad cambiar el color o decolorar el pelo de forma temporal, semipermanente, o permanente, en función de sus componentes (oxidativos o no) y de su penetración a diferentes niveles de la corteza del tallo. El conocimiento de los tintes, el modo de uso y los efectos secundarios posibles (eccema de contacto, cáncer, porosidad, fragilidad) proporciona al dermatólogo no solo conocimientos, sino herramientas terapéuticas coadyuvantes en la práctica tricológica diaria.

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## Introduction

Hair is an important component of most mammal body coverings and helps create a barrier between an animal and its environment.<sup>1</sup> While it does not serve a vital biological function in humans, its psychological significance is considerable<sup>1,2</sup> owing to the fundamental role it plays in the development of body image and self-identification in both men and women.<sup>3,4</sup> Hair length, color, and style are especially important for physical appearance and self-perception, and can be modified according to how we wish to be perceived by others.<sup>4</sup> Unlike other physical attributes, these features are easily changed and do not require surgery.<sup>2,3,5</sup> Perhaps for this reason, since ancient times humans have developed products and techniques to change and improve hair appearance, color, texture, and style.<sup>3</sup>

The products in question are termed *hair cosmetics*. Trüeb defines them as “preparations intended for placing in contact with the hair and scalp, with the purpose of cleansing, promoting attractiveness, altering appearance, and/or protecting them in order to maintain them in good condition.”<sup>6</sup> Hair cosmetics are used by men and women of all ages<sup>7</sup> to optimize hair appearance and repair hair damage, ironically caused in most instances by inappropriate exposure to hair cosmetics.<sup>8</sup> These products may sometimes be used as adjuncts to medical treatments for hair conditions.

Considering the above, dermatologists need to be aware of the principles of cosmetic hair care and of the formulations, application methods,<sup>9</sup> and side effects of different types of hair cosmetics.<sup>10</sup> The purpose is not only to diagnose and treat hair and scalp disorders, but also to ensure beneficial management of conditions with a serious psychological impact on the patient, for whom hair care advice can be as important as hope of a cure.<sup>9</sup> These principles will also assist in providing cosmetic guidance for those patients who merely wish to improve their appearance. Working together, dermatologists and the cosmetics industry have paved the way for better and increasingly convenient and effective products for regular grooming, repair, and maintenance.<sup>8</sup>

## Hair Cosmetics: Definitions

Garrote and Bonet<sup>11</sup> define hair treatment cosmetics as “the cosmetic products indicated for use when changes in the hair or scalp compromise its healthy appearance, lead to potential hair loss, or simply make the hair and hence the person look less attractive.”

Annex I to EU Directive No 76/768/EEC lists the following hair-care products<sup>12</sup>:

1. hair tints and bleaches
2. products for waving, straightening, and fixing
3. setting products
4. cleansing products (lotions, powders, shampoos)
5. conditioning products (lotions, creams, oils)
6. hairdressing products (lotions, lacquers, brilliantines)

Until recently, cosmetics were products used to enhance beauty whereas pharmaceuticals were used to cure disease. The boundaries are more blurred today, since the cosmetics

industry uses physiologically active ingredients that form pharmacologically active compounds.<sup>13</sup>

We will classify hair cosmetics according to purpose:

- Hygiene: to remove dirt.
- Maintenance: to improve hair styling and protect the cuticle.
- Beauty: to change hair color or shape.
- Correction (or therapy): to contribute to medical or surgical treatment.

## Hair Beauty Cosmetics: Hair Dyes

Hair beauty cosmetics are those that change hair color or shape. They include temporary setting products (such as hairspray, foam, or hair gel), permanent waving or straightening products, and hair dyes.

Hair dyes color hair either temporarily or permanently by removing part of the existing pigment and/or adding new pigment.<sup>14</sup>

Dyes are used by both men and women to alter natural hair color, postpone graying of hair, or restore pigmentation once graying has set in.<sup>14,15</sup> In developed countries, 70% of women dye their hair at least once, and many do so regularly.<sup>14</sup>

We will review certain key, basic concepts that should contribute to a better understanding of hair dyes and their use.

## Hair Shaft: Structure

Hair is an appendage of the epidermis<sup>2</sup> comprising the hair follicle and hair shaft.<sup>15</sup> Beauty treatments do not affect the follicle cosmetically<sup>2,15</sup>; all changes involve the shaft.

The hair shaft, or hair fiber, comprises 3 layers: the cuticle, the cortex, and the medulla.<sup>2,15</sup> Chemically, the shaft consists of proteins, lipids, water, melanin, and trace elements.<sup>16</sup> A hair shaft can tell us about a person's hair care history,<sup>17</sup> and may feature signs of weathering, from the root to the tip.<sup>15</sup> The tip of the hair shaft, as the oldest part, exhibits the most cosmetic damage, whereas the root is probably less porous and has different chemical properties that affect its response and influence the cosmetic effects of treatments applied to this region.<sup>17</sup>

The hair shaft is a flexible structure that can be stretched to a considerable degree by applying traction. Breakage is thought to occur at loads ranging between 50 g and 100 g. This is relevant to prosthetic cosmetic practices, such as the application of hair extensions or of hair integration systems.<sup>18</sup>

## Cuticle

The cuticle consists of 6 to 8 layers of overlapping scale-like cells arranged so that their free edges point toward the tip of the shaft.<sup>16</sup> It protects the cortex beneath and acts as a physical barrier against external insult.<sup>2</sup> It consists of 2 parts, the exocuticle and the endocuticle.

External to the cuticle is the F-layer, tightly joined to the cuticle by covalent bonds.<sup>5</sup> It consists of a single-molecule-thick layer of 18-methyl eicosanoic acid, a highly

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