Unwanted facial hair is a common condition that often goes untreated. Women most often seek treatment, but men may also have concerns about this problem.¹ In most cases, a severe underlying medical condition is not the cause of unwanted facial hair. Its presence, however, causes significant psychologic stress and may lead patients to resort to uncomfortable and often expensive means of removal.

Hair Growth Cycle

The growth of human hair is cyclic, involving phases of active growth (anagen) and quiescence (telogen). In addition, an intermediate stage of transition, known as catagen, occurs between active growth and cessation of growth. Between 85 and 90 percent of hairs are in the anagen phase at any one time, with the remainder in telogen.²-⁴

During the anagen phase, mitotic activity in the hair bulb and dermal papilla resumes and forms the new hair shaft, pushing out the old inactive hair, or club hair, as the new hair advances. The matrix cells, which form the new hair, multiply rapidly and ascend into the follicular canal, dehydrate, and form the growing shaft. The visible hair shaft is composed of an outer cuticle, the cortex and, sometimes, a core of compact, keratinized cells, all of which are made of protein.²-⁵

Hairs that are in the anagen phase during removal are more sensitive to the various treatment modalities than hairs in the telogen phase. Alteration of matrix cell activity during anagen, by whatever method chosen, increases the amount of time from removal to regrowth. As a result, one of three alterations can occur: early cessation of anagen causing telogen to occur, transition into a dystrophic stage of anagen, or degeneration of the matrix.⁵-⁸

Depending on the site of the hair, the time spent in each phase differs considerably, from an anagen phase of two to six years for scalp hair to one to two months for thigh hair. The telogen phase also varies, ranging from one and one half months for mustache hairs to three to six months for leg hairs.⁵ During telogen, growth stops, and the entire structure rests for a variable period of time, depending on the site. Once anagen begins, the remaining club hair is ejected, and the growth cycle continues.
Patterns of hair growth vary greatly depending on whether the patient is male or female. In addition, ethnicity may also determine normal growth patterns that can be interpreted as abnormal by physicians outside of a patient’s native culture. Growth of androgen-sensitive hairs at various regions of the body (beard, axillae, pubis, chest, and shoulders, for example) can arouse suspicion of an underlying organic cause. Overproduction of testosterone and other androgens in female patients may cause abnormal growth patterns that can be clinically evident as hirsutism. All such patients should be evaluated for an underlying cause of the hair growth, whether the unwanted facial hair is to be treated or not.

Methods of Hair Removal

Several methods of hair removal are available, each with varying degrees of cost, efficacy, and side effects. Methods of hair removal are summarized in Table 1.

Shaving

Shaving does not change the thickness or growth rate of human hair. Rather, the rough-textured, beveled edge that shaving produces (compared with the softer, tapered tip of uncut hair) may give the appearance of thickening. Although shaving is a useful and safe method of facial hair removal (and the chief method chosen by men), it is not popular among women.

Side effects of shaving are generally minimal. Irritation, often caused by components of the shaving lubricant, and minor cuts can occur. Pseudofolliculitis barbae, caused by the ingrowth of curly hair, is also a fairly common side effect in some ethnic groups.

Epilation/Depilation

Epilation, or plucking, is often the first method chosen by patients. The entire hair shaft and bulb are removed, with results lasting six to eight weeks. While this method is probably the least expensive, it is not practical for use over larger areas. Unless the hair is plucked in anagen, the method generally does not change the growth rate of hair. Plucking during anagen may shorten the duration of time spent in this phase and, if repetitive, may permanently damage the matrix.

Numerous methods are used for epilation, from tweezers to devices that pluck several hairs at once. Hot or cold waxing is also a form of epilation. Mixed with the wax is a resin that hardens around the hair shaft and aids in pulling out the hair when the wax has dried. Side effects, which are more common when more than one hair is removed at a time, include burns (from hot wax products), folliculitis, pseudofolliculitis, postinflammatory hyperpigmentation, and scarring.

Depilation is the use of a chemical that dissolves the hair shaft, with results lasting up to two weeks. Composed of thioglycolates and mercaptans, and mixed with an alkali compound (calcium hydroxide or sodium hydroxide), depilatories do not affect the hair bulb. The thioglycolates disrupt disulfide bonds between the cystine molecules found in hair, helping to dissolve the hair shaft. The addition of an alkali compound increases the pH level and can improve the efficacy of the depilatory.

Side effects include chemical dermatitis and, occasionally, allergic dermatitis from the sulfur-containing thioglycolates or fragrance added to the compound. The thioglycolates produce hydrogen disulfide gas, a particularly offensive-smelling byproduct.

Laser

The use of lasers in hair removal allows selective targeting of the hair bulb and can diminish regrowth for at least three months.
Evidence level B, nonrandomized clinical trial] Evidence of permanent hair removal has yet to be established but is under investigation.

The basis for laser hair removal is the specific targeting of melanin in the hair bulb. Melanin absorbs the light emitted by the laser at a specific wavelength. The energy of the laser converts into heat, causing the selective destruction of the hair bulb. However, melanin in the surrounding epidermis can also be targeted, which may limit the success of the procedure. With too much melanin in the adjacent skin, the laser energy is absorbed into the surrounding epidermis, causing epidermal damage or absorptive interference with less effective hair destruction. Patients with dark hair and light skin have a relatively higher concentration of melanin in the hair compared with the epidermis, allowing for more selective absorption of light within the hair bulb, reducing damage to or interference by the melanin in the epidermis. Conversely, gray or white hair is a poor target for laser energy.

The most common side effects of laser hair removal are edema and erythema, which generally resolve within 24 hours after treatment. The process itself can be slightly painful because of the short burst of heat energy created. Furthermore, hypopigmentation and

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**TABLE 1**

**Summary of Hair Removal Methods**

<table>
<thead>
<tr>
<th>Method</th>
<th>Side effects</th>
<th>Permanence</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shaving</td>
<td>Chemical dermatitis, minor cuts, pseudofolliculitis barbae</td>
<td>One to three days</td>
<td>Variably inexpensive</td>
</tr>
<tr>
<td>Epilation: plucking/waxing</td>
<td>Pain, folliculitis, pseudofolliculitis, burns, irritation, postinflammatory hyperpigmentation, scarring</td>
<td>Two to eight weeks</td>
<td>Least expensive</td>
</tr>
<tr>
<td>Depilation: chemical</td>
<td>Chemical dermatitis, occasionally allergic dermatitis</td>
<td>Up to two weeks</td>
<td>Variably inexpensive</td>
</tr>
<tr>
<td>Laser</td>
<td>Edema, erythema, pain, hypopigmentation, hyperpigmentation</td>
<td>At least three months</td>
<td>Variable but approximately six to eight sessions (depending on site and skin/hair color), at $75 to $250 per session</td>
</tr>
<tr>
<td>Electrolysis</td>
<td>Edema, erythema, pain, scarring, keloid formation, postinflammatory pigment changes. Cannot be used by patients with pacemakers.</td>
<td>Considered to be permanent but depends on method and operator</td>
<td>About $18 to $25 per 15-minute session; variable number of sessions initially, followed by maintenance</td>
</tr>
<tr>
<td>Topical: eflornithine (Vaniqa)</td>
<td>Acne, pseudofolliculitis barbae, stinging, burning</td>
<td>Up to eight weeks after discontinuing treatment</td>
<td>Approximately $50* for one month of twice-daily treatment</td>
</tr>
</tbody>
</table>

*—Estimated cost to the pharmacist based on average wholesale prices in Red book. Montvale, N.J.: Medical Economics Data, 2001. Cost to the patient will be higher, depending on prescription filling fee.
hyperpigmentation may occur and are related to skin color.2,5,6,15-18

**ELECTROLYSIS**

Although electrolysis is a common method of hair removal, its practice is the least standardized. Regulation of the process varies from state to state. In addition, no controlled trials have evaluated the efficacy of the procedure. Success depends on the skill of the operator.5,19,20 However, electrolysis is considered to be a permanent method of hair removal. An electric current is passed through a fine-gauge needle or flexible probe inserted into the skin, destroying the follicular isthmus and lower follicle. In one study,21 this led to permanent removal of the hair.

The two basic methods of electrolysis are galvanic and thermolytic. Galvanic electrolysis is the more common method. It destroys the hair follicle using a direct current–induced chemical reaction. The process is variably slow, and repeat treatments are often necessary. Thermolysis uses an alternating current that creates heat within the follicle, causing its destruction. Depending on the operator, the equipment, and the method used, the process can take from 0.02 to 20 seconds per hair. Electrolysis is usually performed on all types of hair but is most effective on hairs in the anagen phase.5,19-22

Side effects of electrolysis, which include pain, erythema, and edema, are generally temporary. Scarring, keloid formation in susceptible patients, and postinflammatory pigment changes are possible. Patients with pacemakers should not undergo electrolysis, regardless of the method.5,20

**TOPICAL**

Several oral medications have successfully reduced the growth of facial hair (e.g., spironolactone [Aldactone], third-generation oral contraceptives, cimetidine [Tagamet]), but long-term safety and efficacy data are lacking. Recently, however, the first topical medication for the treatment of unwanted facial hair has demonstrated success.1 Eflornithine (Vaniqa), an irreversible inhibitor of ornithine decarboxylase, has also been used to treat African sleeping sickness in intravenous and oral forms.23,24 In animal studies, inhibition of ornithine decarboxylase reduced cell division and other cell functions that are necessary for hair growth. Topical application in humans has been shown to remove facial hair, an effect that may last as long as eight weeks after therapy is discontinued. Currently, eflornithine is indicated only for the removal of unwanted facial hair in women.1,24-27

In two randomized, double-blind studies, eflornithine removed unwanted facial hair within four to eight weeks of regular use.24 This hair loss was deemed a “marked improvement” in approximately 32 percent of patient reports when compared with placebo and was accompanied by a significant reduction in the amount of time patients spent removing hair by other means.

Although eflornithine is indicated as a stand-alone treatment, it may improve the success of laser hair removal when the two are used in conjunction.1 If the medication is well tolerated, it can be continued as long as it is...
effective. Hair growth usually returns to pre-
treatment levels within eight weeks of discon-
tinuing the medication.1 While eflornithine is
a useful option, it is not a practical first-line
therapy. It is perhaps best used in patients
sensitive to physical methods of hair removal or
to augment one of these methods.1

Eflornithine is a pregnancy category C
medication, and it is not known whether it is
excreted in human breast milk. The most
common side effects are acne, erythema, and
burning and stinging of the skin. These
symptoms generally resolve without the
need for treatment or discontinuation of
eflornithine.24-27

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REFERENCES

1. Small S. New topical cream reduces facial hair. Skin
& Aging 2000;8.
2. Ross EV, Ladin Z, Kreindel M, Dierickx C. Theoreti-
cal considerations in laser hair removal. Dermatol
3. Habif TP. Hair diseases. In: Habif TP, ed. Clinical der-
matology, a color guide to diagnosis and therapy.
4. Stevens A, Lowe JS. Skin and breast. In: Stevens A,
Lowe JS, eds. Histology. Philadelphia: Lippincott,
6. Tse Y. Hair removal using a pulsed-intense light
7. Abell E. Embryology and anatomy of the hair folli-
cle. In: Olsen EA, ed. Disorders of hair growth: di-
agnosis and treatment. New York: McGraw-Hill,
8. Oliver RF. Whisker growth after removal of the der-
mal papilla and lengths of follicle in the hooded
9. Lynfield YL, Macwilliams P. Shaving and hair
10. Hale PA, Ebling FJ. The effects of epilation and hor-
mones on the activity of rat hair follicles. J Exp Zool
1975;191:49-62.
11. Johnson E, Ebling FJ. The effect of plucking hairs
during different phases of the follicular cycle. J
12. Richards RN, Uy M, Meharg G. Temporary hair
removal in patients with hirsutism: a clinical study.
13. Wright RC. Traumatic folliculitis of the legs: a per-
sistent case associated with use of a home epilat-
771-2.
15. Campos VB, Dierickx CC, Farinelli WA, Lin TY,
Manuskiatti W, Anderson RR. Hair removal with an
800-nm pulsed diode laser. J Am Acad Dermatol
16. Wheeland RG. Laser-assisted hair removal. Derma-
17. Grossman MC, Dierickx C, Farinelli W, Flotide T,
Anderson RR. Damage to hair follicles by normal-
35:889-94.
18. Dierickx CC, Grossman MC, Farinelli WA, Ande-
son RR. Permanent hair removal by normal-mode
19. Wagner RF Jr. Medical and technical issues in office
electrolysis and thermolysis. J Dermatol Surg Oncol
20. Richards RN, Meharg GE. Cosmetic and medical
electrolysis and temporary hair removal: a practice
manual and reference guide. 2d ed. Toronto,
Canada: Medric, 1997.
21. McKinstry CT, Inaba M, Anthony JN. Epilation by
electrocoagulation: factors that result in regrowth
22. Goldman MP, Fitzpatrick RE. Cutaneous laser
surgery: the art and science of selective photother-
23. Quinn TC. African trypanosomiasis. In: Cecil RL,
Bennett JC, Plum F, eds. Cecil Textbook of medicine.
25. Eflornithine cream for facial hair reduction. Med
Lett Drugs Ther 2000;42(1089):96.
26. Hickman JG, Huber F, Palmisano M. Human dermal
safety studies with eflornithine HCI 13.9% cream
(Vaniqa), a novel treatment for excessive facial hair.
27. Shapiro J, Lui H. Vaniqa—eflornithine 13.9%