Introduction

Although loss of scalp hair is a problem that has a psychological effect on individuals of both sexes, the impact is greater in women, even when the degree of alopecia is small, as shown by studies from North America and Spain.1,2,3

The term female-pattern alopecia (FPA) is more appropriate than female androgenetic alopecia as its dependence on androgens and the hereditary character of the process are not clear in all cases. Female pattern alopecia is the most common form of hair loss, affecting more than 50% of women throughout their lifetime,4 and its prevalence and severity increase with age.5 Similar to male androgenetic alopecia, it is characterized by the progressive miniaturization of the hair follicles and a reduction of the percentage of hair in anagen in the affected areas due to this phase becoming shorter and the telogen phase becoming longer.6

Clinical Characteristics

Three clinical forms of FPA have been described (Figure): (1) a diffuse form (Ludwig pattern7), where there is a general reduction of frontoparietal hair density, with a preserved frontal hairline and no crown alopecia; (2) a form with a similar distribution to that of male pattern alopecia (Hamilton pattern8), with recession of the frontal hairline and crown alopecia to varying degrees—this form has been observed in 37% of post-menopausal women9; and (3) an alopecia described by Olsen10 as having a Christmas-tree pattern, with increased hair loss at the scalp midline, gradually increasing toward the frontal area. This third form is the most common, appearing in 70% of a series of 163 women with mild androgenetic alopecia.10

The age at onset varies considerably; there are 2 peaks at 30 years and 50 years. If the onset of puberty is early,
FPA can appear before these ages and the degree of alopecia can increase if left untreated. The hair-pull test is usually negative, unless effluvium is also present. The patients frequently experience high levels of anxiety, and if these processes are not treated they can progress rapidly. Some women with FPA (less than 40%) have hyperandrogenism, along with other clinical signs such as hirsutism, treatment-resistant acne, galactorrhea, infertility, or menstrual dysfunction, although most women with FPA do not have clinical or analytical signs of excess androgens. Family history of FPA is less clear than in men with androgenetic alopecia.

### Pathophysiology

The pathophysiology of FPA is thought to be similar to that of androgenetic alopecia in men, where the enzyme 5α reductase (5αR) plays a key role in the peripheral conversion of testosterone to dihydrotestosterone (DHT). Two isoenzymes encoded by 2 different genes have been described: 5αR-I, which is widely distributed throughout the body, and 5αR-II, which is expressed in androgen-dependent tissues such as the prostate gland and hair follicles. The different clinical patterns in women compared to men are due to the differences in the levels and distribution of 5αR, aromatase, and androgen receptors in the hair follicles.

### Laboratory Tests

Diagnosis of FPA is more difficult than in men, because there is usually less hair loss in women and other factors with which loss can be easily confused must be excluded. Such factors include alopecia areata, telogen effluvium, loose anagen hair syndrome, trichotillomania, and scarring alopecia. A general examination is required to eliminate other causes of hair loss. Laboratory tests should include complete blood count, thyroid stimulating hormone, and serum ferritin, as well as prolactin, free and total testosterone, and dehydroepiandrosterone sulfate (DHEAS). The last 2 should be especially assessed in women with other presentations of excess androgens (hirsutism, treatment-resistant adult acne, nigricans acanthosis, menstrual dysfunction, and galactorrhea). If an increase in DHEAS is observed, a 17-OH progesterone blood test can be performed to rule out congenital adrenal hyperplasia during the follicular phase of the menstrual cycle (Table 1).

### Treatment

After appropriate examination, all postmenopausal women consulting for hair loss should be advised to adopt a suitable diet in terms of number of calories. Hair loss due to the following drugs should be ruled out: retinoids, cytotoxic or anticoagulant agents, and those used to treat other scalp problems such as seborrheic dermatitis or psoriasis and that can interfere with the action of specific topical treatment.

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Hypertrichosis may also appear, usually going into remission 4 months after stopping treatment.

Good results are obtained with oral antiandrogens such as cyproterone acetate that have central and peripheral antiandrogenic activity, especially in patients with hyperandrogenism. Spironolactone and flutamide are useful, although their side effects, which are sometimes serious, prevent them from being used in all cases. Cyproterone acetate prevents DHT from binding to its receptor and suppresses the secretion of follicle stimulating hormone and luteinizing hormone. A dose of 50 mg/d is administered on an ongoing basis to postmenopausal women. Spironolactone at a dose of 100–200 mg/d should be administered for a minimum of 6 months. Blood potassium levels should be monitored at baseline and every month, due to the risk of hyperkalemia, and oral rehydration therapy is recommended. Flutamide at minimum doses of 62.5–125 mg/d is more effective for hirsutism than alopecia. A quarterly blood test is recommended due to the moderate risk of liver toxicity. Birth-control methods should be employed as all the treatments mentioned may cause feminization of the male fetus.

Finasteride is a peripheral nonsteroidal antiandrogen that acts by inhibiting 5αR-II, thus blocking the conversion of free testosterone to DHT. Finasteride at a dose of 1 mg/d has proven efficacy in treating alopecia in men; however, its efficacy in women is less clear. An anovulatory drug should also be given if finasteride is administered to premenopausal women, as it can cause feminization of the male fetus, similar to other antiandrogens. Table 2 shows the results of the most relevant studies on the use of oral finasteride in women. Price et al16 conducted a double-blind, randomized, multicenter study that compared finasteride at 1 mg/d with placebo. That study included the greatest number of patients (n = 137), all of whom were postmenopausal and had normal androgen levels, and no differences in efficacy were found at 12 months. The authors pointed out that the advanced age of some of the women may have contributed to this lack of response, as hair thinning in these patients no longer depends as much on 5αR or DHT. The other studies shown in Table 2 were case series or isolated cases. Shum et al17 treated 4 postmenopausal women with hyperandrogenism using finasteride at a dose of 1.25 mg/d for 2.5 years, finding improvements in hair loss and increased hair growth. The authors explained this difference on the basis of the long treatment period (2 of the 4 patients noted no increase in hair until 2 years of treatment had elapsed), and the higher dose, although they recognized that the increase in dose was so small that it may have played no significant role. Finally, all the women had hyperandrogenism, suggesting that this type of female alopecia could have the same pathophysiology as male androgenetic alopecia, unlike other FPA. Thai and Sinclair18 described the case of a postmenopausal woman with normal androgen levels who displayed increased hair density after 12 months of treatment with finasteride at 5 mg/d; previous treatment with spironolactone and cyproterone acetate acetate failed to achieve this response. Trüeb and the Swiss Trichology Study Group19 studied 5 postmenopausal women with normal androgen levels (3 with Ludwig pattern FPA, 1 with Hamilton pattern FPA, and 1 with Olsen pattern FPA). Four were treated with finasteride at 2.5 mg/d and 1 with 5 mg/d for 12 months; all the women improved 6 months after beginning treatment. The most recent study was by Iorizzo et al20 and included 37 premenopausal women without signs of hyperandrogenism treated with finasteride at 2.5 mg/d and an anovulatory drug (drospirenone 3 mg and ethinyl estradiol 30 µg [Yasmin, Schering, Berlin, Germany]) for 12 months; 23 improved (mild improvement in 12, moderate in 8, and marked improvement in 3),

<table>
<thead>
<tr>
<th>Reference</th>
<th>Women, No.</th>
<th>Age, y</th>
<th>Hyperandrogenism</th>
<th>Finasteride dose</th>
<th>Duration of Treatment</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price et al16</td>
<td>137 (67 with finasteride and 70 with placebo)</td>
<td>41-60</td>
<td>–</td>
<td>1 mg/d</td>
<td>12 mo</td>
<td>No difference between finasteride and placebo</td>
</tr>
<tr>
<td>Shum et al17</td>
<td>4</td>
<td>36-66</td>
<td>+</td>
<td>1.25 mg/d</td>
<td>&gt;2.5 y</td>
<td>Improvement</td>
</tr>
<tr>
<td>Thai and Sinclair18</td>
<td>1</td>
<td>67</td>
<td>–</td>
<td>5 mg/wk</td>
<td>12 mo</td>
<td>Improvement</td>
</tr>
<tr>
<td>Trüeb et al19</td>
<td>5</td>
<td>52-69</td>
<td>–</td>
<td>2.5 or 5 mg/d</td>
<td>&gt;18 mo</td>
<td>Improvement</td>
</tr>
<tr>
<td>Iorizzo et al20</td>
<td>37</td>
<td>19-50</td>
<td>–</td>
<td>2.5 mg/d +</td>
<td>12 mo</td>
<td>Improvement in 22</td>
</tr>
<tr>
<td>Camacho21</td>
<td>41</td>
<td>+ (SAHA)</td>
<td>2.5 mg/d</td>
<td>2 y</td>
<td>Improvement 75</td>
<td></td>
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Abbreviation: SAHA, seborrhea, acne, hirsutism, and alopecia.

*Yasmin, Schering, Berlin, Germany.
13 did not note any improvement, and 1 patient worsened despite treatment. Camacho also successfully treated alopecia in 41 women with SAHA (seborrhea, acne, hirsutism, and alopecia) using finasteride at 2.5 mg/d. Camacho and Tosti described their personal experience in treating alopecia with finasteride at doses between 2.5 mg/d and 5 mg/d. They studied 65 postmenopausal women with stage I–III female androgenetic alopecia or stage I–II male pattern androgenetic alopecia with increased concentrations of androgens, hypophysial hormones, or with prostate-specific antigen (PSA) above 0.02 ng/mL (PSA should be absent in women). Finasteride was used in combination with a 5% minoxidil solution twice a day and a promoter of vascular endothelial growth factor production (0.1% α-tocopherol nicotinate) twice a week. The patients noted that hair loss stopped at 3 months; regrowth began at 6 months, especially in the frontal and vertex region, becoming more evident between 12 and 18 months. No regrowth was observed in the frontotemporal region, becoming more evident between 12 and 18 months. No regrowth was observed in the frontotemporal regions (as in the case of male-pattern alopecia). They also used this treatment successfully in postmenopausal women with normal androgen levels. All the authors who have used finasteride in women highlight that it is well tolerated and there are no side effects.

In summary, finasteride seems to be an effective treatment for alopecia in women. A better response is obtained in women with early-onset alopecia and hyperandrogenism. Efficacy is lower if the alopecia onset occurs later. A higher dose than that given to men should be administered to women for at least 2 years to achieve improvement. It is also effective in premenopausal women, but suitable birth-control methods must be employed due to the risk of feminization of the male fetus.

### Key Points in the Treatment of Female Pattern Alopecia With Finasteride

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| **Efficacy is lower if the alopecia onset occurs later** |
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### References


### Conflicts of Interest

The authors declare no conflicts of interest.

