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### LEARNING OBJECTIVES

Upon successful completion of this lesson, you should be able to:

1. explain the basic physiology of hair growth
2. describe the pathophysiology and clinical presentation of different categories of alopecia
3. discuss the relative effectiveness and safety of pharmacological and nonpharmacological treatments used in alopecia therapy
4. explain the pharmacist's role in the care of patients with alopecia

### INSTRUCTIONS

1. After carefully reading this lesson, study each question in the post-test and select the one option you believe is the best answer. Although more than one option may be considered acceptable, only one option is the *best* answer.
2. To pass this lesson, a grade of at least 70% (14 out of 20) is required. If you pass, your CEU(s) will be recorded with the relevant provincial authority(ies). (Note: some provinces require individual pharmacists to notify them.)

### ANSWERING OPTIONS

- A. For immediate results, answer online at [www.pharmacygateway.ca](http://www.pharmacygateway.ca).
- B. Mail or fax the printed answer card to (416) 764-3937. Your reply card will be marked and you will be advised of your results within six to eight weeks in a letter from *Pharmacy Practice*.

## At a loss: Alopecia

By Karen Jensen, MSc, BSP and Dorothy Sanderson, BSP



**Alopecia (baldness) is the partial or complete absence of hair from areas where it is usually present.**<sup>1</sup> It most commonly involves scalp hair but can affect other areas of the body. Although the condition is physically benign, it can have important psychological and social consequences for patients.<sup>2</sup>

Some types of alopecia can be managed with over-the-counter (OTC) treatments, while others require prescription drugs or specialized medical treatment to minimize the extent of permanent baldness. Pharmacists need to be knowledgeable about the different types of alopecia and their treatment in order to provide patients with appropriate advice and realistic expectations about the benefits of therapy.

This lesson will review normal hair growth, types of alopecia and their treatment and the role pharmacists can play in the management of alopecia.

### Hair growth physiology

An individual is born with a fixed number of hair follicles. There are two basic types of hair: *vellous* (fine, soft, nonpigmented hair that covers the body) and *terminal* (long, coarse, pigmented hair found on the scalp, face, axillae and pubic area). Under the influence of androgens, certain hair follicles in the facial area, chest, legs and arms increase in size to produce terminal hair. Conversely, follicles in specific areas of the scalp can decrease in size, producing vellous hair. Genetics mediate the response of hair follicles to androgens.<sup>3</sup>

There are four stages to hair growth on the scalp.

1. **anagen** (growth stage) which lasts two to three years;
2. **catagen** (transition stage), lasting two to three weeks during which the follicle degenerates and growth stops;
3. **telogen** (resting stage) which lasts three to four months;
4. **exogen** (shedding stage) where the hair is ejected and a new cycle begins.

The scalp has approximately 100,000 follicles. In a normal scalp 80–90% of follicles are in the anagen stage, 5–10% in the telogen stage, 1–3% in the catagen stage and 0.1% in the exogen stage. During the anagen stage, hair grows at the rate of approximately one centimeter per month.

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At a loss: Alopecia

The normal rate of shedding is 75–100 hairs per day.<sup>3,4</sup>

## Classification of alopecias

Alopecia can be broadly divided into two categories: scarring (cicatricial) or non-scarring (noncicatricial). Scarring alopecia is associated with fibrosis and inflammation, which permanently destroy the hair follicle, resulting in irreversible hair loss. In non-scarring alopecia, hair loss is usually transient—although the hair shaft is lost, the follicle still retains the ability to regrow hair.<sup>5</sup>

## Noncicatricial alopecias

### ANDROGENETIC ALOPECIA

Androgenetic alopecia (AGA), also known as male-pattern baldness or female-pattern baldness, is the most common type of hair loss for both men and women.<sup>5</sup> More than 50% of Caucasian men have noticeable male-pattern baldness by the age of 50, and 30–40% of Caucasian women show some evidence of hair loss by age 60.<sup>4</sup> AGA is less prevalent among people of African and Asian descent.<sup>6</sup>

The pathophysiology of AGA involves both reduction in hair size and loss of hair due to the combined effects of genetics and androgen on scalp hair follicles.<sup>6</sup> The exact nature of maternal and paternal influences on AGA has not been fully explained.<sup>6</sup> Variations in the androgen receptor gene, located on the X chromosome and therefore always inherited by males from their mothers, are reported to play an important part in the etiology of AGA.<sup>7</sup> Similarities between fathers and sons with respect to AGA, however, suggest autosomal genes located on non-sex chromosomes, which can be inherited from fathers.<sup>7</sup> These genes have not yet been identified.<sup>7</sup>

In AGA, the number of hair follicles remain the same and hair growth cycles continue, but the anagen phase is shortened and a shorter, thinner hair shaft is produced (follicular miniaturization), providing progressively less scalp coverage.<sup>6,8</sup> In men, hair thinning generally starts in the crown area, forming an M-shaped pattern in frontal areas, and gradually progressing to the mid-scalp area.<sup>9</sup> On average, hair fibre density decreases by approximately 6% per year, although there may be occasional periods of heavier loss.<sup>6</sup> The extent of balding is dependent on genetic factors and their influence on androgen activity.<sup>6</sup>

Androgens appear to be of less importance in the etiology of female-pattern hair loss and some researchers question its inclusion in the category of AGA.<sup>10</sup> Hair loss in women is milder and less noticeable than in men.<sup>8</sup>

It presents as diffuse central thinning (widening of the part line) or a “Christmas tree” pattern in the frontal scalp area.<sup>11</sup> Unlike male-pattern balding, the frontal hairline is usually preserved.<sup>11</sup> Hair loss can range from mild to severe, but usually does not progress to complete baldness.<sup>4</sup>

### AGA treatment options for men

#### Topical minoxidil

By a mechanism not fully understood, minoxidil stimulates the conversion of miniaturized follicles to terminal anagen follicles and increases the duration of the anagen phase.<sup>6</sup> The 2% solution produces visible hair growth in approximately one-third of users, fine hair growth in one-third and no growth in one-third.<sup>12</sup> In a 120-day randomized controlled trial, minoxidil 5% produced significantly more hair regrowth than minoxidil 2%.<sup>13</sup> Fifty-four per cent of subjects using the 5% solution showed an increase in hair count versus 48% of patients using the 2% solution.<sup>13</sup> Optimal outcomes are believed to occur in men who begin therapy early and have a pretreatment vertex (area on the top of the head) balding spot of 8.0 cm or less in diameter. Minoxidil is effective on frontal areas as long as hairs have not completely miniaturized, but is ineffective on completely bald areas.<sup>6,12</sup> Minoxidil is more effective as a preventive treatment, slowing hair loss in up to 80% of users.<sup>4</sup> It may take 6–9 months for hair growth to become visible and maximum effect can be expected after one year.<sup>6</sup> Daily application, continued indefinitely, is necessary to maintain hair growth as minoxidil is not a permanent cure for alopecia. Patients should be warned of the possibility of shedding in the first few months of treatment as hair follicles are stimulated to move from the telogen stage to the anagen stage.<sup>6,12</sup> For further information on the proper application of minoxidil refer to the website at [www.e-therapeutics.ca](http://www.e-therapeutics.ca).

**Side effects.** Contact dermatitis is the most common side effect of topical minoxidil and occurs in 6.5% of patients.<sup>6</sup> In most instances this is not a true contact allergy but an irritation caused by propylene glycol, the vehicle commonly used in minoxidil products. Compounding minoxidil in hexylene glycol or polyethylene glycol rather than propylene glycol, or as a lotion or foam, may solve this problem.<sup>11</sup>

Fewer than one in 1,000 patients have reported decreased blood pressure and tachycardia while using minoxidil. Systemic absorption is minimal and an association between cardiovascular effects and topical minoxidil has not been confirmed. Some

experts, however, suggest that patients with cardiovascular disease or hypotension should be cautioned about the possibility of these side effects.<sup>6</sup>

### Finasteride

Finasteride inhibits 5- $\alpha$  reductase, blocking the conversion of testosterone to dihydrotestosterone (the active form of testosterone) in the hair follicle.<sup>4</sup> At an oral dosage of 1 mg/day for two years, in men between 18 and 41 years of age with mild to moderate AGA, finasteride produced growth of visible hair in 66% of users and prevented progression of hair loss in 83%.<sup>14</sup> Treatment for three months or longer is needed for any visible benefit.<sup>15</sup> With continued use, scalp coverage continues to improve as new hair lengthens, thickens and becomes more pigmented, with maximum effect reached in two years.<sup>9</sup> Effects reverse if treatment is stopped and scalp coverage returns to pretreatment level within 12 months.<sup>15</sup> One small open study compared finasteride to topical minoxidil 5% and reported a higher percentage of subjects who had an “increased intensity of hair” after one year of treatment in the finasteride group compared to the minoxidil group (80% vs. 52%).<sup>16</sup>

**Side effects.** Sexual dysfunction (decreased libido, decreased semen volume and erectile dysfunction) is the most common side effect of finasteride, occurring in fewer than 2% of men < 41 years of age, but somewhat more often in older men.<sup>11,17</sup> These effects will often decrease with continued treatment or resolve completely within days to weeks of stopping finasteride. Finasteride does not affect spermatogenesis. Its concentration in semen is minuscule and does not pose a risk to pregnant women.<sup>10</sup>

A concern about increased incidence of high-grade cancer associated with finasteride was reported in the Prostate Cancer Prevention Trial (PCPT), a seven-year, placebo-controlled trial in men  $\geq$  55 years of age with normal prostates.<sup>18</sup> Subjects who took finasteride 5 mg daily had fewer cancers overall (18% vs. 24% in the placebo group) but the cancers were a higher grade (37% in the finasteride group vs. 22% in placebo).<sup>18</sup> Recent analysis, however, indicates that finasteride increases the sensitivity of diagnostic tests for prostate cancer. This likely accounts for the paradoxical increase in the incidence of advanced cancer seen in the PCPT.<sup>19</sup>

### Minoxidil and finasteride combination

When switching from one drug to the other, patients should continue with the original

**table 1**

**Drug-induced alopecia**<sup>\*3,4,36</sup>

Drug category	Specific drugs	Type of alopecia	Frequency
ACE inhibitors	• captopril • enalapril	• telogen effluvium	not available
androgens	• systemic and oral testosterone • danazol	• precipitate or exacerbate AGA	not available
anticoagulants	• warfarin	• diffuse shedding with increased number of hairs in telogen phase	> 10%
antimitotic agents	• colchicine • methotrexate	• as above	1–10%
antineoplastic agents	• bleomycin • cyclophosphamide • cytarabine • dacarbazine • dactinomycin • daunorubicin • fluorouracil • hydroxyurea • ifosfamide • mitomycin • procarbazine • vinblastine • vincristine	• anagen effluvium	dose dependent—alopecia begins 2 weeks after onset of therapy
antiparkinsonian agents	• levodopa	• telogen effluvium	not available
antiseizure agents	• valproic acid • trimethadone	• telogen effluvium	7%
beta-blockers	• metoprolol • propranolol	• telogen effluvium	not available
birth control agents	• oral contraceptives	• telogen effluvium occurs during oral contraceptive therapy, or 2–3 months after cessation of oral contraceptives	9%
bipolar treatments	• lithium	• telogen effluvium	10–19%
ergot derivatives	• bromocriptine	• telogen effluvium	not available
H <sub>2</sub> blockers	• cimetidine	• telogen effluvium — onset 1 wk to 11 months	not available
heavy metals	• thallium • mercury • lead	• diffuse shedding of abnormal anagen hair 10 days after ingestion; • complete hair loss in 1 month; • diffuse hair loss with acute & chronic exposure	not available
cholesterol-lowering agents	• atorvastatin • clofibrate	• diffuse hair loss	2%
retinoids	• isotretinoin	• increased hair shedding & plucked telogen count; • decreased duration of anagen phase	10–75%

ACE = angiotensin-converting enzyme; AGA = androgenic alopecia; \* not exhaustive; other drugs may cause various forms of alopecia

medication for at least three months to prevent hair loss in the interval before the second medication becomes effective.<sup>10</sup> Preliminary evidence suggests the combination of finasteride and minoxidil may have additive beneficial effects in the treatment of AGA.<sup>6</sup>

**Treatment options for women**

Women with female-pattern hair loss should avoid or minimize the use of any medications that might have androgenic activity. (See Table 1.) Adjustments to determine the effective and tolerable dose of oral contraceptive or hormone replacement therapy should be finalized before starting treatment for alopecia.<sup>10,18</sup>

**Topical minoxidil**

Topical minoxidil 2% is the only approved treatment for women with female-pattern hair loss.<sup>9</sup> In a 32-week American study, 60% of women demonstrated some new hair growth (20% moderate, 40% minimal).<sup>12</sup> In a similar European study, there was noticeable hair growth in 45% of subjects.<sup>12</sup> Minoxidil 2% is indicated for pre- and postmenopausal women with and without hyperandrogenism.<sup>10</sup> It can take up to 12 months for hair growth to become apparent.<sup>12</sup> Minoxidil 5% is commonly used in women under the supervision of a physician.<sup>20</sup>

**Side effects.** In addition to contact dermatitis, up to 7% of women using minoxidil develop hypertrichosis, a condition in which vellous hair appears mainly over the cheeks and forehead.<sup>9,21</sup> This occurs more frequently with the 5% than the 2% topical solution.<sup>10</sup> It may be caused by accidental spread of the minoxidil to these areas or by hypersensitivity to local absorption of the drug.<sup>17</sup> Facial hair growth may decrease as treatment is continued, and disappears completely when treatment is stopped.<sup>17</sup> Hypertrichosis is more noticeable and occurs more frequently in women than in men.

The likelihood of topical minoxidil causing harm to the fetus appears low, but use during the first trimester of pregnancy is not recommended due to the lack of safety data.<sup>22</sup> The American Academy of Pediatrics rates topical minoxidil as compatible with breastfeeding.<sup>22</sup>

**Antiandrogens**

Although not officially approved for treatment of hair loss in women, antiandrogens may be beneficial for women who have high androgen levels. Fewer than 40% of women with female-pattern hair loss have elevated androgen levels. Symptoms of hyperandrogenism include hirsutism, severe acne, and irregular

**table 2**

## Resources for healthcare professionals

<p><b>eMedicine</b></p>	<p><b>Androgenic alopecia.</b> This e-Medicine section provides a comprehensive discussion of the pathophysiology, diagnosis, current treatment options and prognosis for AGA.  <a href="http://www.emedicine.com/derm/TOPIC21.HTM">www.emedicine.com/derm/TOPIC21.HTM</a> (accessed March 15, 2008).                  Readers can also access the following from this page, with the same detailed descriptions for each condition.  <b>Anagen effluvium:</b> <a href="http://www.emedicine.com/derm/topic894.htm">www.emedicine.com/derm/topic894.htm</a> (accessed June 19, 2008).  <b>Telogen effluvium:</b> <a href="http://www.emedicine.com/derm/topic416.htm">www.emedicine.com/derm/topic416.htm</a> (accessed June 19, 2008).</p>
<p><b>eMedicine</b></p>	<p>This section on <b>alopecia areata</b> presents a detailed discussion of pathophysiology, diagnosis, current treatment options and prognosis.  <a href="http://www.emedicine.com/derm/TOPIC14.HTM">www.emedicine.com/derm/TOPIC14.HTM</a> (accessed March 15, 2008).                  The following can also be accessed from this page:  <b>Tinea capitis:</b> <a href="http://www.emedicine.com/derm/topic420.htm">www.emedicine.com/derm/topic420.htm</a> (accessed June 19, 2008)  <b>Trichotillomania:</b> <a href="http://www.emedicine.com/derm/topic433.htm">www.emedicine.com/derm/topic433.htm</a> (accessed June 19, 2008).</p>
<p><b>National guideline clearinghouse</b></p>	<p><b>Guidelines for the management of alopecia areata.</b> Guidelines prepared for dermatologists on behalf of the British Association of Dermatologists, include evidence-based guidance for treatment with identification of the strength of evidence available at the time of preparation of the guidelines, and a brief overview of epidemiological aspects, diagnosis and investigation, as they relate to the management of alopecia areata.  <a href="http://www.guideline.gov/summary/summary.aspx?ss=15&amp;doc_id=6618&amp;nbr=4162">www.guideline.gov/summary/summary.aspx?ss=15&amp;doc_id=6618&amp;nbr=4162</a> (accessed March 15, 2008).</p>

menstruation. Women with these symptoms should have their testosterone levels checked. If levels are high, these patients may respond to drugs that block the production or decrease the effect of androgens. All antiandrogens have the potential to cause feminization of a male fetus; therefore premenopausal women able to bear children must use an effective method of contraception while taking these medications. Oral contraceptives are recommended for this purpose (particularly those containing desogestrel, norgestimate or drospirenone since these have the least androgenic activity) because their intrinsic androgen-lowering effects may also be of benefit in the treatment of the alopecia. Women of childbearing potential should be on an oral contraceptive for at least one month and have had a negative pregnancy test before taking any of the following medications.<sup>17</sup>

*Finasteride* is contraindicated in premenopausal women because of concerns regarding abnormal genitalia development in the male fetus if the drug is taken during pregnancy.<sup>14</sup> It does not appear to be effective in the general population of postmenopausal women with female-pattern hair loss<sup>15</sup> but may be of benefit for postmenopausal women with confirmed hyperandrogenism at a dose of 1.25 mg daily.<sup>10</sup>

*Flutamide*, a nonsteroidal antiandrogen,

was compared with finasteride, cyproterone acetate and placebo in a small study of women with alopecia and hyperandrogenism. Women in the flutamide group took 250 mg daily for one year and showed modest improvement in alopecia compared with no improvement in the other treatment groups.<sup>21</sup>

Other antiandrogenic drugs that have been used for female pattern AGA include spironolactone and cyproterone. Small studies and case reports suggest 100–200 mg daily of spironolactone may be of benefit in women who do not respond to minoxidil.<sup>21</sup> Cyproterone acetate 100 mg on days 5–15 of the menstrual cycle combined with 50 ug ethinyl estradiol on days 5–25 has shown some benefit in women with hyperandrogenism.<sup>23</sup>

### Adjunct and nonpharmacological therapy

Scalp dermatitis can interfere with the treatment of hair loss in men and women; therefore this condition should be treated with appropriate medications (e.g., antiseborrheic shampoos, topical corticosteroids).<sup>11</sup> A balanced diet with adequate protein is recommended to support hair growth.<sup>10</sup>

Tinted powders, lotions and hairsprays can all provide a camouflage covering of the scalp in areas of hair thinning. Wigs, hairpieces and hair extensions can also be used to cover a thinning scalp. Advances in the

technology of these prostheses have made their use much more acceptable in terms of comfort and appearance.<sup>10</sup>

The surgical management of male AGA now includes a number of different procedures, including hair transplants and scalp reductions, which can be very effective.<sup>11</sup> Improvements in hair transplantation techniques has made this a more popular option for women as well.<sup>21</sup> Medical treatment with finasteride and/or minoxidil may help improve and maintain the results of surgery by stabilizing underlying hair loss.<sup>6,10</sup> In a study that compared the outcomes of patients undergoing hair surgery with and without finasteride, those taking finasteride reported superior results.<sup>6</sup>

### ALOPECIA AREATA

Alopecia areata (AA) is an autoimmune inflammatory disorder affecting hair follicles, which occurs in 1–2% of the population. It has a similar prevalence in men, women and different ethnic groups.<sup>23</sup> Although it can occur at any age, it is most likely to affect children and younger adults.<sup>23</sup> Approximately 20% of patients have a family history of AA.<sup>4</sup> Twenty to 30% of patients have pre-existing autoimmune diseases (e.g., thyroiditis, systemic lupus erythematosus, vitiligo, coeliac disease, connective tissue disorders).<sup>4,23</sup> Other factors which can cause AA include physical stress, emotional stress and infections.<sup>4</sup>

AA typically presents as a smooth, round or oval bald patch. It usually appears on the scalp but may occur on any hair-bearing area of the body. The patch is often surrounded by short, broken-off hairs called “exclamation-mark” hairs. Eighty per cent of patients have a single patch, 12% have two patches, and 8% have more than two. In some patients, AA can progress to complete loss of scalp hair (alopecia totalis) or to loss of all scalp and body hair (alopecia universalis). Nail pitting or ridging is also present in up to 49% of patients. The alopecia is usually self-limiting and complete regrowth of hair may occur within one to two years without treatment. However, AA may persist for several years with hair growth never recovering. Patients younger than five years of age at the onset of disease, with extensive hair loss, severe nail involvement and history of atopy are more likely to develop a chronic form of the condition.<sup>11,23</sup>

### Treatment options

Treatment is not necessary for patients with limited areas of AA of less than one year’s duration because hair regrowth can be expected to occur spontaneously. However,

**table 3**

Resources for consumers	
<b>Body and Health Canada.com</b>	Alopecia: the facts on alopecia. Found under the Seniors' Health section, this fact sheet has information for those of any age wondering about alopecia. Sections include the different kinds of alopecia, causes, symptoms, diagnoses and treatment. <a href="http://bodyandhealth.canada.com/channel_condition_info_details.asp?disease_id=3&amp;channel_id=10&amp;relation_id=10865">http://bodyandhealth.canada.com/channel_condition_info_details.asp?disease_id=3&amp;channel_id=10&amp;relation_id=10865</a> (accessed March 20, 2008)
<b>American Hair Loss Council</b>	This not-for-profit site offers unbiased information on non-medical and nonpharmacological strategies to treat alopecia. <a href="http://www.ahlc.org">www.ahlc.org</a> (accessed June 7, 2008).
<b>National Alopecia Areata Foundation</b>	This site is specific to alopecia areata. Under Alopecia Areata the types, causes, symptoms and treatments for alopecia areata are outlined with links to more detailed descriptions. The site also provides information on support for people with this condition <a href="http://www.naaf.org/">www.naaf.org/</a> (accessed March 15, 2008).
<b>Alopecia Areata Support Community</b>	Chat room, message boards and more detailed information about alopecia areata, treatment options and coping strategies under About Alopecia. <a href="http://groups.msn.com/AlopeciaAreataSupportCommunity/internationalfoundations.msnnw">http://groups.msn.com/AlopeciaAreataSupportCommunity/internationalfoundations.msnnw</a> (accessed March 15, 2008).

patients who are distressed about the condition or who have more severe alopecia, can be treated to stimulate hair regrowth and reduce inflammation. Treatment options available at this time may help stimulate normal hair growth but do not cure or prevent recurrence of AA.<sup>23</sup>

*Corticosteroids*

First-line treatment for adults (and children ≥ 10 years of age) with less than 50% scalp involvement is intralesional injection of a corticosteroid, usually triamcinolone acetonide.<sup>5,23,24</sup> Small amounts (0.1 ml) of a 5–10 mg/ml solution are injected into the mid-dermis in multiple sites 1 cm apart.<sup>23</sup> In responsive patients, regrowth is usually seen within four weeks.<sup>23</sup> Treatment can be repeated every 4–6 weeks as necessary.<sup>24</sup> Treatment should be stopped as soon as regrowth is complete, or after six months if there is no response.<sup>23</sup>

Pain from intralesional injections can be managed by pretreatment with a topical anesthetic cream such as lidocaine-prilocaine.<sup>23</sup> Skin atrophy is a common side effect of corticosteroids but usually resolves after a few months.<sup>17</sup> Telangiectasis and hypopigmentation have also been reported.<sup>17</sup>

Topical corticosteroids are often used, particularly for children under 10 years old, because they are painless and easy to apply.<sup>23,24</sup> Response to these agents alone, however, is quite low; probably because the steroid does not penetrate into the hair follicle.<sup>23</sup> Using ultrapotency products such as clobetasol propionate 0.05% ointment, under occlusion with plastic, is reported to

provide better results.<sup>17</sup> Topical corticosteroids may have an additive benefit when combined with other treatments for AA.<sup>9,17</sup>

Oral corticosteroid therapy is effective, but the risks of systemic effects, and the high frequency of relapse when therapy is discontinued, generally limit the use of these agents.<sup>23</sup> Short-term therapy is used by some clinicians in rapidly progressing AA.<sup>17</sup>

*Minoxidil*

Topical minoxidil 5% applied twice daily is reported to produce cosmetically acceptable hair growth in 20–45% of patients with varying degrees of AA.<sup>23</sup> The 2% solution is not effective for AA.<sup>12</sup> Some clinicians consider topical minoxidil 5% as an option for children with AA.<sup>9,23</sup>

*Anthralin*

Anthralin is a contact irritant thought to have immunosuppressant and anti-inflammatory activity.<sup>23,24</sup> The 0.5 or 1% cream can be applied overnight or used as short-contact therapy (1–3% preparation) beginning with 20–30 minutes daily use and gradually increasing exposure until low-grade erythema and pruritus develop.<sup>17,24</sup> New hair growth is visible in three months if treatment is effective; cosmetically acceptable results may take longer than six months.<sup>17</sup> Acceptable hair regrowth has been reported in 20–65% of patients.<sup>24</sup> Side effects include pruritus, local erythema, folliculitis, staining of skin and clothing and regional lymphadenopathy.<sup>23,24</sup>

*Topical immunotherapy*

Topical immunotherapy (contact sensitizers)

induces an allergic dermatitis that is hypothesized to have an immunomodulating effect, shifting T-cells away from the hair follicle and allowing hair regrowth.<sup>17,24</sup> This treatment is an option for patients ≥ 10 years of age with hair loss of > 50% of their scalp hair.<sup>23</sup> Diphenylcyclopropenone or squaric acid dibutylester are applied by a dermatologist in a clinic or hospital setting and induce the eczema-like reaction necessary for this therapy.<sup>17</sup> Response rates of 50–60% are reported, with regrowth appearing in three to 12 months.<sup>17</sup> Relapse occurs frequently, however, and only 30% of patients experience long-term benefit.<sup>17</sup> Undesirable effects include urticaria, lymphadenopathy, pigmentary changes, facial or eyelid edema, flu-like symptoms and on rare occasions, anaphylaxis.<sup>17,24</sup>

*Other*

Other pharmacological treatments used with varying success for AA include narrowband ultraviolet B treatments or psoralen plus ultraviolet A light, cyclosporine, azathioprine, dapsone and sulfasalazine. Treatments currently being investigated include laser treatments, plaquenil, efalizumab (anti-CD44-v10 antibody), incorporation of steroids into liposomes, topical ascomycin macrolides, and induction of tolerance via administration of gradually increasing doses of an antigen (once a suitable antigen is identified).<sup>11,23</sup>

*Nonpharmacological options*

The cosmetic techniques and scalp prostheses discussed above for AGA can also be options for patients with AA, especially those with rapidly progressing, or > 50%, hair loss. Patients can be reassured that these are only temporary measures as this form of alopecia is usually self-limiting.<sup>17</sup>

**TELOGEN EFFLUVIUM**

Telogen effluvium (TE) is characterized by diffuse hair loss caused by an abnormally high number of hair follicles prematurely entering the telogen stage and shedding their fibres a few months later. The ratio of anagen to telogen hair changes from the normal ratio of 90:10 to 70:30 and more than 300 hairs may be lost each day. Hair is shed from the entire scalp and is often not noticed until 30–50% of scalp hair is gone. There are no signs of inflammation and, in contrast to AGA, there is no miniaturization of follicles.<sup>3,4,21</sup>

Underlying causes of TE include severe physical stress such as childbirth, surgery, chronic diseases and febrile illnesses.<sup>3,4</sup> Other causes of TE are iron deficiency, crash diets,

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severe emotional stress, endocrine imbalances (e.g., hypo- or hyperthyroidism) and drug reactions.<sup>3,4</sup> In about one-third of cases of TE, no cause can be traced. Hair loss usually begins one to three months after the precipitating event.<sup>17</sup> In most cases, the hair loss is self-limiting and completely reversible within several months after the cause is eliminated. In some cases, the hair loss lasts for years and is known as chronic telogen effluvium.<sup>11</sup>

Treatment involves removing the cause if possible. Blood tests to rule out iron deficiency and thyroid dysfunction are suggested, although the benefit of universal testing has not been proven. If the ferritin level is < 70 µg/L, iron supplementation is recommended. Some case series studies have reported that supplementation with iron in women with low ferritin levels could stop the loss of hair and lead to growth of new hair. However, not all studies report positive results for iron supplements.<sup>21</sup>

Numerous drugs have been associated with hair loss (Table 1) but in many cases causality has not been established. Drugs most commonly implicated are anticoagulants, anticonvulsants and retinoids. Although initially estimated to range from 48 to 78%, a survey of dermatologists suggests that warfarin-induced hair loss is an uncommon occurrence.<sup>13</sup> Nevertheless, any drug has the potential to cause telogen effluvium; therefore in situations where hair loss is suspected to be drug-induced and suitable alternatives are available, the drug(s) should be discontinued.<sup>13</sup>

Hair loss can last for up to six months after removal of the cause.<sup>21</sup> If hair loss persists, topical minoxidil may be tried.<sup>4</sup> Patients can be reassured that telogen effluvium seldom causes permanent baldness.<sup>3,4</sup>

## ANAGEN EFFLUVIUM

Anagen effluvium also involves diffuse loss of hair over the entire scalp, but in this type of alopecia, the precipitating agent or event causes immediate destruction of the hair shaft and shedding of anagen hairs.<sup>4</sup> Onset is rapid and extensive shedding occurs within a few weeks. Causes include systemic chemotherapy, certain medications (Table 1), toxins such as mercury or thallium, radiation to the head, and severe protein malnutrition.<sup>3</sup> Regrowth of hair is usually rapid once the precipitating agent is discontinued, although colour and texture may be altered.<sup>25</sup>

Alopecia caused by anagen effluvium along with bone marrow suppression and gastrointestinal disturbances, are rated as the three major adverse effects of cancer chemotherapy.<sup>26</sup> Chemotherapeutic drugs

arrest the mitotic activity of rapidly dividing cells, including hair follicles in the anagen phase.<sup>27</sup> Because the majority of hairs at any one time are in the anagen phase, chemotherapy drugs can cause rapid and extensive hair loss.<sup>4</sup> Although this hair loss is usually reversible, the effect can be very distressing to many patients.<sup>26</sup>

Currently, no medications are approved for the prevention of chemotherapy-induced alopecia.<sup>25</sup> Several different categories of pharmaceuticals are being investigated for this purpose (e.g., antioxidants, antibodies, hair growth cycle modifiers, apoptosis inhibitors).<sup>25,26</sup> Only three agents have been tested in humans. AS101, an immunomodulator, reduced the severity of alopecia in patients treated with carboplatin and etoposide.<sup>26</sup> Further study in larger groups of patients is needed to verify these results. Pretreatment with calcitriol, the active form of vitamin D, was reported to prevent alopecia associated with paclitaxel in one study; however, there is concern that calcitriol may also have a protective effect on cancer cells.<sup>26</sup> Topical minoxidil 2% has also been studied in this context; it does not prevent alopecia but does shorten the time to regrowth with certain chemotherapeutic agents.<sup>26</sup>

## TINEA CAPITIS

Tinea capitis, also known as ringworm of the scalp, is a superficial fungal infection of the skin that involves hair follicles and shafts on the scalp, eyebrows and eyelashes.<sup>28</sup> It is the most common cause of hair loss in children and should be considered in any pediatric patient who presents with scaling hair loss. Although rare in adults, it is occasionally seen in the elderly.<sup>28</sup> Tinea capitis can be transmitted via infected persons, fallen hairs and animals. It is considered to be a public health problem, particularly in inner cities.<sup>27</sup> Untreated, long-standing tinea capitis may result in permanent scarring alopecia with serious psychological consequences.<sup>29</sup>

The organisms most commonly associated with tinea capitis are *Trichophyton spp* and *Microsporum spp*. Current guidelines recommend oral terbinafine (adults: 250 mg OD x 2–4 weeks; children: < 20 kg 62.5 mg OD, 20–40 kg 125 mg OD, > 40 kg 250 mg OD x 4 weeks) or itraconazole (adults: 100 mg BID x 4–8 weeks; children [off-label use, preliminary evidence suggests efficacy and safety in children ≥ 8 months of age]: 5 mg/kg/day x 4 weeks). Topical antifungal agents do not enter hair follicles in high enough concentrations to be effective. Prednisone is sometimes used for cases involving severe inflammation.<sup>30</sup>

## TRAUMATIC ALOPECIA

Traumatic alopecia is caused by intentional or unintentional physical or chemical injuries to the hair and scalp. In most cases hair loss can be reversed by removing the cause of the injury. Irreversible damage to the scalp may occur if no remedial action is taken, in which case hair transplantation may be necessary.<sup>4</sup>

## Cosmetic alopecias

Undue stress may be placed on hair follicles by vigorous brushing and backcombing or by wearing the hair in tight braids, weaves and ponytails. This can result in *traction alopecia*. Heat from oil treatments, hot rollers or hair dryers can also damage hair follicles and cause loss of hair. Similarly, chemicals used in certain hair dyes, permanent waves and relaxers and shampoos have been associated with hair loss. Treatment involves identifying and then modifying or discontinuing the practice associated with hair loss.<sup>4</sup>

## Trichotillomania

Trichotillomania, or compulsive hair-pulling, is a psychiatric disorder of impulse control.<sup>9</sup> It is a common cause of childhood alopecia, with an average age of onset of eight years in boys and 12 years in girls.<sup>9</sup> It is characterized by patches of broken hairs of different lengths on a normal-appearing scalp.<sup>4</sup> In children, trichotillomania is often associated with lack of attention, divorce of parents, learning disabilities, or social problems at school.<sup>4</sup> Co-morbidities in adolescents and adults include anxiety disorders, mood disorders and mental retardation.<sup>31</sup> It is often accompanied by other picking behaviours such as skin picking and nail biting.<sup>27</sup>

Treatment involves education, counselling and cognitive behavioural therapy.<sup>9,31</sup> No medications are officially approved for trichotillomania;<sup>9</sup> however, some benefit has been reported with use of the following treatments: fluoxetine 20–40 mg daily in adults, clomipramine 25–250 mg daily in adults and clomipramine up to 3 mg/kg/day in children.<sup>32</sup> In a recently published systematic review, habit reversal therapy (a form of behavioural modification) provided the best results, clomipramine was moderately effective, while fluoxetine was no more effective than placebo.<sup>33</sup>

## Cicatricial alopecias

In cicatricial alopecias, inflammatory processes destroy hair follicles and produce scar tissue. The result is irreversible hair loss.<sup>34</sup> Cicatricial alopecias can be primary or secondary to congenital conditions, infections, injuries, neoplasms or dermatoses.<sup>35</sup> A wide

variety of conditions are associated with primary cicatricial alopecia. These can be categorized as lymphocytic, neutrophilic or mixed according to the primary inflammatory cell found on biopsy.<sup>34</sup> These alopecias are difficult to diagnose and treat, therefore patients are usually under the care of a dermatologist.<sup>9</sup> Treatment needs to be started as soon as possible in order to minimize permanent hair loss.<sup>35</sup> Even with appropriate treatment and control of symptoms, disease activity can recur and/or hair loss may progress insidiously.<sup>34</sup> Once the inflammation has run its course and follicles have disappeared, continued therapy is ineffective.<sup>4</sup>

### Treatment of lymphocytic cicatricial alopecia

Examples of lymphocytic alopecias are chronic cutaneous lupus erythematosus, lichen planopilaris, classic pseudopelade and alopecia mucinosa. First-line oral therapy for active disease is hydroxychloroquine 200 mg twice daily for adults and 4–5 mg/kg/day for children. Some improvement may occur in one to two months, but it may take several months for maximum effect. Prednisone or isotretinoin can be used short-term to stabilize severe disease. Isotretinoin can also be used as an alternative if the condition does not respond to hydroxychloroquine. Other drugs which have been tried with variable results include mycophenolate mofetil, cyclosporine, methotrexate, azathioprine, gold, interferon- $\alpha$ -2, and monoclonal anti-CD4 antibodies.<sup>34,35</sup>

Topical therapy such as high-potency corticosteroids, tacrolimus, imiquimod and tazarotene may be used with oral drugs for relief

of the itching, burning, pain, inflammation or redness which may occur with the lymphocytic alopecias. In some cases of less severe disease, topical therapy alone may be adequate.<sup>34,35</sup>

### Treatment of predominantly neutrophilic cicatricial alopecia

Examples of neutrophilic alopecias are folliculitis decalvans and dissecting cellulitis. The appropriate antibiotic should be selected based on culture and sensitivity.<sup>34</sup> *Staphylococcus aureus* is the organism most commonly implicated. Usual treatment is rifampin 300 mg twice weekly and clindamycin 300 mg BID, both for 10 weeks.<sup>34,35</sup> Alternatives are ciprofloxacin 750 mg BID, cephalexin 500 mg QID or doxycycline 100 mg BID.<sup>34,35</sup> Isotretinoin has been reported to induce remission in patients with dissecting cellulitis.<sup>34,35</sup>

### The role of the pharmacist

Patients with alopecia are commonly reluctant to seek help. In their day-to-day interaction with patients, pharmacists are in a position to initiate counselling on the nature, causes and prognosis of different types of alopecia. Equally important is education regarding available treatment options, how a specific treatment should be used (especially topicals) and possible side effects. Pharmacists can also help provide realistic hair growth expectations. For example, many OTC, natural remedy, popular press and Internet-based products advertise miraculous results that, for many patients, will never be realized.

Drug-induced alopecia is usually reversed

when the offending agent is discontinued. Pharmacists can be instrumental in identifying potential cases of drug-induced hair loss, and ensuring a patient receives a suitable alternative, if available. Note that the medication history may need to be reviewed for at least several months back. For example, telogen effluvium takes a few months to be noticed, as well as to resolve following discontinuation of the suspected drug.

Pharmacists should be aware of resources to assist alopecia patients. They should be able to discuss, or refer a patient to sources of cosmetic treatments such as wigs, hair-style changes, hair transplants and eyebrow tattooing, which can greatly enhance appearance and self-image. Also helpful is letting patients know about support groups, which can help provide coping strategies. Stress management may also be important, especially if stress is causing or aggravating hair loss. Pharmacists should be prepared to encourage this approach when indicated. Internet resources with more information for health professionals and for consumers are found in Tables 2 and 3 respectively.

### Summary

The way our hair looks makes a very personal statement. A “good hair day” gives us confidence and a feeling of well-being. Our culture associates loss of hair with aging or illness, even though it may not be caused by either. Pharmacists who are sensitive, encouraging, nonjudgmental and, most of all, approachable can be of great help to people living with alopecia. **19**

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PHARMACY PRACTICE NATIONAL CONTINUING EDUCATION PROGRAM

At a loss: Alopecia

## Questions

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**1 What type of alopecia can occur after fluorouracil administration?**

- a) telogen effluvium
- b) alopecia areata
- c) trichotillomania
- d) anagen effluvium

**2 Which gastroesophageal reflux disease (GERD) treatment may be associated with alopecia?**

- a) omeprazole
- b) cimetidine
- c) metoclopramide
- d) ranitidine

**3 Treatment of androgenetic alopecia (AGA) in men may include all of the following except:**

- a) psychological support
- b) anthralin
- c) minoxidil
- d) finasteride
- e) topical corticosteroids

**4 Hair regrowth may eventually occur without treatment in which type(s) of alopecia?**

- a) alopecia areata
- b) androgenetic alopecia
- c) telogen effluvium
- d) both a) and c)
- e) all of the above

**5 Which of the following statements is true?**

- a) Minoxidil should be used for a maximum of 12 months.
- b) Minoxidil should be applied after hair gel.
- c) Minoxidil absorption occurs in one hour.
- d) Minoxidil is to be applied to the hair.

**6 Which of the following drugs is unlikely to be associated with alopecia?**

- a) isotretinoin
- b) warfarin
- c) colchicine
- d) hydrochlorothiazide

**7 Tinea capitis can be effectively treated with which of the following medications?**

- a) nystatin
- b) itraconazole
- c) selenium sulfide lotion
- d) miconazole

**8 Which of the following terms describes hair loss associated with scarring?**

- a) androgenetic alopecia
- b) cicatricial alopecia
- c) alopecia areata
- d) anagen effluvium

**9 What type of alopecia is unlikely to occur in children?**

- a) tinea capitis

- b) alopecia associated with trichotillomania
- c) androgenetic alopecia
- d) alopecia areata

**10 Which of the following treatments has been shown to provide the most benefit for trichotillomania?**

- a) clomipramine
- b) fluoxetine
- c) topical corticosteroids
- d) habit reversal therapy
- e) minoxidil

**T.S., one of your long-time customers, enters the pharmacy. She complains "I'm going bald! I can pull a handful of hair from anywhere on my scalp and my drain is full of hair after showering." As you try to calm her, you remember that she recently went through a bitter divorce and child custody battle.**

**11 What information would help with a diagnosis of T.S.'s hair loss?**

- a) current medications
- b) serum iron levels
- c) TSH level
- d) family history of alopecia
- e) all of the above

**12 T.S. sees her physician and all tests come back normal. You have reviewed her medications and none cause hair loss. What type of alopecia does she likely have?**

- a) alopecia mucinosa
- b) alopecia areata
- c) telogen effluvium
- d) anagen effluvium
- e) none of the above

**13 If T.S. has AGA, you would expect to see:**

- a) thinning of the hair in the part line
- b) loss of hair on the eyebrows
- c) full scalp hair regrowth after about 12 months of topical minoxidil
- d) both a) and b)
- e) all of the above

**14 T.S. wants a treatment—anything that will give her hair. What would you recommend?**

- a) hair transplantation
- b) triamcinolone injections
- c) oral contraceptives
- d) a wig until hair regrows

**B.T., a regular customer, asks for some advice. He tells you his doctor says he has alopecia areata and he wants to know what you can tell him about this condition.**

**15 Which of the following statements about alopecia areata (AA) is false?**

- a) AA is caused by increased androgen levels.
- b) AA is an autoimmune disease.
- c) Nail pitting may be involved.
- d) AA may be characterized by exclamation-mark hairs.

**16 All of the following treatments have been used to treat alopecia areata except:**

- a) topical immunotherapy
- b) anthralin cream
- c) itraconazole
- d) triamcinolone injections

**17 All of the following are cicatricial alopecias except:**

- a) alopecia mucinosa
- b) folliculitis decalvans
- c) chronic cutaneous lupus erythematosus
- d) traction alopecia

**18 The hair shedding stage is known as:**

- a) telogen
- b) catagen
- c) exogen
- d) anagen

**19 Evidence suggests that finasteride may be effective in the treatment of female-pattern hair loss in which of the following patient groups?**

- a) premenopausal women with high testosterone levels
- b) premenopausal women with normal testosterone levels
- c) postmenopausal women with high testosterone levels
- d) postmenopausal women with normal testosterone levels

**20 Minoxidil side effects may include all of the following except:**

- a) redness and irritation at the application site
- b) decreased libido
- c) initial hair shedding
- d) unexplained weight gain

## ce faculty

### THIS MONTH

At a loss: Alopecia

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All lessons are reviewed by a minimum of six pharmacists for accuracy, currency and relevance to current pharmacy practice.

This lesson is valid until August 18, 2011. Information about alopecia may change over the course of this time. Readers are responsible for determining the most current aspects of this topic.

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