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5 Alopecia classifications
Pierre Bouhanna

ALOPECIA CLASSIFICATIONS

Alopecia classifications allow accurate diagnosis, a targeted therapy and a precise prognosis. The most common types of alopecia are androgenetic alopecia, telogen effluvium, alopecia areata, and cicatricial alopecia. Hair loss can occur through a variety of mechanisms. If hair shafts are defective or traumatized, they can be prone to breakage or premature loss. Intentionally or unintentionally, people may subject their hair follicles to physical trauma that can result in alopecia. Traction alopecia, postoperative pressure-induced alopecia, and trichotillomania are a few examples. The remaining types of alopecia are due to failure of the follicular epithelium. This can be due to inflammation, infection, senescence, hormonal influences, medications, genetics, combinations of these, and other unknown causes.

For these reasons, various classifications are useful guides.

Cicatricial versus noncicatricial alopecia

The most common classification system divides the diseases into cicatricial versus noncicatricial forms of alopecia. Cicatricial means that follicular epithelium has been replaced by connective tissue. However, in some cases of alopecia, the follicles seem to simply "disappear" without any noticeable alteration (Figure 5.1). The definition of cicatricial alopecia might include all forms of alopecia in which hair follicles are permanently lost. In contrast, noncicatricial forms of alopecia preserve the follicular epithelial apparatus and are potentially reversible.

Some hair diseases demonstrate a biphasic pattern, where noncicatricial hair loss is seen early in the course of the disease, and permanent hair loss becomes apparent in the later stages of disease. Examples of diseases demonstrating this biphasic pattern include androgenetic alopecia, alopecia areata, and traction alopecia.

Classification of cicatricial alopecia

Clinically, cicatricial alopecia is defined by the loss of follicular ostia (Figure 5.2). Histologically, cicatricial alopecia can be subdivided into two categories.[1,2] The first is primary cicatricial alopecia, where the target of inflammation appears to be the follicle, more specifically, the noncycling portion of the follicle and/or the bulge zone (the location of follicular stem cell).[3] Most of the primary cicatricial alopecias do not have a well-defined cause (Figure 5.3a–c).

In secondary cicatricial alopecia, the follicle is destroyed in a nonspecific manner.[3,4] Examples are burns, radiation dermatitis, cutaneous malignancies, cutaneous sarcoidosis, sclerosing dermatoses, necrobiosis lipoidica, and cutaneous tuberculosis.

The primary cicatricial alopecias result in "naked" hair shafts suggesting that the follicular epithelium is quickly destroyed around terminal anagen shafts. Any inflammatory process is to destroy the follicular stem cells in the bulge zone.

Figure 5.1 **Noncicatricial alopecia with regular and round patches of alopecia areata where all the hair has disappeared; the skin surface has a normal aspect.**

Figure 5.2 **Cicatricial alopecia with irregular bald patches; note the presence of normal-looking hair within the balding patch.**
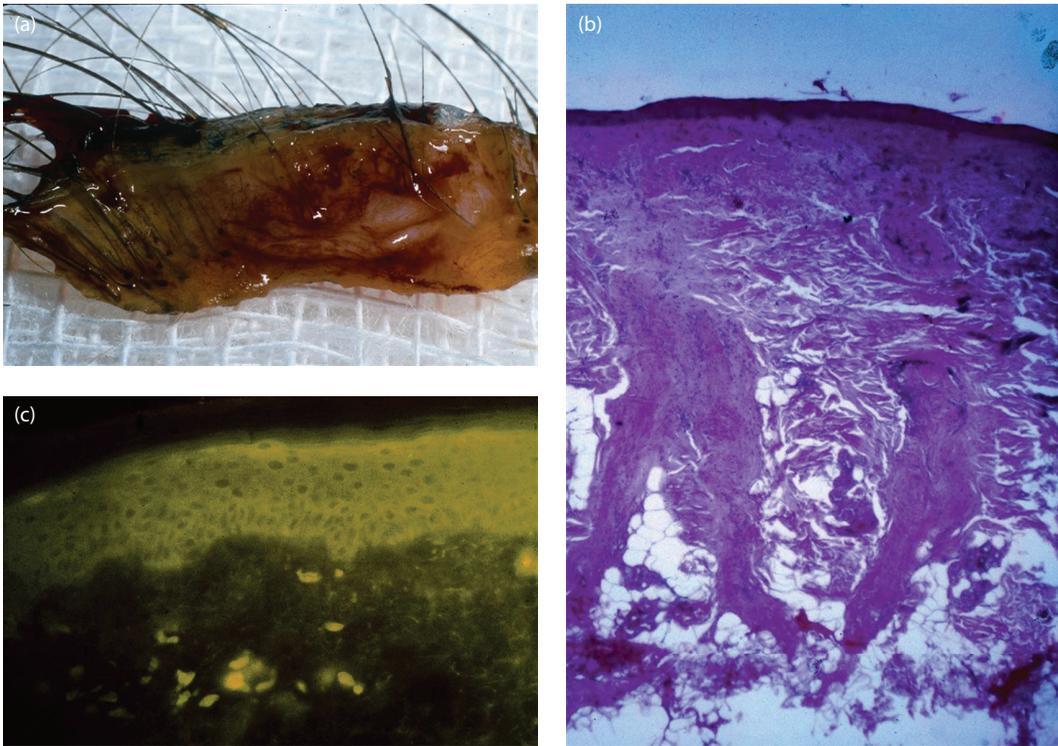
Figure 5.3 **(a) Macroscopic view and (b) histological aspect of skin and follicular lesions of irreversible cicatricial alopecia, (c) histological aspect on direct immunofluorescence of lichenoid cicatricial alopecia.**

Classification based on the primary inflammatory cell present in the biopsy specimen is subdivided as follows: lymphocytic, neutrophilic, mixed, and nonspecific (Table 5.1).

Classifications of male and female androgenetic alopecia

Various classifications of male androgenetic alopecia have been described (Figures 5.4 and 5.5). In fact, all the classification schemes proposed so far are only topographic. A multifactorial classification[5] has been developed to study parameters such as fixed distances of the face, scalp laxity and thickness, and hair coverage. This includes density, caliber, shape, length, growth rate, and hair color. This approach will lead to a better evaluation of the evolution of androgenetic alopecia in both sexes, either spontaneously or under treatment.

Male or female androgenetic alopecia induces a relatively early hair loss phenomenon of varying incidence and extent. Several intermediate evolutive stages exist between minimal thinning due to a decrease in hair density (frontotemporal recessions, crown or vertex) and the stage where only a narrow, horseshoe-shaped band remains. Classifications of baldness require a more objective, precise, and detailed approach for the different modifications determined by the evolutive process. This

is equally true for all the experimental, medical, and surgical approaches of alopecia.

Table 5.1 Classification of Primary Cicatricial Alopecia

Lymphocytic
Chronic cutaneous lupus erythematosus
Lichen planopilaris (LPP)
Classic LPP
Frontal fibrosing alopecia
Graham-Little syndrome
Classic pseudopelade (Brocq)
Central centrifugal cicatricial alopecia
Alopecia mucinosa
Keratosis follicularis spinulosa decalvans
Neutrophilic
Folliculitis decalvans
Dissecting cellulitis/folliculitis (perifolliculitis abscedens et suffodiens)
Mixed
Folliculitis (acne) keloidalis
Folliculitis (acne) necrotica
Erosive pustular dermatosis
Nonspecifi
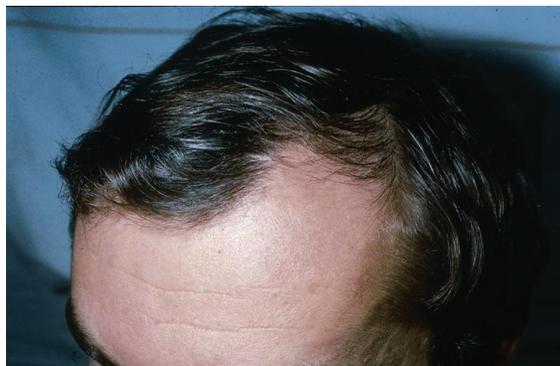
Figure 5.4 Typical frontotemporal recessions of a male androgenetic alopecia.

History of classifications

Various classifications have been proposed, since the study of Beek[6] in 1950, and Ogata[7] in 1953.

In 1951, Hamilton[8] established a classification modified by Norwood[9] based on the description of eight evolutive aspects and three subgroups. He also made a comparison between the incidence of baldness in Caucasians and in Chinese.

In 1976, Bouhanna[10] proposed a simplified classification of alopecia in three evolutive stages and two subgroups.

In 1977, Ludwig[11] classifi d female androgenetic alopecia in three evolutive stages. In women, there is a diffuse alopecia of the top of scalp with a preserved frontal fringe.

In 2000, Bouhanna[5] developed the multifactorial classification for a better assessment of male and female androgenetic alopecia evolution with or without medical and surgical treatments.[12,13]
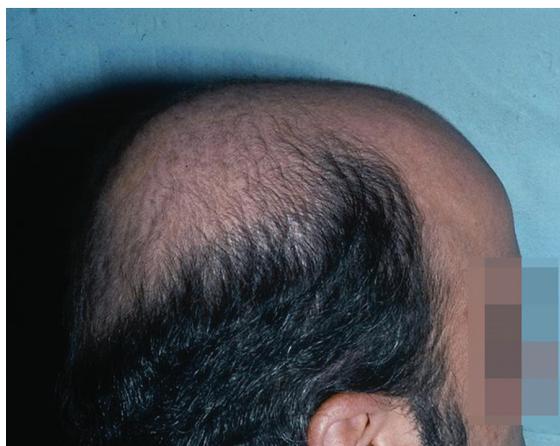
Figure 5.5 Typical male androgenetic alopecia.

Hamilton-Norwood classification for male pattern baldness

Schematically, male androgenetic alopecia is graded according to the topography:

Type I: Minimal recession is seen along the anterior border of the frontotemporal hairline.

Type II: Frontotemporal triangular areas of recession are more or less symmetrical.

Type III: Deep frontotemporal recessions are usually symmetrical.

Type III vertex: In this type, the hair is lost also in the vertex.

Type IV: The frontal and frontotemporal recession is more severe.

Type V: The vertex region of alopecia remains separated from the frontotemporal region of alopecia.

Type VI: The frontotemporal and vertex regions of alopecia are confluent.

Type VII: The most severe form in which remains a narrow, horseshoe-shaped band of hair (Figure 5.6).[8,9]

Other types of androgenetic alopecia include the following:

- Diffuse, unpatterned alopecia in which there is a general decrease in the density of hair, without any definite pattern.
- Diffuse, patterned alopecia which is essentially the same as in the more common male pattern
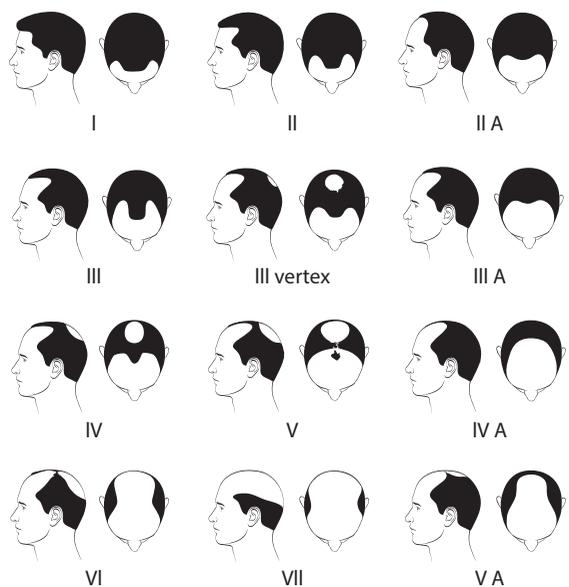
Figure 5.6 Seven stages of evolution of male androgenetic alopecia. (Adapted from Hamilton JB. *Ann NY Acad Sci.* 1951;53:708–728.)
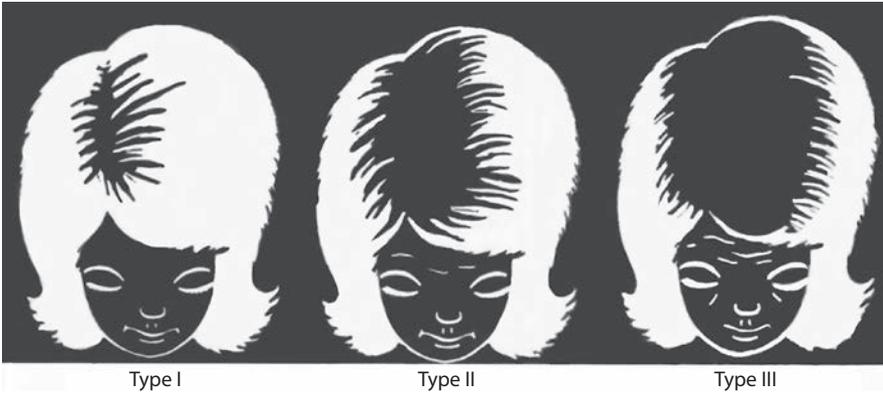
Figure 5.7 **Three stages of evolution of the female androgenetic alopecia classification. (Adapted from Ludwig E.** *Br J Dermatol.* **1977;97:247–254.)**

baldness, but the areas involved do not become totally bald; the hair decreases only in density.

- Male pattern alopecia with persistent midfrontal forelock.
- Persistent anterior fringe almost totally preserved frontal hairline, but with a baldness posterior to this.

Ludwig classification for female pattern baldness
Schematically, female androgenetic alopecia is graded according to the topography:

Stage 1: Moderate oval vertex alopecia with long axis anteroposterior, located 2 cm behind the frontal fringe, which is preserved.
Stage 2: Clear alopecia located 1 cm from the frontal fringe.
Stage 3: Complete alopecia of the vertex, with persistence of a very light fringe (Figure 5.7).[11]

Bouhanna multifactorial classification. The multifactorial classification allows a better assessment of male or female androgenetic alopecia.[5]

Precise evaluation of various objective parameters helps to determine the medical and surgical indications, through the evaluation of the extent of bald and hairy areas, the degree of laxity and thickness of the scalp, and the ability of the hair to cover according to hair density, caliber, shape, length, growth rate, and hair color.

Bald and hairy areas measurements. The extent of bald and hairy areas is measured with precision with a ruler (Figure 5.8a) according to various parameters (Figure 5.8b). In men the values of the fixed measurements corresponding to the stage of a normal head of hair are:

- *Median Sagittal Distance (MS):* 34–37 cm (mean 35 cm); the distance between the edge of the frontal hairline and the lower occipital line (——).
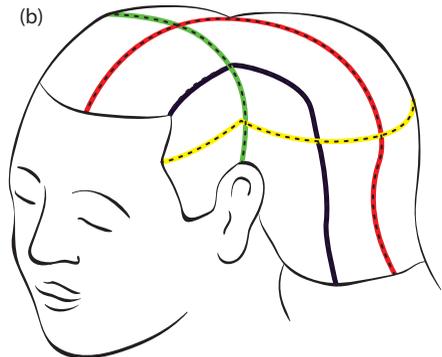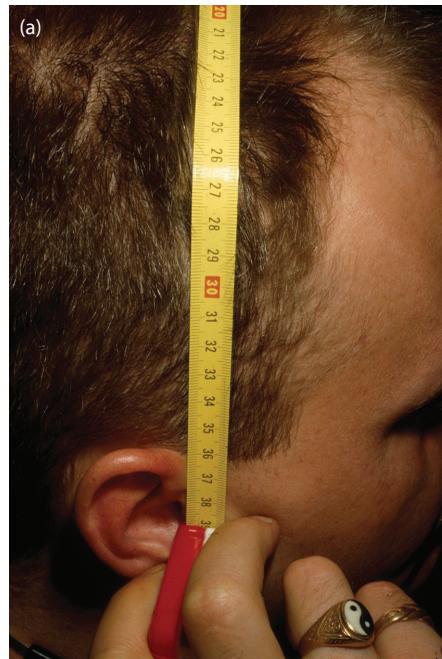
Figure 5.8 **(a) Male profile and measurement with a ruler. (b) The four schematic axes to be calculated.**
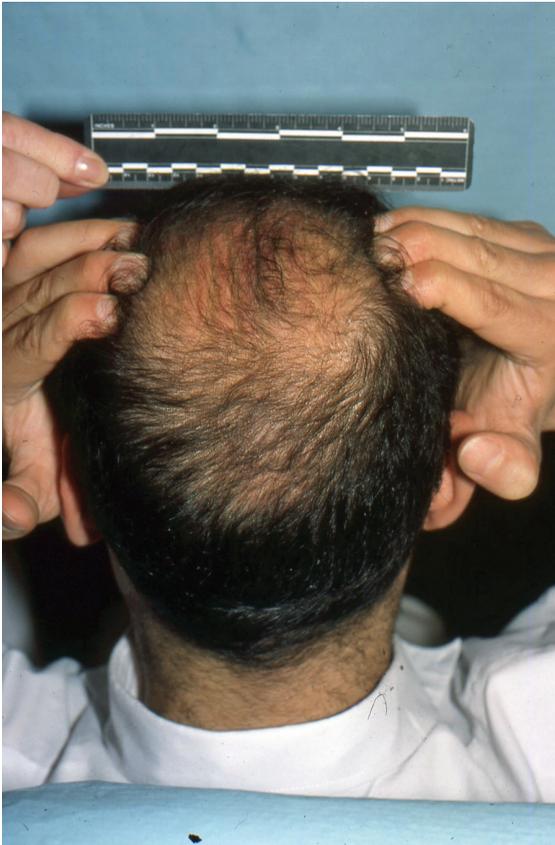
Figure 5.9 **Evaluation of the laxity by counting the number of folds after bimanual compression.**

- *Left and Right Sagittal Paramedian Distances (LSPM and RSPM):* 33–36 cm (mean 34 cm); the distances between the bottom of the left or right frontal recession and the lower occipital line (——).
- *Transverse Supra-Auricular Distance (TSA):* 30–34 cm (mean 32 cm); the distance between the two left and right supra-auricular hairlines (——).
- *Temporal Anterior Spacing Distance (TAS):* 34–40 cm (mean 37 cm); the distance between the two most proximal anterior temporal lines (——).
- *Stage of Maximal Balding (SMB):* Median occipital height.

MS = 30–34 cm (mean = 32 cm)
LSPM and RSPM = 30–33 cm (mean = 32 cm)
TSA = 28–32 cm (mean = 30 cm)
TAS = 30–36 cm (mean = 34 cm)

The stage of maximal baldness cannot be measured as the female androgenetic alopecia is diffuse.

Laxity of the scalp
Laxity of the scalp is measured on a scale, according to Norwood,[14] and graded:

0 = 0 folds
1 = 1 to 2 folds
2 = 3 to 4 folds
3 = Folds >5

It depends on the folds resulting from the bimanual compression of the scalp to determine degree of laxity (Figure 5.9).

Thickness of the scalp
In order to measure scalp thickness, we set up a simple method. A disposable subcutaneous needle is inserted vertically until it reaches the galea. The emerging portion of the needle is extracted with a Kocher forceps (Figure 5.10a). The sunken portion is then measured with a micrometer measuring device (Figure 5.10b). Scalp thickness is graded on a scale:

0 = Very thin (<2 mm)
1 = Thin (2–5 mm)
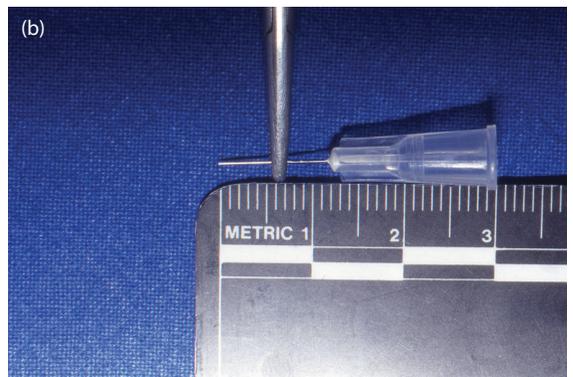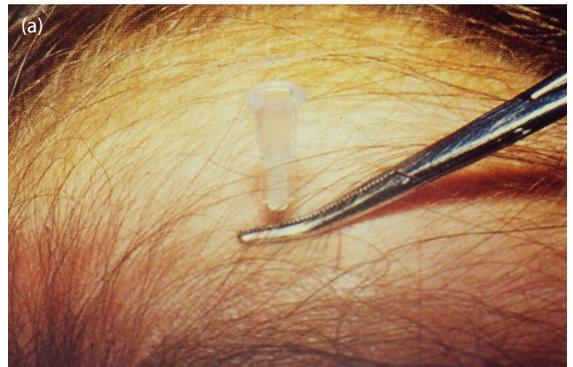
Figure 5.10 **(a,b) Evaluation of the scalp thickness by measurement of the sunken portion of a needle inserted vertically deep to the galea and extracted with a Kocher forceps.**
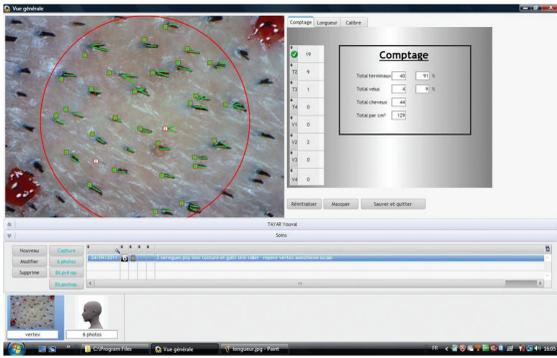
Figure 5.11 **Digital phototrichogram for hair density evaluation.**

Figure 5.13 **Various hair shaft shapes.**

2 = Medium (5–8 mm)
3 = Thick (>8 mm)

Ability for hair to cover
Hair density. This is measured with great precision with the digital phototrichogram[15] (Figure 5.11) and graded:

0 = Poor (< 50 hairs/cm²)
1 = Medium (50–100 hairs/cm²)
2 = Good (100–200 hairs/cm²)
3 = Very good (>200 hairs/cm²)

The digital phototrichogram allows a precise evaluation of hair caliber less or more than 40 μmn (Figure 5.12).

Shape of hair shaft. This variable classifies the shape of the hair shaft as straight, wavy, curly, or frizzy (Figure 5.13).

Hair length (L). This is graded on a scale:

0: L < 1 cm
1: L = 1–2 cm
2: L = 3 to 5 cm
3: L > 5 cm

Figure 5.12 **Digital phototrichogram for hair caliber evaluation.**

Figure 5.14 **Two successive digital macrophotographs, 3 days apart, allow one to evaluate the hair growth rate (phototrichogram). (a) At day 0 the circle locates the area for the hair count. (b) At day 3 on the same area, the anagen hair are still growing. The telogen have stopped their hair growth.**
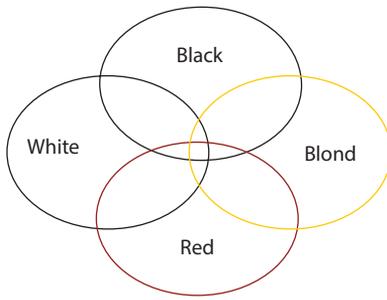
Figure 5.15 **Various hair shaft colors.**

Growth rate of hair. The growth rate of hair can be evaluated through a digital phototrichogram, which measures the growth rate of hair on two successive macrophotographs at a three days' interval (Figure 5.14).

Hair color. For practical classification purposes, we propose four basic tones: black (Bk), blond (B), red (R), and white (W). These are mixed together according to the natural appearance of hair (e.g., gray hair = Bk + W) (Figure 5.15).

CONCLUSION

The use in current practice of hair and scalp classifications helps in making an accurate diagnosis in the case of cicatricial alopecia. The various classifications for male and female androgenetic alopecia allow for a precise prognosis with or without targeted therapy.

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