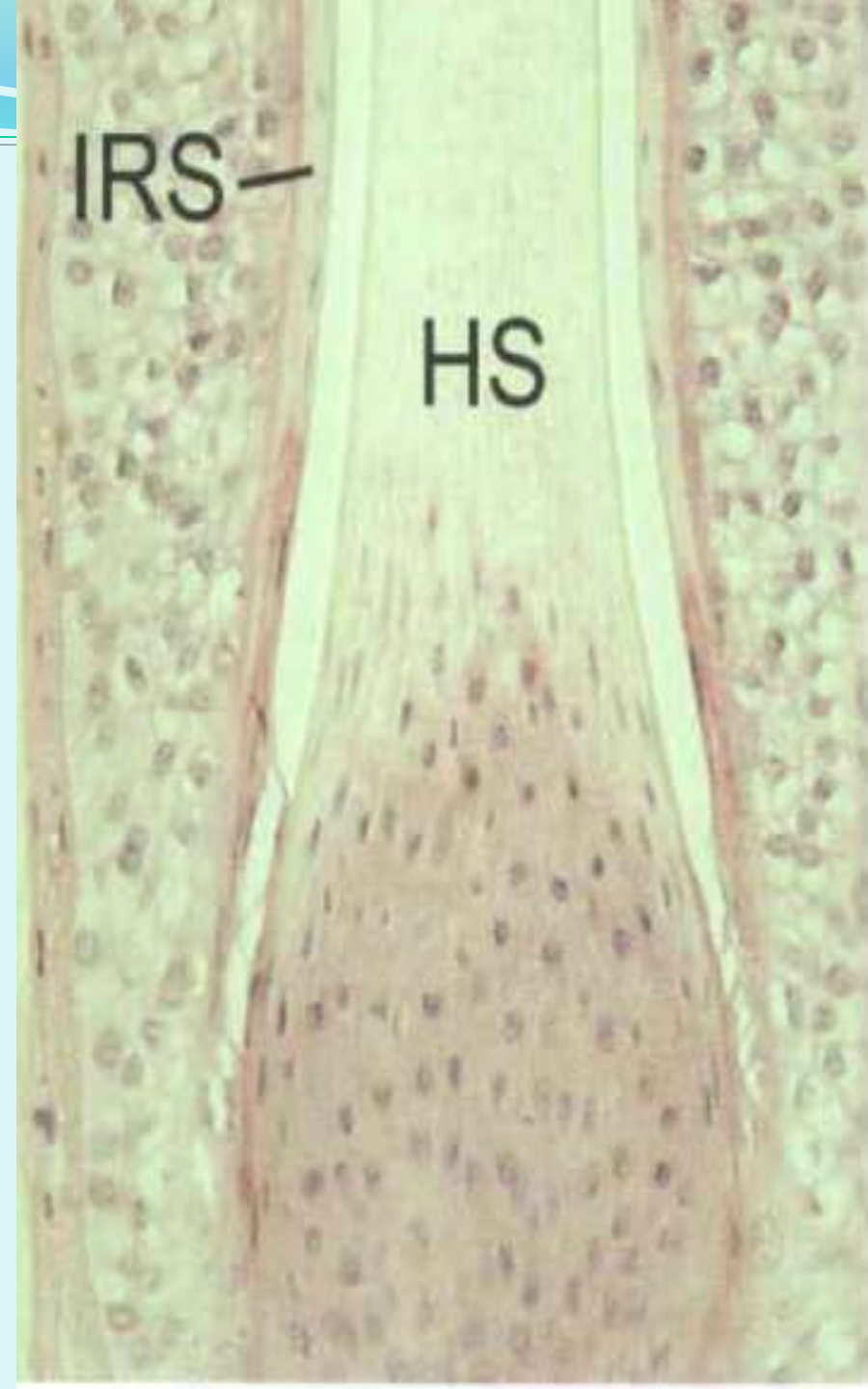


ALOPECIA: diagnosis and treatment

Maryam Nasimi

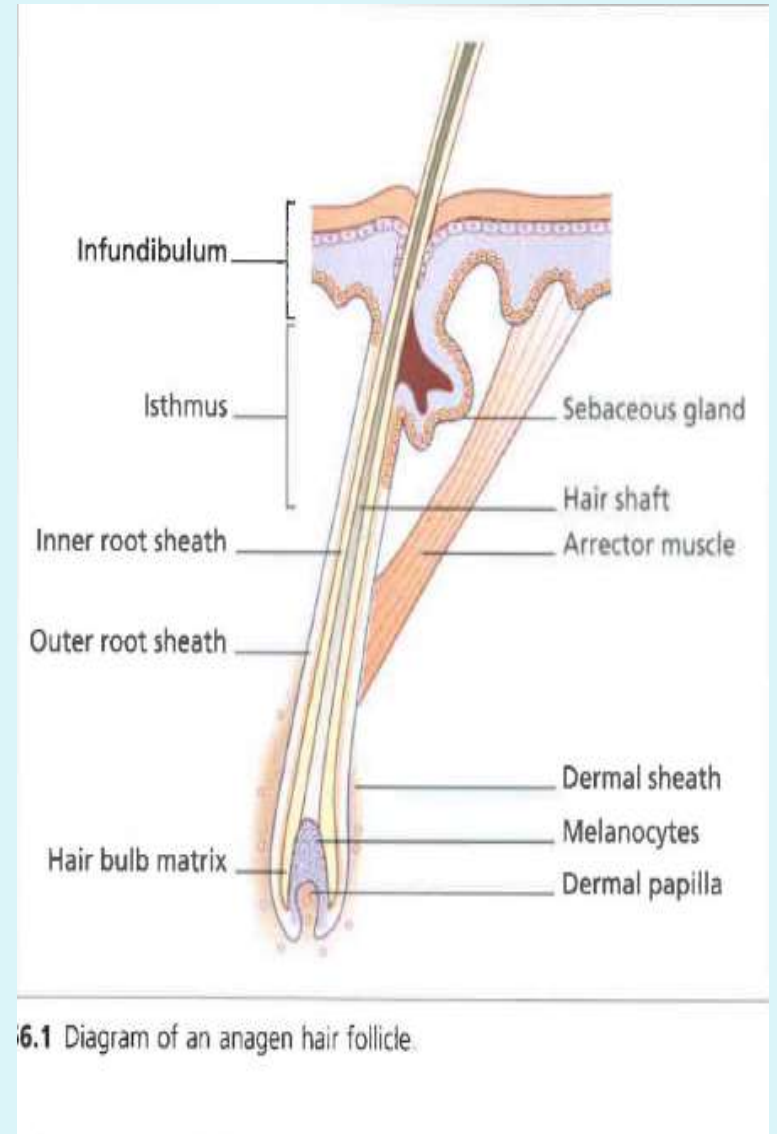
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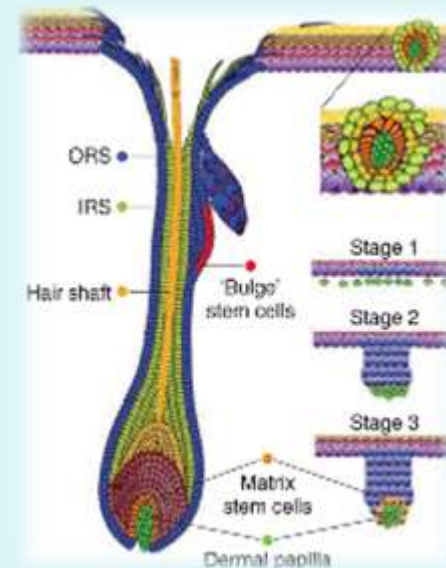
INTRODUCTION

- The pilosebaceous unit includes the hair follicle, the arrector pili muscle, the sebaceous gland and, where present, the apocrine gland.
- The **bulb** is the lowest portion of the follicle and it contains the **hair matrix** and **dermal papilla**.
- Whereas the bulb undergoes cyclical involution and regeneration, the infundibulum and isthmus represent the permanent part of the follicle.

- Keratinocytes within the matrix rapidly proliferate and differentiate into six distinct cell lineages:
- Cells arising from the central matrix give rise to the hair shaft, the *medulla*, *cortex* and hair shaft *cuticle*.
- The outer aspects of the matrix give rise to the *inner root sheath (IRS)*, a structure that is also composed of three layers: (1) the *IRS cuticle* (2) the *Huxley* layer (3) the *Henle* layer.



- The arrector pili muscle attaches to the hair follicle at the *bulge*. Certain epithelial cells within the ORS bulge have stem cell-like properties and are involved in hair follicle regeneration and cycling.
- Theoretically, if this site is permanently injured, hair regrowth cannot occur.



Growth cycle of hair

1-Anagen (growing phase)

- hair grows = 0.3-0.4 mm/day
- (1 cm/month, 15cm/year)
- Active growing phase for 2-6-8 years
- About 90-95% of scalp hairs

2- catagen (transitional phase)

- 2 to 3 weeks 1% of scalp hairs

3- Telogen (resting phase)

- 100 days 5-10% of scalp hairs

About 25-100 telogen hairs are shed each day

Different type of alopecias

When assessing a patient for alopecia it is important to establish whether the hair loss is due to:

1. loss of hair follicles
2. alteration in hair cycling
3. fracture of the hair shaft



- Complete **loss of hair follicles** is a feature of scar tissue following wounding, primary cicatricial alopecias and congenital follicular agenesis. Follicular ostia are lost and the scalp is smooth and shiny.



- **Fractured hair shafts:** are usually visible as a short hair on the surface of the scalp. It may be patchy or generalized. Most hair shaft disorders are congenital, but may not be clinically apparent when the child is around 12 months old.
- Tinea capitis is an acquired form of hair shaft fracture.



- Alterations in the hair cycle with premature termination of anagen growth is a feature of alopecia areata, androgenetic alopecia, telogen effluvium and anagen effluvium.
- Follicular ostia remain visible on close inspection of the scalp.



• Noncicatricial :

- Androgenetic alopecia
- Alopecia areata
- Telogen effluvium
- Anagen effluvium
- Trichotillomania
- Tractional

• Cicatricial :

- Developmental
- Physical
- Infection
- Malignancy
- DLE
- Lichen planus
-

Evaluation of hair loss

1- History

- Sudden vs gradual loss
- Presence of systemic disease or high fever
- Recent psychologic or physical stress
- Medication or chemical exposure

2- Examination

- Localized vs Generalized
- Scarring vs nonscarring
- Inflammatory vs noninflammatory
- Density: normal or decreased
- Presence of follicular plugging
- Skin disease in other areas

3-Diagnostic procedures

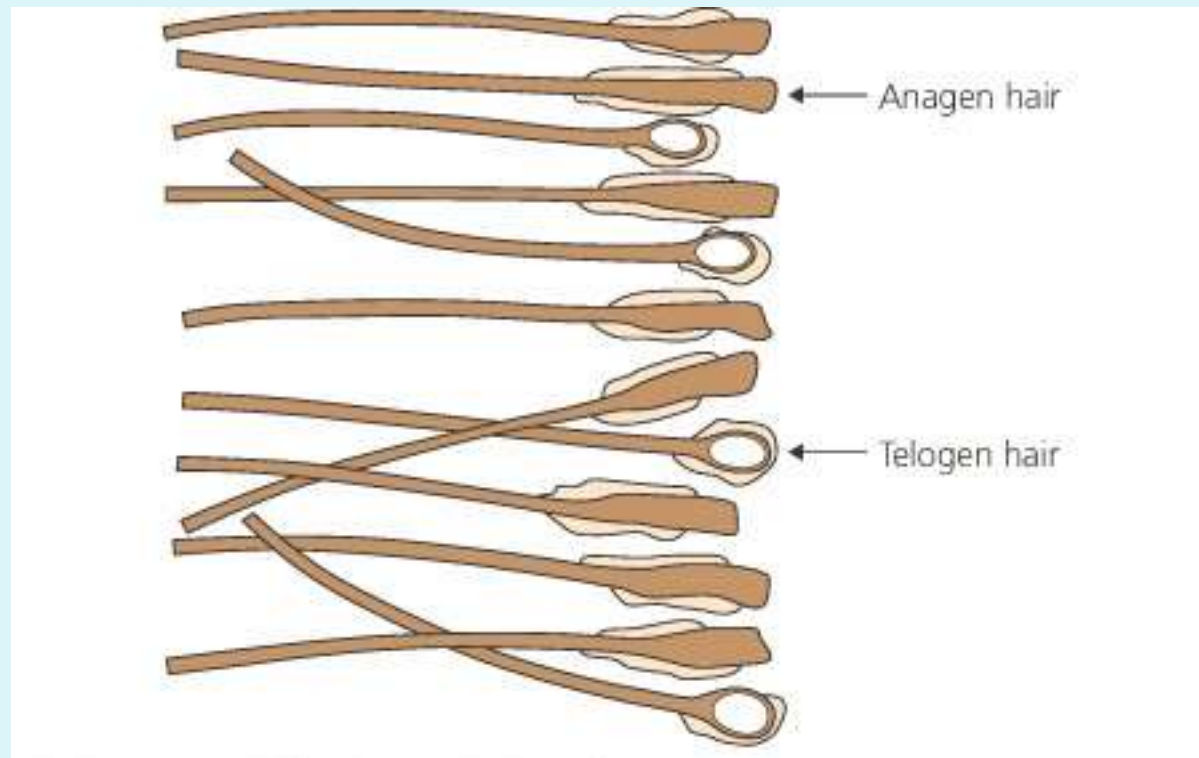
- Hair pull test
- Daily counts
- Hair shaft examination
- Hair pluck- Trichogram
- Potassium hydroxide examination for fungi
- Scalp biopsy
- Hormone studies

Pull test





Hair pluck preparation showing anagen and telogen hairs



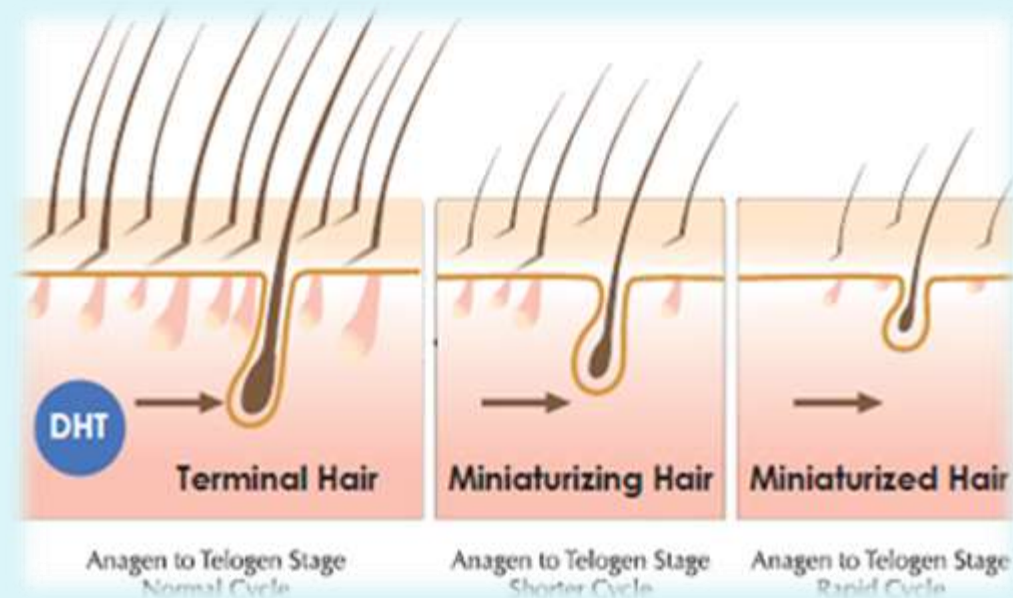
ANDROGENETIC ALOPECIA

- Androgenetic alopecia (AGA) is an androgen-dependent, hereditary physical trait resulting from the conversion of scalp terminal hairs into miniaturized vellus hairs in a characteristic pattern.
- The frequency and severity **increase with age**, and at least 80% of Caucasian men and 50% of women show evidence of AGA by age 70 years.

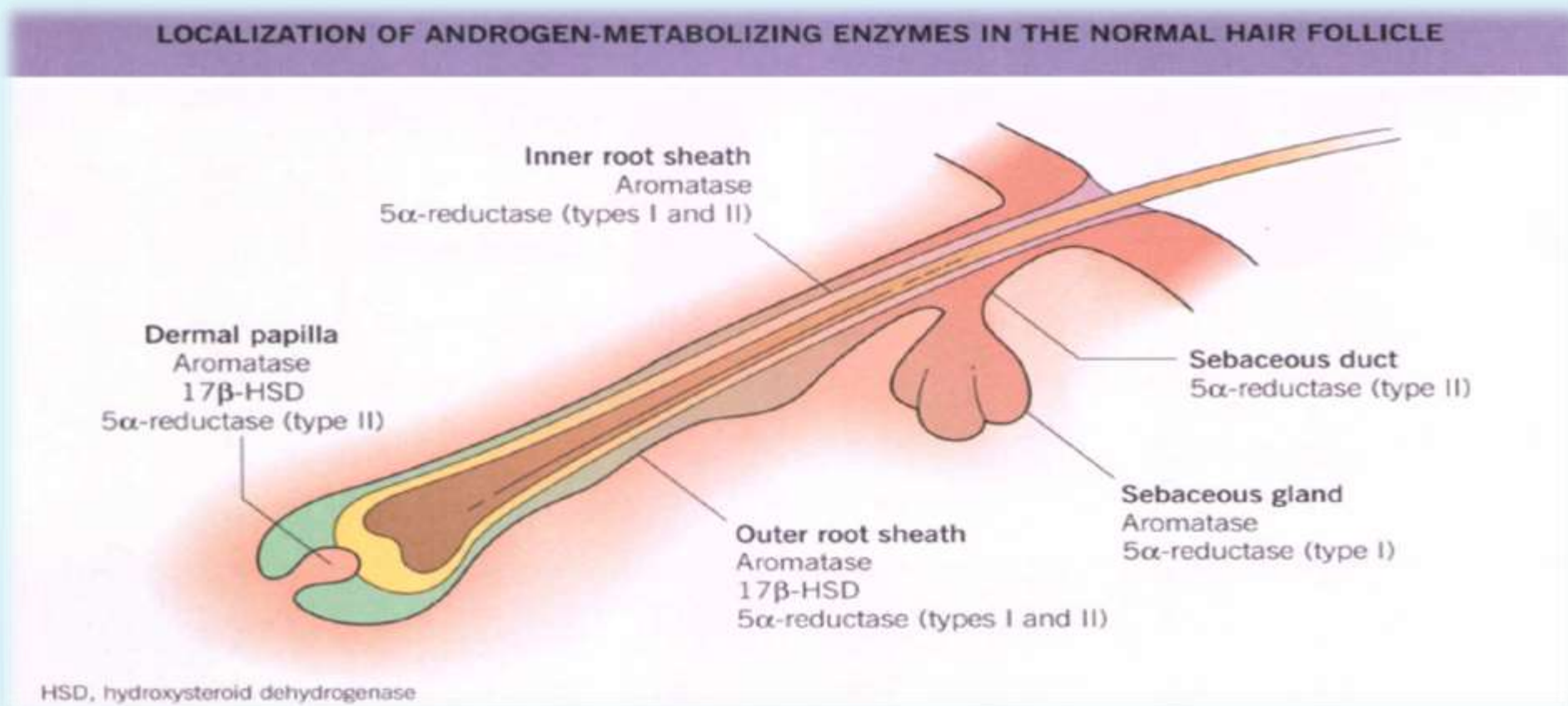
Pathogenesis

- High concordance of MPHL amongst monozygotic twins indicates a strong **genetic predisposition**. The inheritance is polygenic and a number of genetic loci have been implicated, including those that encode the **androgen receptor** and **aromatas**.
- Androgen hormones clearly initiate and promulgate MPHL in genetically susceptible individuals, and while inhibition of androgen biosynthesis or action will arrest the progression of MPHL.

- In men, the expression of AGA is related in particular to the **dehydroepiandrosterone (DHT)**. Testosterone is converted to DHT by the enzyme 5 α -reductase.



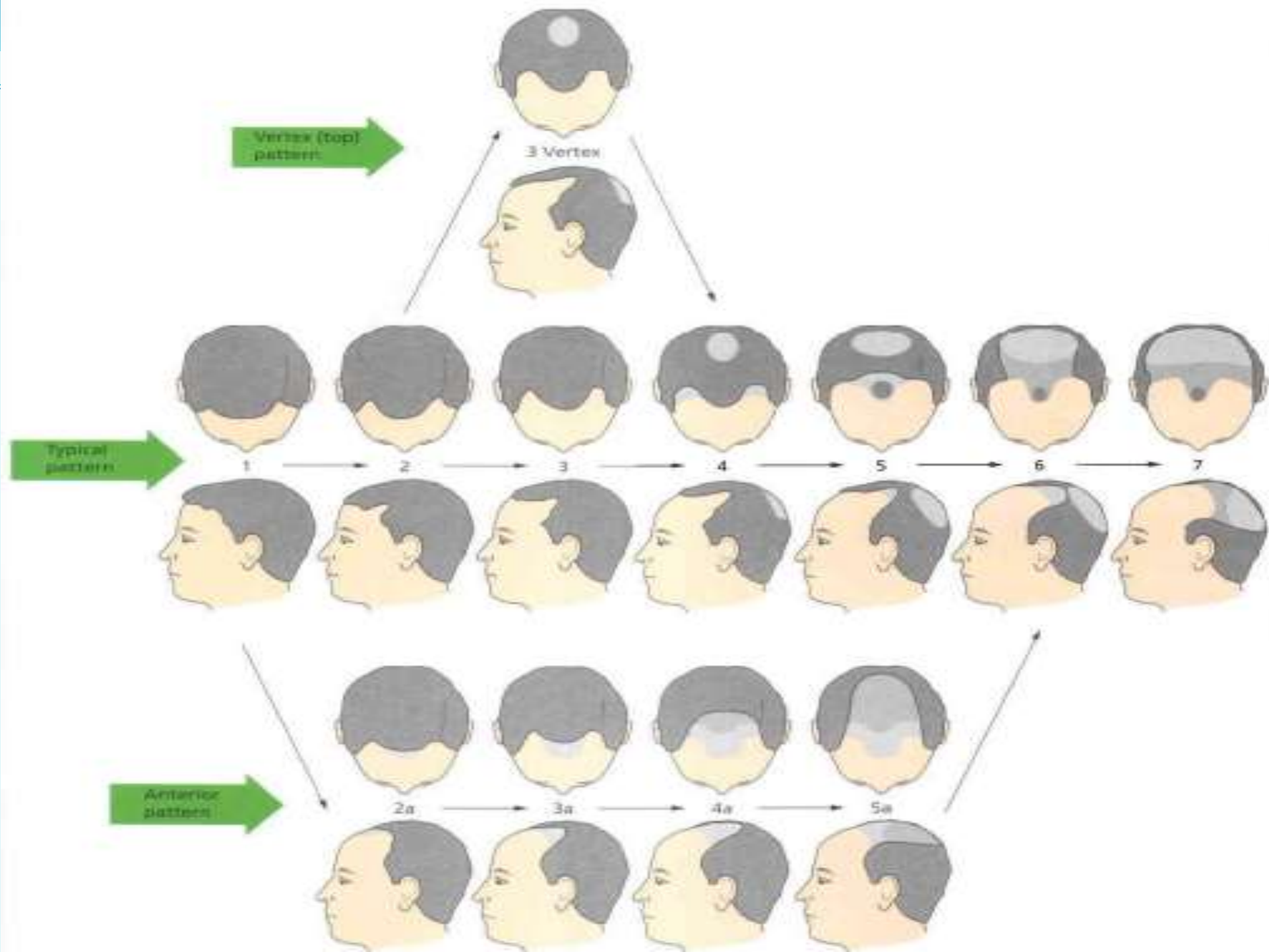
- **Type I 5 α -reductase** is present predominantly in sebaceous glands and the liver, whereas **type II 5 α reductase** dominates in scalp, beard and chest hair follicles, as well as in the liver and the prostate gland.



- In women, a similar pathophysiology is postulated. Women who develop balding shortly after puberty often have a **positive family history** for pattern hair loss in both male and female family members.
- In women who develop pattern alopecia during the perimenopausal period, it may be due to a **genetic predisposition** as well as alterations in **androgen metabolism** at the level of the hair follicle and systemic hormonal changes.

Clinical features

- MPHL is symmetric and progressive with some pattern variation. **Hamilton** and then **Norwood** first classified the patterns of male AGA based upon frontoparietal and frontal recession as well as vertex thinning .
- Occasionally, a "male type" pattern is seen in women, and then they too can be classified with the Hamilton or Norwood system.



- However, the most common pattern of FPHL is **diffuse central thinning of the crown** with preservation of the frontal hairline. Often there is frontal accentuation of the hair loss, creating a "**Christmas tree**" pattern.



- Examination of the central part width can be used to classify severity of FPHL and it can be compared to the occipital part width.

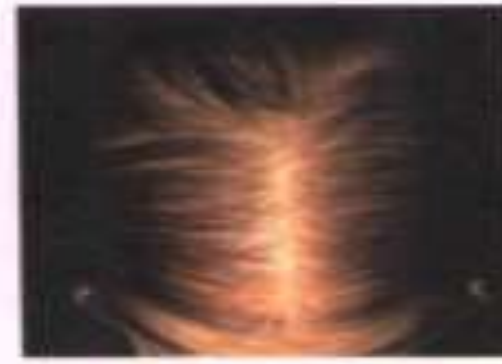
THE SINCLAIR SCALE FOR FEMALE PATTERN HAIR LOSS



Stage 1



Stage 2



Stage 3



Stage 4



Stage 5

Fig. 69.3 The Sinclair scale for female pattern hair loss. Stage 1 – normal; Stage 2 – widening of the central part line; Stage 3 – widening of the part line with translucency of the hairs at its border; Stage 4 – development of a bald area anteriorly along the part line; and Stage 5 – advanced hair loss.

- Most women who present with hair loss have no other evidence of virilization.
- However, if the hair loss is of sudden onset, rapidly progressive and advanced, a full medical history and examination, and endocrinological investigation are desirable to exclude virilization, which can rarely be caused by a virilizing tumor.
- Investigation is also indicated in women with AGA of gradual onset accompanied by menstrual disturbance, hirsutism or recrudescence of acne.

a diversity of hair shaft diameters affects >20% of the hairs.

Brown halos around hair shafts (peripilar sign) is a subtle clue.



Medical management

- Although improvement may be seen after as soon as 4 months, 1 year of treatment may be required before a clinical response is observed. Maintenance therapy is required to sustain the effect.
- Serial photography at 6- to 12-monthly intervals helps to encourage patient adherence to treatment in the long term .

Management of male pattern baldness

- **Minoxidil lotion.** Minoxidil is a potent vasodilator that increases terminal hair density in up to 30% of individuals. Terminal hair appeared to regrow at the margins, but complete covering of the bald areas was seen in less than 10% of responders.
- The benefit is most pronounced in the first 6 months of therapy and thereafter is marginal.

- men who responded best to minoxidil were those in whom:
 1. The balding process was at an **early stage**
 2. Maximum diameter of the bald area of **less than 10 cm²**
 3. Pre-treatment hair density was in **excess of 20 hairs/cm²**



- Topical minoxidil appears to be a safe therapy with side effects only of **local irritation** and **hypertrichosis** of the temples, and there is a low incidence of contact dermatitis.



- If treatment is stopped, clinical regression occurs **within 6 months**, to the state of baldness that would have existed if treatment had not been applied so, applications must continue twice daily for the rest of their lives.

- **Finasteride:** Finasteride is a potent and highly selective antagonist of 5 α -reductase type 2. It inhibits the conversion of testosterone to DHT.
- After 12 months of finasteride treatment, terminal hair counts increase and vellus hair counts decrease, demonstrating the ability of finasteride to **reverse the miniaturization process**.
- An oral dosage of **1mg/ day** reduces scalp DHT by 64% and serum DHT by 68%.

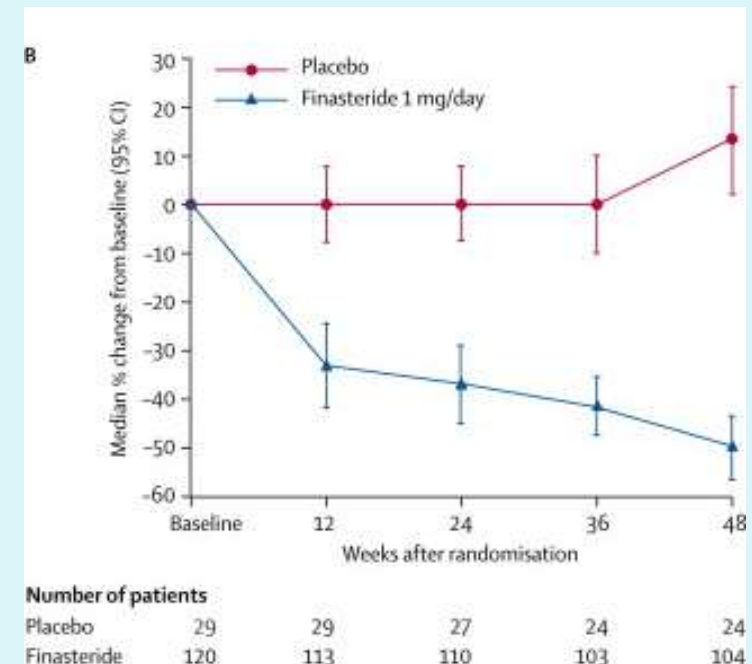


- After 1 year, patients on finasteride have a 10% increase in the mean number of terminal hairs compared with baseline counts. After 5 years of continuous therapy, hair counts remained **close to the 1-year level**, whereas the counts in the placebo patients had dropped by 30%.
- These data suggest that the maximal number of finasteride responsive follicles are recruited by the end of **1 year**, and further improvement in scalp coverage results from increase in **hair length, diameter** and **pigmentation**.

- Few adverse effects were reported. In the finasteride group, **loss of libido** was reported in 1.8% and **erectile dysfunction** in 1.3%. The placebo groups reported these same events, with frequencies of 1.3% and 0.7%, respectively.

- These events appeared to **resolve on cessation** of the drug and, in some cases, with continued treatment.

- Of note is that older men on finasteride experienced a 50% reduction in serum prostate-specific antigen (PSA) levels which could result in an underestimation of prostatic cancer risk.



- Finasteride is a **teratogen**. The drug is secreted in the semen but the concentration of finasteride in the semen is well below the minimum effect dosage, and no recommendations regarding the use of condoms are made in the product information leaflet.
- Finasteride has no effect on spermatogenesis or semen production.

- Reversible **painful gynaecomastia** has been reported in approximately 0.001 % .
- The **prostate cancer prevention** trial has demonstrated that 5 mg daily of finasteride will reduce the incidence of prostate cancer by 25% among men aged 55 and over.



- **Dutasteride** is a combined type 1 and 2 5 α -reductase inhibitor. It produces a dose-dependent reduction in serum and scalp DHT levels to a greater degree than that seen with finasteride, and is **more effective** than finasteride in stimulating hair regrowth in MPB.
- Dutasteride is currently marketed at a **0.5 mg** dosage for BPH and it is not licensed for treatment of MPB. Sexual **side effects are more common** with dutasteride, and are also dose related, but appear to be reversible on cessation.



Management of female pattern hair loss

- **Minoxidil:** Topical minoxidil has been shown to arrest hair loss or to induce mild to moderate hair regrowth in approximately 60% of women with FPHL.
- A clinical trial comparing 5% and 2% formulations of minoxidil found a mean increase in non-vellus hair counts after 48 weeks of 18% and 14%, respectively.



Antiandrogens



- **Spironolactone** acts by competitively blocking androgen receptors. It also weakly inhibits androgen biosynthesis.
- Side effects are dose related and include menstrual irregularities, breast tenderness and feminization a male fetus. The antialdosterone effect can result in an elevation of serum potassium and a slight reduction in BP, although this is rarely significant in the absence of renal impairment.
- Rare cases of hepatocellular carcinoma and hepatitis in higher doses have been reported.

- **Cyproterone acetate** is an androgen receptor blocker and potent progestin . It also has an antigonadotrophic effect. There is little evidence of efficacy in FPHL and may be more effective in women with **hyperandrogenism**.
- Most practitioners use cyproterone acetate **50-100 mg/ day** for the first 10 days of each menstrual cycle. The combination with oral oestrogen therapy provides effective contraception and stabilizes menstrual irregularities.



- **Flutamide** is a non-steroidal antiandrogen that acts by inhibiting androgen uptake and by inhibiting nuclear binding of androgen within the target tissue. One study suggested that flutamide is superior to cyproterone acetate and finasteride in the treatment of androgenetic alopecia .
- However, rare but potentially fatal **hepatotoxicity** limits the use of flutamide for this condition .



- In a double-blind, placebo-controlled study involving almost 100 postmenopausal women with FPHL, 1 mg finasteride was found to be no better than placebo.
- Subsequent case reports and a case series have reported benefits in both pre- and postmenopausal women, but teratogenicity remains a relative contraindication to use in premenopausal women.

Avoid Pregnancy



Telogen effluvium

- Scalp trichography reveals that an average of 86% of plucked hairs are in anagen, 1% in catagen and 13% are in telogen.
- If the average number of scalp hairs is 100000, then 7000 hairs should be in telogen at anyone time. As the approximate duration of telogen is 100 days, 77 hairs should be shed each day, but most people are not aware of shedding anywhere near this amount.



Acute telogen effluvium

- Acute telogen effluvium is an acute onset scalp hair loss that occurs **2-3 months** after a triggering event such as a high fever, surgical trauma, sudden starvation or haemorrhage. In approximately **a third** of cases of acute telogen effluvium, no trigger can be identified.
- Acute telogen effluvium is commonly attributed to **emotional stress**, but there is no evidence that suggests the stresses of everyday life are sufficient to induce diffuse hair loss.



- The daily loss ranges from under 100 to over 1000. It may be severe but is never total.

- The severity of the alopecia depends on the:

- 1) duration and severity of the trigger
- 2) individual susceptibility

- Shedding can be expected to cease within 3-6 months and thereafter recovery should be complete.

Telogen gravidarum

- Refers to the telogen hair loss seen **2-3 months** after childbirth. It is universal to some degree, but is often subclinical.
- Most cases of telogen gravidarum resolve; however, a small proportion of women may experience persistent episodic shedding that may be diffuse or localized.
- It has been suggested that after pregnancy some hairs may not revert to an asynchronous growth pattern seen in normal adult.



Diagnosis

- The diagnosis is usually simple with specific trigger **6-16 weeks** earlier.
- The hair **pull test is positive**, with normal club hair at the **vertex and the scalp margins**.
However, a negative hair pull test does not exclude the diagnosis of telogen effluvium.
- The trichogram usually shows more than **25%** of telogen hairs in acute telogen effluvium.

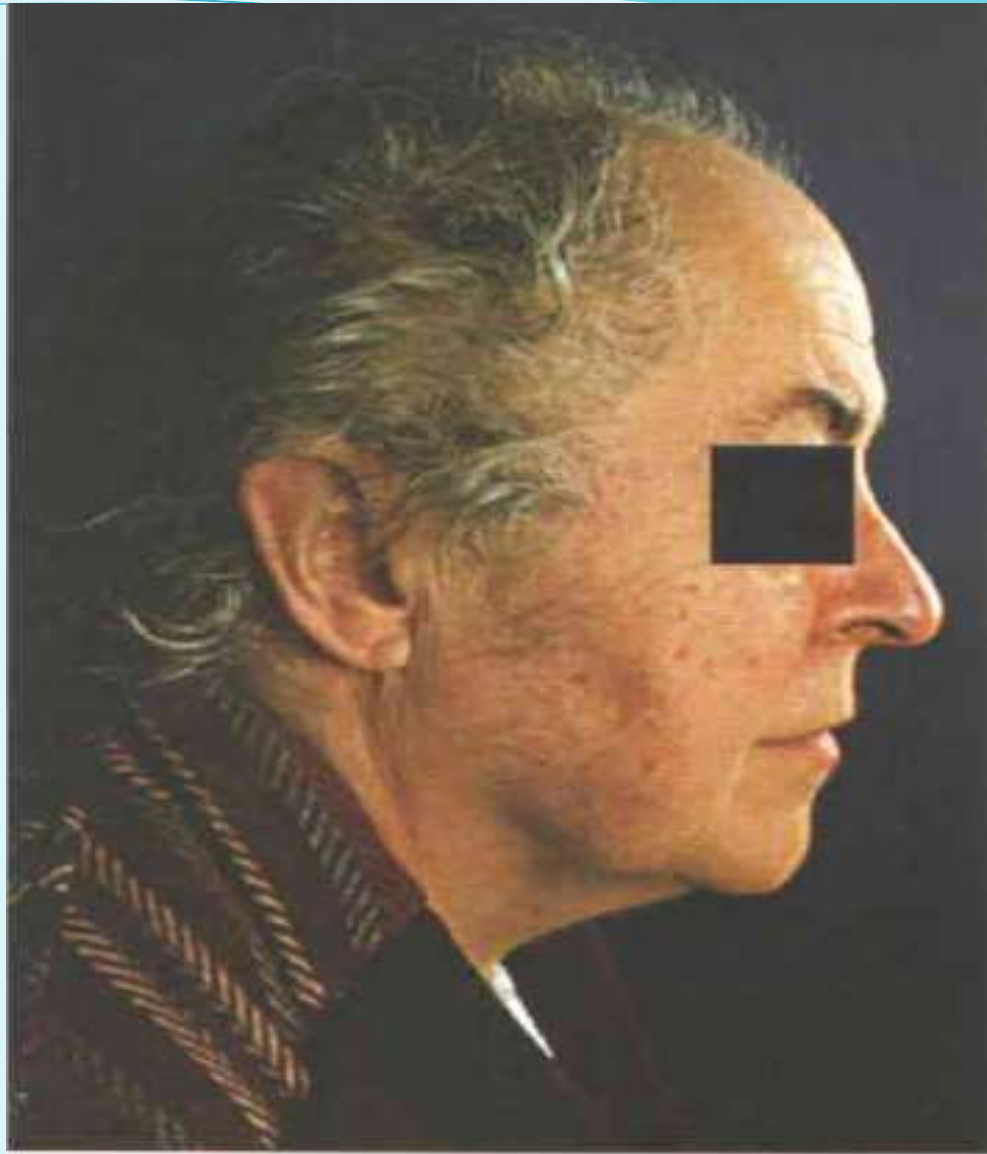


Chronic diffuse telogen hair loss

- If the insult is prolonged or repeated, shedding can develop insidiously. Chronic diffuse telogen hair loss refers to telogen hair shedding persisting for longer than 6 months.
- It can be a result of a primary chronic telogen effluvium or be secondary to a variety of causes including FPHL.

Causes

- Accepted causes of chronic diffuse telogen hair loss are:
 - 1) **Thyroid disorders** (hypo and hyperthyroidism)
 - 2) Profound iron deficiency anaemia
 - 3) **Acrodermatitis enteropathica**, however diffuse hair loss alone, with no other symptoms or signs, is never a result of dietary zinc deficiency .
 - 4) Malnutrition
 - 5) Metabolic disturbances such as **liver disorders** and **CRF**
 - 6) Advanced malignant disease as a result of hypoproteinaemia, but alopecia has occurred as an early sign of **Hodgkin's disease**.
 - 7) **SLE** and **dermatomyositis** can also cause telogen hair loss .
 - 8) Diffuse hair loss may occur in **secondary syphilis**, but the characteristic moth-eaten appearance is not always present



diffuse alopecia in association with hypothyroidism.

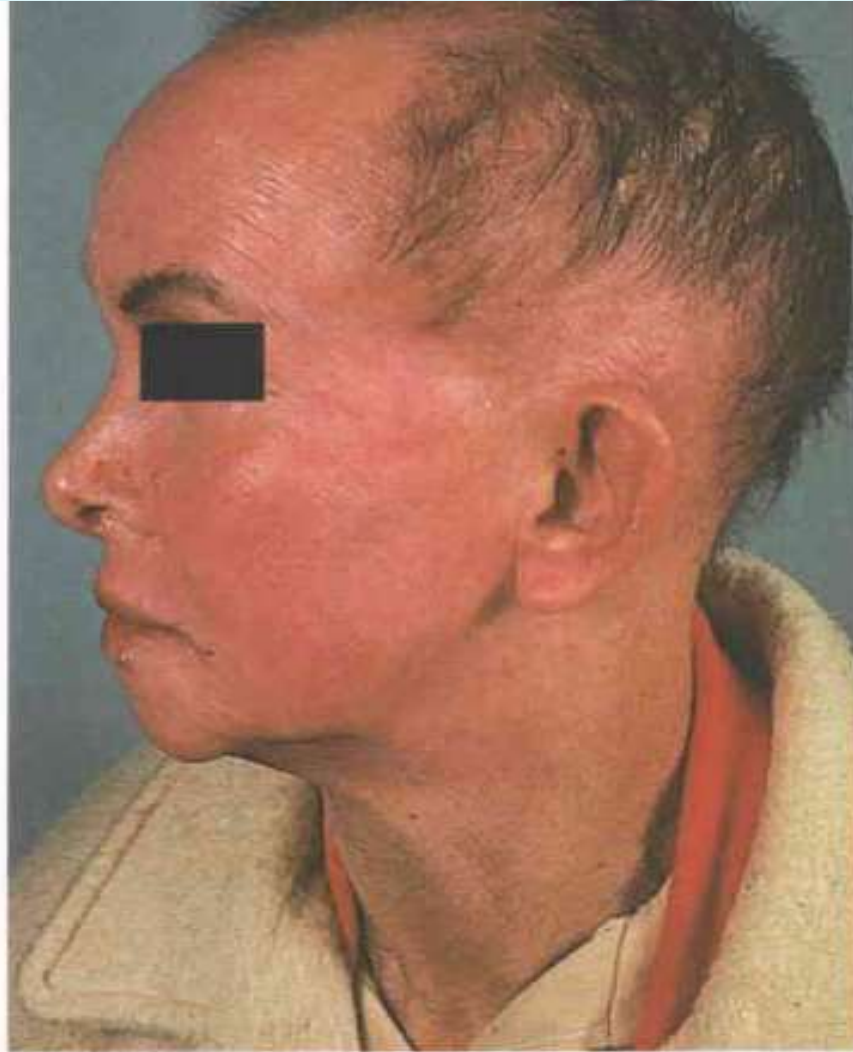


Fig. 66.20 Acquired zinc deficiency resulting from prolonged parenteral feeding and inadequate zinc supplementation.



Fig. 66.21 Hair loss and photosensitivity caused by systemic lupus erythematosus.

- **Drug-induced diffuse telogen hair loss** usually starts 6-12 weeks after instigation of treatment and is progressive while the drug is continued.
- A dose-related diffuse telogen hair loss is common with **etretinate** and **acitretin**, but less common with isotretinoin. The retinoids appear to cause a telogen anchorage defect and reduce the duration of anagen.



Chronic telogen effluvium

- Chronic telogen effluvium (CTE) is a primary, idiopathic and often self-limiting condition affecting middle-aged women between 30 and 50 years of age.
- Women describe a sudden onset of increased hair shedding persisting for at least 6 months. Hair shedding is much less obvious in males with short Hair.



- The diagnosis of CTE is made by exclusion of other causes of telogen hair loss. A thorough history is required, including a detailed drug and dietary history.
- A full clinical examination should be performed, including scalp examination and hair pull testing. The routine work-up includes full blood count and thyroid function tests.
- Syphilis serology, antinuclear antibody titer, serum zinc level should be performed if clinically warranted.

A photograph of a historic stone building, likely a palace or fortress, featuring multiple levels of arched windows and doorways. The building is constructed from light-colored stone blocks. In the foreground, there is a courtyard with a low stone wall and several large, lush green rose bushes with pink flowers. A few people are visible near the building's entrance on the right. The background shows a steep, rocky hillside with some greenery.

Thanks for your attention