

HAIR TRANSPLANTATION

APRIL 3, 2020



Disclosures

- Nothing to disclose

Overview

- Etiology of Alopecia
- Anatomy of Hair
- Pathophysiology of Hair Loss
- Assessment and Management of Androgenetic Alopecia



Causes of Alopecia

“Absence of hair from skin areas where it is normally present”

- Trauma
- Burns
- Autoimmune disorders
 - Alopecia areata, Lupus
- Chemotherapy
- Dermatologic conditions
- Androgenetic alopecia
 - Most common cause of hair loss in men (MPB)



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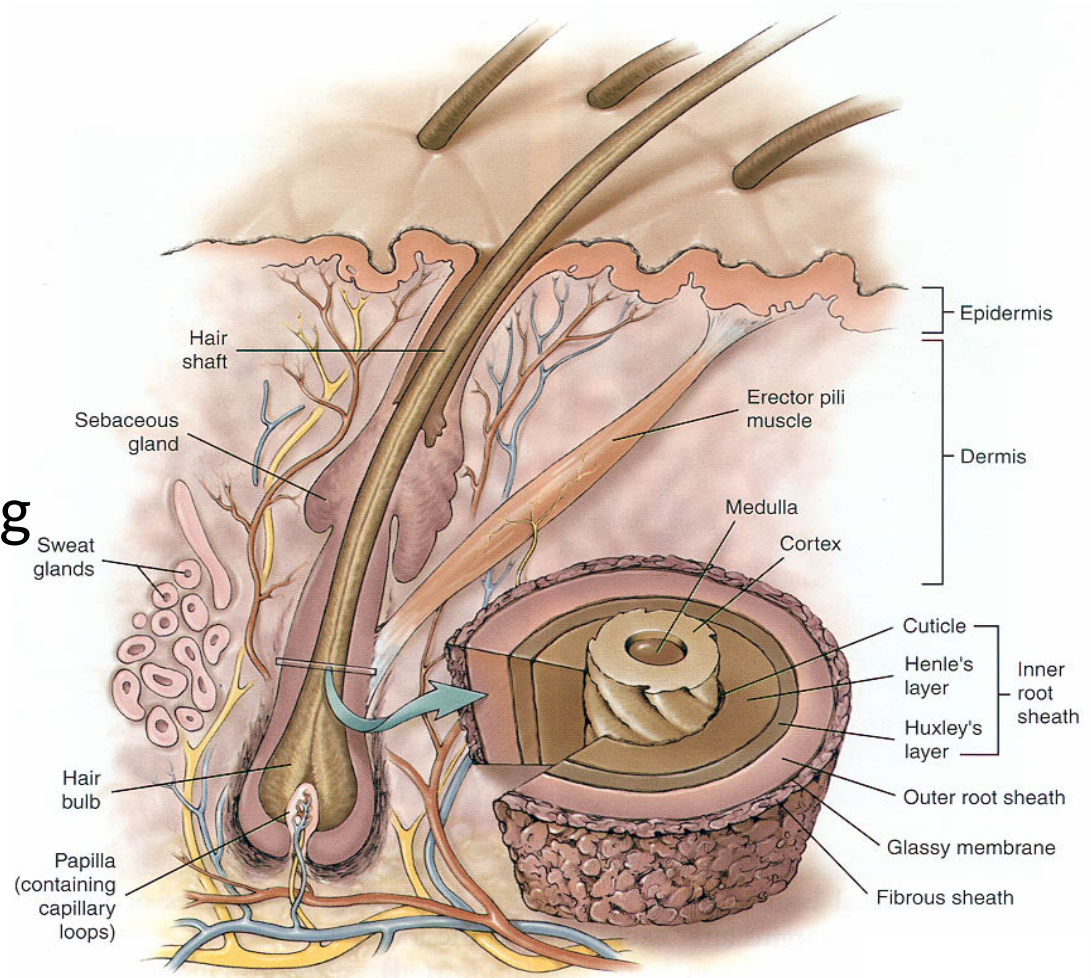


Embryology

- Begins between 9 and 12 weeks gestational age
- Hair production typically seen between 16 and 20 weeks gestational age
- Derived from ectoderm and mesoderm

Anatomy

- Shaft composed of 3 layers
 - Cuticle: outer layer
 - Cortex: middle layer
 - Medulla: inner layer
- Surrounded by supporting structures
 - Erector pili muscle
 - Sebaceous and sweat glands
 - Blood supply



Androgenetic Alopecia

- Definition
 - Hereditary thinning of the hair induced by androgens in genetically susceptible men and women
 - a.k.a. Male-pattern baldness, Female-pattern hair loss

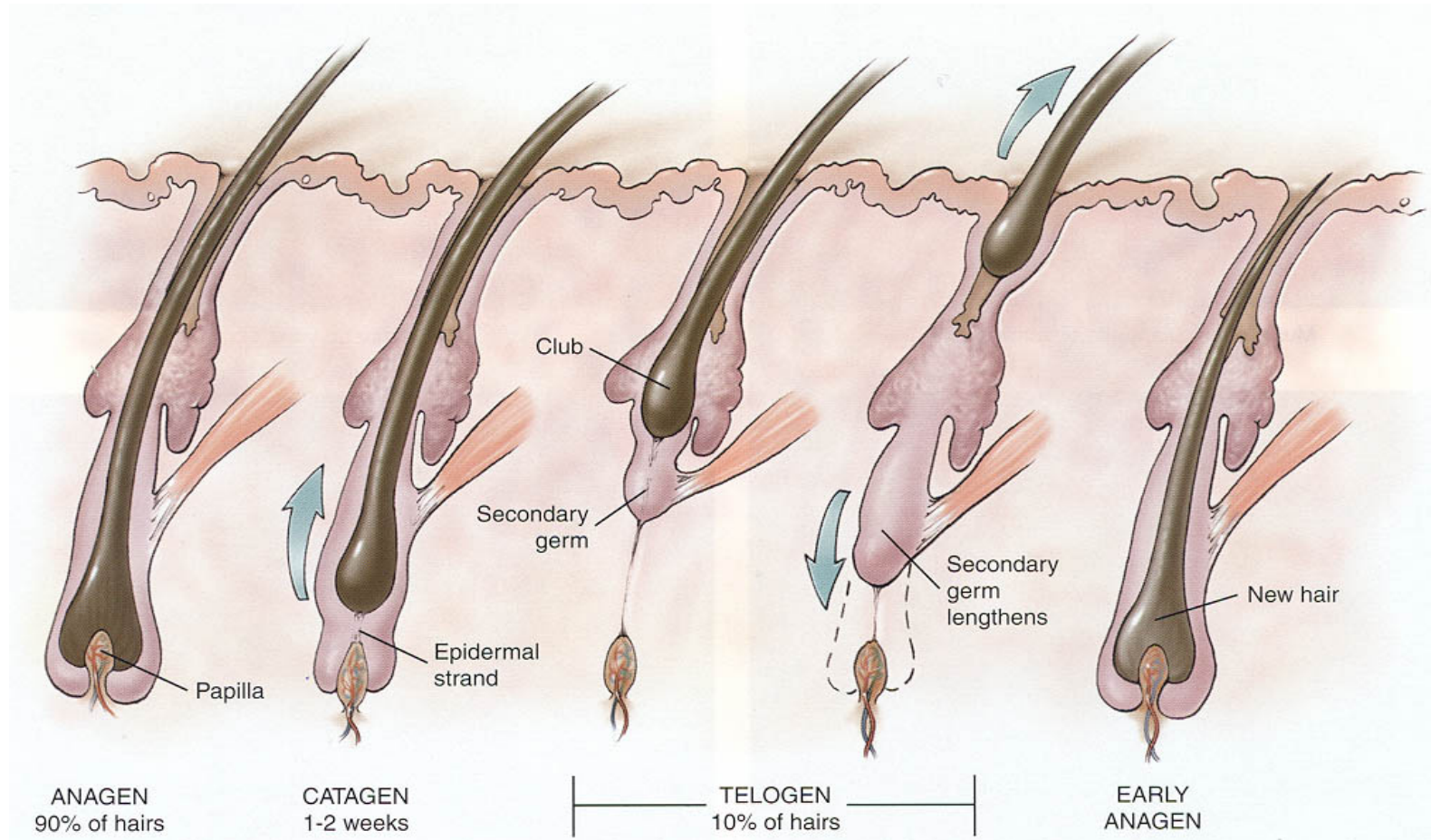


Androgenetic Alopecia

- Thinning of hair usually begins between 12 and 40 years old in males and females
- Approximately half the population expresses this trait to some degree before age 50
- Inheritance is polygenic



Hair Growth Cycle*

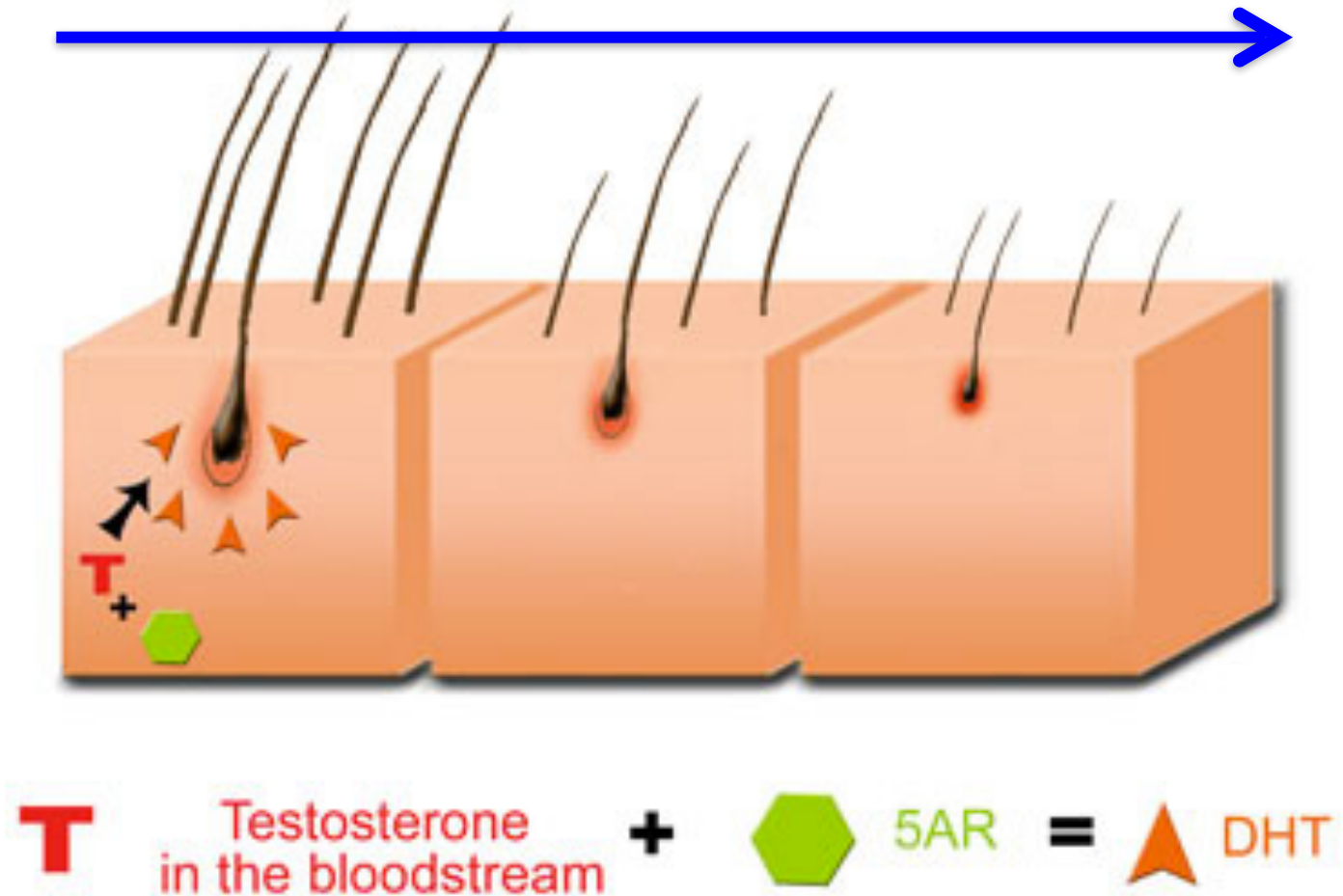


**Growth
Phase**
2-6 yrs

**Involution
Phase**
<1%

Rest Phase
2-3 mos

Pathophysiology of Hair Loss*



Patient Evaluation

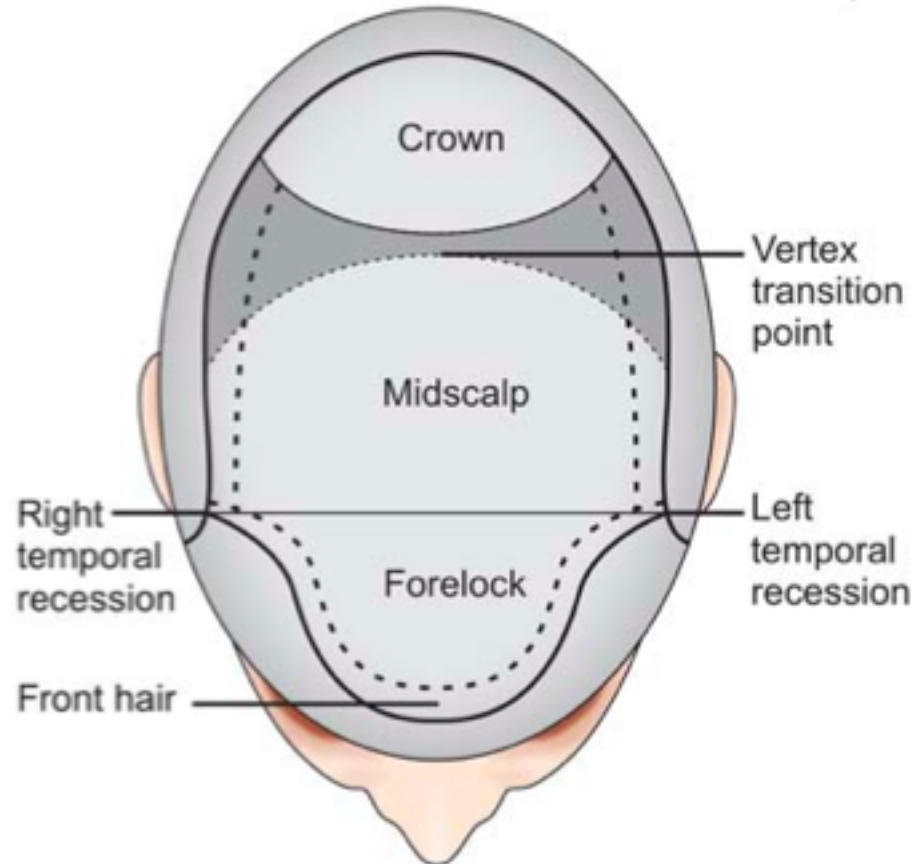
- History
 - Age
 - Progression of hair loss pattern
 - Family history (contributory but not requisite)
 - Goals and Expectations? Are they reasonable? Achievable?
 - What treatments have been tried thus far?
 - Medications? Allergies? Social Hx? Psychiatric hx?

Patient Evaluation

- Physical
 - Pattern and Progression of hair loss
 - Miniaturization
 - Hair colour, texture, shape
 - Donor site laxity and hair density
 - Scalp skin conditions

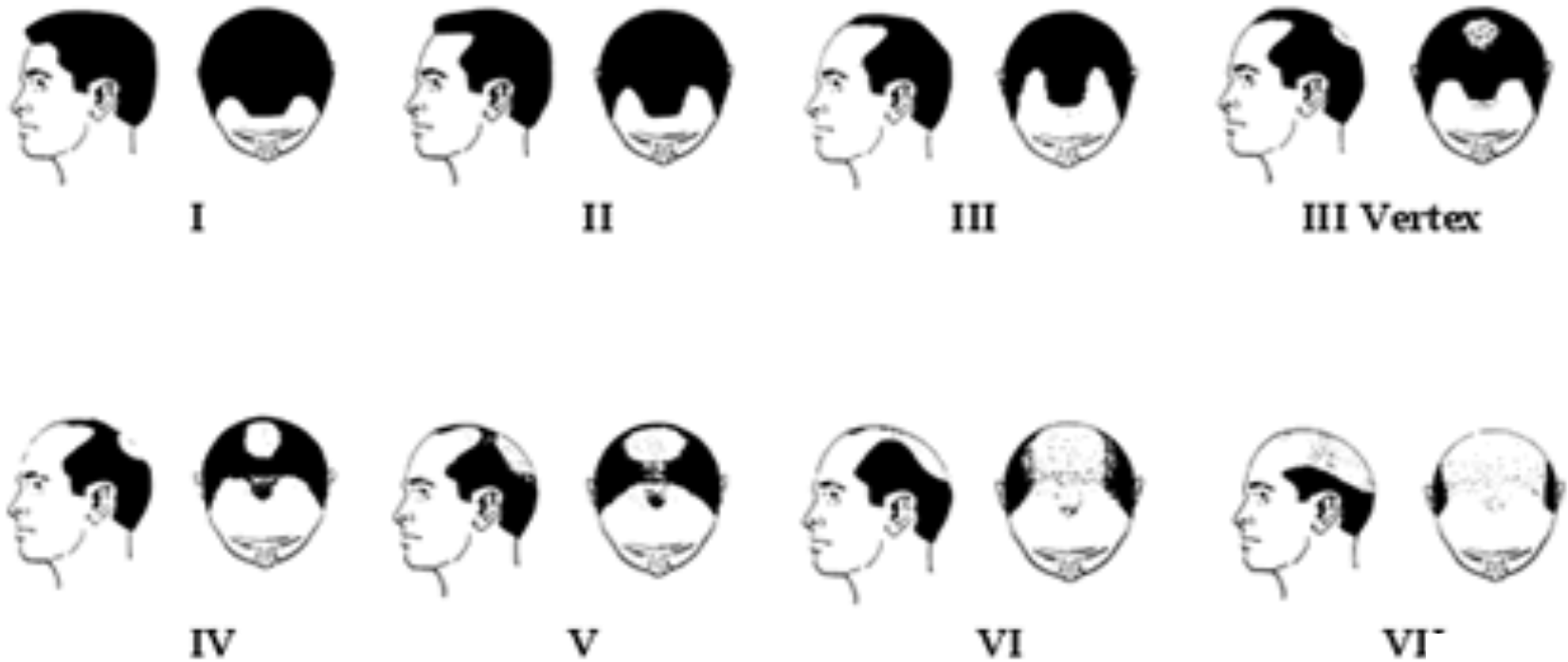
Regions of Scalp

Terms used to describe the areas of the head/scalp



Classification-Men

Norwood's Classification of Male Pattern Alopecia



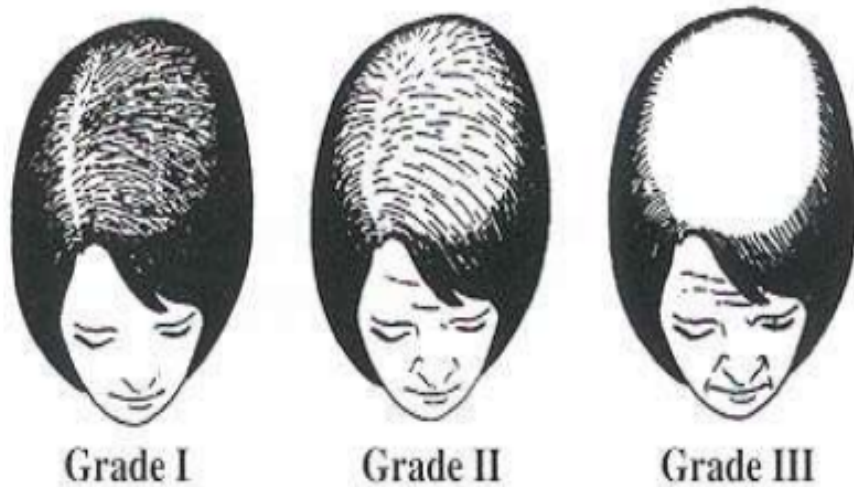
Hair Loss in Women

- 55-60% of females have alternative causes for hair loss other than androgenetic alopecia (FPHL)
- FPHL takes on a different pattern from MPB
- Can be more distressing than MPB due to societal pressures
- Exercise caution in transplanting women



Classification-Women

- Ludwig Classification System



From Ludwig E. Ludwig's classification of female androgenic alopecia. Br J Dermatol 97:247, 1977.

Patient Evaluation

- Additional Tests
 - Pull test (1-3 hairs is normal)
 - Scalp biopsy (4mm punch)
 - Densitometry (handheld magnifier, look for miniaturization)
 - Labs (hair loss in women or unconventional patterns): CBC, DHEAS level, Total Testosterone level, TSH, free T4, TIBC, Iron, Transferrin saturation

Management



Medical Management

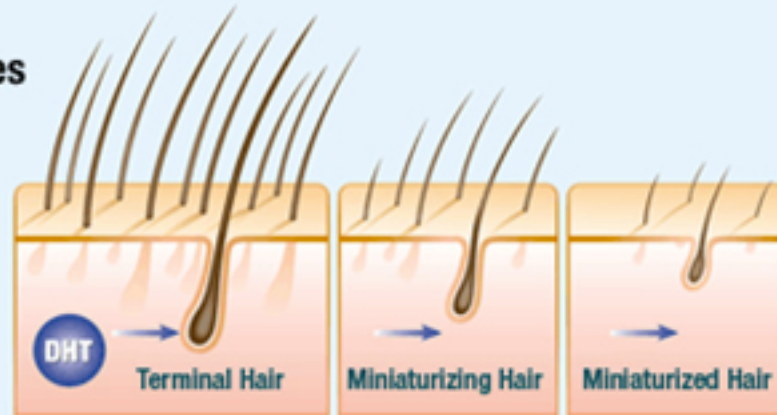


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1. Propecia (Finasteride)

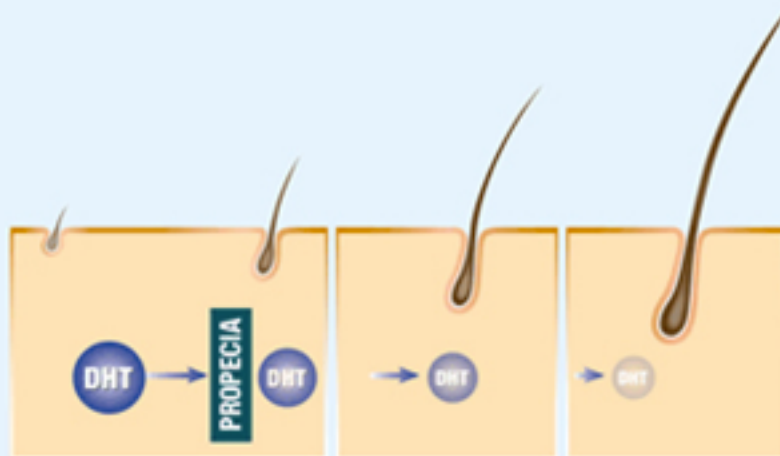
DHT shrinks hair follicles

DHT may contribute to the shortening of the growth phase of hair follicles, causing them to shrink until there are fewer visible hairs left on the scalp.



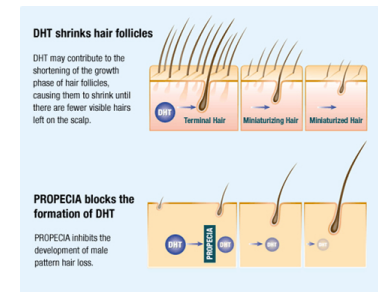
PROPECIA blocks the formation of DHT

PROPECIA inhibits the development of male pattern hair loss.



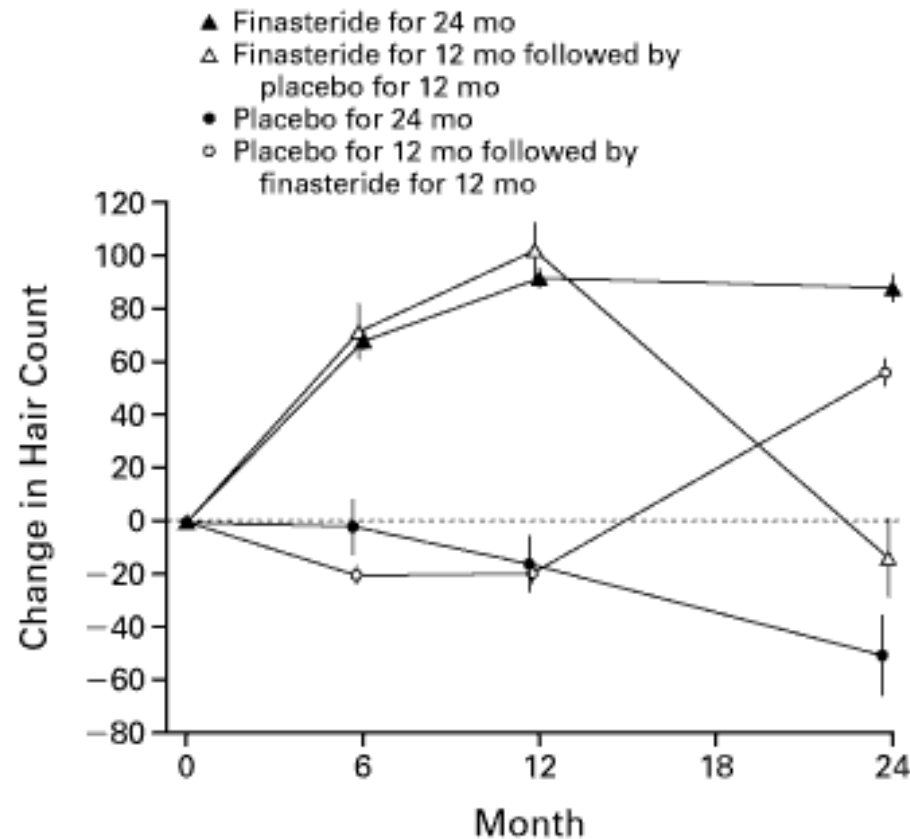
1. Propecia (Finasteride)

- 1 mg/day PO decreases both vertex and frontal hair loss and actually increased hair growth and hair counts
- Specifically converts the scalp hair into the anagen phase and has been shown to reverse hair miniaturization (ie. terminal to vellus conversion)
- Not approved for use in women (teratogenic, no benefit in PMW)



1. Propecia (Finasteride)

- Effect of Finasteride given at 1mg PO QD (NEJM 1999- VH Price)



1. Propecia (Finasteride)

Timeline for Result

PROPECIA

PLACEBO

Percentage of men who maintained or increased their hair count



1. Propecia (Finasteride) *

- Side Effects:
 - Decreased libido (1.8%)
 - Erectile dysfunction (1.3%)
 - Decreased ejaculate volume (0.8%)
- PSA reduced 30-50%, so should double the value for an accurate number
- If you stop the medication, the side effects will resolve

A stylized, handwritten-style logo or signature, possibly representing the letter 'a' or a similar character, located in the bottom right corner of the slide.

2. Rogaine (Minoxidil)

- Topical solution, exists as 2% or 5% liquid or foam that is applied directly to the scalp BID
 - 5% for men only, not for women (risk of facial hair)
- Mechanism of action not known
 - Thought to shift hairs from telogen to anagen phase
- 3 Main Effects: maintain current hairs, increase hair volume (vellus→terminal), increased hair counts

A stylized, handwritten-style letter 'a' with a long, sweeping underline that curves around the base of the letter.

2. Rogaine (Minoxidil)

- Stimulates moderate hair growth in 40% of men and halts balding in the majority of patients
- Best in patients with vellus hairs (ie. not total alopecia) and treatment initiated early (eg. < 40 yo)
- Main adverse effects are local dermatitis and pruritus, headaches

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Surgical Management

Surgical Management

- Hair Transplantation
 - Strip Technique
 - Follicular Unit Extraction (FUE) Technique

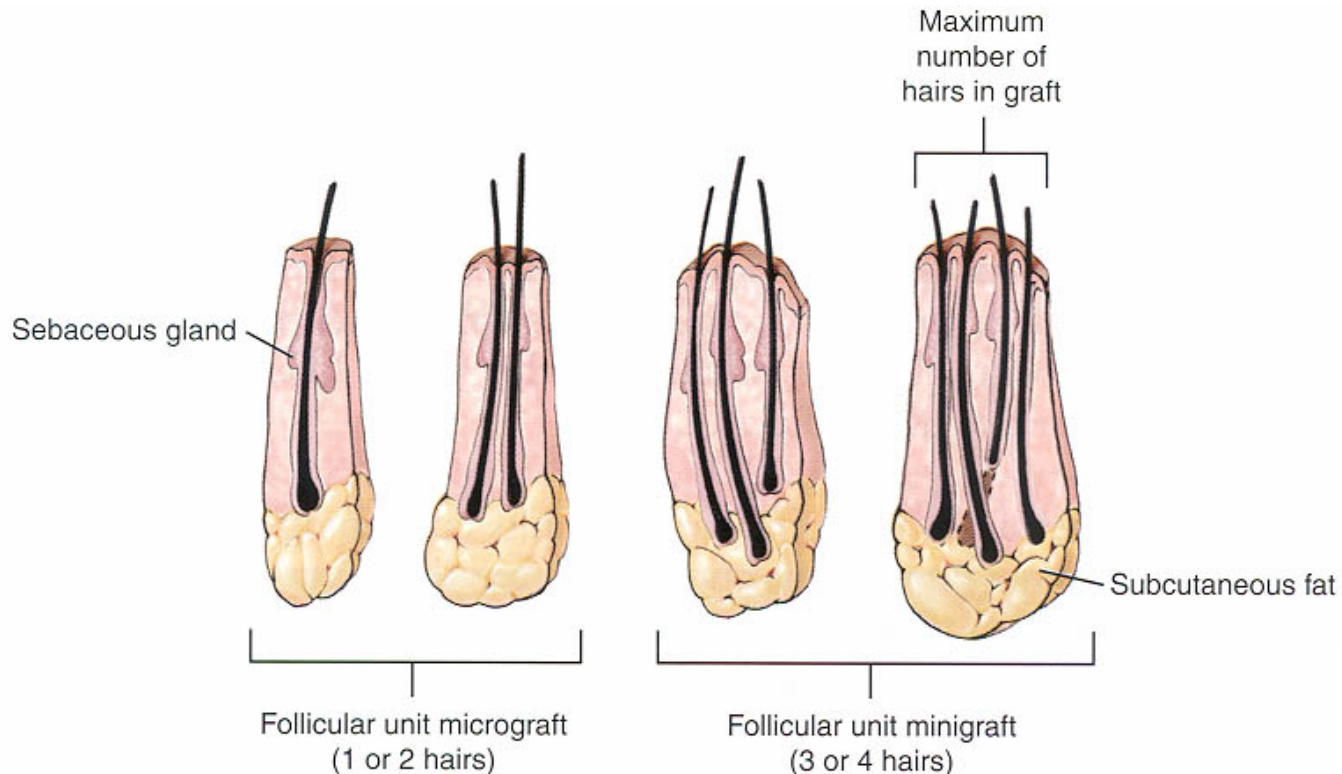
Surgical Management

- Hair Transplantation: there are two main factors in hair transplantation that are critical to providing a natural, undetectable result
 - Follicular Unit Grafting: allows us to recreate a hair restoration that matches the topography (density) of a natural hair growth pattern
 - Matching the Angle and Direction of transplanted hairs to natural hair growth (“Like with like”)

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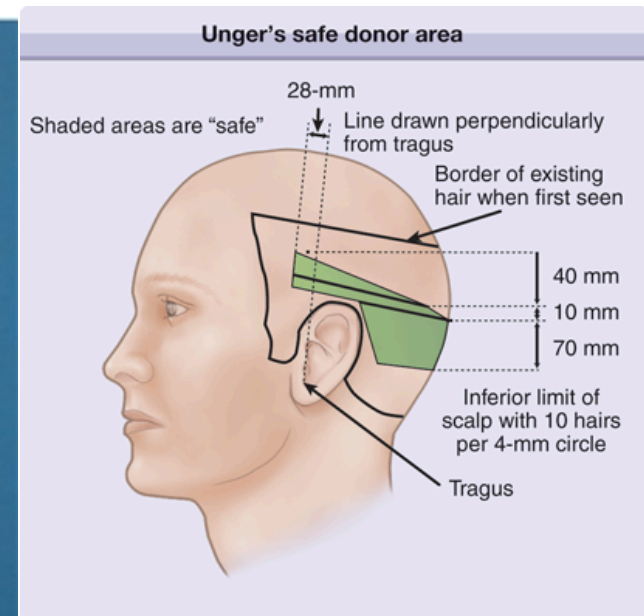
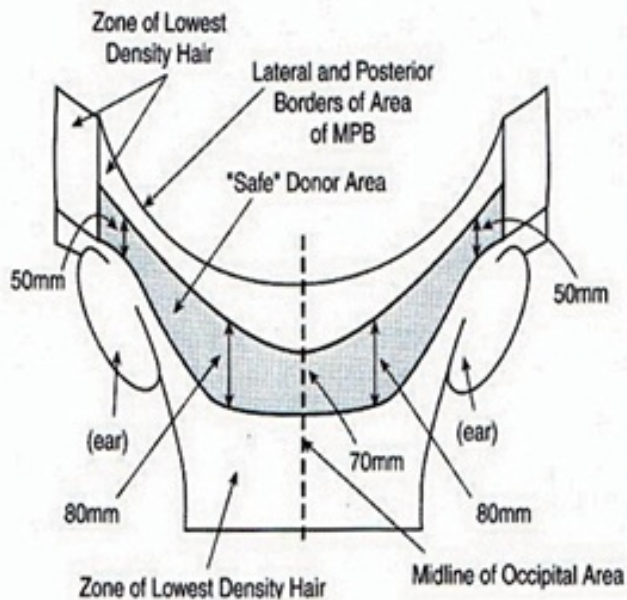
Hair Transplantation

- Follicular graft units have between 1 and 4 hair follicles



Donor Site

- Safe Donor Area



Source: Goldsmith LA, Katz SI, Gilchrist BA, Paller AS, Leffell DJ, Wolff K: *Fitzpatrick's General Medicine*, 8th Edition: www.accessmedicine.com

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In General

- Procedure:
 - Mark out the plan for the transplant (show DM slides)
 - Trim donor area to 1-5 mm with electric clippers
 - From occipital protuberance medially to over ears laterally (larger area for FUE)
 - Local anesthesia: ring block around scalp, deep subQ fat layer
 - Tumescence into superficial fat / deep dermis
 - Distension, rising tide to move follicles up and away from deeper vessels and nerves



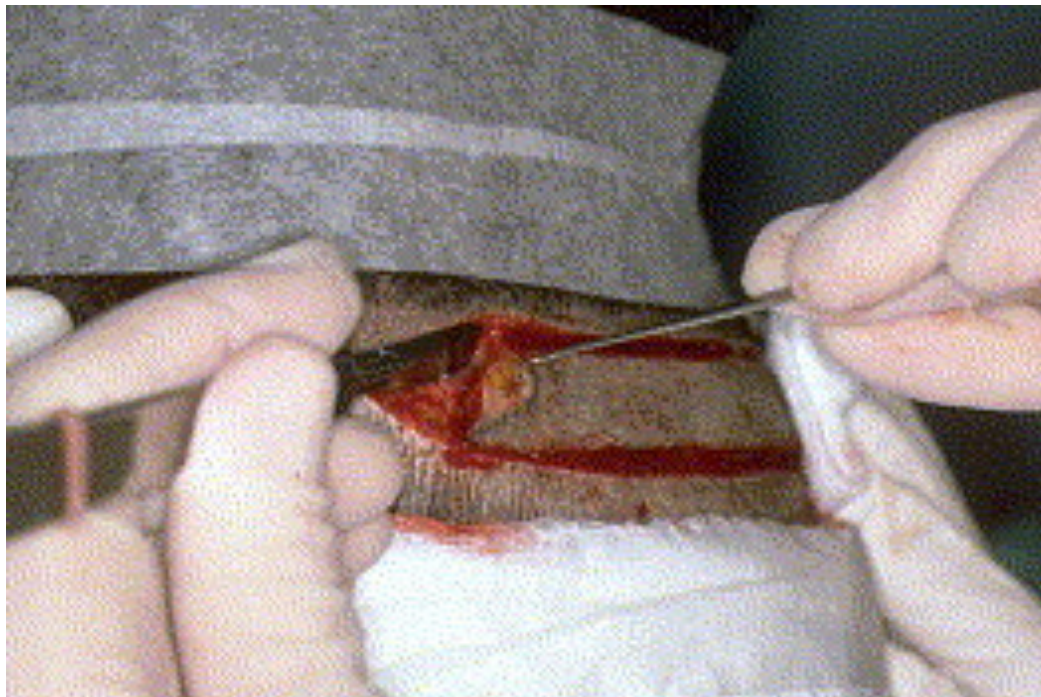
Strip Technique

- Mark out strip (1-1.2 cm width depending on scalp laxity, tapered at the ends)
- 10 blade, beveled incision, observing follicles to avoid transection as you go
- Stay above galea/muscle layer to avoid neurovascular injury
- Judicious hemostasis
- Running 3-0 Prolene closure



Strip Technique

- Donor strip elevated in subcutaneous fat plane

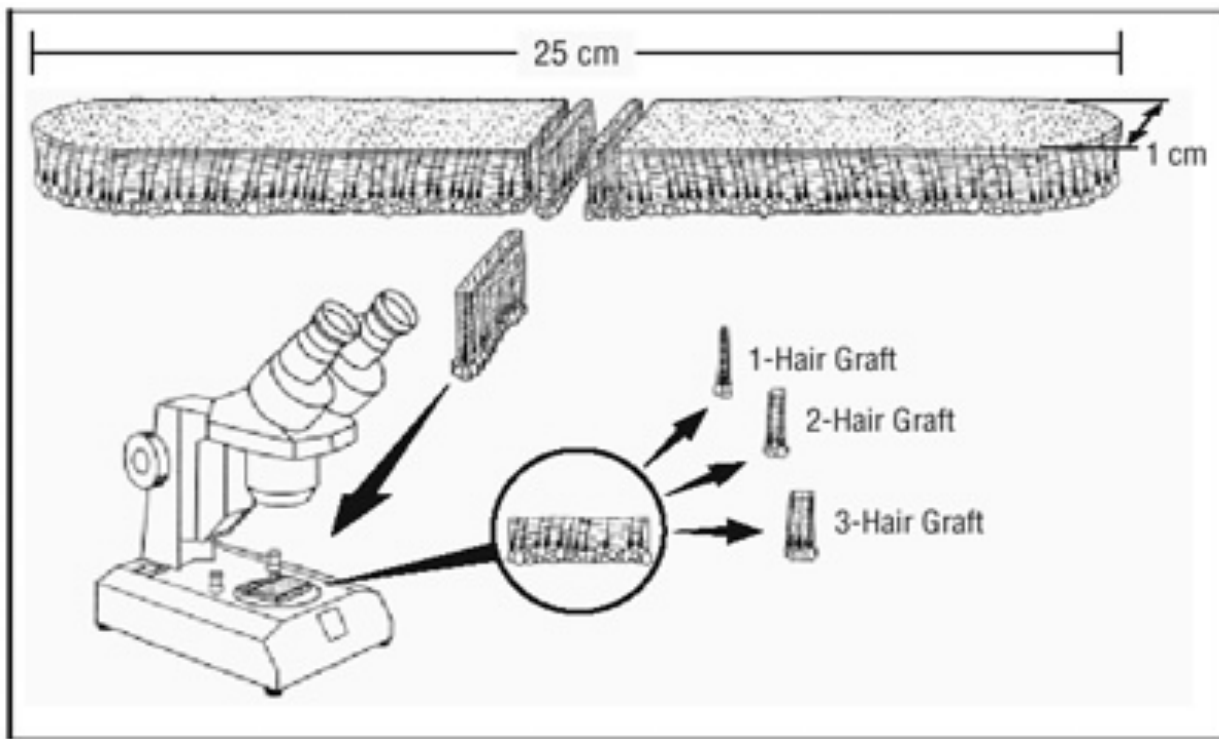


Strip Technique

- One square cm of donor tissue yields approximately 100 follicular units

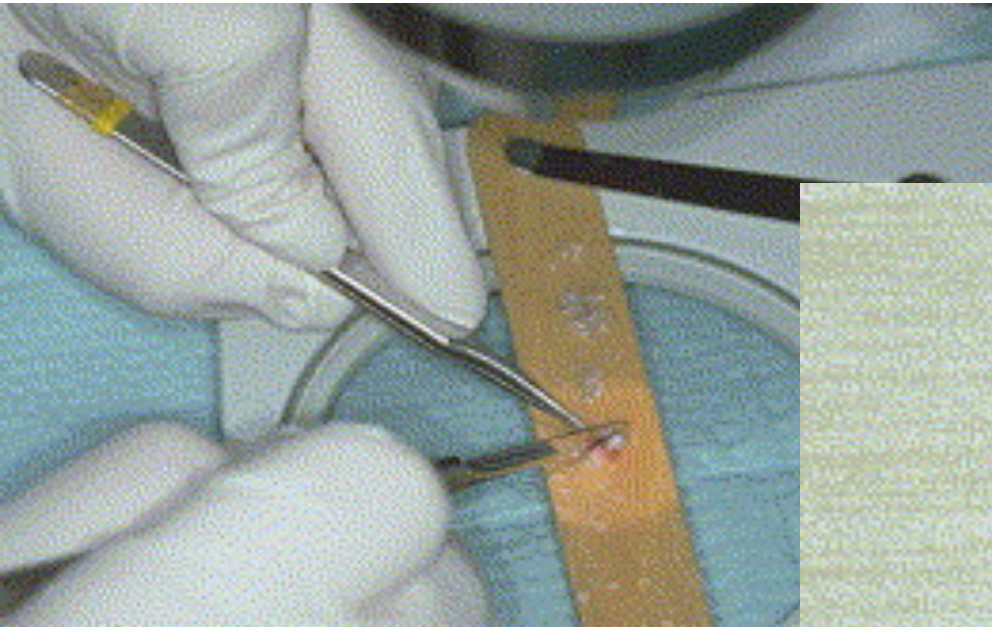


Strip Technique-Slivering



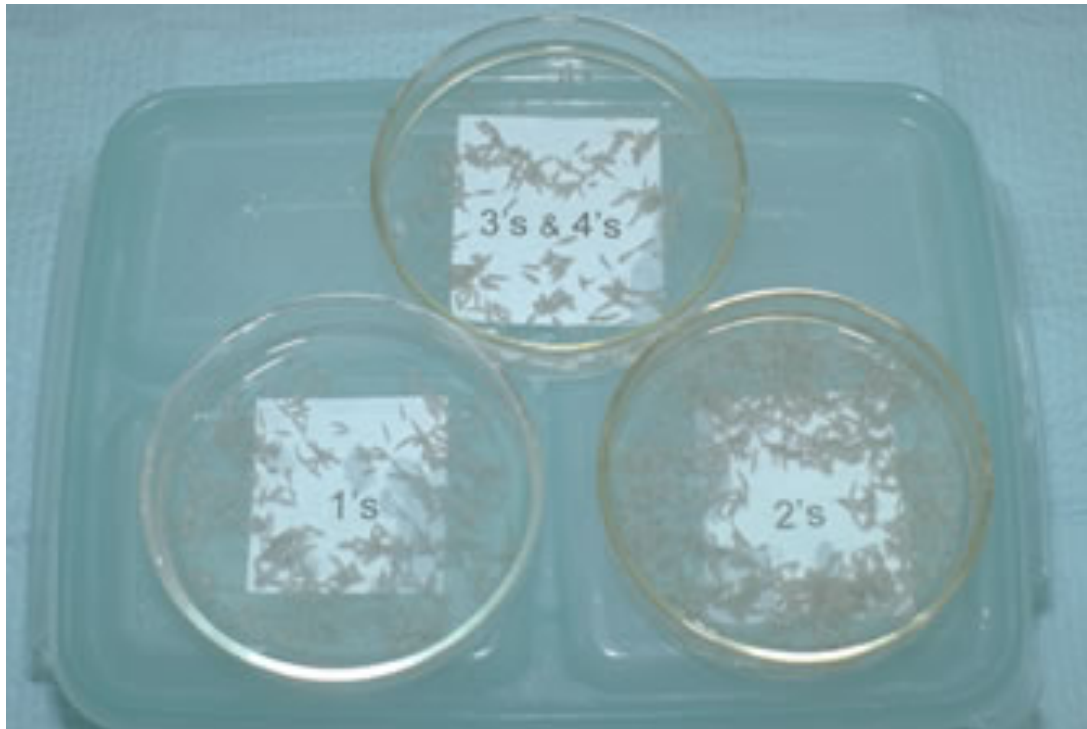
Strip Technique

- Slivers are then dissected into individual follicular units



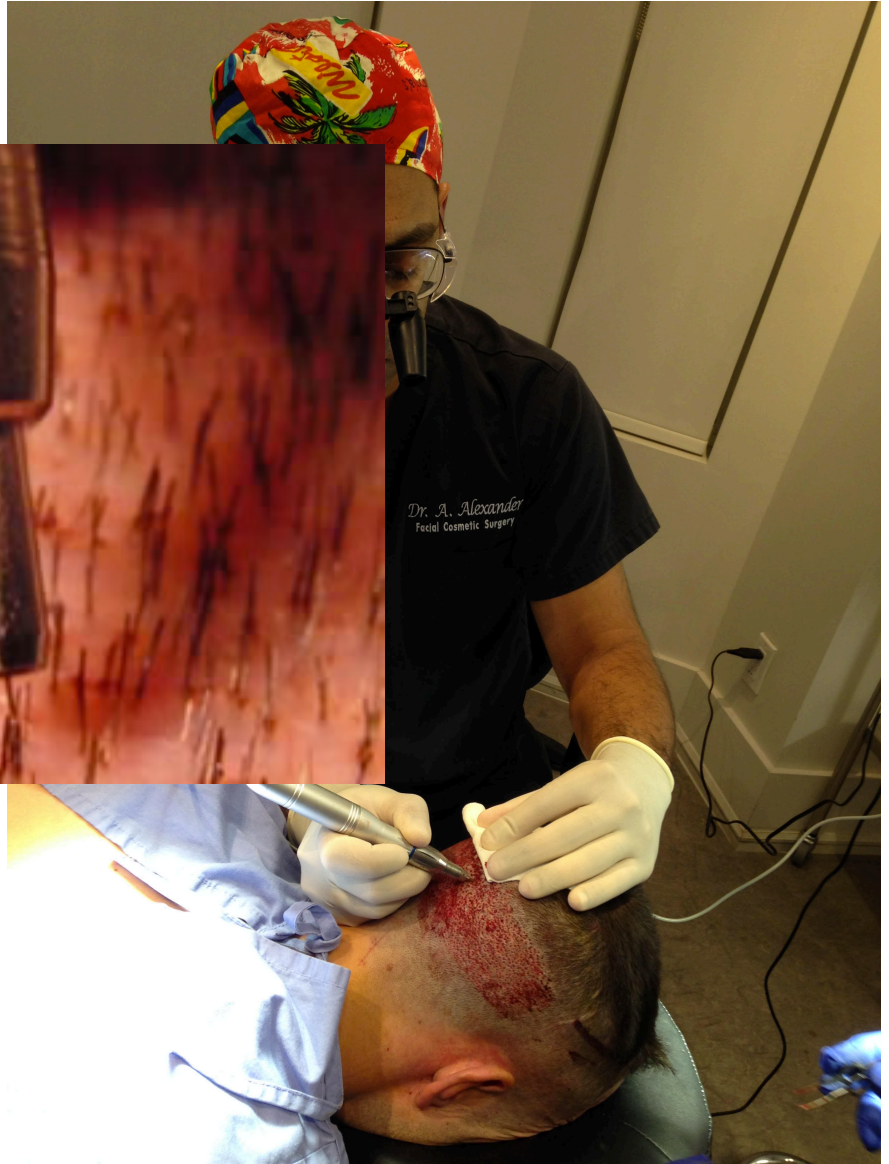
Strip Technique

- Follicular units are sorted based on hair number into petri dishes of saline on ice



FUE Technique

- Everything is essentially the same, except
 - Shave large area
 - Harvesting hair follicles one at a time with a motorized punch



FUE Technique

- Therefore don't have the slivering step, grafts are essentially ready to be planted



*

FOLLICULAR UNIT EXTRACTION (FUE)

No scalpels, staples or sutures

No linear scar

No visible scar so long as head is not shaved

Minimal pain on recovery

Faster healing, quicker return to normal activities

Up to 2000 grafts per session (large cases require 2 days)

1-4 hours of extraction

Higher cost

FOLLICULAR UNIT GRAFTING (FUG, aka “STRIP”)

Wound edges closed precisely with sutures

Long, thin scar

Typically heals beautifully and is imperceptible so long as hair is kept sufficiently long

Can be painful postoperatively, but this is easily controlled with pain medication

Longer recovery, sutures removed at 10-14 days postoperatively

Up to 4000 grafts per session (1 day)

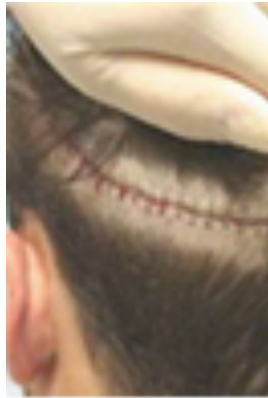
1 hour of extraction

Lower cost

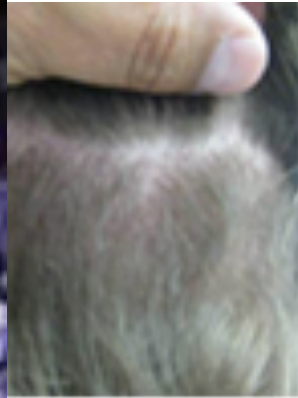
1 week post-FUE



Strip vs. FUE: scar



Resulting



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e

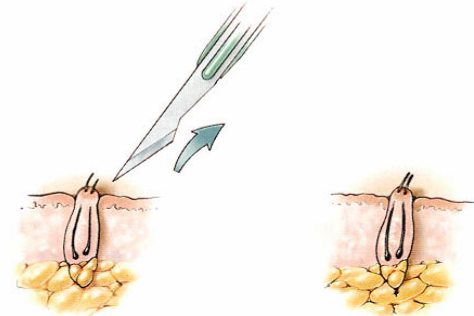
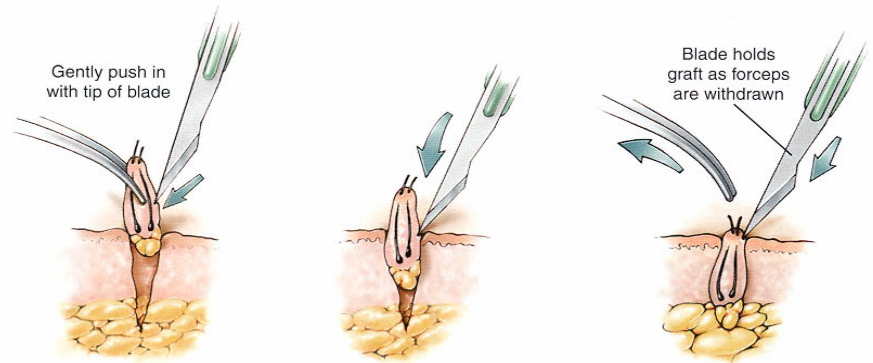
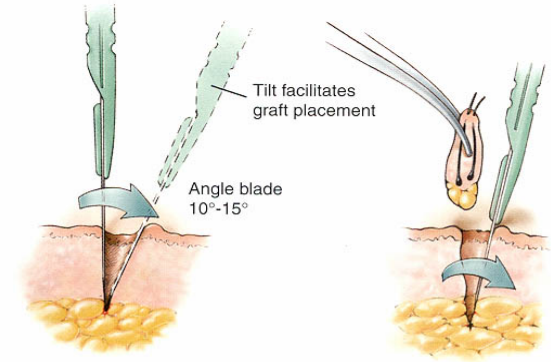
Ready to Plant!

- Critical to match density, angle and direction of the transplanted hairs
- Just like planting a garden: dig a hole, plant the graft, watch it grow!



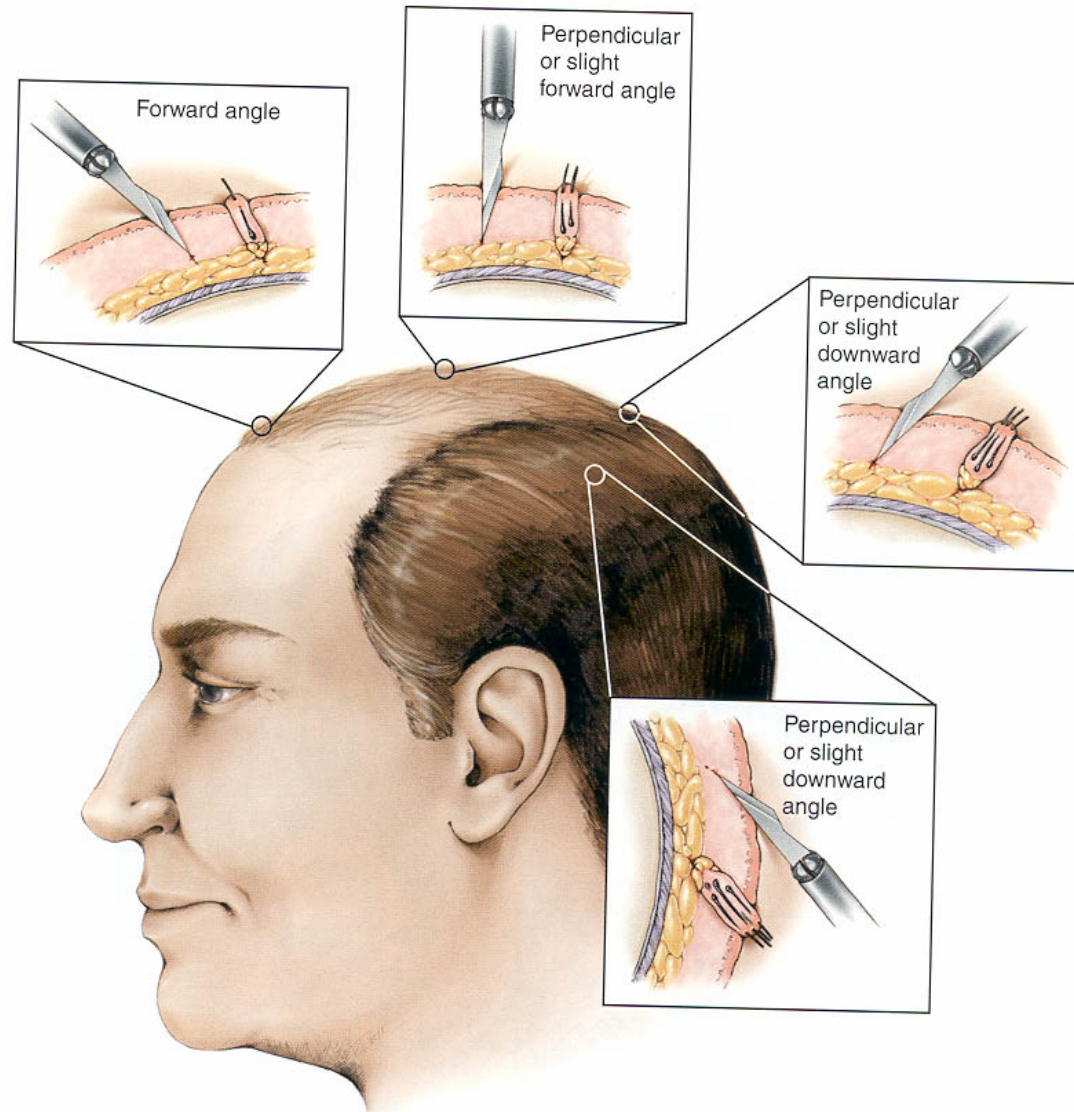
Recipient Sites

- Recipient Sites
 - Needle size guide equivalents
 - 20 gauge = 1-hair unit
 - 19 gauge = 2-hair and thin 3-hair units
 - 18 gauge = 3-hair and 4-hair units

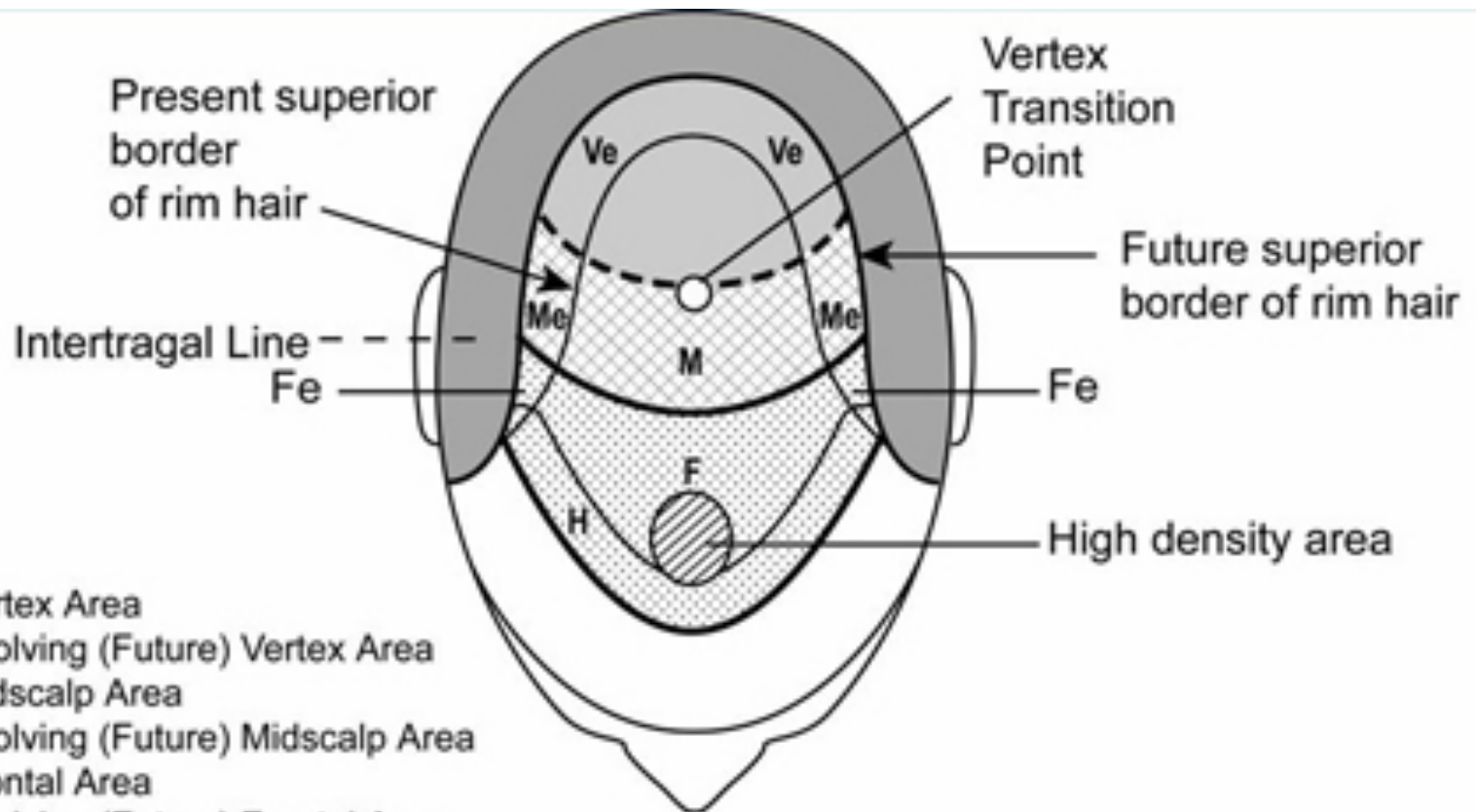


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Angle & Direction



Density Distribution



- V = Vertex Area
- Ve = Evolving (Future) Vertex Area
- M = Midscalp Area
- Me = Evolving (Future) Midscalp Area
- F = Frontal Area
- Fe = Evolving (Future) Frontal Area
- H = Hairline zone

Logistics

- Typical transplant case takes us all day (7am to 5pm, with a break for lunch)
- All under local anesthesia, pleasant day
- Team-based treatment: surgeon, minimum three technicians



Postop Course

- Keep donor area covered with ointment and dressing overnight
- Regular spritzing of grafts for 2 days
- Gently wash scalp with water basin starting POD #3
- Sutures removed POD #10
- Regular showering POD #14
- Stop Rogaine 2 weeks pre-tx, re-start 2 weeks post-tx

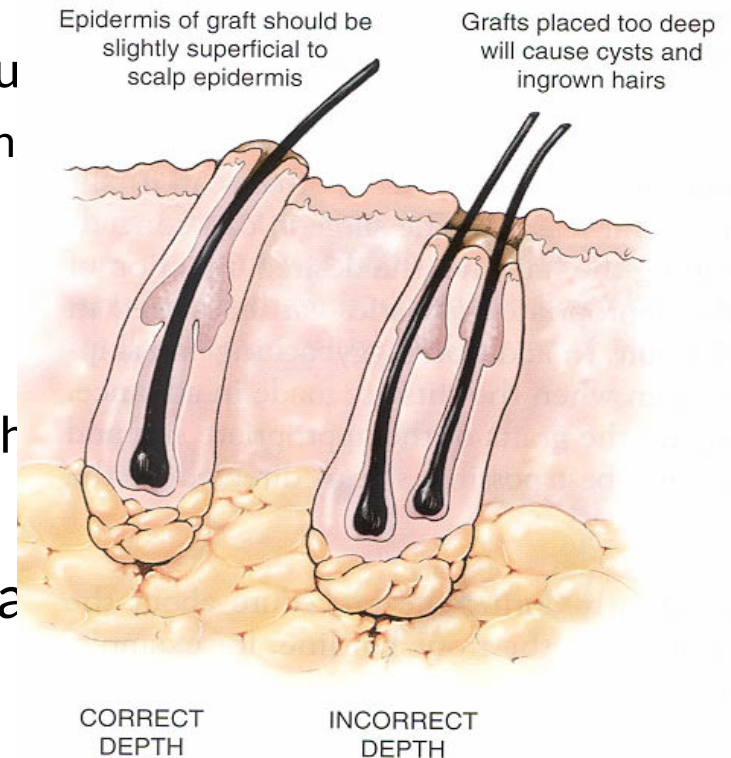
Postop Course

- Transplanted hair begins to fall out 2 to 4 weeks after the surgery. These hairs then re-grow at 3 to 4 months after the surgery
- At 6 months, 70% of the hair will have appeared
- 12-18 months for full growth
- Shedding of the native hair can also sometimes occur post operatively. This is quite rare and if it occurs it will always re-grow (shock loss)



Pitfalls & Complications

- Poor patient selection
 - Operating on young patients is difficult
 - Hairline creation looks unnatural long
 - Do not know donor site stability
- Poor aesthetic outcome
 - Grafts in wrong direction
 - Crown transplant in young patient with
- Improper graft handling → Poor graft
- Wide donor scars (strip)
- Buried grafts → cysts



B & A's

Strip, 2500 grafts



Strip, 2500 grafts



Strip, 2250 grafts



FUE, 1800 grafts



FUE, 1800 grafts



FUE, 1800 grafts



THANK YOU