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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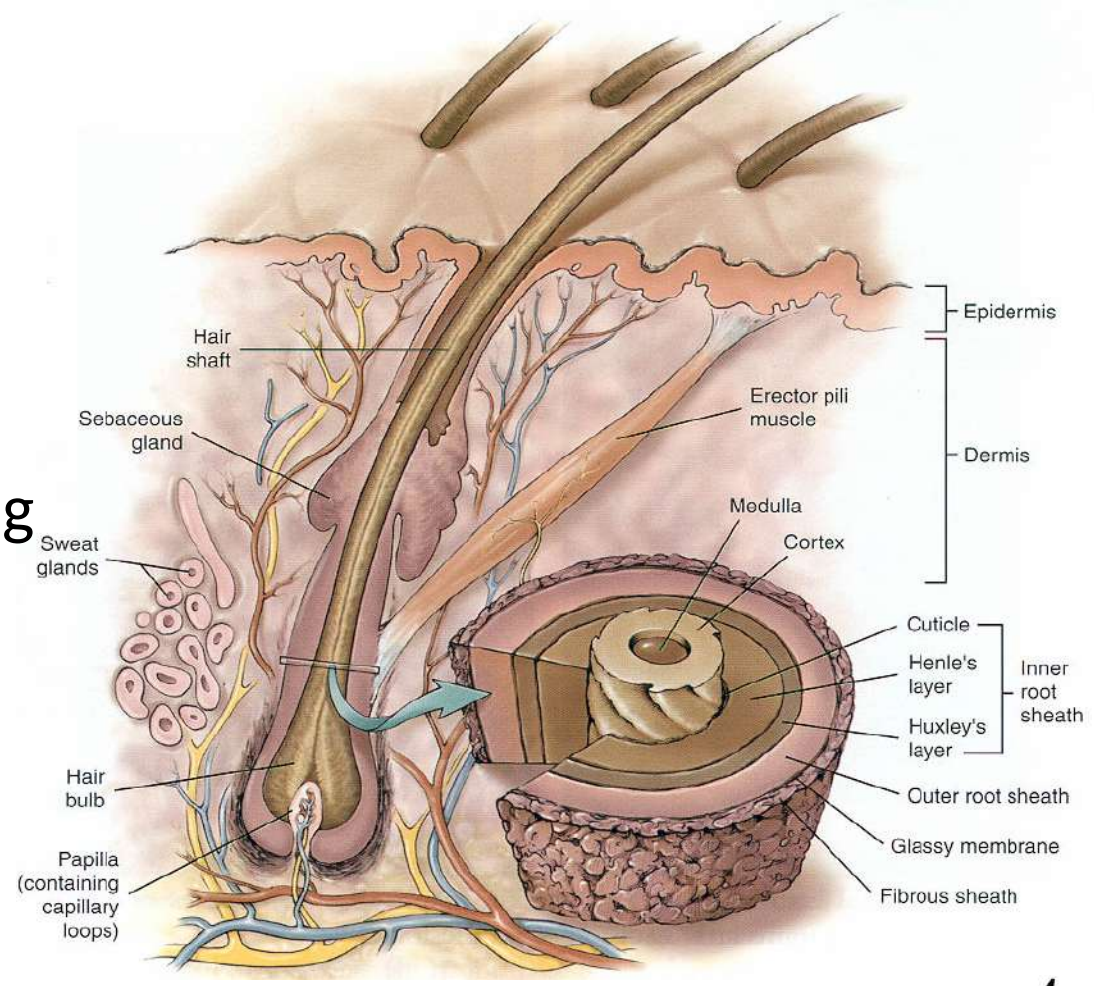
Embryology

- 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



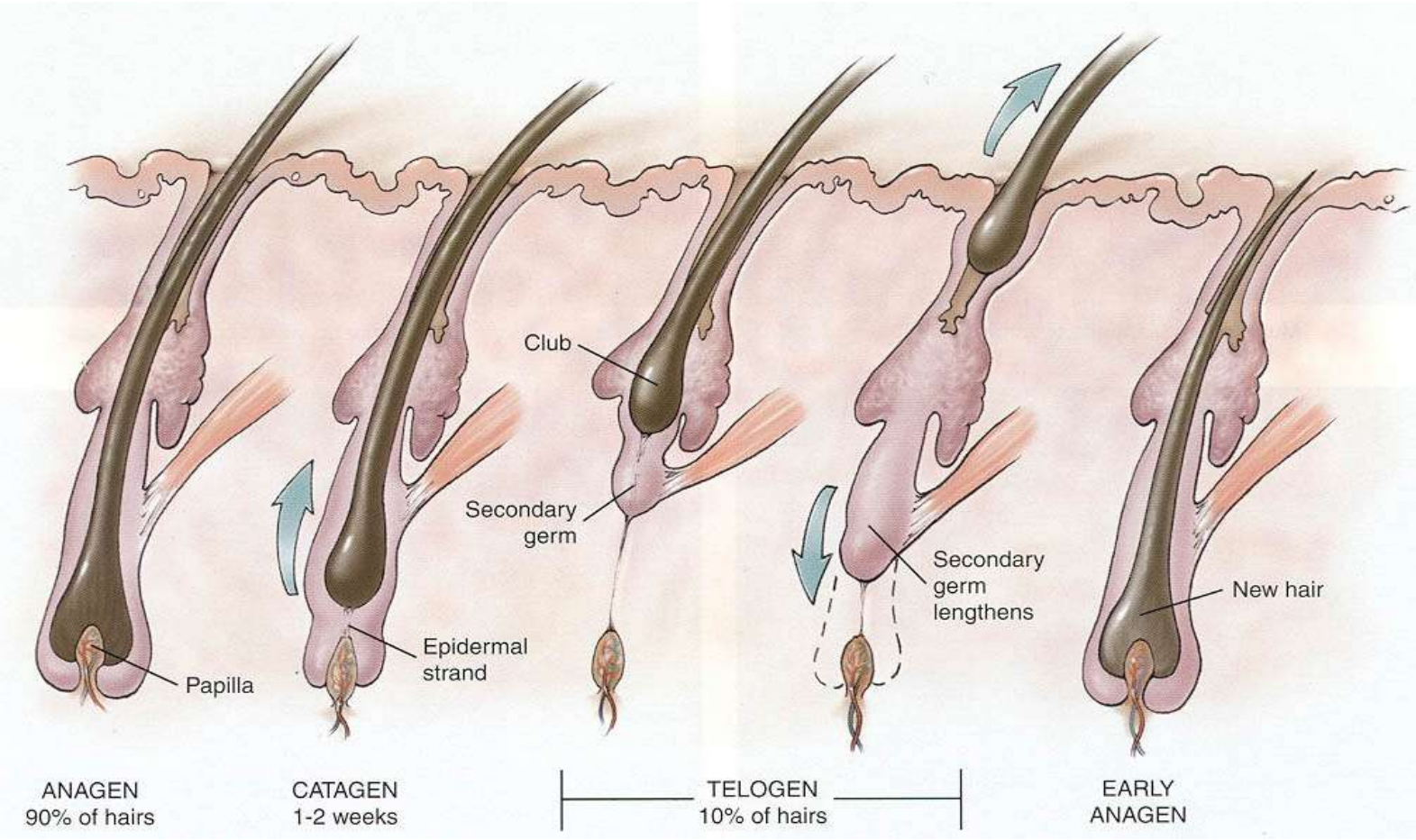
Androgenetic Alopecia

- 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*

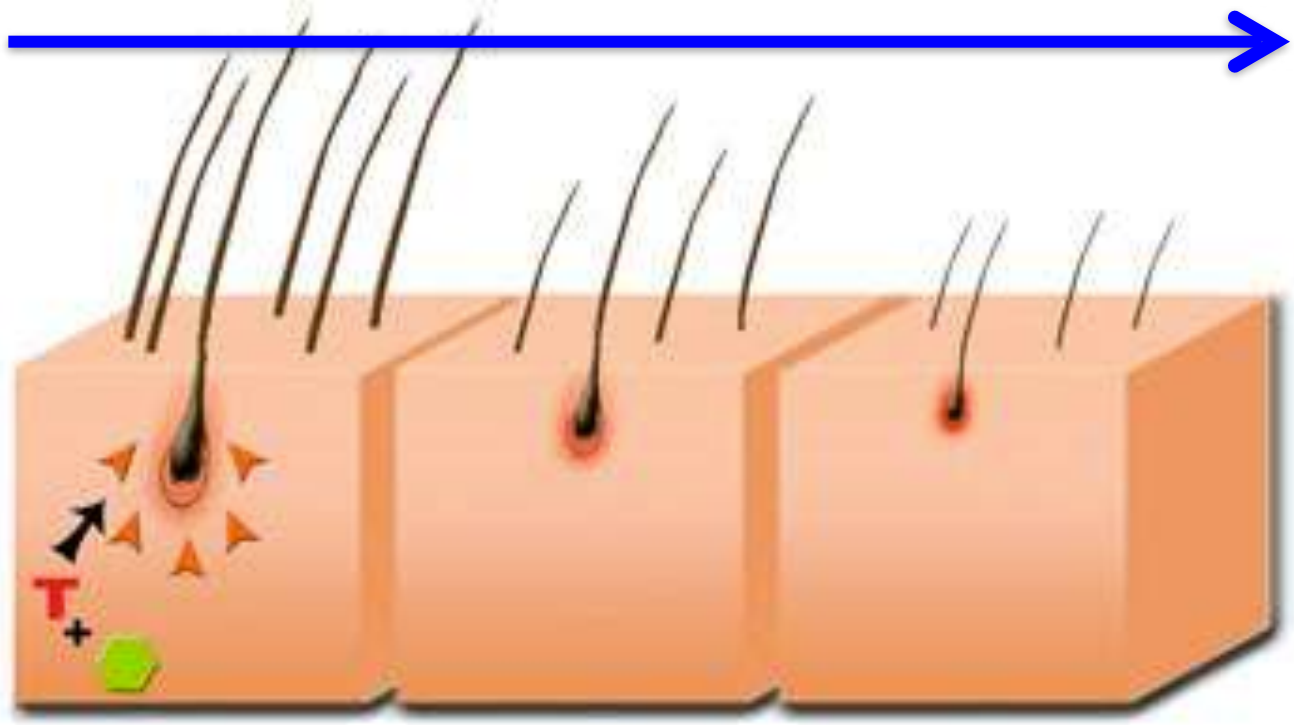


Growth Phase 2-6 yrs

Involution Phase <1%

Rest Phase 2-3 mos

Pathophysiology of Hair Loss*



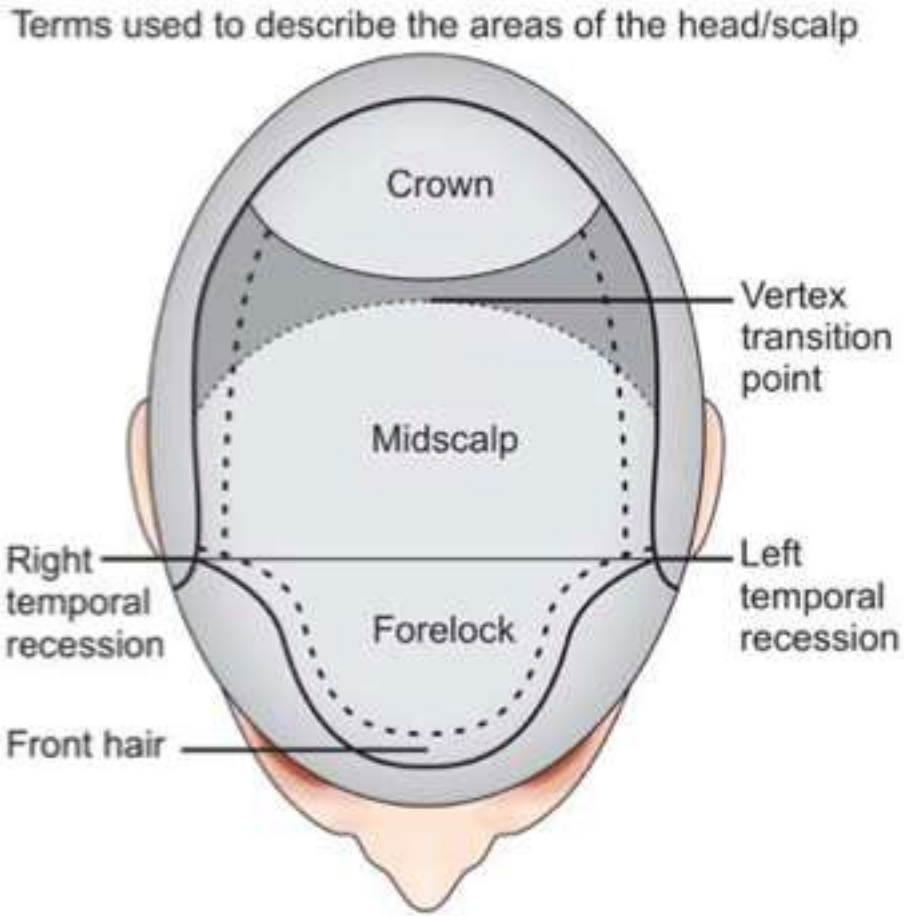
Patient Evaluation

- 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?

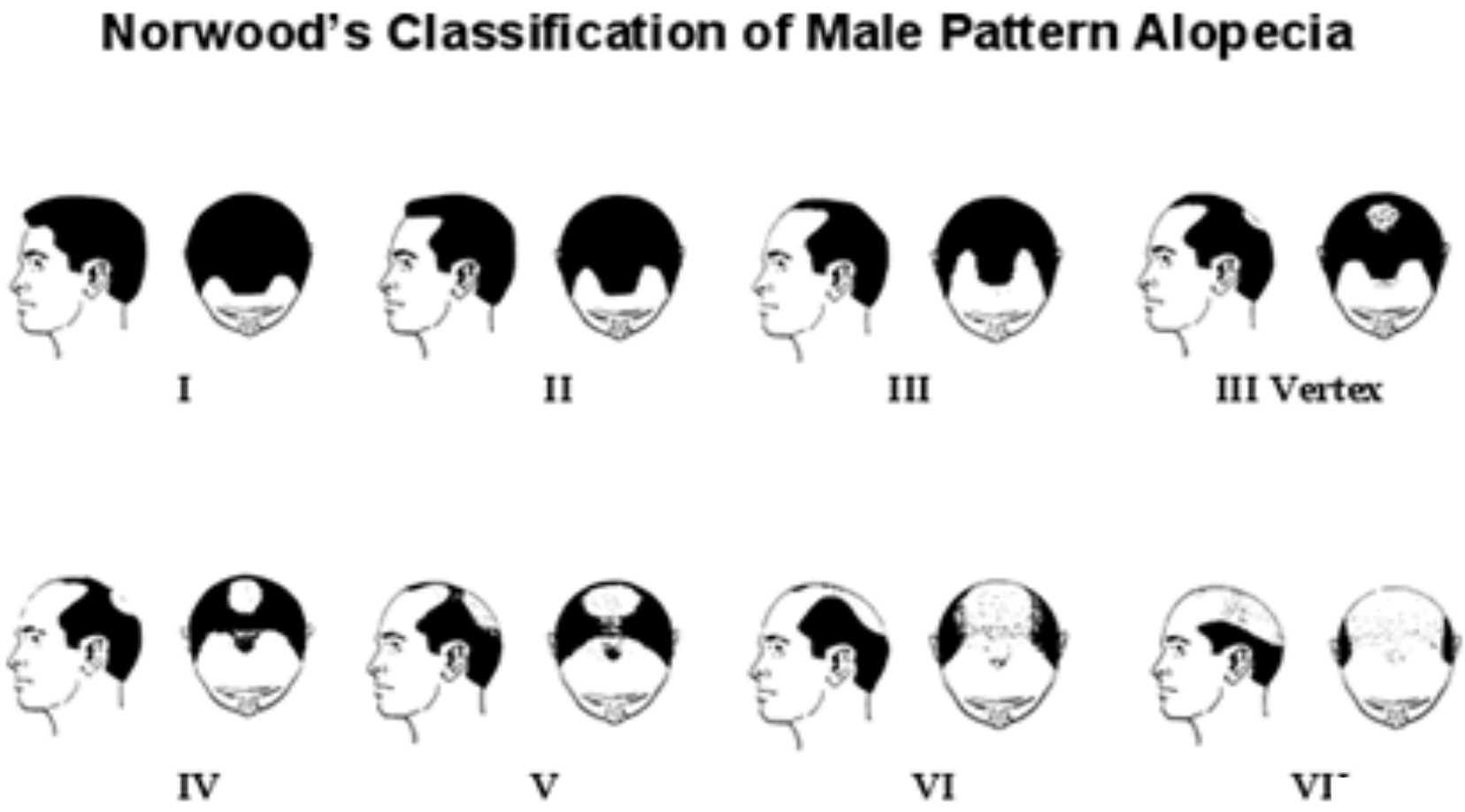
Patient Evaluation

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

Regions of Scalp



Classification-Men



Hair Loss in Women

- 55-60% of females have alternative causes for hair loss other than adrogenetic 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.

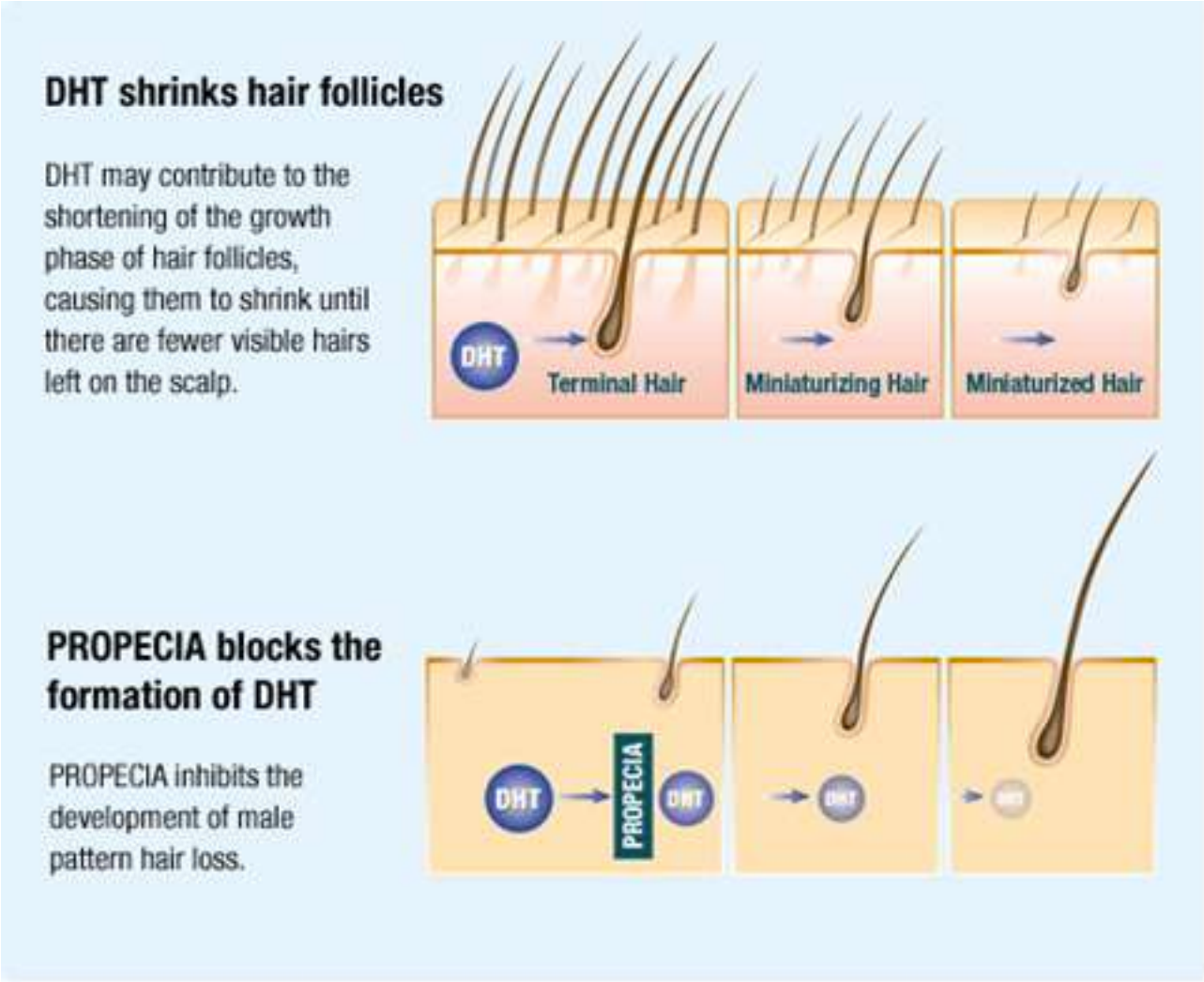
Patient Evaluation

- 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, Trasferrin saturation

Management

Medical Management

1. Propecia (Finasteride)

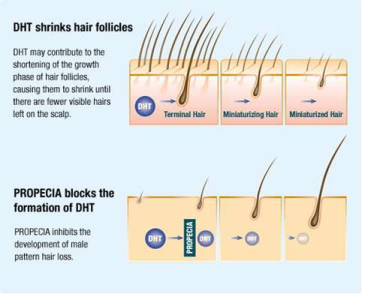


1. Propecia (Finasteride)

- 1 mg/day PO decreases both vertex and frontal hair loss and actually increased hair growth and hair counts

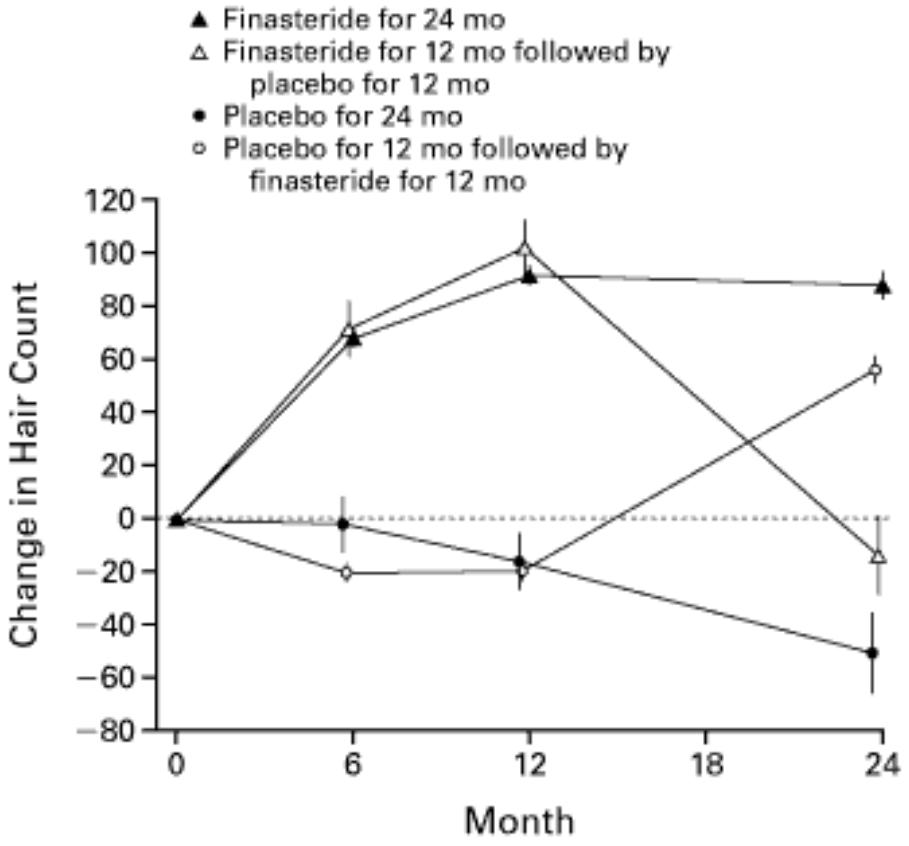
- Specifically converts the scalp hair into the anagen phase and has been shown to reverse hair miniaturization (ie. terminal to vellus conversion)

- 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)

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

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

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

Surgical Management

Surgical Management

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

Surgical Management

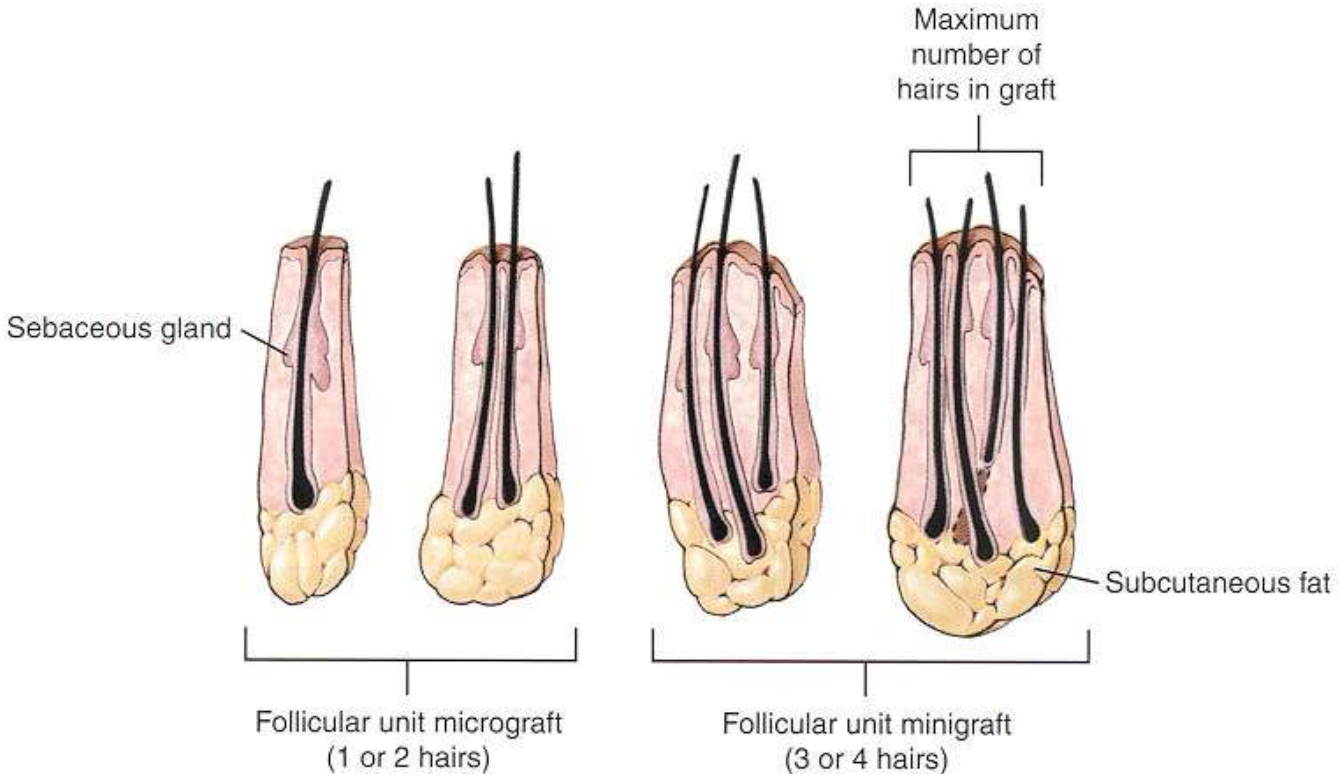
- Hair Transplantation: there are two main factors in hair transplantation that are critical to providing a natural, undetectable result

  - 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”)

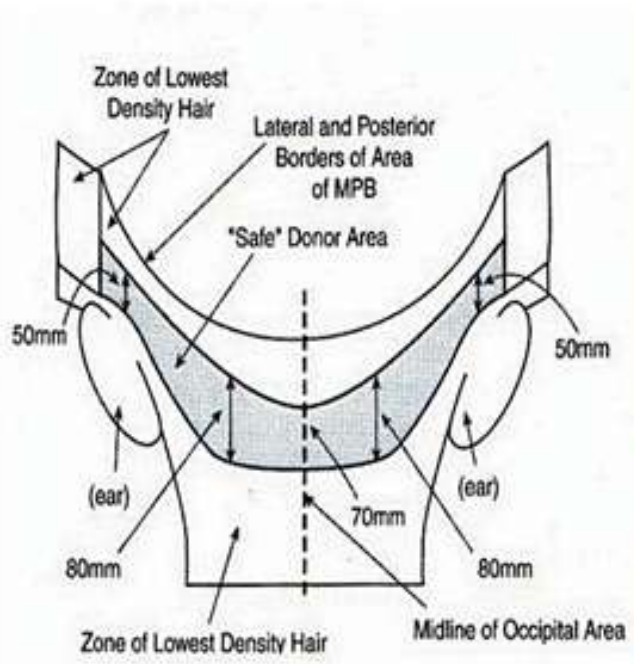
Hair Transplantation

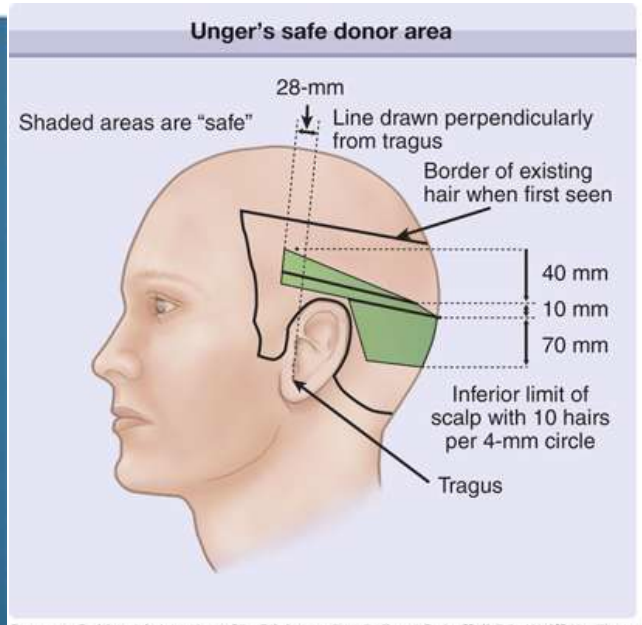
- Follicular graft units have between 1 and 4 hair follicles



Donor Site

- Safe Donor Area





Source: Goldsmith LA, Katz SI, Gilchrest BA, Paller AS, Leffell DJ, Wolff K: *Fitzpatri in 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
  - Tumescent 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

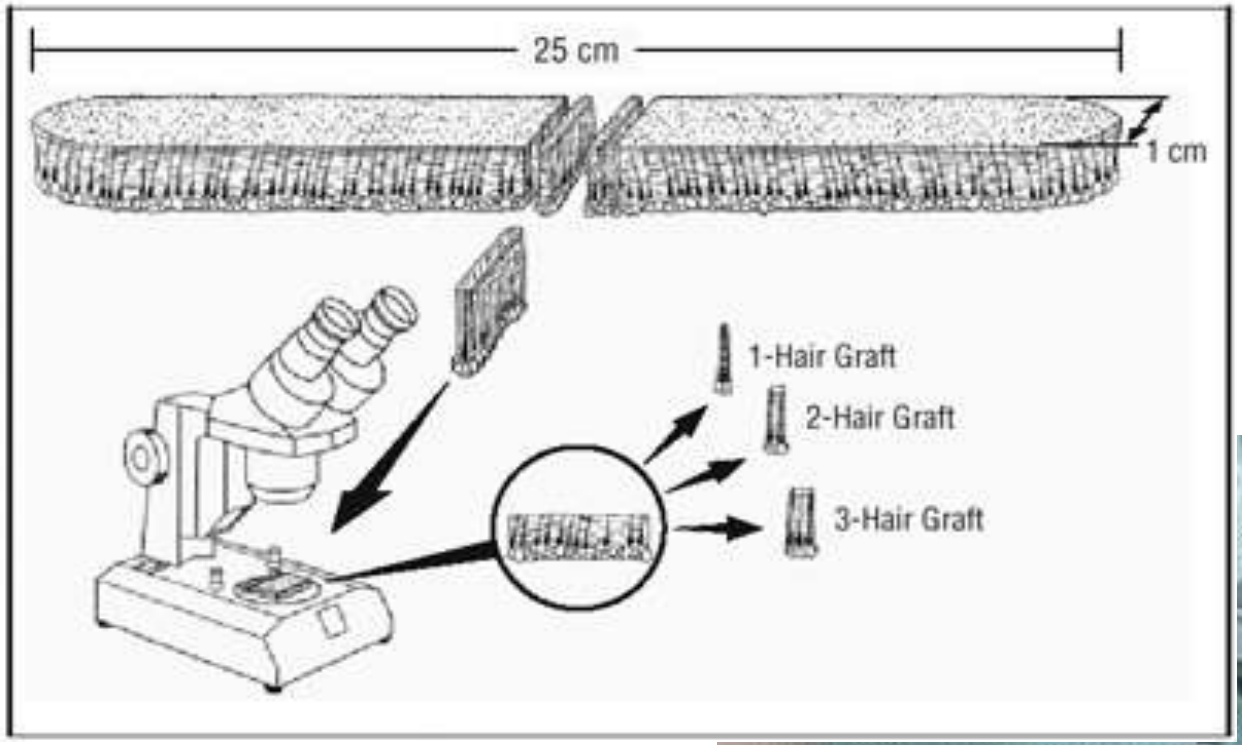
Strip Technique

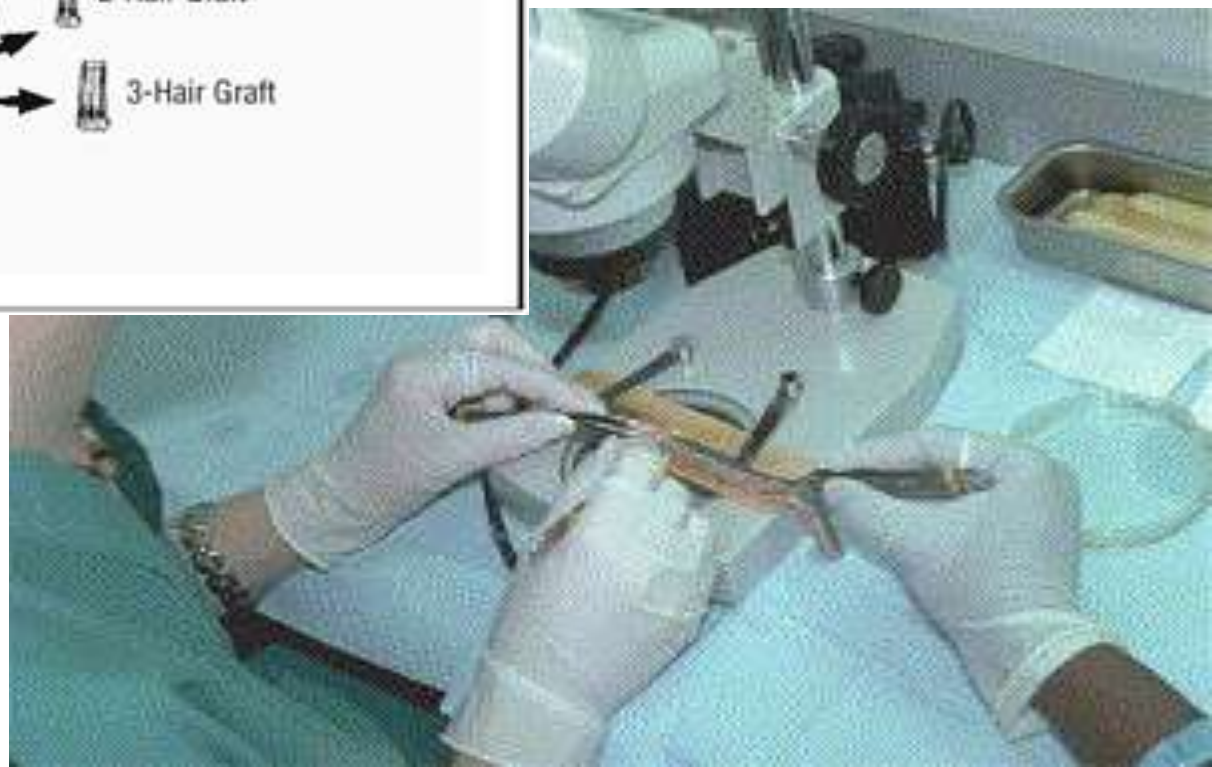
- Donor strip elevated in subcutaneous fat plane

Strip Technique

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

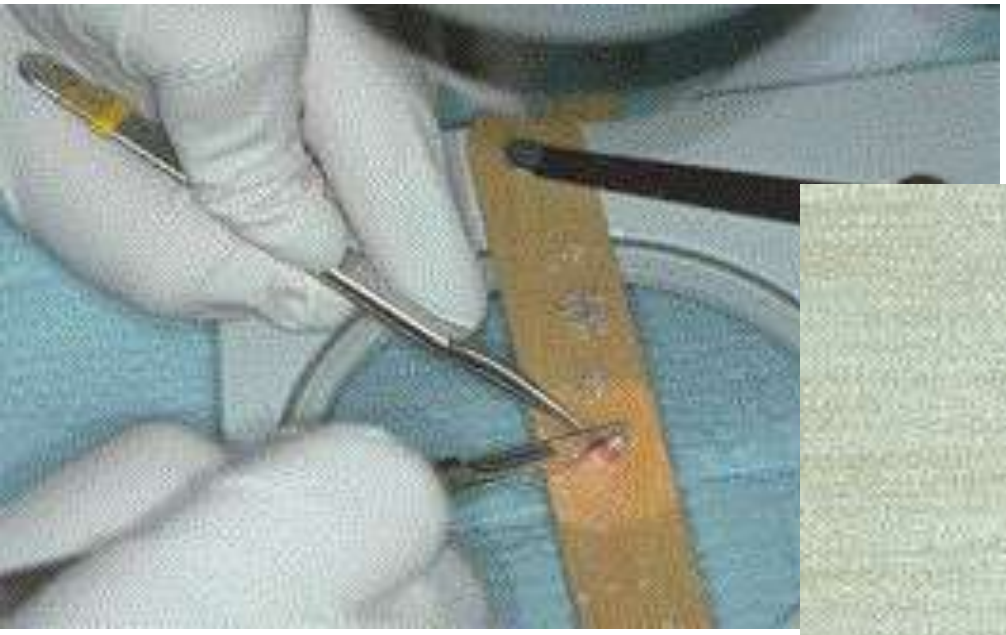
Strip Technique-Slivering





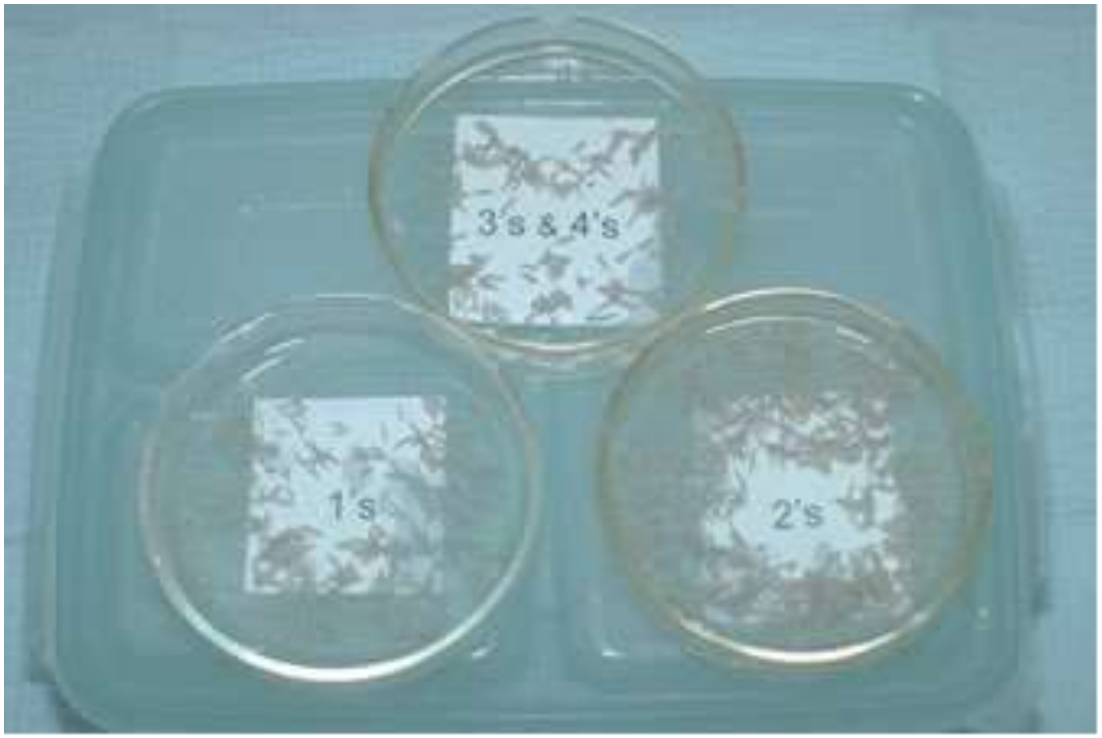
Strip Technique

- 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 t same, excep
  - Shave large
  - Harvesting hair follicle a-time with motorized punch

FUE Technique

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

*

FOLLICULAR UNIT EXTRACTION (FUE)	FOLLICULAR UNIT GRAFTING (FUG, aka "STRIP")
No scalpels, staples or sutures	Wound edges closed precisely with sutures
No linear scar	Long, thin scar
No visible scar so long as head is not shaved	Typically heals beautifully and is imperceptible so long as hair is kept sufficiently long
Minimal pain on recovery	Can be painful postoperatively, but this is easily controlled with pain medication
Faster healing, quicker return to normal activities	Longer recovery, sutures removed at 10-14 days postoperatively
Up to 2000 grafts per session (large cases require 2 days)	Up to 4000 grafts per session (1 day)
1-4 hours of extraction	1 hour of extraction
Higher cost	Lower cost

1 week post-FUE

Strip vs. FUE: scar

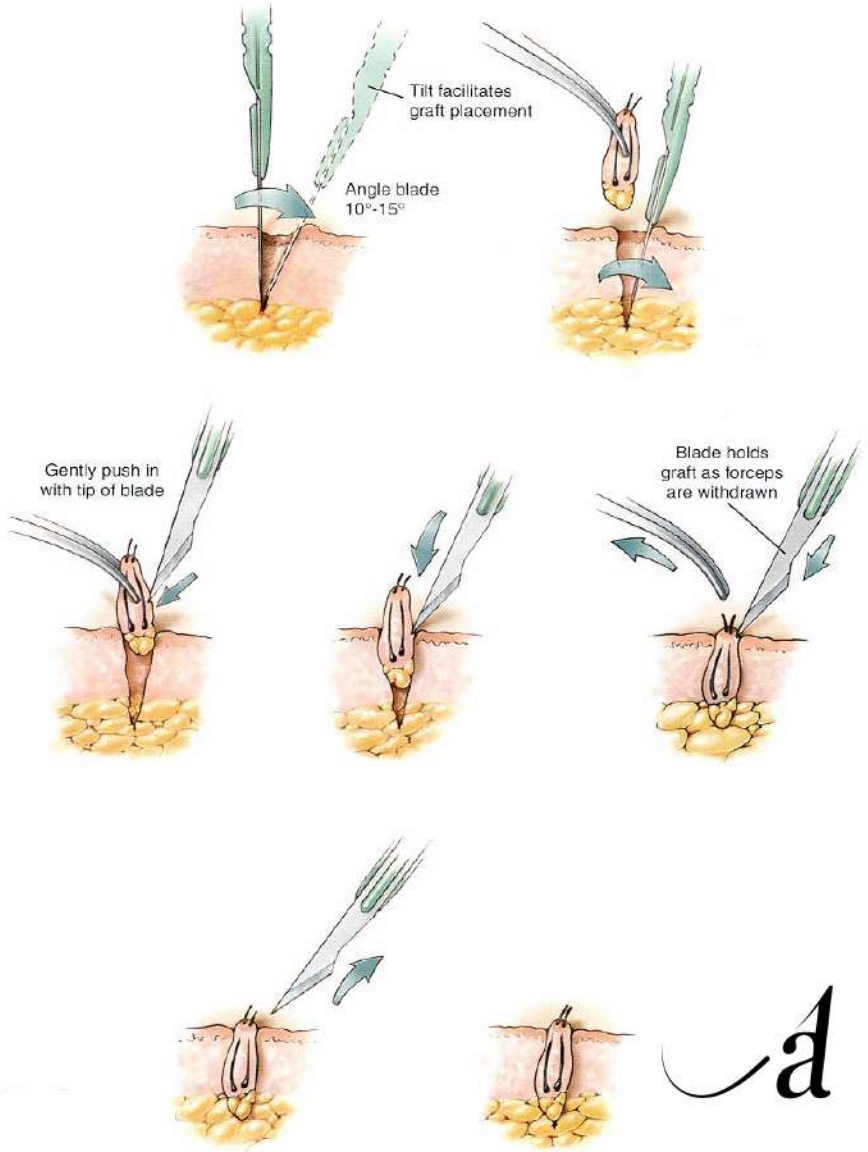
Ready to Plant!

- Critical to match density, angle and direction of the transplanted hairs

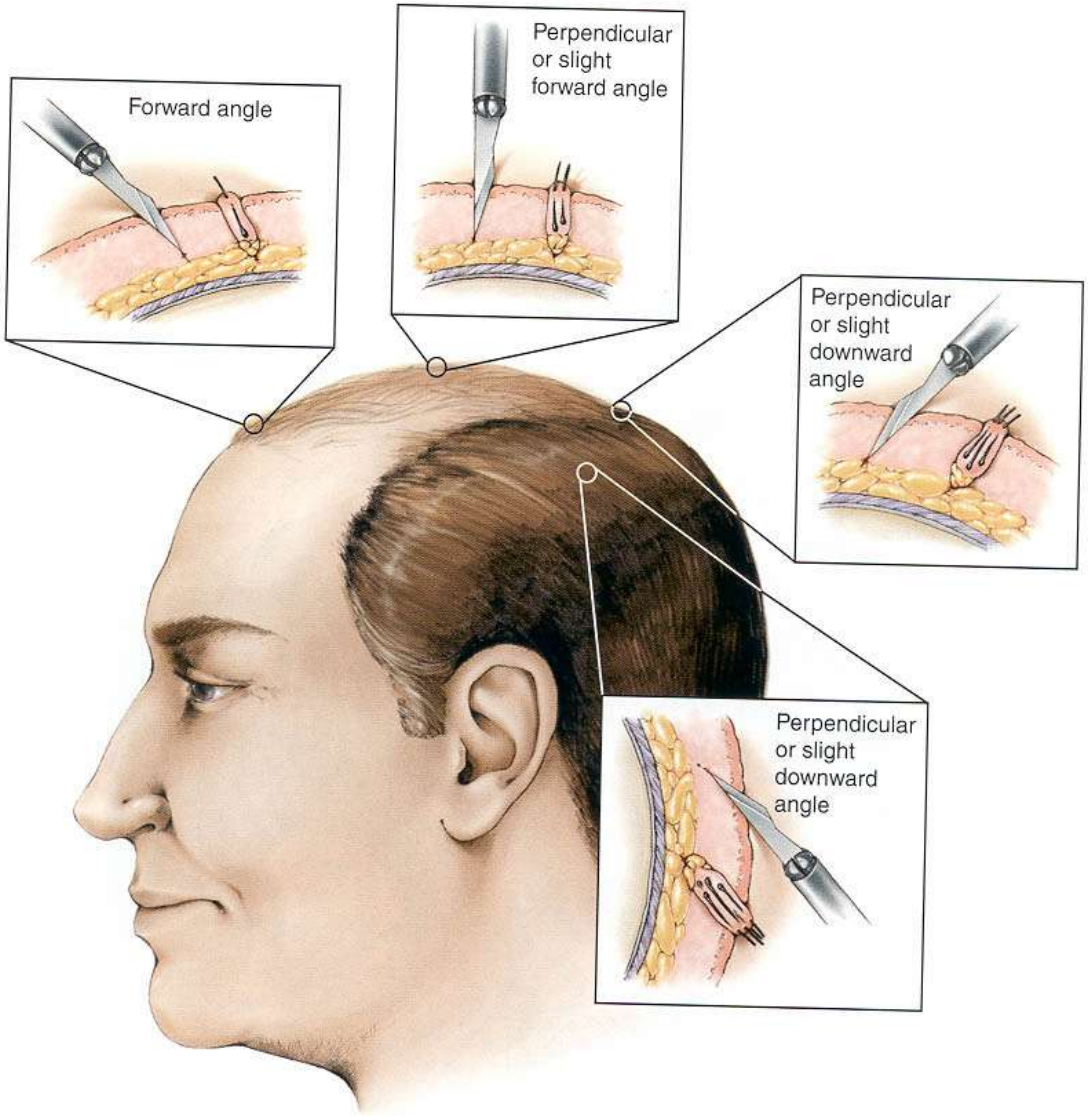
- Just like planting a garden: dig a hole, plant the graft, watch it grow!

Recipient Sites

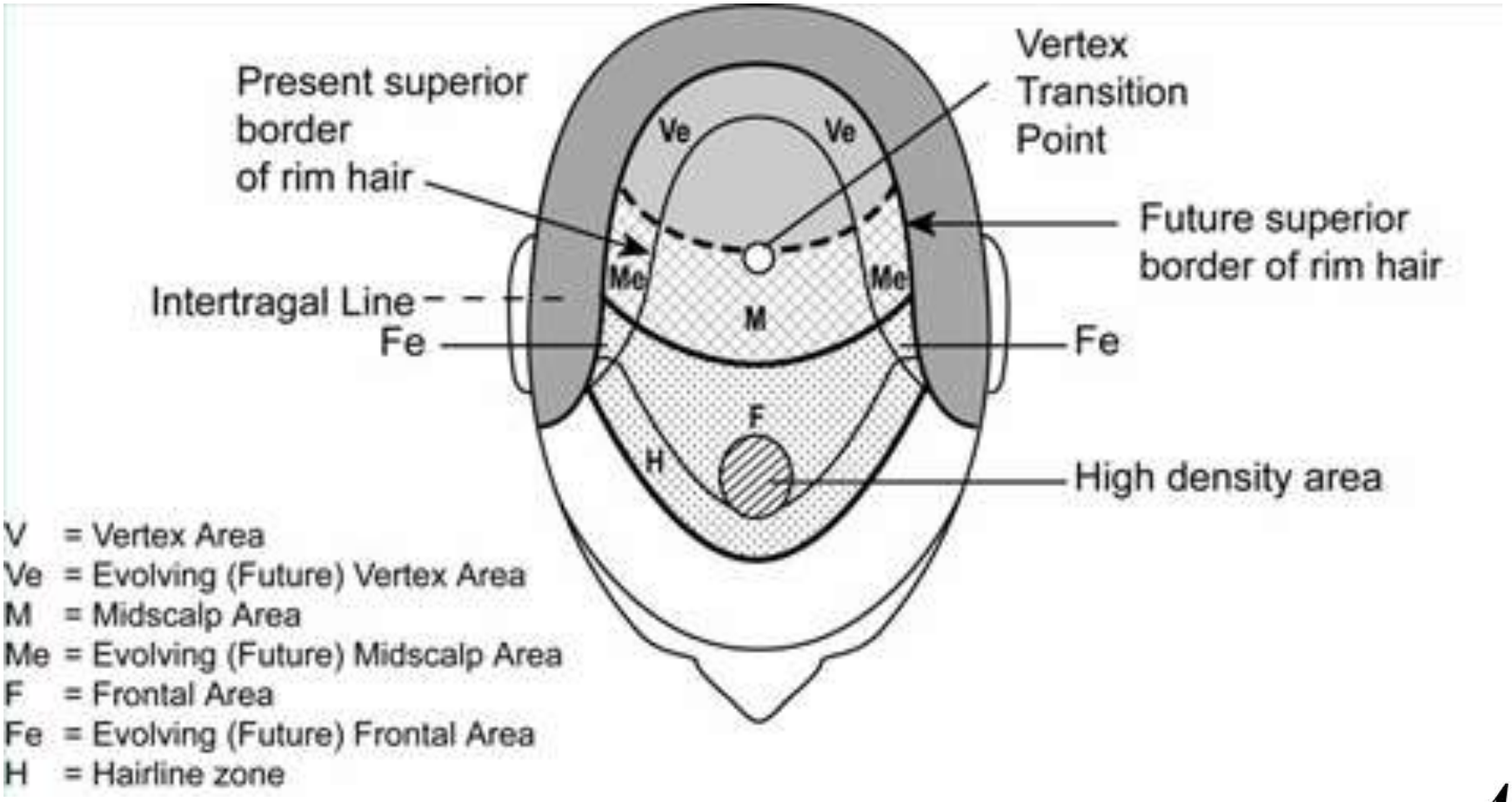
- Recipient Sites
  - Needle size guide equivalents
    - 20 gauge = 1-hair unit
    - 19 gauge = 2-hair and thin 3-hair units
    - 18 gauge = 3-hair and 4-hair units



Angle & Direction



Density Distribution



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

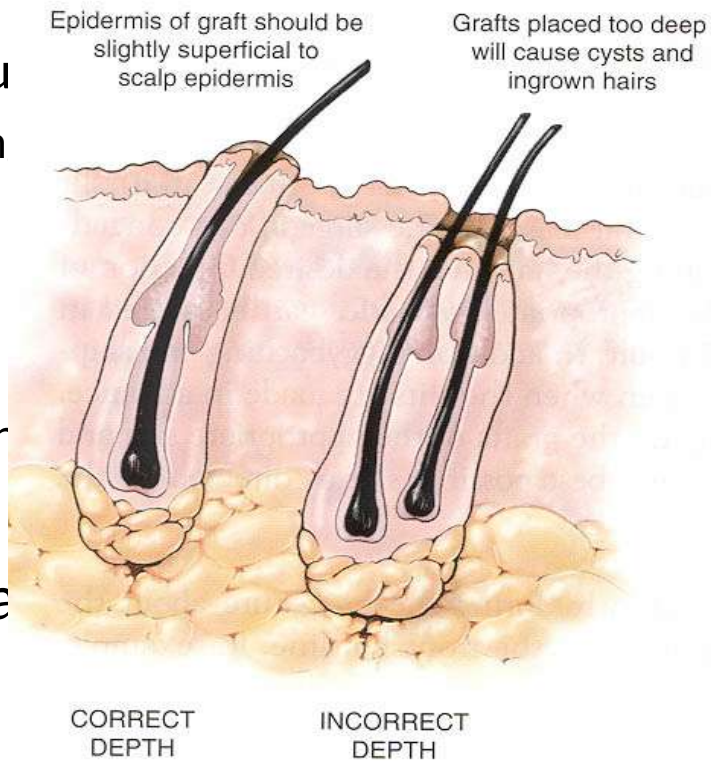
- Keep donor area covered with ointment and dressing overnight
- Regular spritzing of grafts for 2 days
- Gently wash scalp with water basin starting POD #3
- Sutures removed POD #10
- Regular showering POD #14
- Stop Rogaine 2 weeks pre-tx, re-start 2 weeks post-tx

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 difficu
    - Hairline creation looks unnatural lon
    - Do not know donor site stability
- Poor aesthetic outcome
  - Grafts in wrong direction
  - Crown transplant in young patient wh
- Improper graft handling→Poor gra
- 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