

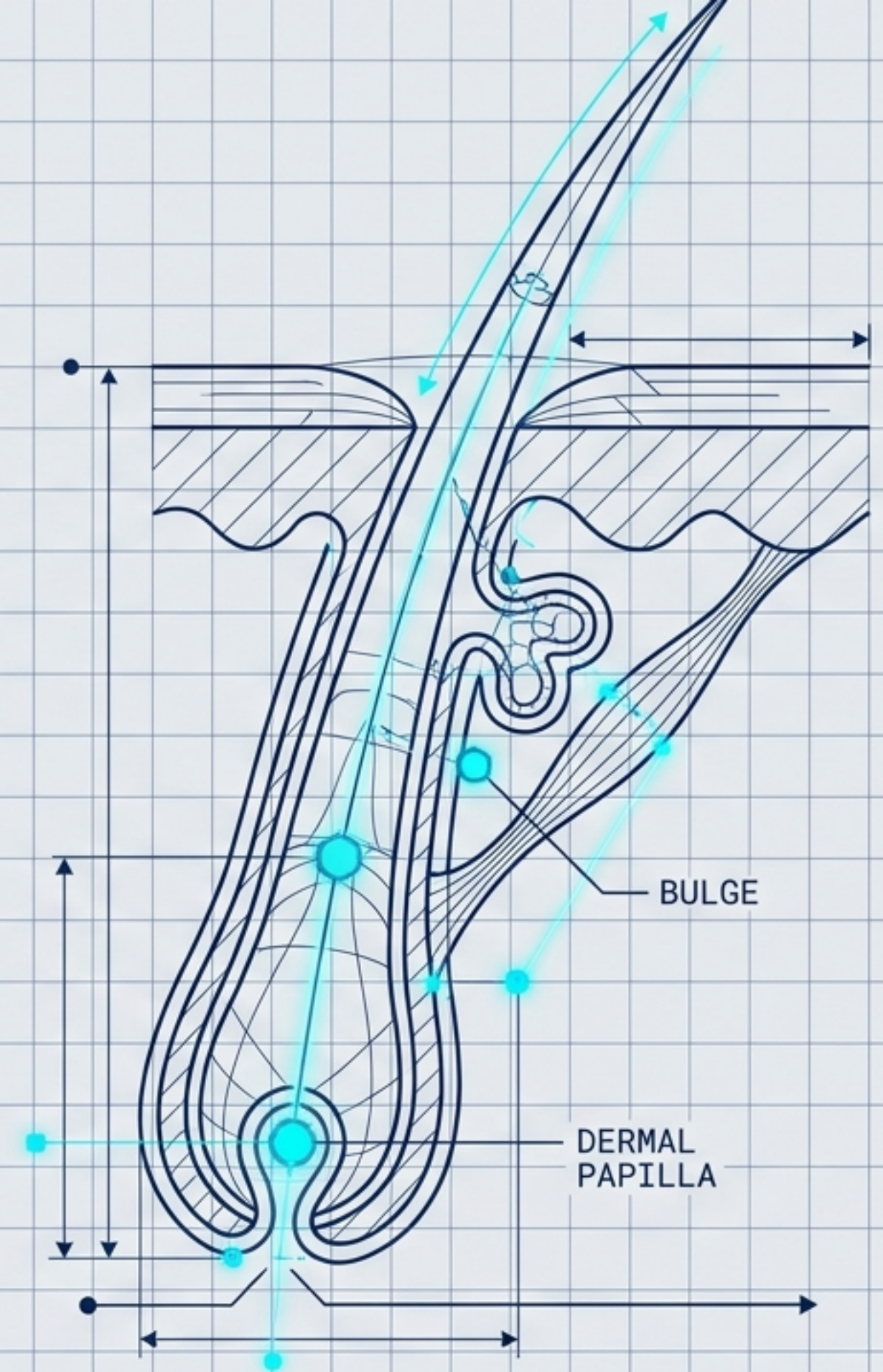
# The Science of Hair Regrowth

Ranking Non-Surgical  
Monotherapies:  
A Clinical & Patient Guide

[SYSTEMATIC  
REVIEW  
SYNTHESIS]

[EFFICACY  
HIERARCHIES]

[MECHANISM  
OF ACTION]





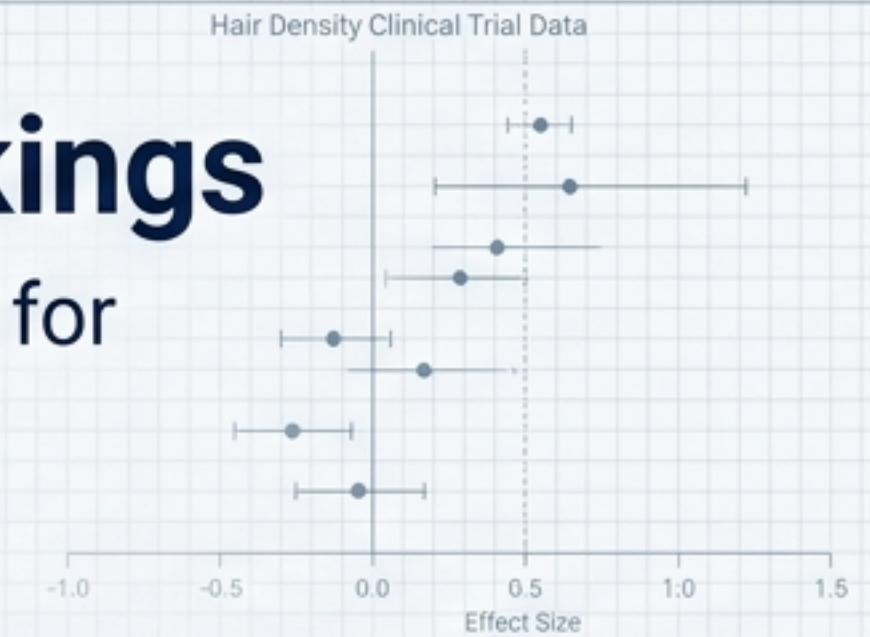
# The Efficacy Hierarchy: Monotherapy Rankings

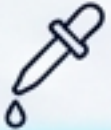
Treatments ranked in descending order of standalone effectiveness for **Androgenetic Alopecia** based on randomized **clinical data**.

Finasteride (1 mg)

Finasteride (0.5 mg)

Dutasteride (0.5 mg)

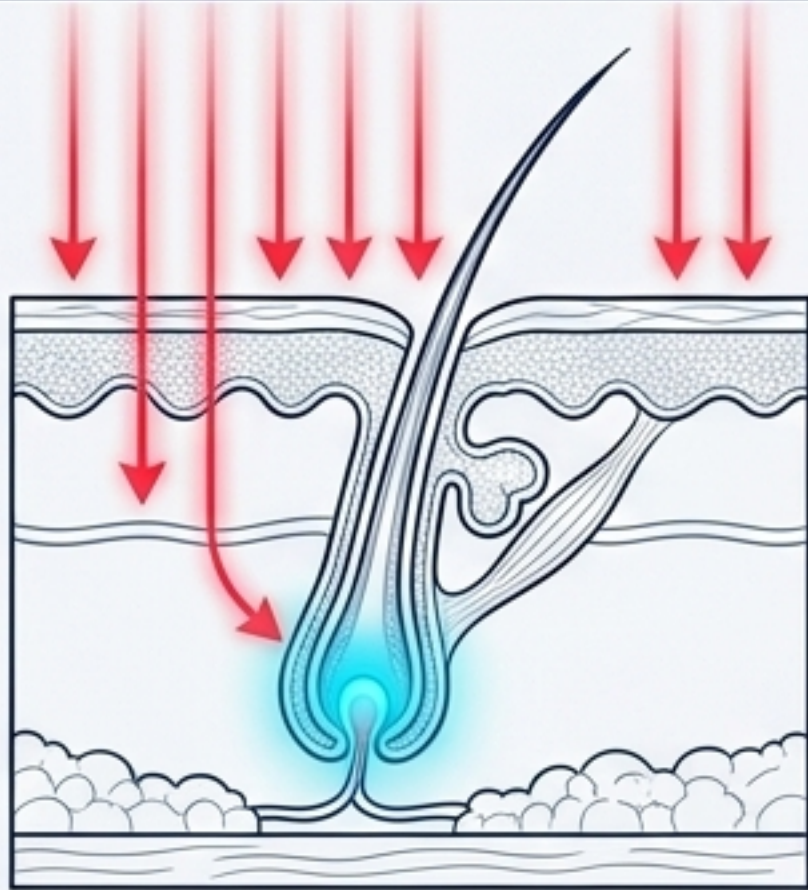


|   |                                                                                     |                                                            |                                                                                                                                                                                                    |
|---|-------------------------------------------------------------------------------------|------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 |    | <b>Bimatoprost</b> (Topical / Prostaglandin analogue)      |                                                                                                                 |
| 2 |    | <b>Low-Level Laser Therapy (LLLT)</b> (Photobiomodulation) |                                                                                                                 |
| 3 |   | <b>Finasteride (1 mg)</b> (Oral 5-AR inhibitor)            |                                                                                                                |
| 4 |  | <b>Dutasteride (0.5 mg)</b> (Oral 5-AR inhibitor)          |                                                                                                               |
| 5 |  | <b>5% Minoxidil</b> (Topical Vasodilator)                  |                                                                                                               |
| 6 |  | <b>2% Minoxidil</b> (Topical Vasodilator)                  |                                                                                                               |
| 7 |  | <b>Platelet-Rich Plasma (PRP)</b> (Autologous injection)   |  <div>Highest variance / wide confidence intervals resulting in lowest definitive monotherapy efficacy.</div> |



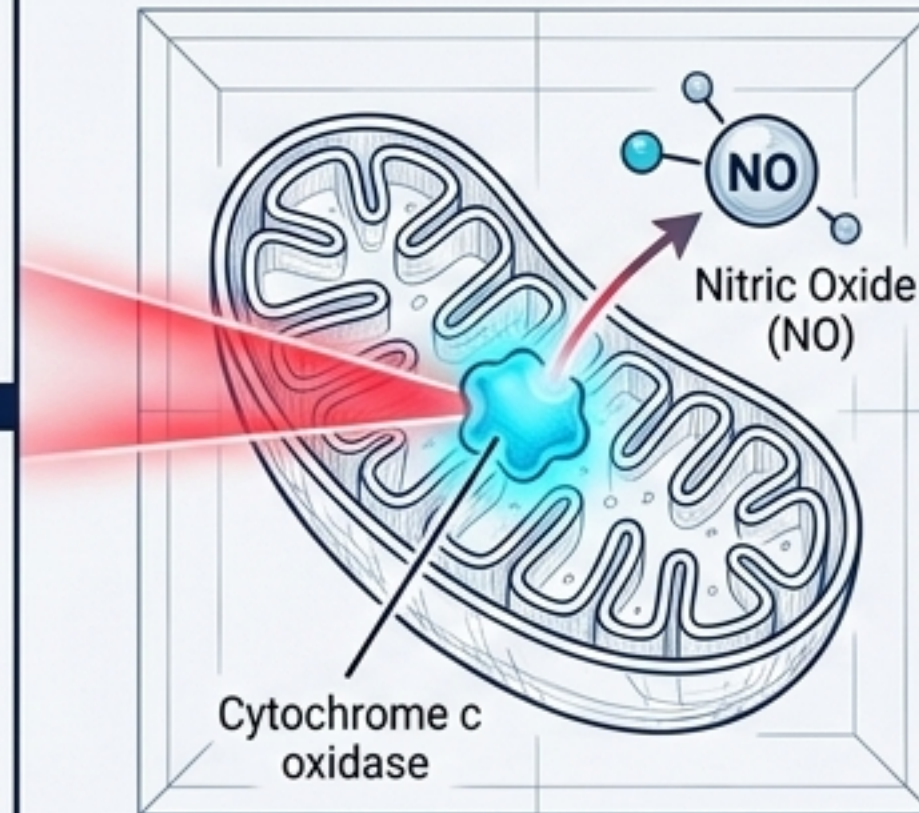
# The Photobiomodulation Engine: How LLLT Restores Follicles

## Scalp & Follicle Level (Target Penetration)



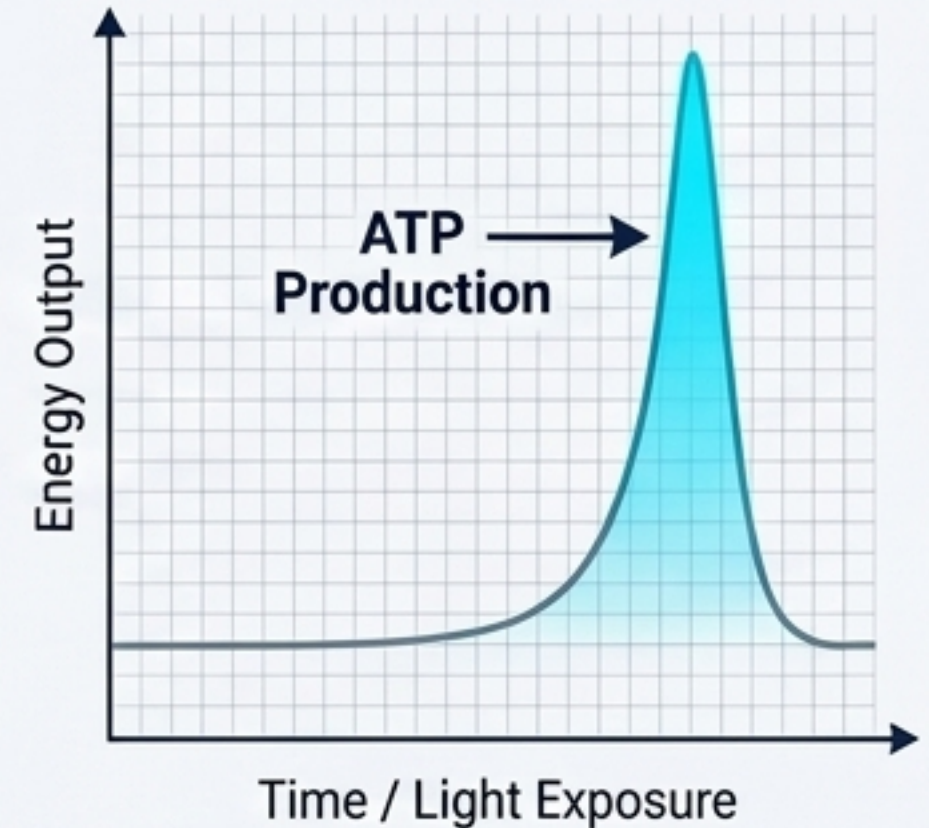
635 nm – 655 nm wavelength red laser light safely bypasses the epidermis to directly reach the follicular bulge and dermal papilla without thermal damage.

## Cellular Level (Molecular Unblocking)



The light energy triggers the photodissociation of inhibitory nitric oxide (NO) from cytochrome c oxidase (Unit IV in the mitochondrial respiratory chain).

## Molecular Level (The ATP Catalyst)



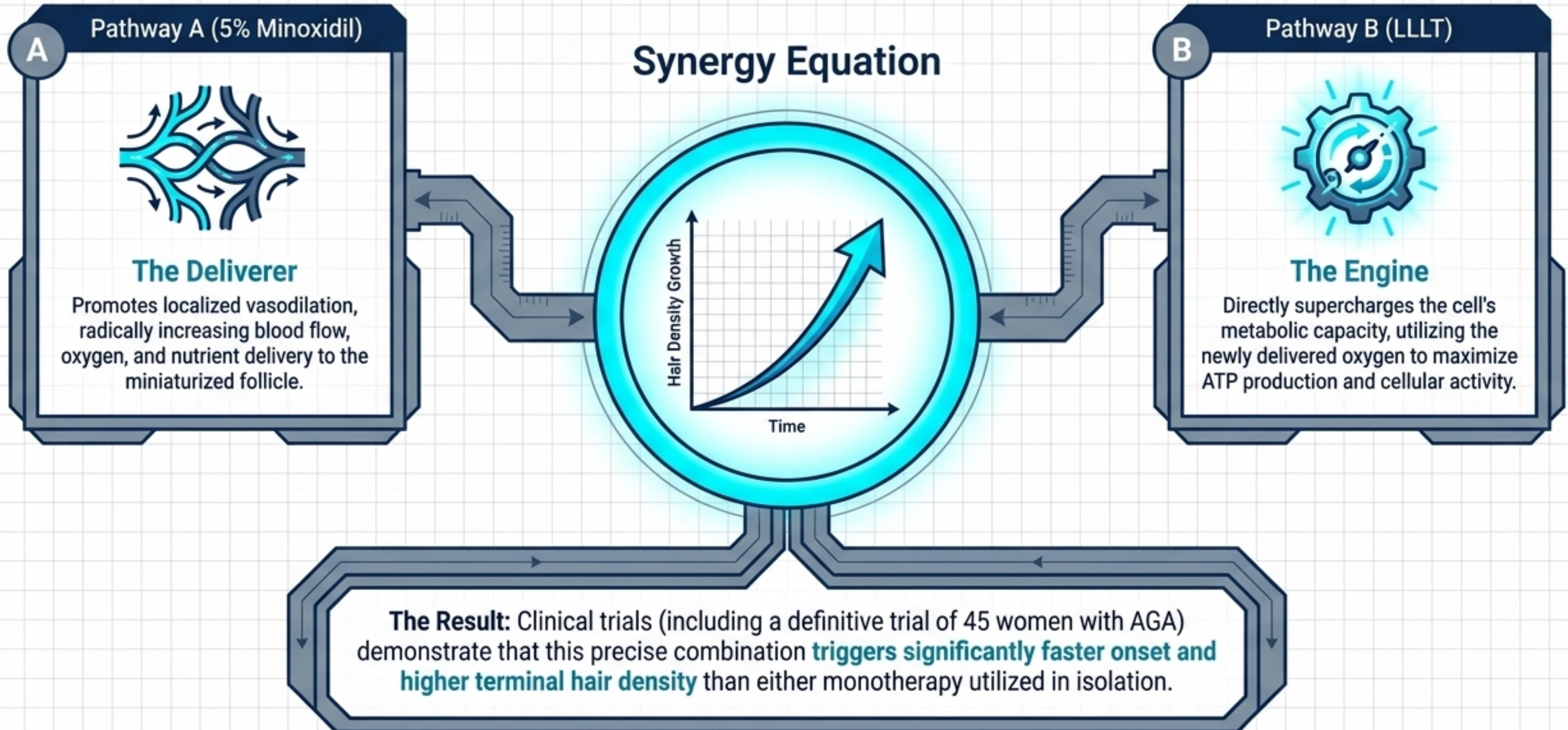
With NO removed, cellular respiration optimizes, driving a massive surge in ATP (adenosine triphosphate) production.

Accelerated mitosis, stimulation of follicle stem cells, and a definitive shift from the telogen (resting) to anagen (growth) phase.



# The Multiplier Effect: 5% Minoxidil + LLLT

Attacking androgenetic alopecia through non-competing, complementary biological pathways.





# Clinical Realities: Safety, Side Effects, and Compliance

| Low-Level Laser Therapy (LLLT) |                                                                                                                                                                                                                                                 | Topical 5% Minoxidil |                                                                                                                                                                                                                                                                        |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Side Effects:                  |  <b>Exceptionally mild.</b> Clinical data reports temporary dry skin (5.1%), slight pruritus/itching (2.5%), and a warm sensation (1.3%). Zero systemic risks. | Side Effects:        |  <b>Moderate localized risks.</b> Higher rates of scalp irritation, erythema, and vehicle-dependent contact dermatitis.                                                             |
| Shedding Phase:                |  <b>Minimal to none.</b>                                                                                                                                     | Shedding Phase:      |  <b>Common.</b> Initial telogen effluvium (shedding) is a known and highly documented psychological hurdle for patients.                                                          |
| Patient Compliance:            |  <b>High.</b> Requires 8–15 minute sessions, 3x per week. Leaves zero residue and creates no cosmetic friction for styling.                                  | Patient Compliance:  |  <b>Moderate.</b> Requires daily or twice-daily application. The solution must remain in contact with the scalp for at least 4 hours, often leaving hair feeling greasy or stiff. |