



Understanding Hair Structure and Hair Removal Techniques

Hair removal is a common cosmetic practice with various methods available, ranging from traditional techniques to advanced laser treatments. This presentation explores the structure of hair, the hair growth cycle, and different hair removal methods, with a focus on advanced laser techniques such as Nd:YAG and Alexandrite lasers.



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PLASTIC SURGEON

The Hair Follicle Structure

Hair Follicle

The hair follicle is a complex skin structure responsible for hair growth. It is embedded in the dermis and consists of multiple layers, including the hair bulb, which is the living part of the hair.

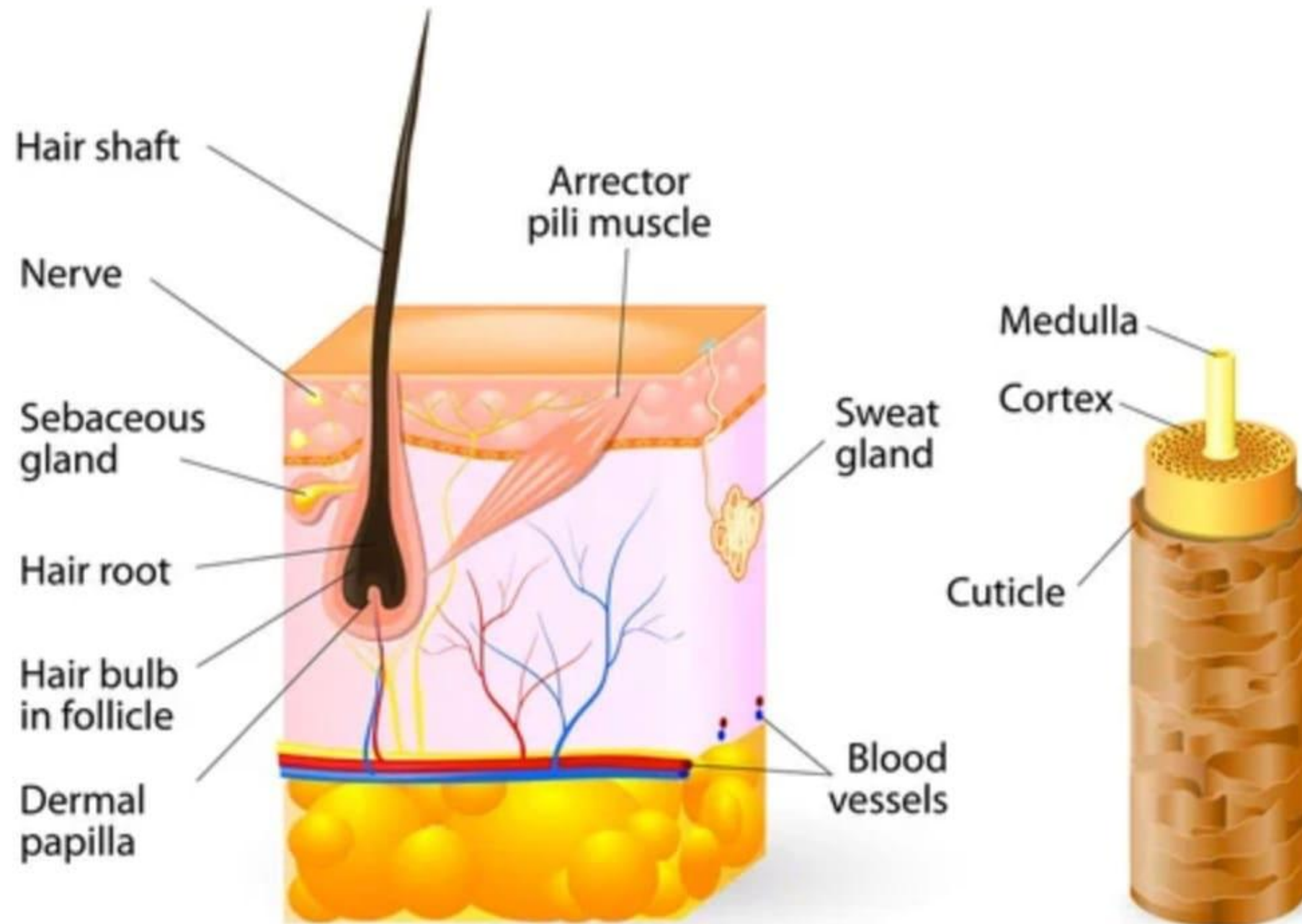
The hair follicle is closely associated with the **sebaceous gland**, which produces **sebum**, an oily substance that lubricates the hair and skin, providing moisture and protection.

Hair Shaft

The hair shaft is the visible part of the hair that extends above the skin's surface. It is composed of three main layers:

- **Cuticle**: The outermost layer, made of overlapping keratinized cells that protect the inner layers.
- **Cortex**: The middle layer, which contains keratin and melanin, giving hair its strength, color, and texture.
- **Medulla**: The innermost layer, which is not always present and is more prominent in thicker hairs.

HAIR ANATOMY



Hair Growth Cycle

Anagen Phase

The active growth phase, lasting 2–6 years. Hair grows approximately 1 cm per month during this phase.



Catagen Phase

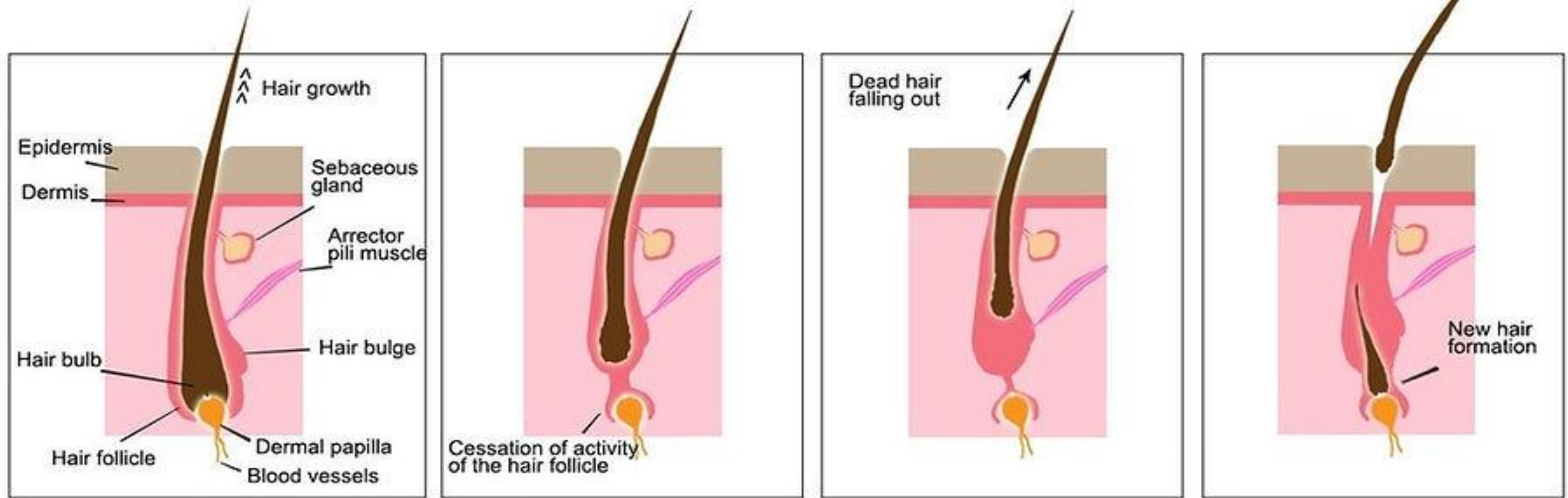
A transitional phase lasting 2–4 weeks, where hair growth stops, and the follicle shrinks.

Telogen Phase

The resting phase, lasting about 3–5 months. Hair sheds during this phase, and new hair begins to grow, restarting the cycle.

Understanding the hair growth cycle is essential for effective hair removal techniques, as treatments like laser hair removal target hair in the anagen phase.

The Hair Cycle



Anagen Phase

2-6 Years

Active Growth

Producing New Cells

Catagen Phase

2-4 Weeks

Stops Growing

Detaching Slowly

Telogen Phase

3-5 Months

Follicle Rest

Prepares Next Cycle

Cycle
Starts
Over



Traditional Hair Removal Techniques



Waxing

- A semi-permanent method that removes hair from the root.
- Warm wax is applied to the skin, adhered to the hair, and then quickly removed, pulling out the hair.
- Results last 3–6 weeks, depending on hair growth.



Threading

- A traditional method using a twisted cotton thread to remove hair from the follicle.
- Commonly used for facial hair removal, such as eyebrows.
- Precise and effective for small areas.



Depilatory Creams

- Chemical-based creams that dissolve hair at the skin's surface.
- Easy to use but temporary, with results lasting a few days.
- May cause skin irritation in sensitive individuals.
- These hair-removing creams contain alkaline-based ingredients like sodium thioglycolate, calcium thioglycolate, and strontium sulfide.



2-3 days



Shaving



1-2 weeks



**Depilatory
cream**



3-4 weeks



Wax



3-4 weeks



**Epilator
Threading**



Forever



Laser

Permanent Hair Removal Method



Normal Follicle



Razor



Depilatory Cream



Wax



Laser Hair Removal

Advanced Hair Removal: Laser Hair Removal

Laser hair removal is one of the most advanced and effective methods for long-term hair reduction. Two of the most commonly used lasers in this field are the Nd:YAG laser and the Alexandrite laser. Each laser has unique properties that make it suitable for different skin types and hair colors.

1 How Laser Hair Removal Works

Laser hair removal works by targeting the melanin in the hair follicle with concentrated light. The light is absorbed by the pigment, creating heat that damages the follicle and inhibits future hair growth.

2 Effectiveness Factors

The effectiveness of laser hair removal depends on the contrast between hair and skin color, the laser type used, and the stage of hair growth during treatment.

Nd:YAG Laser

How It Works

The Nd:YAG laser emits light at a wavelength of 1064 nm, which penetrates deeply into the skin.

It targets the melanin in the hair follicle, generating heat that damages the follicle and inhibits future hair growth.

The longer wavelength allows it to bypass the melanin in the epidermis (surface skin), making it safer for darker skin tones (Fitzpatrick skin types IV–VI).

Advantages

- **Safe for Dark Skin:** The 1064 nm wavelength minimizes the risk of hyperpigmentation, burns, and scarring in darker skin types.
- **Deep Penetration:** Effective for coarse, thick hair due to its ability to reach deeper follicles.
- **Versatility:** Can be used on almost all body areas, including sensitive areas like the face, bikini line, and underarms.

Limitations

- **Less effective on fine or light-colored hair** (blonde, gray, or red) due to lower melanin content.
- **May require more sessions** compared to other lasers for optimal results.

Alexandrite Laser

How It Works

The Alexandrite laser emits light at a wavelength of 755 nm, which is highly absorbed by melanin.

It targets the melanin in the hair shaft and follicle, generating heat to destroy the follicle.

The shorter wavelength makes it highly effective for lighter skin types (Fitzpatrick skin types I–III).

Advantages

- Fast and Efficient: Covers larger areas quickly due to its larger spot size and high repetition rate.
- Effective for Light Skin: Ideal for individuals with fair skin and dark hair, as the contrast between skin and hair allows for better targeting.
- Precision: Effectively treats fine and coarse hair.

Limitations

- Not suitable for darker skin tones (Fitzpatrick skin types IV–VI) due to the risk of burns, hyperpigmentation, and scarring.
- Less effective on lighter hair colors (blonde, gray, or red).



Comparison of Nd:YAG and Alexandrite Lasers

Feature	Nd:YAG Laser	Alexandrite Laser
Wavelength	1064 nm	755 nm
Skin Types	Fitzpatrick IV–VI (darker skin)	Fitzpatrick I–III (lighter skin)
Hair Types	Coarse, dark hair	Fine to coarse, dark hair
Penetration Depth	Deep	Moderate
Speed	Slower (smaller spot size)	Faster (larger spot size)
Safety on Dark Skin	High	Low

Procedure for Laser Hair Removal

Pre-Treatment Preparation

- Avoid sun exposure and tanning for at least 4–6 weeks before treatment.
- Shave the treatment area 24–48 hours before the session (do not wax or pluck, as this removes the hair follicle).
- Conduct a patch test to assess skin reaction and determine the appropriate laser settings.

During the Treatment

- A cooling gel or cooling device is applied to protect the skin and minimize discomfort.
- The laser is applied to the treatment area in pulses. Patients may feel a slight snapping sensation or warmth.
- The duration of the session depends on the size of the treatment area (e.g., upper lip: 5–10 minutes; legs: 30–60 minutes).

Post-Treatment Care

- Apply soothing creams or aloe vera to reduce redness and irritation.
- Avoid sun exposure and use sunscreen to protect the treated area.
- Do not wax, pluck, or use depilatory creams between sessions. Shaving is allowed.
- Multiple sessions (6–8) are typically required, spaced 4–6 weeks apart, to target hair in different growth phases (anagen).

Safety, Advantages, and Limitations of Laser Hair Removal

Safety Considerations

1

- Skin Type Matching: Ensure the laser type matches the patient's skin type to minimize risks.
- Cooling Systems: Use integrated cooling systems or cooling gels to protect the epidermis and enhance patient comfort.
- Trained Professionals: Only licensed and trained practitioners should perform laser hair removal to avoid complications like burns, scarring, or pigmentation changes.
- Post-Care Instructions: Educate patients on proper aftercare to ensure optimal results and minimize side effects.

2

Advantages

- Long-Term Results: Reduces hair growth significantly after a series of treatments.
- Precision: Targets dark, coarse hairs while leaving surrounding skin undamaged.
- Speed: Treats multiple hairs simultaneously, making it efficient for large areas like the back or legs.
- Reduced Ingrown Hairs: Unlike shaving or waxing, laser hair removal minimizes the occurrence of ingrown hairs.

Limitations and Risks

3

- Multiple Sessions Required: Hair grows in cycles, so multiple treatments are needed to target all follicles.
- Cost: Laser hair removal can be expensive compared to other methods.
- Temporary Side Effects: Redness, swelling, and mild discomfort may occur but usually subside within a few hours to days.
- Not Suitable for All Hair Types: Less effective on light-colored hair (blonde, gray, or red).