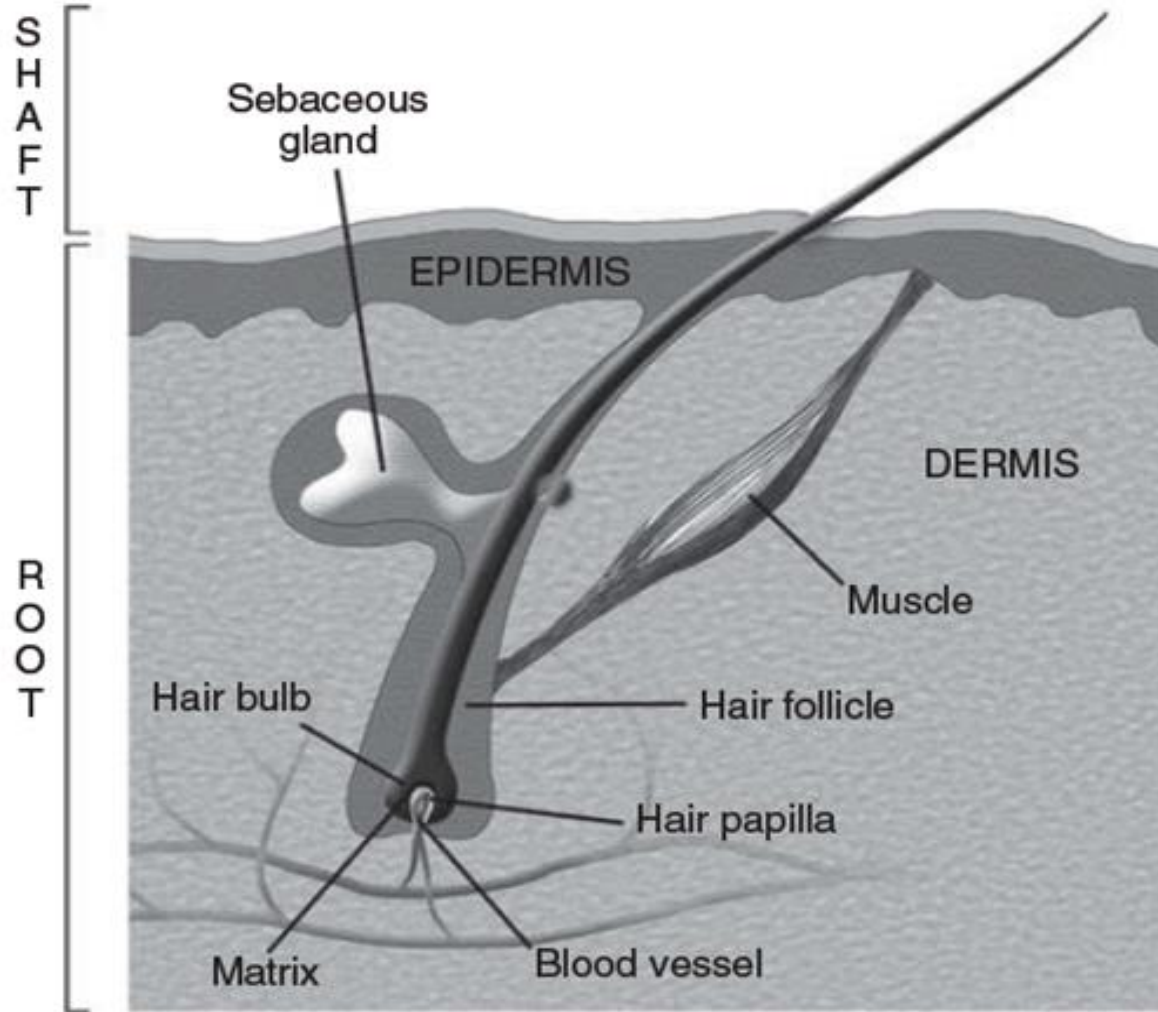


Unit 2

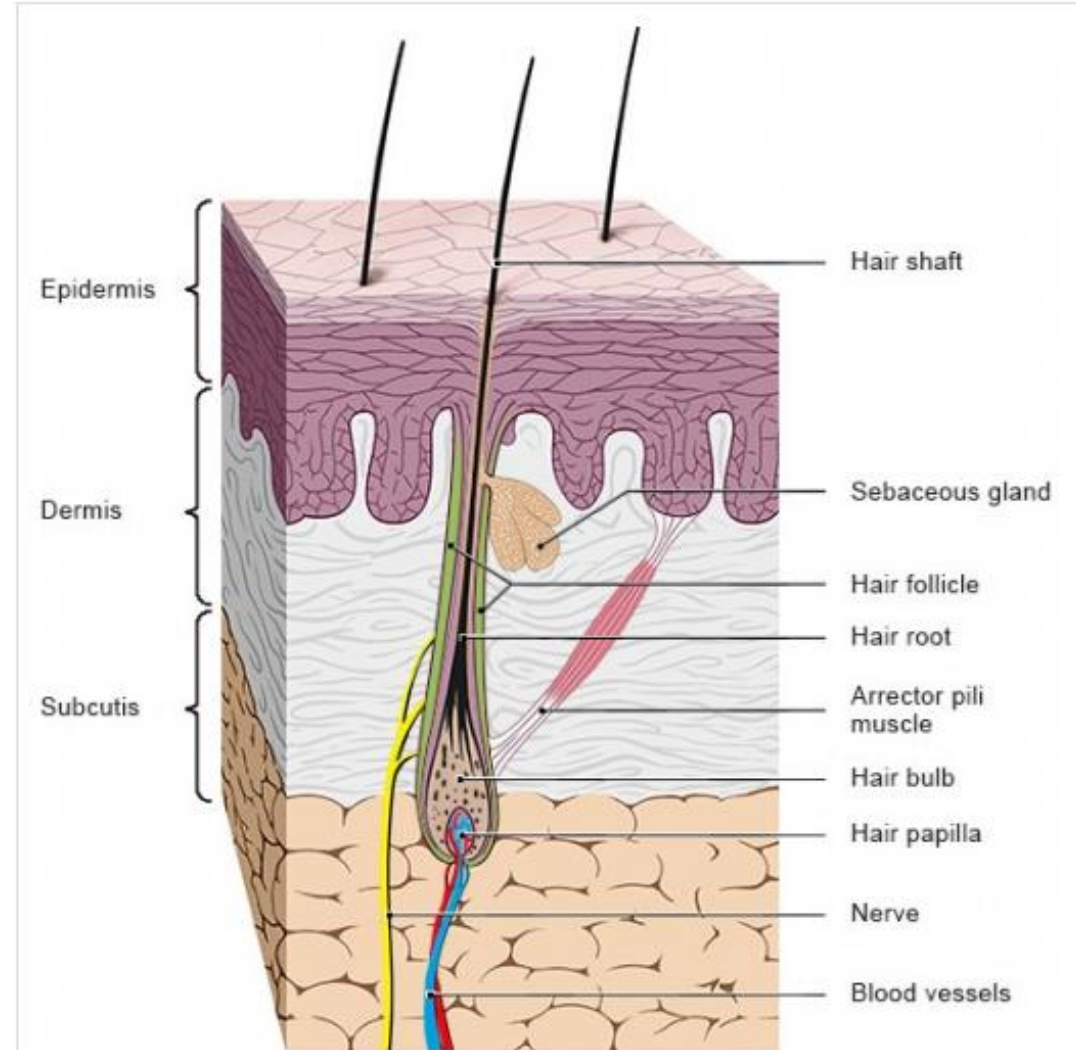
Biological aspects: Structure of hair & related Problems

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Structure of Hair



Structure of the human hair.



Structure of a hair

Structure of hair

- Hair is a simple structure that is made up of protein filaments called Keratin.
- Hair is a flexible thin keratin thread with great strength and elasticity.
- It is present on almost all surfaces of the human skin
- Hair acts as a barrier to foreign particles.
- It's an important part of appearance and creates gender identity.
- Hair is the only body structure that can completely renew itself without scarring.
- Hair is made up of two separate structures
 - The hair follicle: which exists below the skin.
 - The hair shaft: which is the hair that we see.

STRUCTURE OF HAIR & HAIR GROWTH CYCLE

Cosmetologists should study the properties of the hair and scalp so that they can differentiate between normal and abnormal hair loss, offer a variety of chemical services to clients, and aid a client in caring for their scalp and hair well-being.

Trichology- study of hair and its diseases and care.

Structure of the Hair

Human hair is divided into two parts:

(“epi”- means above or outer; “derm”- means skin so epidermis is the OUTER layer of skin)

- **Hair root (roots are underground)**- located below the epidermis
- **Hair shaft**- located above the epidermis

Structures of the Hair Root

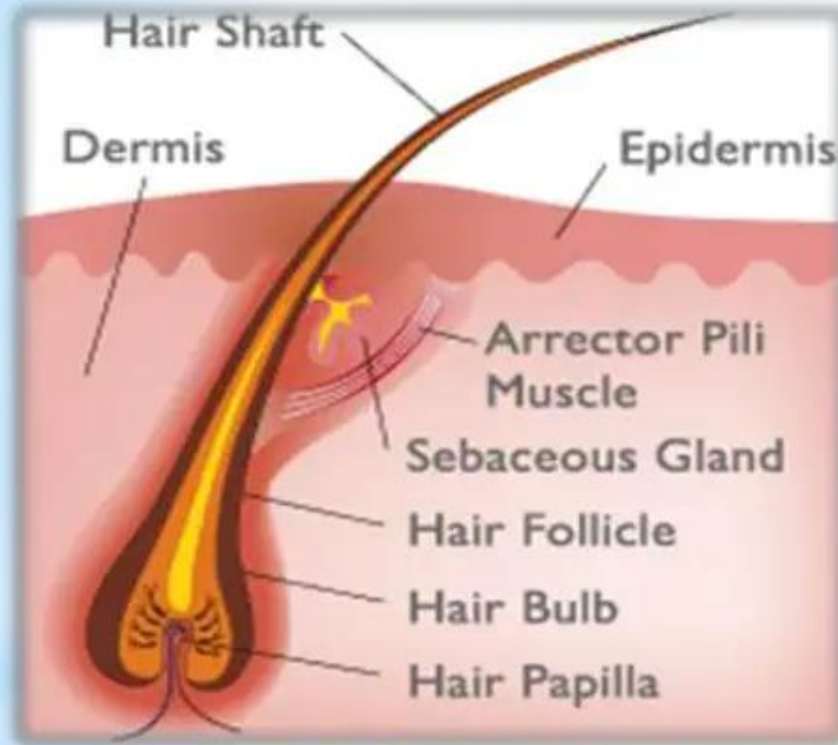
- * **Hair follicle-** tube-like depression or pocket in the skin or scalp that contains the hair root
- * **Hair bulb-** lowest part of a strand of hair; thickened, club-shaped
- * **Dermal papilla-** small, cone-shaped elevation located at the base of the hair follicle that fits into the hair bulb
- * **Arrector pili muscle-** small, involuntary muscle in the base of the hair follicle; when it contracts, we get goose bumps
- * **Sebaceous glands-** oil glands in the skin that are connected to the hair follicles; secretes sebum (fatty, oily substance)

Structures of the Hair Shaft

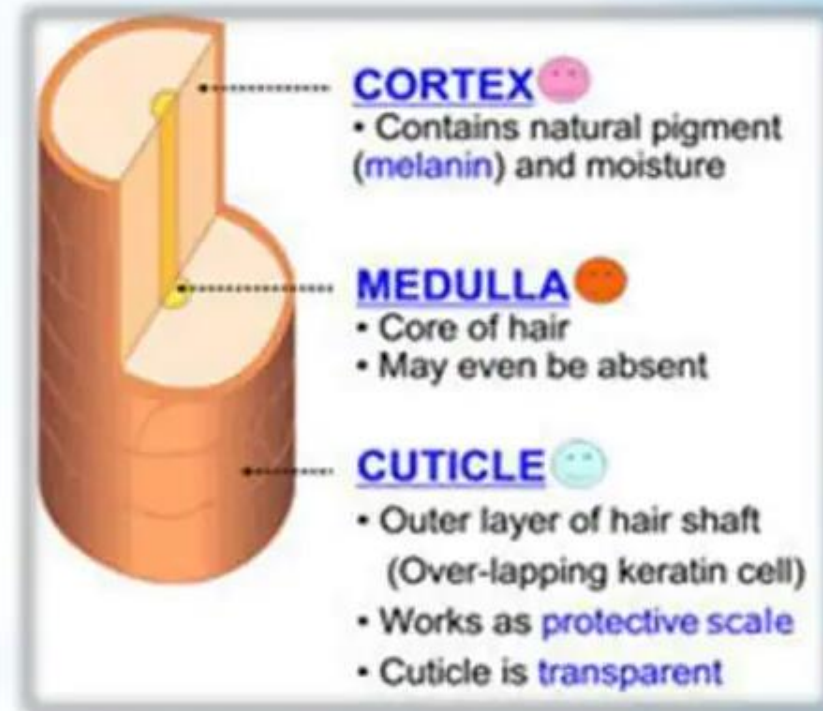
- * **Hair cuticle-** outermost layer of hair; consists of a single, overlapping layer of transparent, scale-like cells; protects inner structure of hair; creates shines and smoothness
- * **Cortex-** middle layer of the hair; 90% of total hair weight comes from the cortex; elasticity and color are the result of protein in the cortex
- * **Medulla-** innermost layer of hair; generally only thick, coarse hair contains a medulla; has no known purpose

Chemical Composition of the Hair

- * **Keratinization-** process by which newly formed hair cells in the hair bulb mature, fill with keratin, move upward, lose their nucleus and die
- * **COHNS-** major elements that make up the human hair:
- * Carbon, Oxygen, Hydrogen, Nitrogen, Sulfur



STRUCTURE OF HAIR ROOT



STRUCTURE OF HAIR SHAFT

Side Bonds of the Cortex

- * **Side bonds**-link the polypeptide chains (long chain of amino acids linked together by peptide bonds) together; responsible for the strength and elasticity of human hair
- * **Hydrogen Bond**- weak, physical cross-link bond that is easily broken by water or heat
- * **Salt Bond**- weak, physical cross-link bond that is broken by alkaline or acidic solutions
- * **Disulfide Bond**- strong, chemical side bond; can be broken by extreme heat, some high-temp styling tools, permanent waves and chemical relaxers

Hair Pigment

- * **Melanin**- the tiny grains of pigment in the cortex that give hair its natural color
- * **Eumelanin**- provides natural dark brown to black hair color
- * **Pheomelanin**- provides natural colors ranging from red to ginger to yellow and blonde tones

HAIR GROWTH CYCLE

- *The three stages of hair growth are the
 - 1. Anagen Phase**
 - 2. Catagen Phase**
 - 3. telogen Phase**
- *Each strand of hair on the human body is at its own stage of development.
- *Once the cycle is complete, it restarts and a new strand of hair begins to form.
- *The rate or speed of hair growth is about 1.25 centimetres or 0.5 inches per month, or about 15 centimetres or 6 inches per year.

ANAGEN PHASE

- *The anagen phase is known as the growth phase. This is the phase where the hair physically grows approximately 1 cm per month.
- *It begins in the papilla and can last from two to six years. The span at which the hair remains in this stage of growth is determined by genetics.
- *The longer the hair stays in the anagen phase, the longer it will grow. During this phase, the cells in the papilla divide to produce new hair fibers[contradictory], and the follicle buries itself into the dermal layer of the skin to nourish the strand. About 85% - 90% of the hairs on one's head are in the anagen phase at any given time

CATAGEN PHASE

Clip slide

- *The catagen phase, also known as the transitional phase, allows the follicle to, in a sense, renew itself. During this time, which lasts about two weeks, the hair follicle shrinks due to disintegration and the papilla detaches and "rests," cutting the hair strand off from its nourishing blood supply.
- *Signals sent out by the body (that only selectively affect 1 percent of all hair of one's body at any given time) determine when the anagen phase ends and the catagen phase begins.
- *The first sign of catagen is the cessation of melanin production in the hair bulb and apoptosis of follicular melanocytes. Ultimately, the follicle is 1/6 its original length, causing the hair shaft to be pushed upward.
- *While hair is not growing during this phase, the length of the terminal fibers increase when the follicle pushes them upward.

TELOGEN PHASE

- * During the telogen or resting phase (also known as shedding phase) the follicle remains dormant for one to four months. Ten to fifteen percent of the hairs on one's head are in this phase of growth at any given time.
- * In this phase the epidermal cells lining the follicle channel continue to grow as normal and may accumulate around the base of the hair, temporarily anchoring it in place and preserving the hair for its natural purpose without taxing the body's resources needed during the growth phase.
- * At some point, the follicle will begin to grow again, softening the anchor point of the shaft initially. The hair base will break free from the root and the hair will be shed. Within two weeks the new hair shaft will begin to emerge once the telogen phase is complete. The process results in normal hair loss known as shedding.

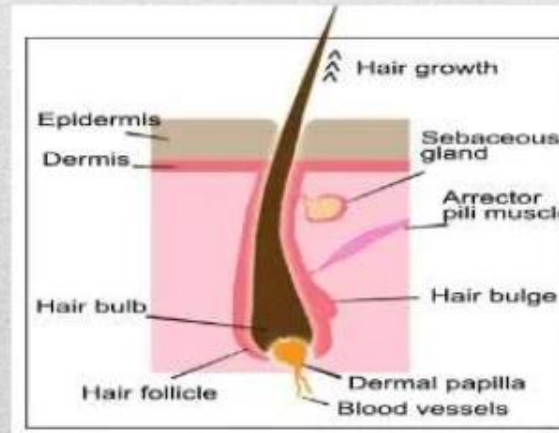
HAIR GROWTH CYCLE

Hair growth cycle comprises of 4 phases. These are



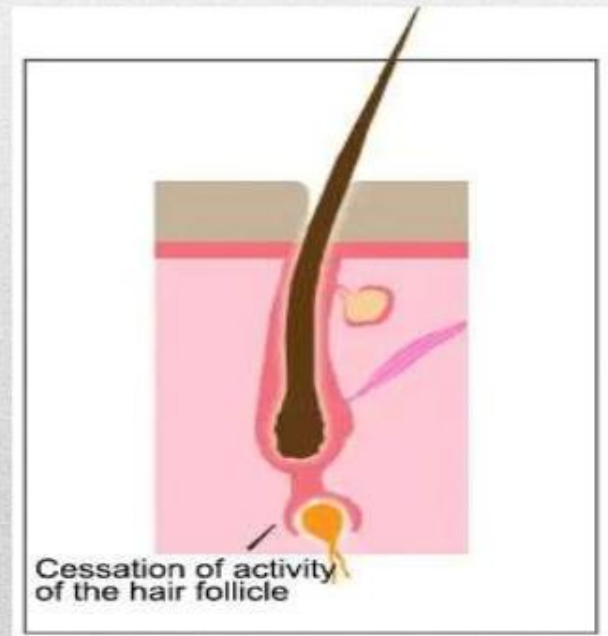
1) Anagen phase (Growing phase) -

- ❖ The growing phase last 2-7 years and determine the length of hair.
- ❖ Hair grows arround half an inch a month and faster in summer than winter. The anagen phase last and average of 3-5 years, a full length hair averages 18-30 inches.
- ❖ The anagen phase is generally longer in asian and last as much as 7 years with hair being able to grow to one meter.



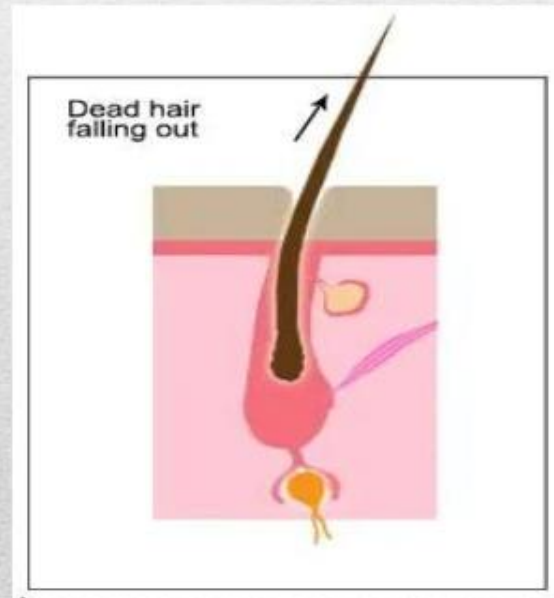
2) Catagen (Transition phase)-

- ❖ This is the transitional phase that last about 10 days.
- ❖ The hair follicle shrink and detaches from the dermal capilla.



3) Talogen phase (Resting phase)-

- ❖ This is the resting phase which are less around 3 month. Around 10- 15 % of hair are in this phase.
- ❖ The old hair is resting, a new hair begins the growth phase.
- ❖ Lastly hair enters the alogen phase, hair is release and false out.



4) Exogen phase-

- ❖ This is the part of resting phase where the old hair falls and new hair continuous to grow. The thickness, texture and shape of the hair is determine in this stage.

