

Chapter 11: Properties of the Hair and Scalp

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

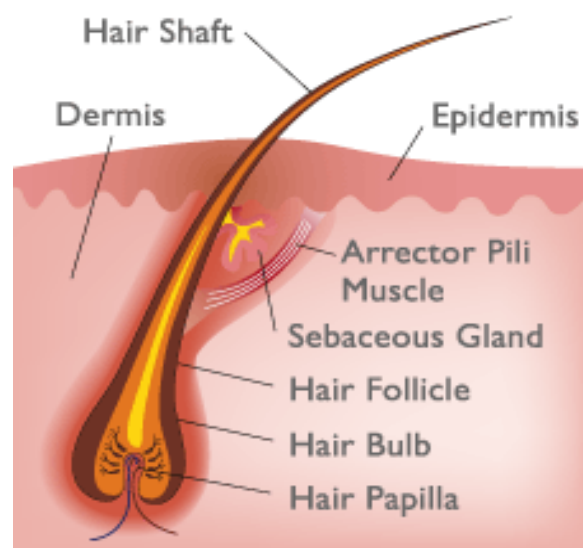
Human hair is divided into two parts:

(“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

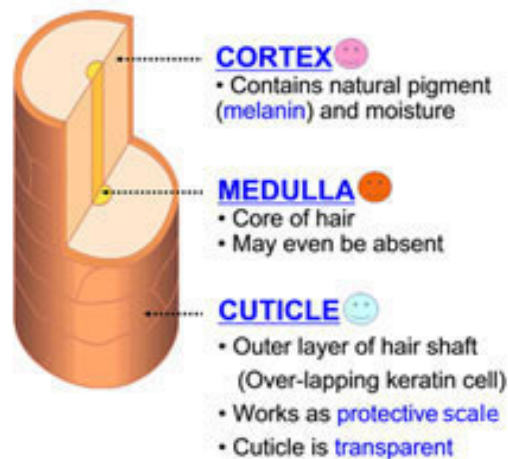
Structures of the Hair Root (220-221)

- **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; secrete *sebum* (fatty, oily substance)



Structures of the Hair Shaft (p. 221-222)

- **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 (p. 222-223)

- **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

Side Bonds of the Cortex (p. 223-225)

- **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 (p.225)

- **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

Wave Patterns (p.225- 227)

- **Wave Pattern**- refers to the shape of the hair strand
 - **There are several theories that try to explain the varying degree of curl in a person's hair, but none are definite.*

Wave Pattern and Cross-Section	
<i>Wave Pattern</i>	<i>Shape of Cross-Section</i>
Straight hair	Round cross-section
Wavy or Curly hair	Oval to flattened oval cross-section
Extremely curly hair	Flattened cross-section

HAIR GROWTH (p. 227-229)

Two main types of hair found on the body are vellus hair and terminal hair.

- **Vellus hair (lanugo hair)**- short, fine, unpigmented, downy; appears on parts of the body that are normally considered hairless (forehead, eyelids, bald scalp); almost never has a medulla; helps with the evaporation of perspiration; women normally retain 55% more vellus hair than men
- **Terminal hair**- long, coarse, pigmented hair found on the scalp, legs, arms, and bodies of both males and females; it usually has a medulla

Growth Cycles of Hair (p. 227-229)

There are three phases of hair growth that occur over and over throughout life: anagen, catagen, and telogen.

- **Anagen phase (growth phase)**- new hair is produced; new cells are actively manufactured in the follicle; hair cells grow faster in this phase than any other normal cell in the body; the average growth of healthy scalp hair is about 1/2” per month; the anagen phase generally lasts from 3-5 years but can last as long as 10. The longer the anagen phase, the longer a person’s hair can grow.
- **Catagen phase**- brief transition period between the growth and the resting phases of a hair follicle; signals the end of the anagen phase; lasts from one to two weeks.
- **Telogen Phase (resting phase)**-final phase in the cycle; lasts about three to six months

On average, the entire growth cycle repeats itself once every four to five years.

Myths

Facts

Shaving, clipping and cutting hair makes it grow back faster, darker, and coarser	Shaving or cutting hair has no effect on hair growth
Scalp massages increase hair growth	There is no scientific proof that massage helps hair growth
Gray hair is coarser and more resistant than pigmented hair	Other than lack of pigment, gray hair is exactly like pigmented hair
The amount of curly hair is always determined by racial background	Anyone of any race can have extremely curly hair
Hair cross-sections always relate to the amount of curl	Cross-sections of hair can be almost any shape and do not always relate to the amount of curl

Hair Loss (p. 229-232)

**Everyone loses some hair every day. Estimates range from 100-150 hairs per day although new estimates are closer 35-40 per day.*

Emotional Impact of Hair Loss

Bald Men feel:

- Less physically attractive
- Less assertive
- Less successful
- Less personally likable
- Older
- More preoccupied with their baldness
- It is important to conceal or compensate for hair loss
- They experience more negative social and emotional effects

Although hair loss is less common in women than men, it can also be a traumatic and devastating experience as women have a greater emotional investment in their appearance.

Types of Abnormal Hair Loss (p. 230-232)

Alopecia- hair loss; areata- spots

- **Androgenic alopecia-** hair loss characterized by the miniaturization of terminal hair that is converted into vellus hair; usually caused by genetics, age, or hormonal changes; known as male pattern baldness in men; results in overall thinning of hair at crown in women
- **Alopecia areata-** autoimmune disorder that causes the affected hair follicles to be mistakenly attacked by a person's own immune system; hair loss in spots
- **Alopecia universalis-** *complete body* hair loss
- **Alopecia totalis-** *complete scalp* hair loss

Hair Loss Treatments (p. 231-232)

*Only two treatments, Minoxidil and finasteride, have been proven to stimulate hair growth and are approved by the FDA for sale in the United States.

- **Minoxidil**- a topical put on the scalp twice a day; sold OTC; no serious side effects
- **Finasteride**- oral prescription for men only; serious side effects; not for use by women
- **Surgical options**- hair transplant; expensive
- **Nonmedical options**- wigs, toupes, extensions, weavings

DISORDERS OF THE HAIR (p. 232-233)

Tricho- pertaining to hair; **hyper-**too much; **rrhexi-**rupture; **nodosa-** nodules

- **Canities**- technical term for gray hair
 - **Congenital canities**- present at birth; present in those with albinism
 - **Acquired canities**- develops with age
- **Ringed hair**- characterized by alternating bands of gray and pigmented hair throughout the hair strand
- **Hypertrichosis (hirsuties- think “hair suit”)**- condition of abnormal hair growth; characterized by growth of terminal hair in areas of the body where only vellus hair normally grows
- **Trichoptilosis**- technical term for split ends



- **Trichorrhexis nodosa**- technical term for knotted hair



- **Monilethrix**- (necklace hair)-technical name for beaded hair (hair breaks easily between the beads or nodes)



- **Fragilitas crinium**- technical term for brittle hair; hairs may split at any part of their length



Disorders of the Scalp (p. 233-236)

- **Pityriasis**- technical term for dandruff; excessive production and accumulation of skin cells
 - **Pityriasis steatoides**- more severe case of dandruff characterized by an accumulation of greasy or waxy scales mixed with sebum that stick to the scalp in crusts
 - **Pityriasis capitis simplex**- technical term for classic dandruff characterized by large flakes, irritation, and an itchy *scalp*

Fungal Infections

**do not perform services on someone presenting with a fungal infection*

- **Tinea**- technical term for ringworm; characterized by itching, scales, and sometimes painful, circular lesions; contagious and easily transmitted
 - **Tinea barbae**- “barber’s itch”; similar to tinea capitis;
 - **Tinea capitis**-characterized by red papules or spots at the opening of the hair follicles; patches spread and hair becomes brittle; hair often breaks off leaving only a stump
- **Tinea favosa**- also known as tinea favus; characterized by dry, sulfur-yellow, cuplike crusts on the scalp called scutula; has a distinctive odor; scars from this are bald patches that may be pink or white and shiny

Parasitic Infections

- **Scabies**- highly infectious; blisters and pustules usually form on the scalp; excessive itching makes it worse; do not perform services on someone with scabies
- **Pediculosis capitis**- *head* lice; easily transmitted by contact with infested combs, brushes, hats, and personal items; do not perform services on someone with lice

Staphylococci Infections

*staphylococci are bacteria that infect the skin or scalp; do not perform services on someone with these infections

- **Furuncle**- technical name for a boil, an acute localized bacterial infection of the hair follicle that produces constant pain
- **Carbuncle**- inflammation of the subcutaneous tissue; similar to a furuncle but larger (*clue- a car is bigger than your furry uncle*)

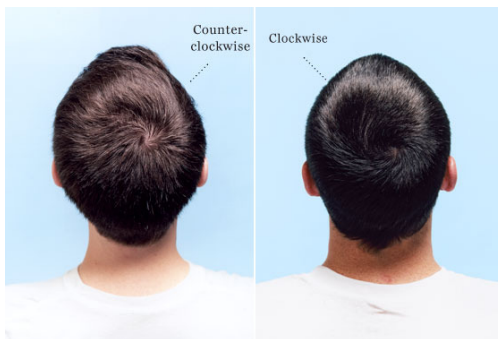
HAIR AND SCALP ANALYSIS

- **Texture**- thickness or diameter of individual hair strand; coarse hair has the largest diameter; medium is most common; fine hair is more fragile
 - Determined by feeling a single dry strand between the fingers; take from four areas (front, temple, crown, and nape); hold each strand securely and feel with thumb and forefinger of other hand
- **Density**- measures the number of individual hair strands on one square inch of scalp; classified as low, medium or high (thin, medium, thick); blondes usually have the highest density and red heads have the lowest
- **Porosity**- ability of hair to absorb moisture
 - **Hydrophobic** (*phobic- afraid of*)- resistant to being penetrated by moisture; requires more alkaline solution during chemical services
 - **Hydrophilic** (*philic- loves*)- easily absorbs moisture; can be dry and fragile due to over processing; requires less alkaline solutions during chemical services
 - **Determine porosity by** taking several strands from four different areas of the head (hairline, temple crown, and nape). Hold securely and run thumb and forefinger from end to scalp.
 - Resistant feels smooth; cuticle is compact, dense, and hard
 - Porous feels slightly rough
 - Highly porous feels very rough, dry, may break

- **Elasticity**- ability of the hair to stretch and return to its original length without breaking; wet hair can stretch about 50% and dry hair can stretch about 25%
 - **Determine elasticity by** taking a strand from four areas of the head (front hairline, crown, temple, and nape); hold single strand of wet hair and try to pull it apart
 - Normal elasticity- stretches and returns to original length
 - Low elasticity-hair breaks or fails to return to original length

Hair Growth Patterns

- **Hair stream**- hair flowing in same directions resulting from follicles sloping in the same direction; two streams flowing in opposite directions form a natural part
- **Whorl**- hair that forms a circular pattern; normally forms in the crown with all hair from that point growing down



- **Cowlick**- tuft of hair that stands straight up; may be located anywhere on the head



Notes:

Dry hair and scalp- can be caused by inactive sebaceous glands; treat with products that contain moisturizers and emollients

Oily hair and scalp- characterized by greasy build-up on the scalp and hair caused by improper shampooing or overactive sebaceous glands; treat by properly washing with normalizing shampoo