Chapter 11
Properties of the Hair and Scalp
“Any fact facing us is not as important as our attitude toward it, for that determines our success or failure. The way you think about a fact may defeat you before you ever do anything about it. You are overcome by the fact because you think you are.”

– Norman Vincent Peale
Objectives

• Name and describe the structures of the hair root.

• List and describe the three layers of the hair shaft.

• Describe the three types of side bonds in the cortex.

• List the factors that should be considered in a hair analysis.
Objectives (continued)

• Describe the hair growth process.

• Discuss the types of hair loss and their causes.

• Describe the options for hair loss treatment.

• Recognize hair and scalp disorders commonly seen in the salon and school and know which can be treated by cosmetologists.
Trichology

- Trichology: the scientific study of hair, its diseases, and its care

- *Integument*: system includes hair, skin, nails

- Hair: slender, threadlike protein filament that is an appendage of the scalp and body
  - Hair root: lies beneath the scalp
  - Hair shaft: projects above the scalp
Healthy Hair

- Proper nutrients required.
- Proteins are sources of amino acids.
Structure of Hair Root

- Follicle
  - Distribution
  - Growth
- Hair bulb
- Dermal papilla
- **Arrector pili**
- Sebaceous glands
Hair Shaft Structure

- Cuticle
- Cortex
- Medulla
Chemical Composition of Hair

- **Keratinization**: cell maturation

- 90 percent protein: amino acids composed of five elements
COHNS Elements

- Carbon – 51 percent
- Oxygen – 21 percent
- Hydrogen – 6 percent
- Nitrogen – 17 percent
- Sulfur – 5 percent
Amino Acids

- Linked like pop beads
- Peptide or end bonds
- Polypeptide chain
- Helix
Side Bonds of the Cortex

- Hydrogen bonds
- Salt bonds
- Disulfide bonds
## Bonds of the Hair

<table>
<thead>
<tr>
<th>Bond</th>
<th>Type</th>
<th>Strength</th>
<th>Broken By</th>
<th>Reformed By</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen</td>
<td>Side bond</td>
<td>Weak, physical</td>
<td>Water or heat</td>
<td>Drying or cooling</td>
</tr>
<tr>
<td>Salt</td>
<td>Side bond</td>
<td>Weak, physical</td>
<td>Changes in pH</td>
<td>Normalizing pH</td>
</tr>
<tr>
<td>Peptide</td>
<td>End bond</td>
<td>Strong, chemical</td>
<td>Chemical depilatories</td>
<td>Not reformed; hair dissolves</td>
</tr>
</tbody>
</table>

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Hair Pigment

• Melanin (tiny grains of pigment)
  – Eumelanin (provides brown/black color)
  – Pheomelanin (provides yellow to red/ginger color)

• Natural hair color (result of ratio of eumelanin to pheomelanin)

• Gray hair (absence of melanin)

• *Hair color* versus *haircolor*
Wave Patterns

- Straight hair
- Wavy hair
- Extremely curly hair
- Asian hair
- Caucasian hair
- African-American hair
Types of Hair

• Vellus (lanugo) hair: short, fine, downy, unpigmented hair on body.

• Terminal hair: long, thick, pigmented hair found on scalp, legs, arms, and body.
Growth Cycles of Hair

- Anagen (growing phase)
- Catagen (transition phase)
- Telogen (resting phase)
Hair Growth Myths

- Clipping, cutting makes hair grow faster.
- Scalp massage increases growth.
- Gray hair is coarser and more resistant.
- Natural curl determined by race.
- Round cross section is straight.
- Oval cross section is wavy.
- Flat cross section is curly.
Hair Loss

• Natural shedding: 35 to 40 hairs per day

• Abnormal loss called alopecia.
  – Androgenetic alopecia, alopecia areata, postpartum alopecia
Hair Loss Perceptions

- Less attractive
- Less assertive
- Less successful
- Less personally likeable
- Older by five years
Emotional Impact of Severe Hair Loss

• Men
  – Negative social and emotional effects; preoccupation with baldness; effort made to conceal

• Women
  – Devastation; anxiety; feelings of helplessness and unattractiveness
Androgenetic Alopecia

- Progressive shrinking or miniaturization of terminal hair
- Affects millions of men and women in the United States
Alopecia Areata

- Sudden loss in round or irregular patches.
- Affects five million people in the United States.
- Immune system attacks hair follicles.
- Begins with small bald patches.
- Occurs in males and females of all ages and races.
- No sign of scalp inflammation.
- No obvious signs of skin disorder.
Postpartum Alopecia

- Temporary hair loss at conclusion of pregnancy
- Growth cycle returns to normal within one year after delivery of baby.
Hair Loss Treatments

• Minoxidil (topical treatment)
• Finasteride (oral treatment)
Hair Disorders

- **Canities**
  - Congenital canities
  - Acquired canities
- Ringed hair
- Hypertrichosis
- **Trichoptilosis**

The World of Courtesy of P&G Beauty from John Grey's, The World of Hair Care
Hair Disorders (continued)

- **Trichorrhexis nodosa**
- **Monilethrix**
- **Fragilitas crinium**

Trichorrhexis nodosa

Monilethrix
Scalp Disorders

- Dandruff
- *Pityriasis capitis simplex*
- *Pityriasis steatoides*
Fungal Parasites

- Tinea
- Tinea capitis
- Tinea favosa
Parasitic Infections

- Scabies (itch mite)
- *Pediculosis capitis* (head lice)
Staphylococci Infections

- **Furuncle** or boil
- **Carbuncle**
Hair Analysis and Texture

- Coarse
- Medium
- Fine
Testing Hair Texture
Hair Density

• Low – thin hair
• Medium – average thickness
• High – dense or thick hair
• Average: 2,200 hairs per square inch
  – Blond: 140,000
  – Brown: 110,000
  – Black: 108,000
  – Red: 80,000
Porosity

- Low porosity
- Average porosity
- High porosity
Testing for Porosity
Elasticity

• Normal elasticity
• Low elasticity
• Testing for elasticity
Growth Patterns

- Hair stream (hair flowing in same direction)
- Whorl (hair forms in a circular pattern)
- Cowlick (tuft of hair that stands straight up)
Dry Hair and Scalp

- Hair appears dull, dry, lifeless.
- Avoid frequent shampooing, strong soaps, detergents, or products with a high alcohol content.
Oily Hair and Scalp

- Use clarifying shampoos.
- Eat a well-balanced diet.
- Exercise.
- Shampoo regularly and frequently.
- Avoid strong soaps, detergents, or products with high alcohol content.
Summary and Review

• Name and describe the five main structures of the hair root.

• Name and describe the three layers of the hair.

• Describe the process of keratinization.

• What are polypeptide chains?
• List and describe the three types of side bonds. Which are permanent and which are temporary? Which are strongest and why?

• Name and describe the two types of melanin responsible for natural hair color.
• Name and describe the two types of hair and their locations on the body.

• What are the three phases of the hair growth cycle and what occurs during each?

• What is the reason for normal daily hair loss?

• What are the most common types of abnormal hair loss?
Summary and Review (continued)

- What are the only two approved hair loss treatments?
- Name the two main types of dandruff and state whether either can be treated in the salon.
- Which scalp and hair disorders cannot be treated in the salon?
- What four factors should be considered in hair analysis?
Congratulations!

You have completed one unit of study toward course completion.