CHAPTER 11 Properties of the Hair and Scalp

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POINT TO PONDER:
"Never give up then, for it is just the place and time that the tide will turn." —Harriet Beecher Stow

WHY STUDY PROPERTIES OF THE HAIR AND SCALP?

1. ____________ is the scientific study of hair, its diseases, and care, which comes from the Greek words ____________, meaning "hair," and ____________, meaning "the study of."

2. The hair, skin, and nails are collectively known as the ____________.

3. Discuss why you think it is important for you to understand the growth, structure, and composition of hair.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

STRUCTURE OF THE HAIR

4. A mature strand of human hair is divided into two parts: the ____________, located below the surface of the scalp, and the ____________, the portion of the hair that projects above the skin.

5. Match the main structures of the hair root with their description.

   ____ 1. Follicle
   a) Small, cone-shaped area located at the base of the follicle

   ____ 2. Bulb
   b) The tube-like depression in the skin or scalp that contains the hair root

   ____ 3. Dermal papilla
   c) Involuntary muscle in the base of the hair follicle
4. Arrector pili  d) The oil glands of the skin
5. Sebaceous glands e) Thickened, club-shaped structure; forms the lower part of the root

6. Hair follicles are distributed all over the body, with the exception of:
   a) ______________________
   b) ______________________

7. A single hair follicle will only ever produce one hair.
   _____ True
   _____ False

8. The lowest part of the hair strand is called the hair ______.

9. Which part of the root contains the blood and nerve supply that provides the nutrients needed for hair growth? ________________

10. Which muscle when contracted causes goose bumps? ____________

11. The sebaceous glands secrete an oily substance called _______, which lubricates the hair and skin.

12. Identify the parts of the skin and hair illustrated below:

   __________
   _________
   __________
   _________
   _________
   _________
   _________

13. What are the three main layers of the hair shaft?
   c) ______________________
   d) ______________________
   e) ______________________

14. The outermost layer of the hair is the ________.

15. Describe the cuticle layer: ________________
16. Describe what a healthy cuticle layer protects.

17. If you hold a single strand of hair that is still attached to your head and move your fingers down the hair shaft, the hair will feel ________.

18. Why must oxidation haircolors, permanent waving solutions, and chemical hair relaxers have an alkaline pH?

19. Which layer of the hair is the cortex?

20. What percentage of weight of the hair comes from the cortex?
   _____ a) 50 percent
   _____ b) 70 percent
   _____ c) 80 percent
   _____ d) 90 percent

21. Name three different hair properties for which the cortex is responsible.
   a) ____________________________
   b) ____________________________
   c) ____________________________

22. In what layer of the hair do changes involving oxidation haircolor, wet setting, thermal styling, permanent waving, and chemical hair relaxing take place?
   ____________________________

23. The ________ is the innermost layer of the hair and is composed of round cells.

24. All hair has three layers.
   _____ True
   _____ False

25. Identify the cross-section of a hair as illustrated below:
26. How many essential amino acids that are provided only by eating a healthy diet does the body need?
   ______ a) 6
   ______ b) 9
   ______ c) 11
   ______ d) 20

27. List some good sources of amino acids.
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________

CHEMICAL COMPOSITION OF HAIR

28. Hair is composed of _______ that grows from cells originating within the hair follicle.

29. The maturation of these cells is a process called ________.

30. Hair is a living thing.
   ______ True
   ______ False
   Explain your answer: __________________________________________
   ____________________________________________________________

31. List the main elements that make up human hair and their percentage in normal hair.
   a) _____________________________
   b) _____________________________
   c) _____________________________
   d) _____________________________
   e) _____________________________

32. Together, the five elements that make up human hair are known as the _______ elements to help people remember them; they are also found in the _______ and the _______.
33. Match each of the following terms with its description.

_____ 1. Amino acid                      a) The chemical bond that links amino acids
_____ 2. Helix                                b) The unit of structure that build proteins
_____ 3. Peptide bond                       c) A long chain of amino acids linked by peptide bonds
_____ 4. Polypeptide chain                  d) The spiral shape of a coiled protein

34. Polypeptide chains are cross-linked together using three different types of side bonds called:

  a) ____________________________

  b) ____________________________

  c) ____________________________

35. A _______ bond is a weak physical side bond that is easily broken by water or heat; these bonds reform when the hair _______.

36. Weak, temporary side bonds between adjacent polypeptide chains are ______ bonds.

37. A _______ bond is a strong chemical side bond that joins the sulfur atom of two neighboring cysteine amino acids to create cystine.

38. How are the hair's strong chemical side bonds broken? __________________________

                                             __________________________
                                             __________________________

39. ______ are the tiny grains of pigment that give natural color to the hair. List and describe the two different types.

  a) __________________________

  b) __________________________

40. How is gray hair different from other hair colors? __________________________

                                             __________________________
                                             __________________________

41. The ________ of the hair refers to the shape of the hair strand and is described as _______ and _______.

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42. Natural wave patterns are the result of ________.

43. Asians tend to have ________ hair, while African Americans tend to have ________ hair; however, this is not a hard-and-fast rule and many exceptions exist.

44. In extremely curly hair, cross-sections are usually ________.

45. The shape of a cross-section of hair always relates to the amount of curl in the hair.
   _____ True
   _____ False

46. Extremely curly hair may have _____ elasticity.

**HAIR GROWTH**

47. The two main types of hair found on the body are ________ hair and ________ hair.

48. Describe vellus hair. ____________________________________________

49. On adults, vellus hair is usually found on the _______________________________________

50. Men retain _____ vellus hair than women.

51. Describe terminal hair. ____________________________________________

52. Terminal hair is found on the ____________________________________________

53. All hair follicles are able to produce both vellus and terminal hair.
   _____ True
   _____ False

54. Unscramble these words, then match each word with its correct description.
   gloeten    neanag    agatecn
   _______   The growth phase of new hair
   _______   The transition phase
   _______   The resting phase
55. What is the average growth of healthy scalp hair per month?
   _____ a) ¼ inch (0.6 cm)
   _____ b) ½ inch (1.25 cm)
   _____ c) ¾ inch (1.8 cm)
   _____ d) 1 inch (2.5 cm)

56. When does hair tend to grow most rapidly?
   _____ a) Between the ages of 8 and 13
   _____ b) Between the ages of 15 and 20
   _____ c) Between the ages of 15 and 30
   _____ d) Between the ages of 40 and 50

57. What percentage of scalp hair is in the catagen phase at any one time?
   _____ a) 1 percent
   _____ b) 5 percent
   _____ c) 10 percent
   _____ d) 15 percent

58. What percentage of scalp hair is in the telogen phase at any one time?
   _____ a) 1 percent
   _____ b) 5 percent
   _____ c) 10 percent
   _____ d) 15 percent

59. How frequently does the average hair growth cycle take to repeat itself?

60. Shaving, clipping, and cutting the hair makes it grow back faster, darker, and coarser.
    _____ True
    _____ False

61. Scalp massage increases hair growth.
    _____ True
    _____ False
62. Gray hair is coarser and more resistant than pigmented hair.
   _____ True
   _____ False

63. A cross-section of hair can be almost any shape, and its shape does not necessarily relate to the amount of curl in the hair.
   _____ True
   _____ False

HAIR LOSS

64. It is normal to lose some hair every day.
   _____ True
   _____ False

65. The average rate of hair loss is _________ hairs per day.

66. Describe why bald and balding men are emotionally affected by their hair loss.
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________

67. While less common than in men, hair loss also affects women.
   _____ True
   _____ False

68. Abnormal hair loss is called ________.

69. ____________________, or androgenetic alopecia, is the result of genetics, age, and hormonal changes that cause miniaturization of terminal hair, converting it to _________ hair.

70. In men, androgenic alopecia is known as __________________ and usually progresses to the familiar horseshoe-shaped fringe of hair.

71. By the age of 35, what percentage of men and women show some degree of hair loss? ___________
72. How many people does androgenic alopecia affect in the United States?
   _____ a) Millions
   _____ b) Thousands
   _____ c) Hundreds

73. What is alopecia areata?

74. Alopecia areata that progresses to total scalp hair loss it is called _________
    _______. When it results in complete body hair loss, it is called _________
    _______.

75. Jane, a client at your salon, gave birth to her first baby three months ago. When
    she comes in for a service, she complains that her hair seems to be shedding.
    This condition is called _________________. You reassure Jane that her hair
    growth cycle should eventually return to _______ within about _________.

76. What are the only two products that have been proven to stimulate hair growth
    and are approved by the Food and Drug Administration (FDA)? ________________
    ________________

77. A topical medication that is applied to the scalp twice a day, and is sold over-
    the-counter as a nonprescription drug, is _______; the most commonly
    known product that contains this drug is called _________.

78. ___________ is an oral prescription medication for men only and is more
    effective and convenient than its nonprescription counterpart.

79. Why are pregnant women warned against having any contact with the oral
    prescription medication used to treat hair loss in men? ________________
    ________________

80. Describe the most common surgical treatment for hair loss.
    ________________
    ________________
    ________________

81. What nonmedical options can a hairstylist offer to counter hair loss?
82. Abnormal hair loss may also be a side effect of ____________ or ____________ cancer treatments.

83. Summarize the different possible causes of hair loss.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

DISORDERS OF THE HAIR

84. Match each of the following hair disorders with its description.

_____ 1. Canities  a) A condition of abnormal growth of hair
_____ 2. Ringed hair  b) Technical term for gray hair
_____ 3. Hypertrichosis  c) Knotted hair
d) Technical term for beaded hair
e) Technical term for brittle hair
f) Characterized by alternating bands of gray and pigmented hair
_____ 4. Trichoptilosis
_____ 5. Trichorrhexis nodosa  g) Technical term for split ends
_____ 6. Monilethrix
_____ 7. Fragilitas crinium

85. There are two types of canities. They are ____________ and ____________.

________________________________________________________________________

86. In addition to genetics, ________ and ________ may also cause premature gray hair.

87. What is an example of hypertrichosis? ____________

What are possible treatments? ____________

________________________________________________________________________

________________________________________________________________________

88. Softening the hair with conditioners and moisturizers is often used in the treatment of ____________ and may also help ____________, but will not repair the damage.

DISORDERS OF THE SCALP

89. How many pounds of dead skin does the average person shed each year?
90. What is the difference between dry scalp and dandruff? ________________

91. Match each of the following scalp disorders with its definition.

_____ 1. Pityriasis  a) Medical term for ringworm

_____ 2. Tinea  b) Dry, sulfur-yellow, cup-like crusts on the scalp called scutula

_____ 3. Tinea capitis  c) An acute, localized bacterial infection of the hair follicle

_____ 4. Tinea favosa  d) Medical term for dandruff

_____ 5. Scabies  e) An inflammation of the subcutaneous tissue caused by staphylococci

_____ 6. Pediculosis capitis  f) Fungal infection characterized by red papules, or spots at the opening of the hair follicles

_____ 7. Furuncle  g) The infestation of the hair and scalp with head lice

_____ 8. Carbuncle  h) Caused by a parasite called a “mite”

92. Research confirms that dandruff is the result of a fungus called ________________, a naturally occurring fungus that is present on all human skin.

93. What is the treatment for dandruff? ________________

94. List the two principle types of dandruff and give their characterizations.

a) ________________

b) ________________

95. What is seborrheic dermatitis? ________________

96. Name some causes of dry scalp. ________________
97. It is appropriate to perform a service on a client who has a severe case of dandruff.

_____ True
_____ False

98. What does tinea look like?

99. Tinea is contagious.

_____ True
_____ False

100. Ringworm is caused by a parasite.

_____ True
_____ False

101. What does tinea barbae affect?

102. Which of the following conditions has a distinctive odor?

_____ a) Tinea barbae
_____ b) Scabies
_____ c) Scutula
_____ d) Head lice

103. List the ways head lice are transmitted from an infected person to a noninfected person.

104. As a cosmetologist, what are two ways you can help prevent the spread of infectious conditions?
HAIR AND SCALP ANALYSIS

105. What special tools does a cosmetologist need in order to perform a hair analysis?

106. Explain the connection between hair analysis and retailing.

107. List and define the four most important factors to consider in hair analysis.
   a) 
   b) 
   c) 
   d) 

108. What are the classifications of hair texture?
   a) 
   b) 
   c) 

109. All hair on a person's head has the same texture.
   _____ True
   _____ False

110. Which hair texture has the largest diameter?

111. Which hair texture is the most common and is the standard?

112. Which hair texture has the smallest diameter and is more fragile?

113. Which hair texture usually requires extra processing when applying a product like haircolor?
114. Hair density can be classified as:
   a) __________________________
   b) __________________________
   c) __________________________

115. Hair density and hair texture are essentially the same thing.
   _____ True
   _____ False

116. The average hair density is about ______ hairs per square inch (2.5 square cm), and the average head of hair contains about ______ individual hair strands.

117. Which hair color typically has the lowest density?
   _____ a) Brown
   _____ b) Blond
   _____ c) Red
   _____ d) Black

118. The hair's ability to absorb moisture is its ________.

119. The degree of porosity is directly related to ___________________________.
   Why? ___________________________

120. A term that means resistant to being penetrated by moisture is ________; a term that means absorbs water easily is ________.

121. Chemical services performed on overly porous hair require ___________________________.

122. Hair with average porosity is considered ________. Overly porous hair is ___________________________.

123. Hair texture always indicates the hair's porosity; for example, coarse hair always has a low porosity.
   _____ True
   _____ False

124. Describe how to check porosity. ___________________________

_____________________

_____________________

_____________________
125. In a porosity check, if the hair feels smooth, ________________________________

126. In a porosity check, if you can feel a slight roughness, ________________________

127. In a porosity check, if the hair feels very rough or dry or breaks, ________________________________

128. The ability of the hair to stretch and return to its original length without breaking is its __________.

129. Hair elasticity is an indication of ________________________________

130. Wet hair with normal elasticity will stretch up to __________ of its original length and return without breaking. Dry hair stretches about __________ of its length.

131. Which of the following statements is true of hair with low elasticity?
   _____ a) Chemical services will require a solution with a higher pH.
   _____ b) Hair services should not be performed at all.
   _____ c) It may not hold a permanent wave as easily.

132. Hair growth patterns are caused by follicles that grow perpendicular (90-degree angle) to the scalp.
   _____ True
   _____ False

133. Knowing if a client has a hair growth pattern is an important consideration when helping them select a hairstyle or haircut.
   _____ True
   _____ False

134. Match each of the following terms with its description.
   _____ a) Hair stream a. Hair following in the same direction
   _____ b) Whorl b. A tuft of hair that stands straight up
   _____ c) Cowlick c. Hair that forms in a circular pattern
135. Which of the following is not a cause of dry hair and scalp?

   ______ a) Winter weather
   ______ b) Desert climate
   ______ c) Inactive sebaceous glands
   ______ d) Active sebaceous glands

136. Oily hair and scalp is caused by ________________ or ________________ sebaceous glands and is characterized by a greasy buildup on the scalp and an oily coating on the hair.

137. Dry hair and scalp can be caused by inactive ________________ and is aggravated by excessive ________________.

138. Oily hair and scalp is characterized by __________________________.

__________________________.