

Science of hair

Objectives: At the end of this lesson you shall be able to

- define hair
- define structure of hair root and hair shaft
- describe chemical composition of hair
- determine PH knowledge of hair
- define hair growth cycle
- describe types of hair
- define hair texture, density, elasticity and porosity.

Hair

Hair is an appendage of the skin. it is a thread-like outgrowth of the skin and scalp of the human body.

The study of hair, technically called trichology.

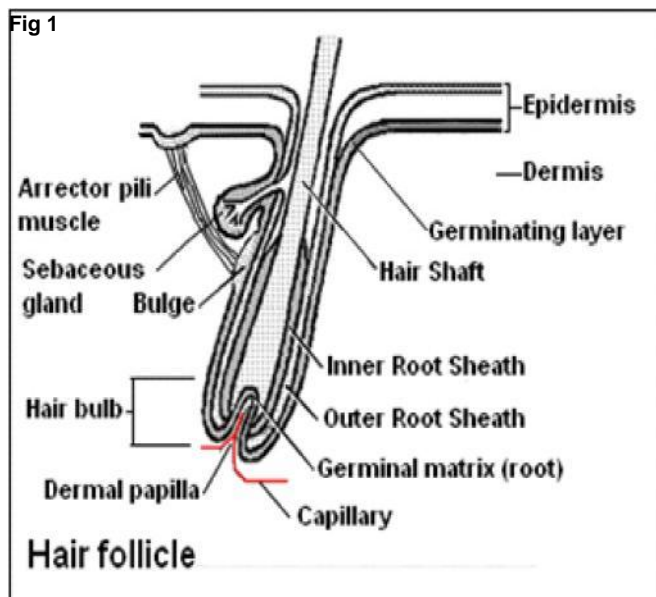
Structure of hair root and hair shaft

There are two main divisions of hair - hair shaft and hair root

- 1 **HAIR SHAFT** - the hair which is above the surface of the scalp and is seen, is termed as hair shaft.
- 2 **HAIR ROOT** - the portion of the hair which is beneath the skin, is termed as hair root. A variety of structures are connected with the hair root. They are the follicle, the hair bulb, and the hair papilla.

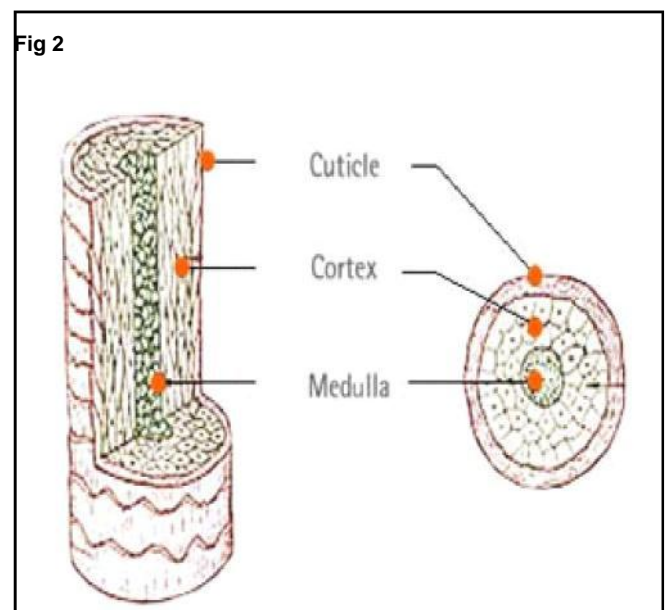
Structure connected with hair root (Fig. 1)

- 1 **HAIR FOLLICLE** - hair follicle is a pocket like tube in the skin or scalp that encases the hair root. Each hair has a follicle which varies with the situation and thickness of the skin and hair. Oil glands are attached to hair follicle for supply of sebum.



- 2 **HAIR BULB** - the hair root looks like a bulb as lowermost
- 3 **PAPILLA** - It is a cone shaped structure which fits into the hair bulb. Papilla is richly supplied by blood and nerves. Growth and regeneration of the hair takes place in this part. Once the papilla is damaged, new hair can never grow.
- 4 **ARRECTOR PILLI** - arrector pili is a small involuntary muscle attached to the underside of a hair follicle. Cold weather and sudden fear make the hair stand and in this situation arrector pili muscle controls the position of the hair follicle.
- 5 **SEBACIOUS GLAND** - These are sac type clusters of gland open into the hair follicle. The gland secretes sebum which spreads along the length of the hair then to the skin, keeping them (skin and hair) soft, supple and shiny.

Although hair looks very small to the naked eye, each strand of hair consists of 3 layers - (Fig. 2)



- 1 **CUTICLE** - The outermost layer of the hair consists of horny cells which look like fish scales and this layer is known as cuticle.
- 2 **CORTEX** - This layer lies just below the cuticle. This portion forms major part of the hair and gives strength and elasticity to the hair.
- 3 **MEDULLA** - This is the innermost part of the hair. Sometimes medulla may be absent in lanugo hair.

Chemical composition of hair

Hair is composed of a protein called keratin, which is present in all horny growths, such as nails.

The chemical composition of hair varies with its color.

The average hair is composed of:

- Carbon-50.65%
- Hydrogen-6.36%
- Nitrogen-17.14%
- Sulfur-5.0%
- Oxygen-20.85%

pH knowledge of hair

Hair reacts quite differently to two different chemical substances known as acids and alkalins. The test for finding out the different chemicals is done by a litmus paper. Red Litmus Paper turns blue in an alkaline solution whereas Blue Litmus Paper turns red in acid solution.

pH scale- The symbol pH means potential of Hydrogen.

The pH scale is a number scale used to measure acidity and alkalinity of a solution. The scale ranges from 0 - 14. pH 7 is neutral. pH values below 7 are acidic; the lower the number, the stronger the acid. pH value above 7 are alkaline; the higher the number, the stronger the alkali.

Although the precise neutral point on the scale is 7.0, the neutral range is considered to extend from pH 6.5 - 7.5. The pH of the skin's & hair's acid mantle ranges from 4.5 - 6.0 is most often referred to as 5.5.

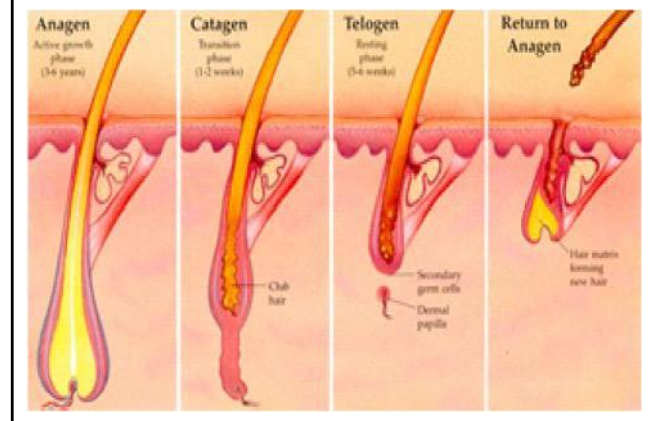
Hair growth cycle

Hair follicles grow in repeated cycles. One cycle can be broken down into three phases. (Fig. 3)

- 1 Anagen - Growth Phase
- 2 Catagen - Transitional phase
- 3 Telogen - Resting Phase

In healthy individuals each hair goes through a cycle of events, growth, and fall and is replaced by another hair.

Fig 3



As a result, a certain amount of hair is shed everyday. Old hair falls out to make place for new hair. In average, 60 - 100 hair is lost per day quite naturally. Average growth rate in each hair is $\frac{1}{2}$ inch - $\frac{7}{8}$ inch per month. A scalp hair continues to grow for 2 - 7 years. Eyebrows and eyelashes are replaced every 4 - 5 months

Types of hair

Types of hair are determined by the presence of sebum and pH condition of the hair.

There are three types of hair:-

- 1 **NORMAL HAIR:** a normal amount of sebum is secreted from the sebaceous gland of a person with normal hair. Normal hair should be kept in medium length.
- 2 **DRY HAIR:** a less amount of sebum is secreted from the sebaceous gland of a person with dry hair. Dry hair should be kept short to prevent it from damage.
- 3 **OILY HAIR:** excess amount of sebum is secreted from the sebaceous gland of a person with oily hair. Oily hair should be kept long, to prevent the scalp from seborrheic condition.

Hair texture, density, elasticity and porosity

Hair texture

Texture refers to the thickness or fineness and feel of the hair. Thickness depends on the diameter of the hair. Texture of hair is its size and quality. (Fig. 4)

- 1 **Thickness** - hair may be coarse and thick, medium, fine and very fine in texture.
- 2 **Feel of the hair** - according to feeling, hair maybe soft and smooth, harsh, rough and wiry in texture.
- 3 **Wave of hair** - according to wave present or absent in hair, it maybe straight, wavy and curly.

Fig 4



Hair density

Density refers to the number of hair per sq. inch. More the number of hair, more the density. Hair can have dense,

moderate and thin density. For dense hair smaller blocking and larger rods should be used. For thinner hair smaller blocking and smaller rods should be used.

Hair porosity

Porosity is the ability of the hair to absorb water. This ability is not connected with the thickness of the hair but is connected with the state of the cuticle layer. Hair can have poor, good or excessive porosity. Excessive porosity is connected with damaged hair and it should be handled carefully for chemical services.

Hair elasticity

Hair elasticity is the ability of the hair to stretch and go back to its normal length without breaking. Normal hair can be stretched to one-fifth of its length. Hair can have poor, good or normal elasticity. Hair with poor elasticity is not suitable for chemical services.

Common Hair Problems

Objectives: At the end of this lesson you shall be able to

- explain dandruff and its type
- state hair falling
- explain the split ends
- explain pediculosis.

Dandruff

Dandruff is one of the most common problem of hair. It can be recognised by small white flakes that appears on scalp. It is also known by the medical term of "pityriasis". (Fig 1)

Fig 1



The main cause of dandruff are poor blood circulation, infection, careless grooming habits and imbalance diet.

There are two types of dandruff:

Oily dandruff : it is also called waxy dandruff and it can be itchy. Medical treatment is the only way to control oily dandruff.

Dry dandruff: dry dandruff is characterised by small white scales. It is the result of poor blood circulation and uncleanliness. Use mild shampoo, regular scalp massage, and use antiseptic scalp lotion to cure dandruff.

Hair falling

Alopecia is the technical term for any abnormal form of hair loss. The natural falling out of hair should not be confused with alopecia. When hair has grown to its full length it comes out by itself and its replaced by a new one. On the other hand the hair lost by alopecia does not come back.

The most common forms of hair loss are:

- 1 **Alopecia senilis:** It is the form of baldness occurring in old age. this hair loss is permanent.(Fig.2)