

# Structure of Hair

by

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Hairs are fine strands of tissue which appear above the skin surface. They cover most of the body, with the exception of the eyelids, the palms of the hands and the soles of the feet. There are three different types of hair.

- **LANUGO HAIR** Fine downy hair that covers the body of the unborn child: it is lost just before or around the birth.
- **VELLUS HAIR** Fine, short, fluffy hair which covers most parts of the body. It can be seen clearly on the faces of women.
- **TERMINAL HAIR** Longer, coarser hair, found on the head, on the faces of men, in ears and eyebrows, on the arms, legs and chest, and in the pubic region.

Each hair has the same basic structure. There are three layers.

- **CUTICLE** The outer layer of colourless cells, which forms a protective surface to the hair. It regulates the chemicals entering and damaging the hair, and protects the hair from excessive heat and drying. The cells overlap, like roof tiles; if you rub a hair from base to tip it feels smooth, but if you rub it from tip to base it feels rough.
- **CORTEX** The middle and largest layer, consisting of long spiral chains of cells like springs. Each cell is made of bundles of fibres. These are composed of small bundles of macro fibrils which in turn are formed from even smaller bundles of proto-fibrils - all long, spiralling, ladder like chains. The way these fibres and cells are held together determines the strength of hair, its thickness, curl and elasticity. Pigments in the cortex give the hair its natural colour.
- **MEDULLA** The central space of the hair. It serves no useful purpose, and is not always present.

## Chemical Properties of the hair

The bundles of fibres found in the cortex are made from molecules of Amino Acids. There are about twenty-two amino acids in the hair, and the molecules of each contain atoms of elements in different proportions. Overall, the elements in hair are in approximately these proportions:-

Carbon 50%  
Oxygen 21%  
Nitrogen 18%  
Hydrogen 7%  
Sulphur 4%

## Growth Stages of Hair

Hair is constantly growing. Over a period of between one and six years an individual hair actively grows, then stops, rests and degenerates, and finally falls out. Before the hair leaves the follicle the new hair is normally ready to replace it. If a hair is not replaced then a tiny area of baldness results. The lives of individual hairs vary and are subject to variations in the body. Some are actively growing while others are resting. Hairs on the head are at different stages of growth.

## Stages of Growth

The life cycle of hair is:-

- **ANAGEN** The active growing stage of the hair, a period of activity of the papilla and germinal matrix. This stage may last from a few months to several years. It is at this stage of formation at the base of the follicle that the hair's thickness, shape and texture is determined. Hair colour too is formed in the early part of anagen.
- **CATAGEN** A period when the hair stops growing but cellular activity continues at the papilla. The hair bulb gradually separates from the papilla and moves further up the follicle.
- **TELOGEN** The final stage, when there is no further growth or activity at the papilla. The follicle begins to shrink, and completely separates from the papilla area. This resting stage does not last long: towards the end of the telogen stage, cells begin to activate in preparation for the new anagen stage of regrowth. The new anagen period involves the hair follicle beginning to grow down again. Vigorous papilla activity generates a new hair at the germinal matrix. At the same time the old hair is slowly making its way up and out of the follicle. Often the old and new hair can be seen at the same time in the follicle. In some animals most of the hairs follow their life cycle 'in step', passing through anagen, catagen and telogen together. This results in moulting. Human hair, however, develops at an uneven rate and few follicles are shedding their hair at the same time. (If all the hairs fell out at the same time we would have bald periods!)

## Regeneration of Hair

The regeneration of hair is influenced by many factors:

- health
- hereditary factors
- diet
- hormone balance
- age
- physical condition
- climate
- chemical effects
- sex

- effects of disease

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