

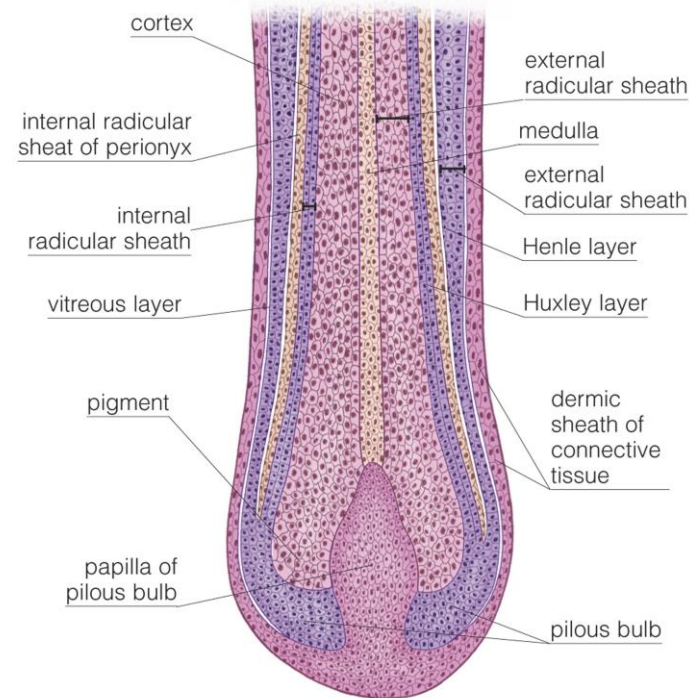
Anatomy and physiology

The hair and hair growth cycle

The hair follicle

The hair follicle is composed of the following structures:

- Inner root sheath
- Outer root sheath
- Vitreous membrane
- Connective tissue sheath



Inner root sheath

It arises from the matrix cells and lies between the hair shaft and the outer root sheath.

It interlocks with the outer cuticle layer of the hair shaft, originating at the base of the follicle from matrix cells.

It grows up inside the hair follicle, along with the hair shaft, until it reaches the level of the sebaceous gland. The hair then continues to grow up and out of it.

It is composed of germinative epithelial cells and has three layers:

- Outer layer – Henle's layer – composed of a single layer of cells.
- Middle layer – Huxley's layer – which is the thickest layer.
- Innermost layer – the cuticle – which interlocks with the outer cuticle of the hair shaft, to help anchor the hair to the follicle.

Outer root sheath

Location:

- Surrounds the inner root sheath.
- Forms the follicle walls.
- Continuation of the basal germinative layer of the epidermis.
- Lines the follicle and is continuous with the stratum corneum. Melanocytes are located within this area.

Structure:

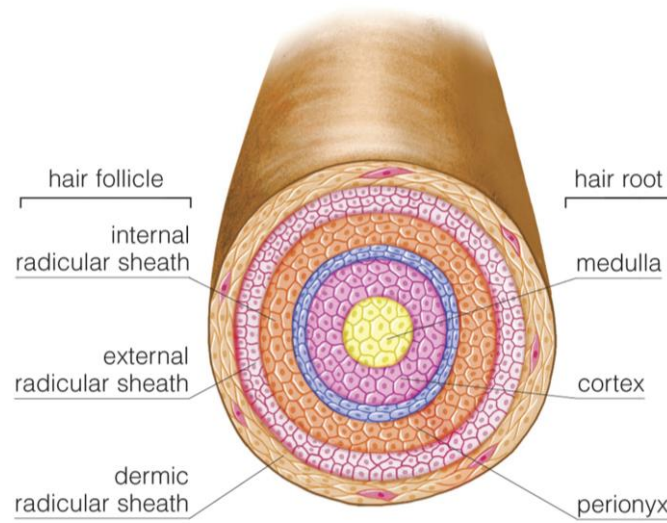
- Comprises germinative epithelial cells.
- Capable of reproduction.
- Contains water and glycogen.
- It is multi-layered in the upper follicle but its thickness varies, being thinner at the bulb region of the follicle.

Outer root sheath

Function:

When stimulated by local blood supply, it is the source of the hair-germinating cells which, in turn, leads to the rebuilding of the lower follicle structures such as the hair bulb, inner root sheath, etc.

It gives support to the follicle.



Outer root sheath (cont.)

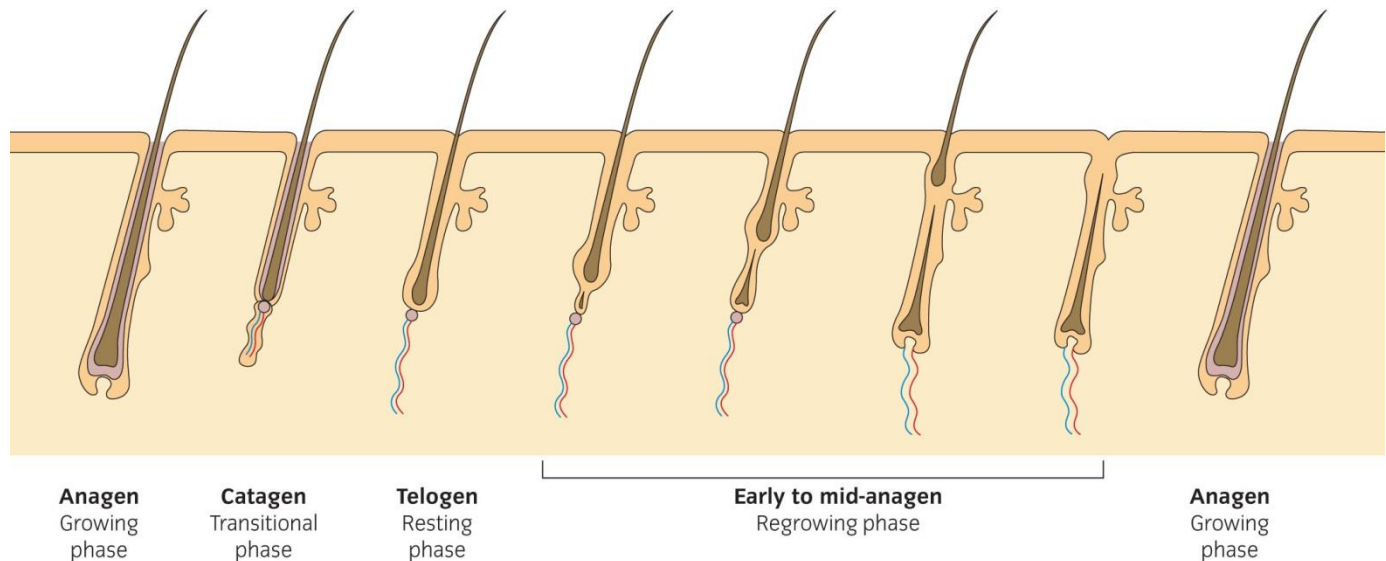
The outer root sheath can be divided into three regions:

1. The upper region, which lies above the opening duct of the sebaceous gland and is continuous with the stratum corneum of the epidermis.
2. The middle region, which extends from the mouth of the sebaceous gland down to the neck of the hair bulb. The cells here are flattened and store large amounts of glycogen.
3. The lower region, which surrounds the hair bulb. This is where the outer root sheath is only two cells thick and slightly elongated, and where mitotic activity starts when stimulated by local blood supply.

The hair growth cycle

The hair on our body grows at different rates. There are three different stages of hair growth.

- Anagen
- Catagen
- Telogen



The word **ACT** will help you to remember these stages and their order:

Anagen stage

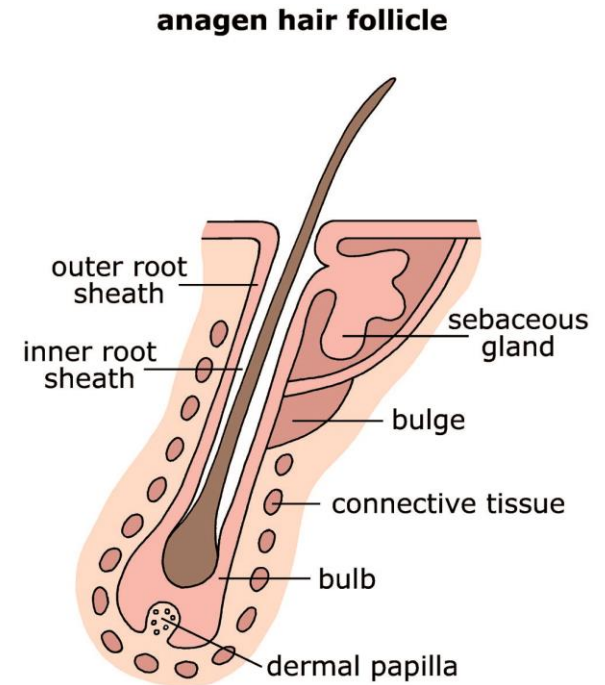
Anagen is the stage of cellular growth and development.

The new follicle starts to form from the dermal cord (hair germ cells).

These cells extend down from the remnants of the permanent follicle.

The dermal cord reproduces by the process of mitosis, growing in width and length and ploughing down to the dermis.

A depression forms at the tip of the dermal cord and here dermal papilla cells gather.



Anagen stage (cont.)

The lower part of the dermal cord forms the large hair bulb, which encases the dermal papilla.

In the lower hair bulb, the matrix cells are activated and cells grow and move up to the upper bulb, where they begin to differentiate. Some cells grow at a faster rate than others and form the inner root sheath.

The other, slower-growing, cells form the hair structure.

In the upper bulb, keratinisation also occurs and the cells lose water, becoming hardened once the hair emerges.

As more cells are produced, the new hair forms a cone and continues up through the dermis, to the permanent part of the follicle.

Once the hair emerges through the skin it is called the hair shaft.

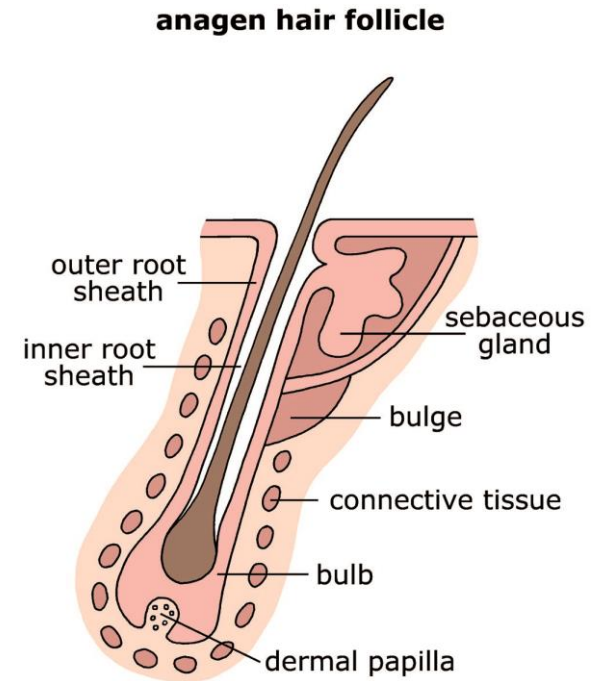
Anagen stage (cont.)

The follicle continues to extend down into the dermis until the hair on the skin's surface has reached its ultimate length.

The percentage of scalp hair in anagen phase is, on average, is 88%.

It lasts from 2–7 years, depending on hereditary factors.

Melanocytes distribute melanin only during anagen, within the matrix region.



Catagen stage

This is the complete reversal of anagen.

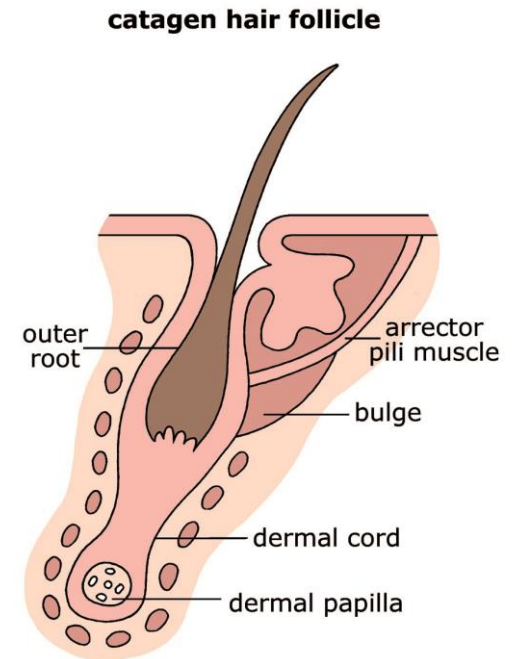
All mitotic activity ceases in the matrix.

The follicle collapses, shrinking by one-third.

Cells in the upper hair bulb move up and away from the dermal papilla.

The dermal papilla shrinks and condenses, moving upwards to lie beneath the shrunken follicle.

The inner root sheath shrivels up.



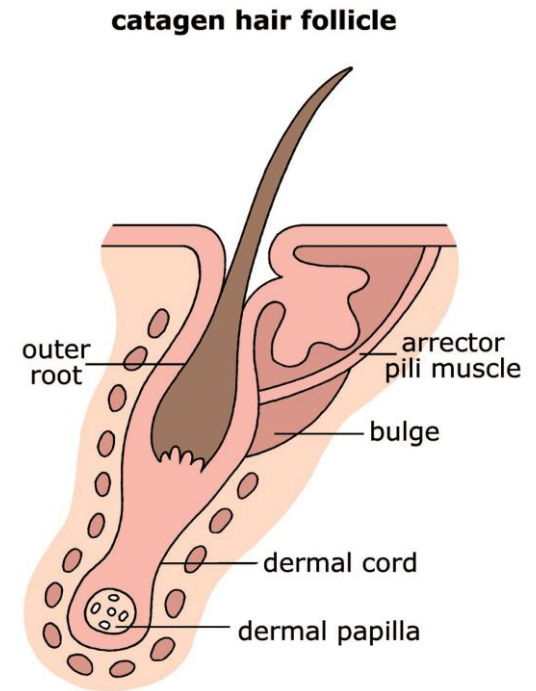
Catagen stage (cont.)

The hair lodges in the follicle wall and is known as a club hair.

The dermal cord is formed from the matrix germinative cells – only during catagen.

Catagen lasts, on average, 2–3 weeks and at any one time 1–2% of body hair is in this cycle.

The club hair receives nourishment from a localised blood supply and the surrounding cells and sebaceous glands.



Telogen stage

This is the resting stage of hair growth.

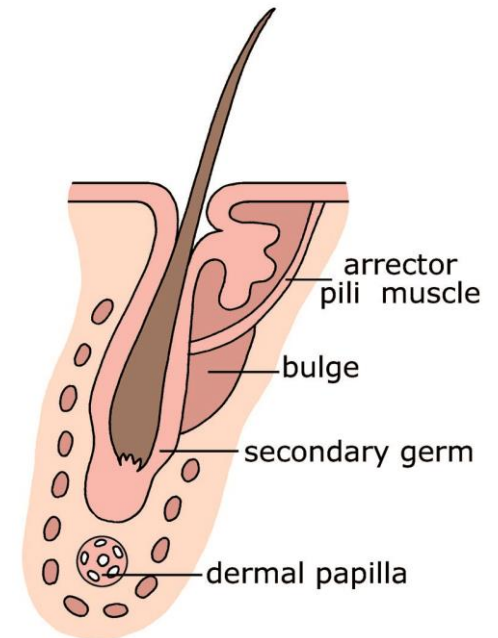
It lasts approximately 100 days.

On average, 10–15% of hair is in this stage.

Hair moves up and is shed.

Hair receives no nourishment.

telogen hair follicle



Telogen stage (cont.)

If telogen phase is prolonged, hair loss is permanent.

Rest stage varies between individuals.

There are occasions when the follicle does not rest but is immediately stimulated by hormones and enzymes carried by the blood.

The dermal papilla is greatly shrunken in this stage but remains in contact with the dermal cord, awaiting stimulation by a biochemical process to merge together, to rebuild a new follicle from below the level of the sebaceous gland.