The hair growth cycle

Each individual hair is formed inside a hair bulb deep in a hair follicle. The follicle is a tiny but powerful factory, which throughout many people's lifetime hardly ever stops working. From a baby's birth for many decades, as much as a century in some people, the follicle continues to produce hairs. Each hair grows for many years; during this time it will be shampooed, conditioned, cut, blown dry, exposed to sun and wind, colored or bleached or permed. None of these treatments affects the growth of the hair in the hair bulb, even though some may seriously damage the hair shaft. Finally the hair spontaneously falls out. The follicle rests for a little while, and then starts to produce yet another new hair. This is the hair cycle.

You need to know about the hair cycle in order to understand many of the problems people have with their hair. These can range from the sudden appearance of hairless patches to complete baldness in men, and sometimes in women too.

Stages of the hair cycle

Between starting to grow and falling out years later, each hair passes through three distinct stages. These are so important that they have been given special names: anagen (the growing phase), catagen (the intermediate phase) and telogen (the shedding phase).

We shall look at these three stages in turn.
generally between three and seven, without interruption. Since human hairs grow at a rate of roughly 1 centimetre a month, hairs can grow to a length of a metre or so.

As we have seen, hair may grow more quickly in winter than in summer. Hair growth varies with the season as a result of a change in the difference between hair follicles in the growing and shedding phases.

Pigment (melanin) is made in the hair bulb throughout this phase of the hair cycle. Less pigment is made in the hair of older people. This is why white hairs start to appear, even though the hair itself may still be growing strongly.

In some older people the hair cycle becomes shorter, the follicles gradually give up producing long, strong hair, and the hairs become thinner and shorter. The result may be a general thinning of the hair, or even a degree of baldness.

**Catagen (the intermediate phase)**
The anagen phase is followed by a short resting phase. This catagen phase lasts for between two and four weeks in the human scalp. No pigment is made during that time, and the follicle stops producing hair. The base of the follicle moves upwards towards the surface of the skin.

**Telogen (the shedding phase)**
The telogen phase lasts for three or four months. This is the time at which a new hair begins to grow from the hair follicle. As it grows upwards the old hair will be shed naturally or may be pulled out, which happens easily and painlessly with telogen hairs. These are the hairs that come out when you shampoo or brush your hair.

Shedding is part of the normal process of the replacement of old hair with new. At any one time, around one in ten of the follicles on an individual's head are in the shedding phase. The new hair emerges from the same opening at the surface of the skin as the old one, and the hair cycle begins again.

**Hair length**

How long anagen lasts is determined genetically, and varies between the sexes and from one person to another. It is the length of this time that decides how long the hair will grow before it falls out.

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**Follicle activity**

In everyday life, nothing interrupts the activity of the hair follicle. Nothing that is put on the scalp or hair can interfere with the growth of the hairs. Only severe burns or scars can affect the hair follicle.

Certain drugs that are given for cancer treatment can prevent hairs from growing. (This is discussed later in this chapter.) Almost always, however, the interruption is only temporary and hairs begin to grow again when the medication is stopped.
HAIR FACTS

The growth of human hair

- Each human head carries roughly 100,000 hair follicles.
- Each follicle can grow many hairs over a lifetime: on average, each grows a new hair around twenty times.
- Not all these follicles are actively growing hairs at any one time. From the moment when it is first formed, each follicle undergoes repeated cycles of active growth and rest. The length of the cycle varies with the individual, and also with the part of the body on which the hair is growing.
- The hairs on an adult scalp do not grow in unison, as they do in an unborn baby. They are 'out of cycle' with each other. If this were not so, everyone would go temporarily bald from time to time.
- The growing and shedding of hair as a whole seems to happen at random, but for each hair follicle the process is precisely controlled. No one knows for certain, however, exactly how the body controls these cycles.
- Plucking a hair from a follicle brings forward the next period of hair growth in that follicle.

Anagen lasts between three and seven years in most people.

- As we have seen, a hair grows at a rate of about 1 centimeter a month.
- After one year it will be 12 cm long. After five years it will be 60 cm long.
- Waist-length hair is 80-90 cm long, and will have taken about seven years to grow.
- Shoulder-length hair will have taken only about three years. Thus only people with long anagen times can expect to grow their hair down to the waist.

As people grow older the period of anagen shortens. For example, the hair of someone with a five-year anagen can grow to a length of 60 cm before it enters the shedding phase. If their anagen period drops to three years as they age, their hair will then grow only to shoulder length before it falls out or is brushed out.

So when a scanty-haired elderly lady boasts that when she was a girl she could sit on her hair, she may very well be telling you the truth!

What controls hair growth?

No one can answer this question with certainty. What we do know is that it takes a lot to stop hair growing!

General health and nutritional factors are increasingly believed to be important for healthy hair growth. We do know that serious anemia affects hair growth. So too does starvation: people who go on a crash diet may start to lose their hair some six to ten weeks later. Many alcoholics have poor hair growth or even hair loss because their way of life tends to lead to malnutrition.
FIGURE 8–1 * Cross-section of skin showing hair growing out of a tubelike structure called the follicle.

FIGURE 8–2 * Scale patterns of various types of hair. (a) Human head hair (600x); (b) dog (1250x); (c) deer (120x); (d) rabbit (300x); (e) cat (2000x); (f) horse (450x). Courtesy International Scientific Instruments, Mountain View, Calif., and New Jersey State Police.
**Figure 6** Medulla patterns

**Figure 8-4** Medulla patterns for various types of hair. (a) Human head hair (450x); (b) dog (450x); (c) deer (100x); (d) rabbit (450x); (e) cat (450x); (f) mouse (450x). Courtesy Linda Jankowski.
FIGURE 8–6 (a) Anagen hair root. (b) Catagen hair root. (c) Telogen hair root (100x). Courtesy Charles A. Linch.

There are also several different possible shapes of hair. Hair can be straight, curly, or kinky, depending on whether the cross section of the shaft is round, oval, or crescent shaped (see Figure 7). It is risky to assign racial characteristics to hair evidence, but generally, hairs found in Asians and Native Americans have a round cross section and no twisting. The hairs of American and European whites, Mexicans, and people of Middle Eastern background show an oval cross section, rarely a twist or undulation, and evenly distributed pigmentation. People of African heritage have hair characteristics that include a flat to crescent-shaped cross section with a twist or undulation and dense, clumped pigmentation. Interestingly, hair from a beard is often coarse and triangular in cross section.
STUDENT DIAGRAM CHART

Diagram #1: Roots
- Anagenic human root with follicular tag (forcibly removed)
- Mature (telogenetic) human root (club shaped)
- Cat root (often frayed at base)
- Dog root (often spade-shaped)

Diagram #2: Shaft
- Tip
- Shaft
- Root
- Cuticle with scales
- Cortex
- Medulla

Diagram #3: Scale Patterns
- Coronal (mouse)
- Spinous (cat)
- Imbricate (human)

Diagram #4: Medulla Patterns
- Fragmented
- Intermittent
- Continuous

Diagram #5: Medulla Types
- Uniserial (rabbit)
- Multiserial (rabbit)
- Vacuolated (dog, fox, common)
- Lattice (deer)
- Amorphous (human, common)

Diagram #6: Cortex
- Scales
- Pigment granules (melanin)
- Cortical fus