



WHAT IS ALOPECIA?

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YOUNG REVIEWERS:



AADIT

AGE: 9



AARUSH

AGE: 13



ELISA

AGE: 14

ALOPECIA

The medical term given to when someone loses their hair, and it does not grow back as it should.

Alopecia is a medical term for hair-loss disorders. Hair is important for us because it impacts our appearance and how we feel about ourselves, and losing hair can be tough for our mental health. In this article, we will explain the different types of alopecia, what can cause them, and how they are treated.

WHAT IS ALOPECIA?

Did you ever see a young person with thinning hair or bald patches, or a person who lost their hair from cancer treatment? These people are suffering from a disorder called **alopecia**.

The word alopecia is not a diagnosis.

Alopecia means hair loss, but the term does not tell us what is causing the hair loss. Losing 50–100 scalp hairs per day is considered normal shedding, and shedding is required for a normal hair cycle. Hair loss that is consistently >100 hairs per day is considered alopecia. In true alopecia, hair does not grow back on its own. Alopecia can affect any

area of the scalp and can also include body hair, such as the beard area in men, the eyebrows, or the eyelashes. We do not fully understand why some patients lose specific portions of their hair, and researchers are actively investigating this.

AN INTRO TO HAIR BIOLOGY

To understand alopecia, it is important to know something about hair and how it normally grows. **Hair follicles** are slightly different depending on their location on the body, but they have the same basic structure and they all have a growth cycle [1]. Let us explain the follicle from the bottom up.

At the base of the hair follicle is the dermal papilla (Figure 1). It has tiny blood vessels that feed it. The dermal papilla communicates with the hair matrix, which is where hair grows from. The matrix also has pigment cells called melanocytes that give hair its color. Everyone has a unique hair color based on the pigments their melanocytes make—cool, right? Another function of the hair matrix is to determine the length and thickness of hair [2]. The next region of the hair follicle is called the bulge, which is the home for hair follicle stem cells. Stem cells are cells that can divide many times, to renew cells and tissues. Hair follicle stem cells are responsible for hair growth and skin health, and they can assist with wound healing [3]. The bulge also contains the arrector pili muscle, which is what pulls up your hairs to give you goose bumps! This helps with keeping your body at a good temperature. There are also little glands in the hair follicle called sebaceous glands, which make an oily substance to protect the hair and skin.

HAIR FOLLICLE

Like a tiny pocket in our skin where our hair grows from.

Figure 1

Healthy hair follicles and which parts get attacked during alopecias. **(A)** A healthy hair follicle. **(B)** The parts of the follicle that are affected by alopecia. Infections with bacteria, viruses, or fungi affect the upper hair follicle. If immune cells attack the bulge area where stem cells reside, scarring alopecia can occur. If immune cells attack the bulb area (dermal papilla and hair matrix), non-scarring alopecia like alopecia areata can occur. This figure was created with Biorender.com.

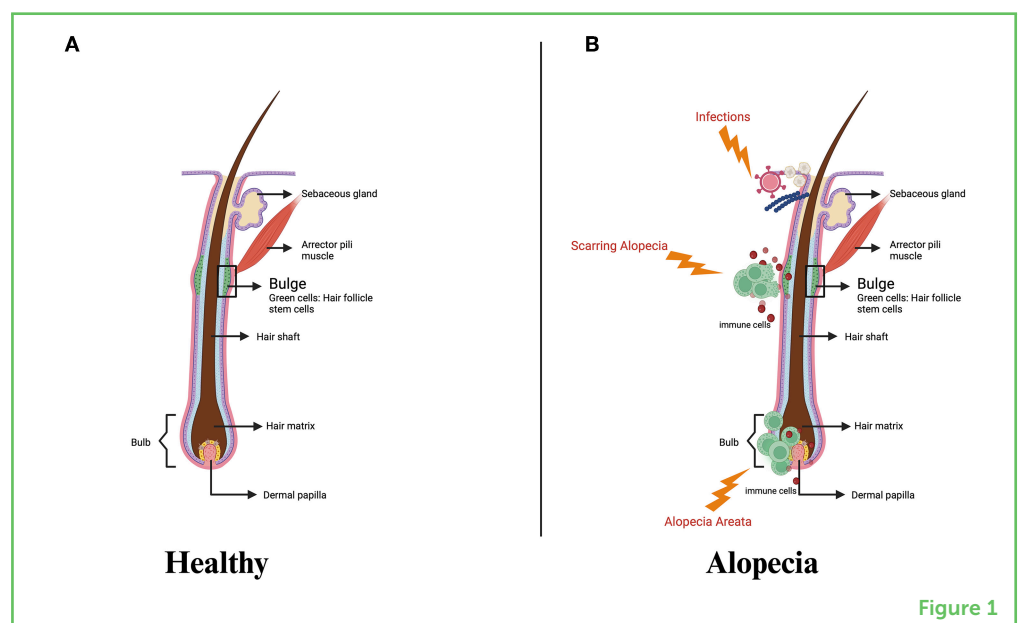


Figure 1

INVOLUTION

A special process where things change and go back to how they were before.

Hair follicles go through several phases: growth, **involution**, and resting. Each hair follicle has its own cycle, so they do not all grow at the same time. The growth phase can last several years. After that, the follicle goes into the involution phase, which only takes a couple of weeks. During that phase, hair takes a break and undergoes a special process where it gets a bit smaller before falling out naturally. The last phase happens when the hair gets ready to fall out. Hair falls out after about 3 months, usually when we comb or wash it. Hair follicles cannot reproduce or spread.

WHAT CAUSES ALOPECIA?

Let us look at a few types of alopecia and their most common causes (Figure 2).

Figure 2

Different types of alopecia. There are several types of alopecia, which can be classified as scarring or non-scarring. **(A)** Frontal fibrosing alopecia is a type of scarring alopecia. In this form, the hairline recedes and causes scarring. **(B)** The most common types of non-scarring alopecias include alopecia areata (patchy-type hair loss); chemotherapy-induced hair loss, which affects the whole body, not just scalp; and androgenic alopecia, which affects the top of the head.

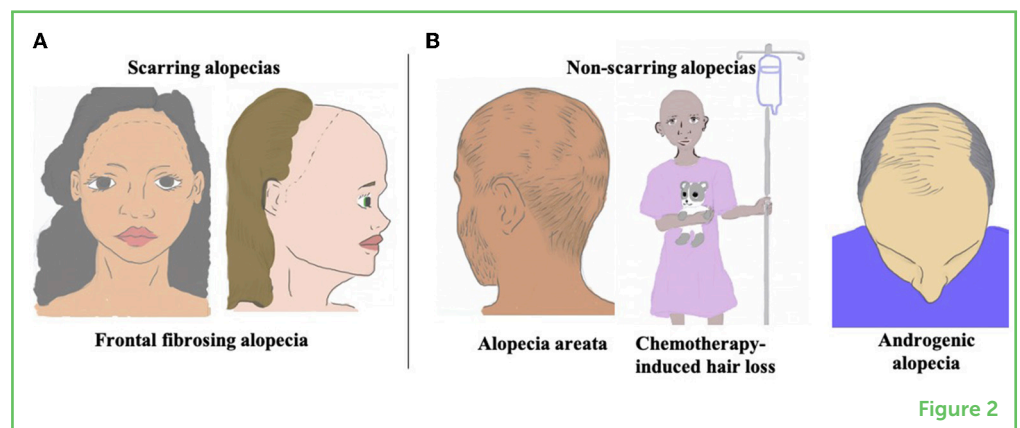


Figure 2

Androgenic Alopecia

Androgenetic alopecia (also called common balding) is the most common alopecia in men and women [4]. Nearly 50% of men are affected by androgenetic alopecia by age 50, and we see similar numbers in women. Generally, patients have a family history of balding, but this is not always the case. This type of hair loss is due to an excessive response to hormones, especially male-type hormones (androgens) like testosterone. These hormones shorten the growth phase of the hair follicle, leading to hair thinning over time. Hair loss in men is often observed on the top and sides of the head, but women typically have hair thinning all over the top of the scalp. Several treatments can be prescribed to treat this type of hair loss, and often laboratory tests are recommended to exclude other causes.

Alopecia Areata

Alopecia areata is a common, reversible autoimmune form of hair loss that affects up to 2% of the population. **Autoimmune diseases** occur when the immune cells attack the body's own tissues. Alopecia areata can affect people of any age, including children. For unclear reasons, immune cells attack the hair follicles when they are in the

AUTOIMMUNE DISEASES

The body's defense system mistakenly attacks its own healthy cells.

growth phase, leading to hair loss [5]. This can cause bald patches, many of which get better without treatment, but in some cases the patches can persist or worsen, leading to complete scalp hair loss. For patients with persistent or severe alopecia areata, there are several treatment options including scalp injections or oral medications. Patients with alopecia areata may be more likely to have other autoimmune diseases.

Infections

Tinea capitis is a type of fungal infection that may affect hair follicles [4]. This infection can occur in children and generally causes patchy hair loss. Unlike alopecia areata, it is commonly itchy and can cause scalp redness and flaking. Diagnosis requires taking a swab to the affected area and then culturing (growing) the fungus in a lab. Tinea capitis is treated by oral medications that kill the fungus.

COVID-19 infection has also been described as triggering increased shedding of hair, which typically starts 2–3 months after the illness. The shedding typically lasts for about 3 months and then gets better on its own. No treatment is needed, as the hair slowly regrows on its own, at a rate of 1 cm per month.

Medicines

Chemotherapy is another common cause of hair loss. Some forms of chemotherapy work by targeting cancer cells that rapidly multiply. Some chemotherapy drugs can cause temporary hair loss because they accidentally target hair follicle cells in addition to cancer cells. Hair typically grows back within 6 months after chemotherapy treatment ends. Other medications can cause hair loss as well; for example, some antiviral medicines, some antibiotics, and some medicines to treat diabetes.

Other Causes

Another common cause of temporary over shedding of hair leading to hair loss is called **telogen effluvium**. Common triggers for telogen effluvium shedding include stopping hormonal birth control or hormone replacement therapy, having a baby, weight loss, significant illness with fever, a change in thyroid medication, or significant stress including loss of a loved one, loss of a job, or divorce. Any of these triggers can lead to excessive hair shedding that typically starts 2–3 months after the event. The hair then over sheds for 3 months before stopping on its own, without treatment, and re-growing at a rate of 1 cm per month. Many people who experience this are understandably concerned and think that they are going to go bald, but this is not the case. The best way to avoid this type of hair loss is to stay as healthy as possible, maintain a stable weight, and avoid changes in hormone-based medications, especially in the case of hormonal birth control.

CHEMOTHERAPY

A special medicine that helps fight and kill the bad cells, especially for those with cancer.

TELOGEN EFFLUVIUM

A medical term for excessive hair shedding.

HAVING ALOPECIA IS DIFFICULT

Alopecia can occur at any age, and it can affect people's lives very deeply. Learning about hair biology and the causes of alopecia can help everyone to understand why some people lose their hair. Some people choose to leave their alopecia as is or to cut their hair very short, so it is less noticeable. Other people choose to treat their alopecia, while some forms of alopecia, like telogen effluvium, get better on their own and do not require treatment. If you or a loved one is bothered by hair loss, you may seek treatment from a dermatologist or other healthcare professional. Treatment options vary from patient to patient. Alopecia can be tough on people's mental health because it affects their appearance and often how they feel about themselves. So, regardless of whether people choose to treat their alopecia, it is important to be emotionally supportive of all patients who have hair loss.

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YOUNG REVIEWERS



AADIT, AGE: 9

My name is Aadit. I am 9 years old and a fourth grader. I like to study high school biology. I play the oboe, soccer and chess for fun. I solve rubix cubes in my spare time. I love traveling to different places around the world. My favorite subject is math, in which I am accelerated in school.



AARUSH, AGE: 13

I am Aarush, 13 years old, and a 8th grader. I am very interested in biology and computer science. My goal is to be a physician researcher in cardiovascular diseases. I play soccer, chess, and violin as some hobbies.



ELISA, AGE: 14

Elisa is a young girl with a curious mind. She is very passionate about science, especially related to biomedical science. She is interested in research and would like to start getting involved in conducting her own explorations at some point in the future. She hopes that, with her critical thinking, her love for health discoveries, and her drive, she will be able to contribute to science through journal review.

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