

Understand Nails as an Accessory Organ of the Integumentary System

FINGERNAILS may provide a canvas for a fancy manicure, but nails actually serve an important purpose. They help you peel the price tag off a birthday present, scratch an itch, and protect the tender tips of your fingers and toes. But have you ever stopped to think about how your body makes the nails? In this unit, you will learn about the different parts of nails, how they grow, and even what your nails can tell you about your general health.



Objective:



Explain nails as part of the integumentary system.

Key Terms:



anemia

cuticle

cyanosis

eponychium

free edge

lunula

matrix

nail bed

nail body

nail plate

nail root

onycholysis

root

Nails and the Integumentary System

The integumentary system is a system of “accessory organs,” including hair, glands, skin, and nails. The primary function of the integumentary system is to act as a barrier and to provide protection for the body.

ANATOMY AND PHYSIOLOGY OF NAILS

Nails are a substructure of the epidermis and are found on the ends of fingers and toes. They are made of the hard protein keratin.

Nail structure is divided into specific parts. The nail begins in the **nail root**, sometimes called just the **root**. The root is also known as the **matrix**. It is located under the skin.

The **nail bed** is the flat surface under the nail. It is the layer of epithelial tissue that extends from the edge of the matrix. The nail bed contains nerves, melanocytes, and blood vessels. The blood vessels nourish the nail bed and give nails their pink color.

The **lunula** is the white, crescent-shaped area at the nail bed, which is nearest the root. Known as the “little moon,” the lunula is formed by air mixed in the keratin. It is usually easiest to see on the thumbnail. The lunula varies in size and shape and may be well marked or undefined. It also tends to disappear with age, so a well-marked lunula in a young adult may be barely visible as the person gets older.

The **nail plate** is the actual nail. It is made of translucent keratin. The underneath surface of the nail plate has grooves along the length of the nail that anchor it to the nail bed. The **nail body** and the **free edge** are the plate regions that hang over the ends of fingers and toes.

The **cuticle** is where the nail plate meets the skin and fuses them. Another name for the cuticle is the **eponychium**. It provides a weather-proof barrier and protects the new nail as it grows from the nail root.

Nails have two primary functions. They aid in grasping and manipulating small objects. They protect fingers and toes from injury.

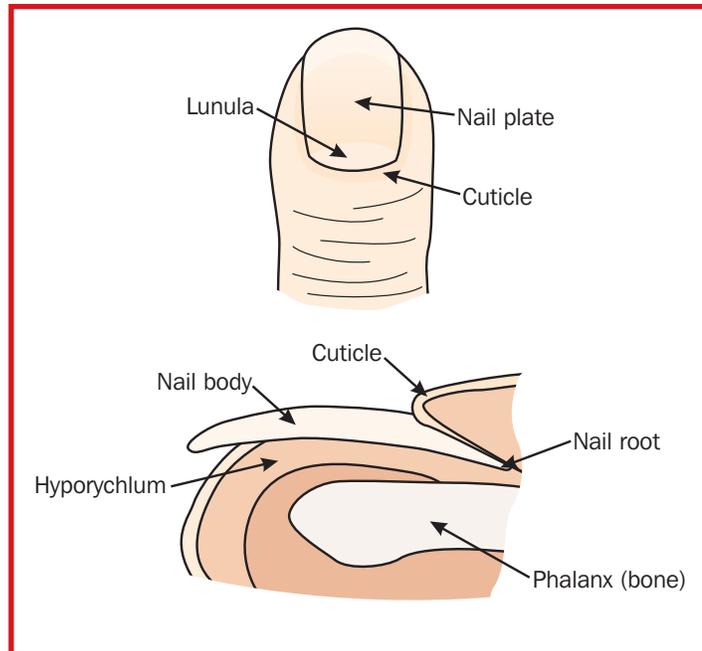


FIGURE 1. Anatomy of a nail.

GROWTH AND DEVELOPMENT OF NAILS

Much like hair, nails are formed by keratinization. When cells at the nail root grow, the new nail cells push out the old nail cells. The keratin causes these old cells to flatten, harden, and press tightly together. Each cell develops into a thin plate. The plates are piled together in layers to form the nail. When the nail cells accumulate, the newly formed nail is pushed forward, sliding along the nail bed. So the part of your nail closest to your cuticle is the newest, while the free edge (the part you would clip) is the oldest.

The growth of nails is slow and continuous. Healthy fingernails grow an average of 0.5 millimeters per week or about 0.1 inch each month. Fingernails grow about three to four times more quickly than toenails. It can take four to six months for a fingernail to grow from the root to the free edge. Toenails, however, may take 12 to 18 months to grow from root to free edge. Both grow faster in summer than winter because of the heat. Fingernails also grow faster on the dominant or more active hand because of the heat generated during activities.



FURTHER EXPLORATION...

ONLINE CONNECTION: Nails and Your Health

The condition of your fingernails may actually provide clues about your state of health. Several health problems include symptoms that affect the appearance of nails. While nail appearance alone may not be enough to diagnose a problem, it may be a sign that you need to see a doctor for further examination. For example, yellow nails may be a sign of respiratory problems, but that is not always the case. Visit the following Mayo Clinic website to learn more about possible health problems that can affect the appearance of fingernails. View the slides on the website. Then look at the nails of your friends and family members to see if they display any of the characteristics identified.

<http://www.mayoclinic.com/health/nails/W000055>

If the nail is torn off, it will regrow, as long as the matrix is not severely injured.

Onycholysis is the loosening of the nail from the nail bed.

The rate of nail growth depends greatly on a person's health and diet. Poor internal health often affects nail growth and appearance. White nails may be a result of **anemia**, which is a decrease of hemoglobin in the blood. Blue discoloration of nails is called **cyanosis** and is caused by lack of oxygen in the blood. Horizontal furrows are caused by malnutrition and illness.

A high-protein diet builds stronger, healthier nails, but the growth rate usually decreases with age and poor circulation.

Summary:



Nails are a substructure of the epidermis and are found on the ends of fingers and toes. A nail begins in the nail root, which is under the skin. The nail bed is the flat surface under the nail, which contains nerves, melanocytes, and blood vessels. The lunula is the "little moon" located near the root. The nail plate is the actual nail, and the nail body and free edge are the plate regions that hang over the end of fingers and toes. The cuticle is where the nail plate meets the skin and fuses them. Nails are formed by keratinization. When cells at the nail root grow, the new cells push out the old cells. The keratin causes these old cells to flatten, harden, and press tightly together, forming nails.

Checking Your Knowledge:



1. What are the parts of a nail?
2. What are the primary functions of nails?

3. How are nails formed?
4. How fast do nails grow?
5. What conditions affect the rate of nail growth?

Expanding Your Knowledge:



Have you ever thought about how useful your nails are? In this unit, you learned one of the primary functions of nails is to aid in grasping and manipulating small objects. Cover your fingertips with pieces of tape or bandages, to simulate what it would be like to have no fingernails. Try to pick up small objects, such as coins or paperclips on a table. Try to peel the price tag off an object or open an envelope. Discuss your difficulties with your classmates, and think of other tasks made easier by your fingernails.

Web Links:



Fingernail Info

http://www.naildoctors.com/nail_info.htm

How to Keep Your Nails Healthy and Strong

<http://www.mayoclinic.com/health/nails/WO00020>