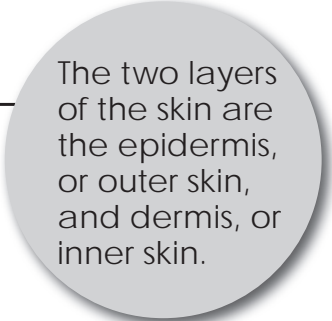


Chapter 1

Behavior of Normal Healthy Skin

It is the desire of all to possess healthy normal skin. However, it is uncertain exactly what constitutes normal skin. Skin is an irregular surface composed of skin scales with intervening hairs, sweat ducts and oil glands that reflect light to the eye, which is perceived as beauty. Healthy skin is important, as humans assess each other based on skin appearance before any other attribute. Skin appearance is the result of many interrelated biochemical and physical factors. Unfortunately, throughout time, these factors are subject to changes from both internal aging and external factors. Sun, smoking, stress, disease and aging alter the structure of the skin, making it sag, and lose its luster and suppleness. Professional skin care maintains skin in its most attractive and healthy state. This chapter will provide an understanding of normal skin behavior in relation to its structure and function to maintain a healthy appearance for a lifetime.

Skin structure _____



The two layers of the skin are the epidermis, or outer skin, and dermis, or inner skin.

Epidermis _____

The skin is composed of two layers, the **epidermis** and the **dermis**, each with a distinct function. The epidermis is the outer skin layer that forms a

barrier to the outer world. This barrier keeps out water, sunlight, insects, germs, heat and cold, dirt and gases. It keeps in fluids such as water and blood, and holds safe minerals, vitamins, hormones, proteins and heat. An incredible self-renewing system, the epidermis provides replacement of the outer cells lost to the environment. It provides a waterproof outer layer, yet permits internal water to carry nutrients to the outermost living cells. It provides a tough outer layer to resist friction, abrasion and pressure, yet is sensitive to the lightest touch or softest breeze. Less glamorous, but equally as important, the skin serves as a vast waste disposal system, ridding the body of many toxic substances. (See **Figure 1-1.**)¹⁻²

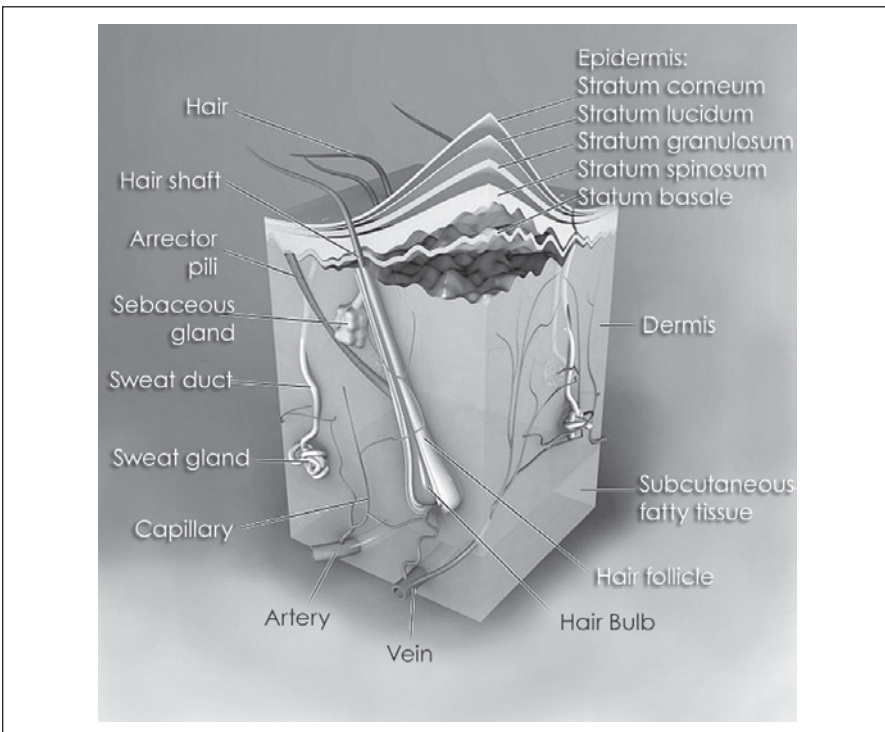


Figure 1-1. The structure of the skin. The skin is composed of the outer layer known as the epidermis; and the inner layer, known as the dermis. The skin barrier is essential to skin health and must be preserved to prevent disease.

Dermis: Papillary dermis

The outer epidermis is tightly connected to the underlying inner skin, known as the dermis. The dermis accounts for more than 90% of the skin mass and for the greatest part of its physical strength. The major divisions of the dermis are the **papillary dermis** and the **reticular dermis**. The papillary

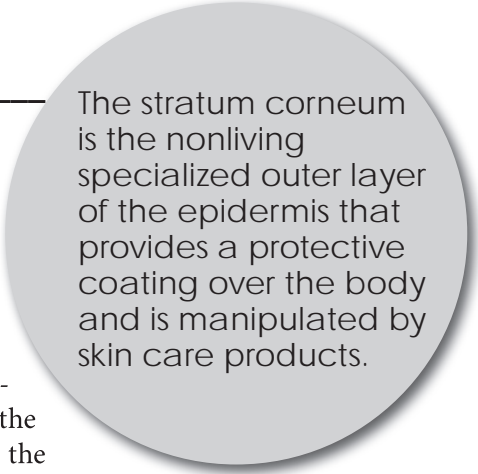
dermis is the outer portion of the dermis in direct contact with the epidermis. It is thin, contains small and loose fibers. The protein fibers that make up the main constituent of the skin are collagen fibers. These collagen fibers are made stretchy and resilient by the addition of elastic material, known as elastin. In addition, there are number blood vessels in the papillary dermis to provide nutrition and lymphatic vessels to carry away the wastes of the body. Finally, there are connective tissue cells and glycosaminoglycans in the papillary dermis. It is the source of nutritional support for the epidermis.

Dermis: Reticular dermis _____

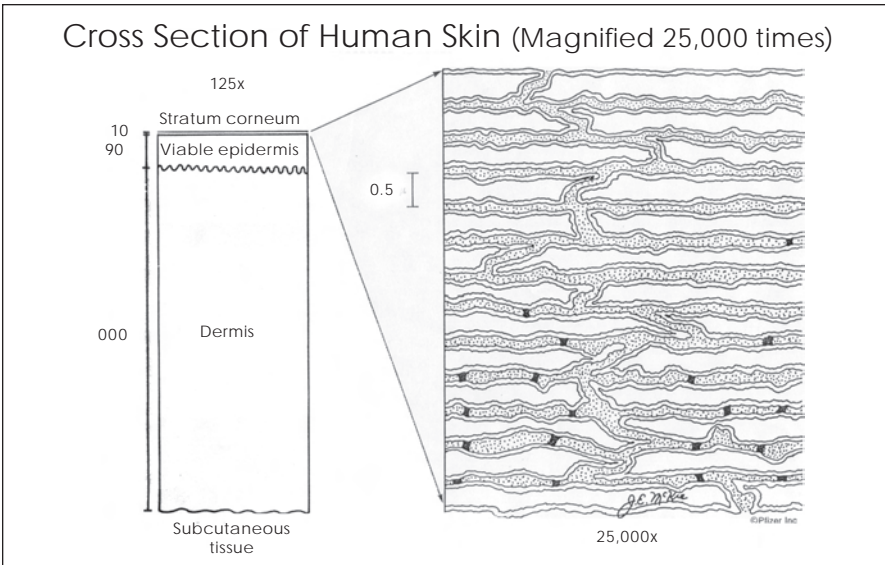
The reticular dermis lies under the papillary dermis and has fewer cells, relatively few blood vessels, dense collagen bundles and coarse elastin fibers. This layer provides the physical strength to the skin that resists tearing. It is the reticular dermis from animals that provides the strong leather used in purses, luggage and shoes. Within the reticular dermis are the sweat and oil glands, along with the hair follicles, that are collectively known as the skin appendages.

Stratum corneum _____

Perhaps the most important layer of the skin, from a cosmetic standpoint, is the **stratum corneum** (SC), also known as the “horny layer.” This outermost layer of the epidermis is impacted by cleansing, moisturization and skin care treatments to the greatest degree. It is the layer assessed by the eye to arrive at the impression of lovely skin. Consider that the whole epidermis is only 0.04–1.5 mm (millimeters) thick; the SC is only 15–150 microns thick. To put that into perspective, the paper on which this is written is 70 microns thick. A micron is 1/1,000 of a millimeter; a millimeter is 0.039 inches. The SC is 0.0030 inches thick. That is thinner than a human hair. Most of human life hangs upon this thin structure, for without a SC, the epidermis would perish. While the SC is very thin, it also is a very tough little tissue. Here is why. Look at the diagram of the stratum corneum under high magnification in **Figure 1-2**.



The stratum corneum is the nonliving specialized outer layer of the epidermis that provides a protective coating over the body and is manipulated by skin care products.



Adapted from a Pfizer Inc. illustration by J. E. McKie.

Figure 1-2. A diagram of the stratum corneum under high magnification.

Keratin is the protein that makes up the bulk of the SC. Keratin is a helical, or coil-shaped fibrous protein made up of a series of building blocks, known as **polypeptides**. These polypeptides are, in turn, made up of the most basic substances, known as **amino acids**. Amino acids are arranged in a variety of orders to form chains of polypeptides, which are then twisted around each other to form proteins. These polypeptides vary in different parts of the body so that the skin protein is not homogeneous, but rather heterogeneous. The protein is resistant to water and many chemicals. It is this complex structure that provides part of the protection from the outside. Manufacturing proteins is one of the major functions of the skin.

These keratin proteins are formed and arranged into cells known as **corneocytes** that are held together with fats, known as **lipids**. The SC can be thought of as a brick wall, with the protein-rich corneocytes forming the bricks and the lipids functioning as the glue. It is this brick wall that provides the barrier necessary for the beauty and health of the body.

The lipids that keep the proteins glued in place in the SC are water-insoluble, oily substances. They can be classified by their electrical charge and by their structure. The two major groups of lipids are **polar lipids** and **nonpolar lipids**. Polar lipids have an electrical charge. Examples of this type of lipid are **phospholipids**, **glycolipids** and **cholesterol**. Non-polar lipids have no electrical charge. **Triglycerides**, **squalene** and **waxes** are examples of this group.

The six major structural groups of lipids are: triglycerides, the most abundant lipids in the body, which function as energy storage compounds

and make up between 12–25% of the lipids in the SC; fatty acids, which give the oily feel and make up between 12–20% of the lipids in the SC; waxes, which make up 6% of the lipids in the SC; and cholesterol, sphingolipids and ceramides, which make up between 14–25% of lipids in the SC.

Making of the barrier

Here are the mechanisms, outlined briefly, that make up the final SC cell (See **Figure 1-3.**) The cells are called **keratinocytes** until they are finally cornified at which time they are called **corneocytes**. Follow the process in **Figure 1-4** showing the various layers of the skin.

The **basal layer**, or bottom layer, is the active, growing, dividing layer of the epidermis. Each cell divides under control of a very sophisticated biochemical system. As

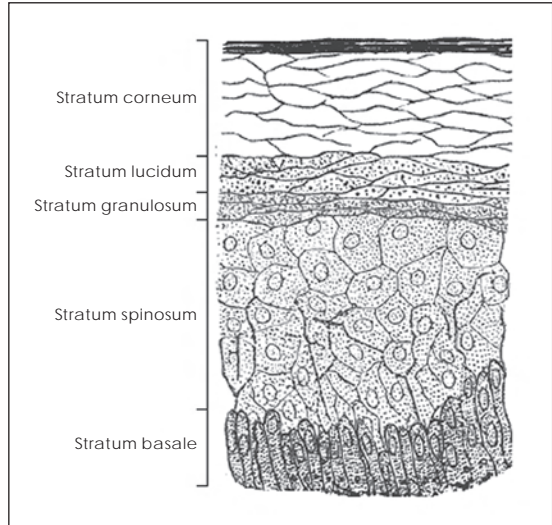
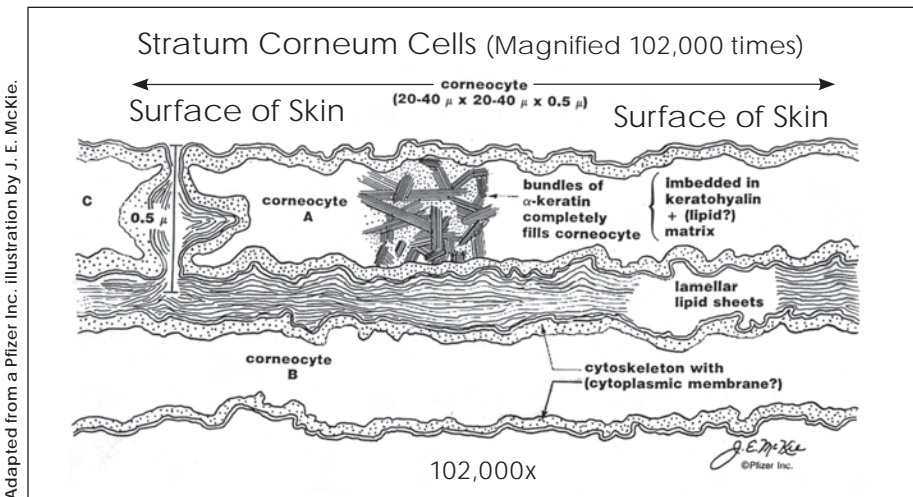


Figure 1-3. The stratum corneum. The stratum corneum is made through a complex process that changes the cells into a protein shell.



Adapted from a Pfizer Inc. illustration by J. E. McKie.

Figure 1-4. Magnified stratum corneum.