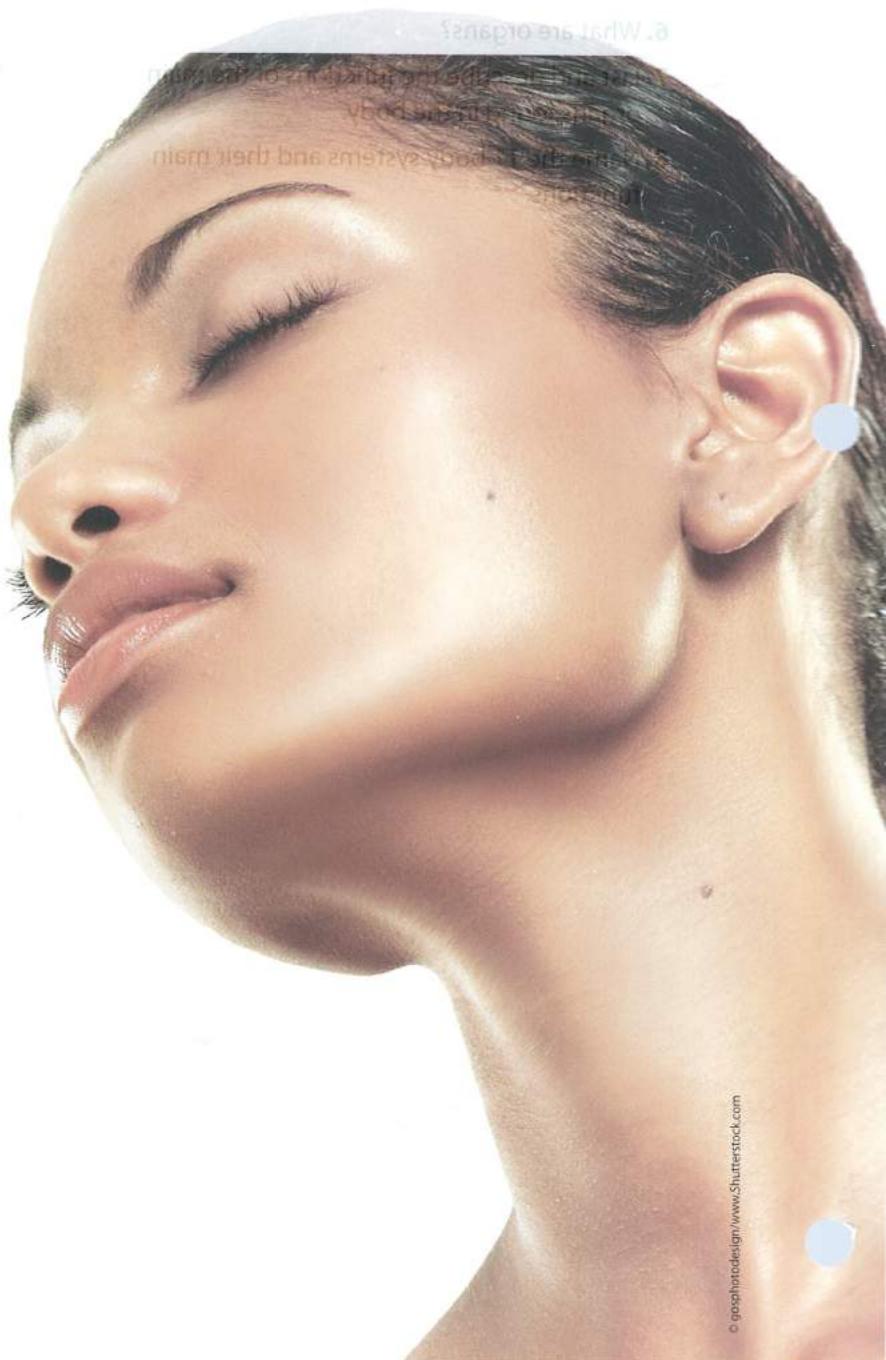


7 Skin Structure, Growth, and Nutrition

Chapter Outline

- Why Study Skin Structure, Growth, and Nutrition?
- Anatomy of the Skin
- Maintaining Skin Health
- Aging of the Skin
- Disorders of the Skin
- Preventing Skin Problems in the Salon



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Learning Objectives

After completing this chapter, you will be able to:

- ✓ LO1** Describe the structure and composition of the skin.
- ✓ LO2** List the functions of the skin.
- ✓ LO3** Describe how to maintain skin health and why it is important.
- ✓ LO4** Describe the aging process and the factors that influence aging of the skin.
- ✓ LO5** Define important terms relating to skin disorders and list which skin disorders may be handled in the salon, and which should be referred to a physician.
- ✓ LO6** Explain ways to prevent skin problems from occurring as a result of salon products or services.

Key Terms

Page number indicates where in the chapter the term is used.

acne papule / 134	dermatitis / 142	melanin / 132	stratum germinativum / 129
adipose tissue / 131	dermatologist / 128	melanocytes / 129	stratum granulosum / 129
adverse skin reaction / 139	dermatology / 128	miliaria rubra / 142	stratum lucidum / 129
albinism / 143	dermis / 129	mole / 144	stratum spinosum / 129
allergic contact dermatitis / 146	eczema / 142	motor nerve fibers / 131	subcutaneous tissue / 131
anhidrosis / 142	elastin / 133	nevus / 143	subcutis tissue / 131
arrector pili muscles / 130	epidermis / 129	overexposure / 146	sudoriferous glands / 133
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basal cell layer / 129	excoriation / 141	papule / 141	tactile corpuscles / 130
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callus / 129	histamines / 149	reticular layer / 130	tubercle / 141
chloasma / 143	hyperhidrosis / 142	scale / 141	tumor / 141
cicatrix / 141	hypertrophy / 144	scar / 141	ulcer / 142
collagen / 132	initiator / 147	sebaceous glands / 133	ultraviolet energy / 129
comedo (plural: comedones) / 134	irritant contact dermatitis / 146	secretory coil / 133	verruca / 144
contact dermatitis / 146	keloid / 141	secretory nerve fibers / 131	vesicle / 141
corium / 129	keratin / 129	sensitization / 146	vitamin A / 135
crust / 141	keratoma / 144	sensory nerve fibers / 131	vitamin C / 136
cutis / 129	lentigenes / 143	skin tag / 144	vitamin D / 136
cyst / 141	lesion / 140	squamous cell carcinoma / 144	vitamin E / 136
derma / 129	leukoderma / 143	stain / 143	vitiligo / 144
	macule (plural: maculae) / 141	stratum corneum / 129	wheal / 141
	malignant melanoma / 145		

Clear, glowing skin is one of today's most important hallmarks of beauty. With all the latest high-performance ingredients and state-of-the-art delivery systems, twenty-first century skin care has entered the realm of high technology, with products and services that truly help protect and preserve the health and beauty of the skin.

No matter how advanced the latest skin care technology may be, knowing how to care for skin begins with an understanding of its underlying structure and basic needs. As a nail technician, you also must recognize adverse conditions—including irritated or inflamed skin conditions, diseases, and infectious skin disorders—so these clients can be referred to a medical professional for treatment, if needed.

WHY STUDY SKIN STRUCTURE, GROWTH, AND NUTRITION?

As a nail professional, an overview of skin structure, growth, and nutrition is important for you to:

- Understand the skin and how it normally functions when healthy.
- Recognize unhealthy conditions that should be referred to a physician.

■ ANATOMY OF THE SKIN

The medical branch of science that deals with the study of skin—its nature, structure, functions, diseases, and treatment—is called **dermatology**.

A **dermatologist** is a physician engaged in the practice of treating the skin, its structures, functions, and diseases. Nail technicians can provide cleansing, preservation of health, and beautification of the skin on the hands, arms (below the elbow), feet, and legs (below the knee). They are not allowed to diagnose, prescribe, or provide any type of treatments nor should they ever recommend any treatments for abnormal conditions, illnesses, or diseases: to do so is a violation of federal law. For example, telling a client that he or she has a nail fungus and should use product X to get rid of it is an example of how a nail technician might improperly diagnosis and prescribe treatment for a medical condition. Instead, nail technicians should explain to the client that he or she appears to have an unhealthy nail condition that should be examined by a family doctor before any services can be provided and ask for written clearance from a doctor indicating the condition is not contagious and will not infect your other clients. The skin is the largest organ of the body. If the skin of an average adult were stretched out, it would cover over 3,000 square inches and weigh about 6 to 9 pounds. Our skin protects the network of muscles, bones, nerves, blood vessels, and everything else inside our bodies. It is our only barrier against the environment. The skin located under our eyes and around the eyelids is the thinnest skin of the body; the skin on the palms of our hands and soles of our feet is the thickest.

Healthy skin is slightly moist, soft, and flexible with a texture (feel and appearance) that ideally is smooth and fine-grained. The surface of healthy skin is slightly acidic and its immune responses react quickly to microscopic organisms that touch or try to enter it. Appendages of the skin include hair, nails, and sweat and oil glands.

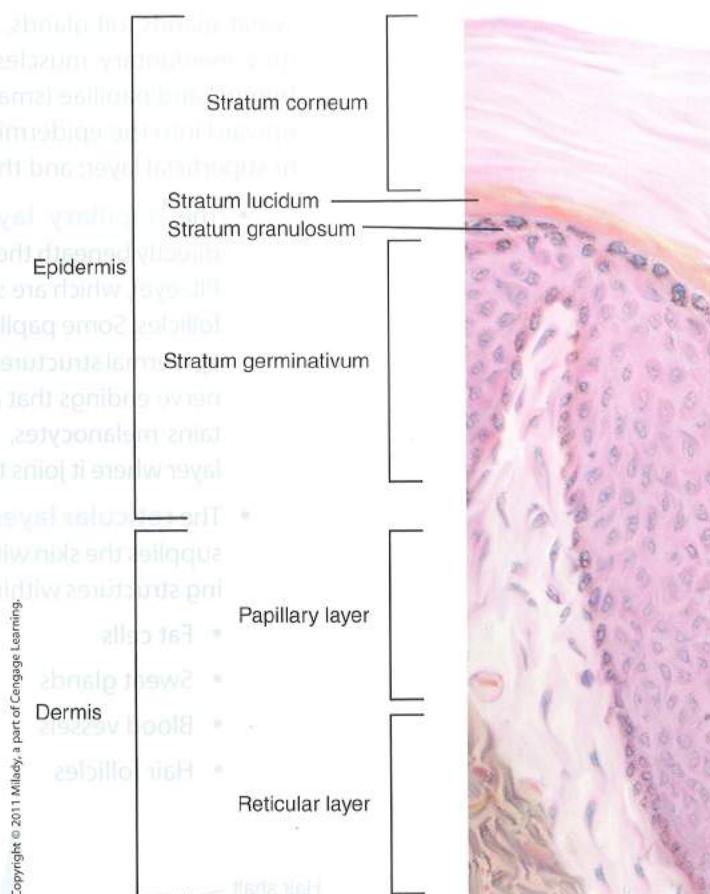
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Continued, repeated pressure on any part of the skin can cause it to thicken and develop into a **callus**, which is a very important and much-needed protective layer that prevents damage to the underlying skin; this layer should never be completely removed, since this can lead to injury and possible infection. The skin is composed of two main divisions: the epidermis and dermis (**Figure 7–1**).

The **epidermis** (ep-uh-DUR-mis) is the outermost and thinnest layer of the skin. It contains no blood vessels but has many small nerve endings. The epidermis is made up of the layers discussed below.

- The **basal cell layer**, also referred to as the **stratum germinativum** (jer-mih-nah-TIV-um), is the deepest layer of the epidermis. It is composed of several layers of differently shaped cells. It is the living layer of the epidermis: it produces new epidermal skin cells and is responsible for the growth of the epidermis.
- The spiny layer, also referred to as the **stratum spinosum**, is just above the basal cell layer. The spiny layer is where the process of skin cell shedding begins.
- The **stratum granulosum** (gran-yoo-LOH-sum), or granular layer, consists of cells that look like small, distinct granules. These cells are dying as they are pushed to the surface and will eventually replace dead cells as they are shed from the skin surface layer.
- The **stratum lucidum** (LOO-sih-dum) is the clear, transparent layer just under the skin surface; it consists of small cells through which light can pass.
- The **stratum corneum** (STRAT-um KOR-nee-um), or horny layer, is the outer layer of the epidermis. The corneum is the layer we see when we look at the skin and the layer cared for by salon products and services. Its scale-like cells are continually being shed and replaced by cells that are constantly rising to the surface from underneath. These cells contain significant amounts of **keratin**, a fibrous protein that is also the principal component of hair and nails. The cells combine with lipids or fats produced by the skin to help make the outer layer of the skin both protective and water-resistant.
- The stratum germinativum has special column-shaped cells that produce other cells called **melanocytes** (muh-LAN-uh-syts); these cells produce a dark skin pigment, called melanin, which helps to protect the sensitive cells in the dermis below from the potentially destructive effects of excessive exposure to **ultraviolet energy** of the sun or ultraviolet "tanning" lamps. The type of melanin produced also determines skin color.

The **dermis** (DUR-mis) is the underlying or inner layer of the skin. It is also called the **derma**, **corium** (KOH-ree-um), or **cutis** (KYOO-tis). This highly sensitive layer of connective tissue is about 25 times thicker than the epidermis. Within its structure, there are numerous blood vessels, lymph vessels, nerves,



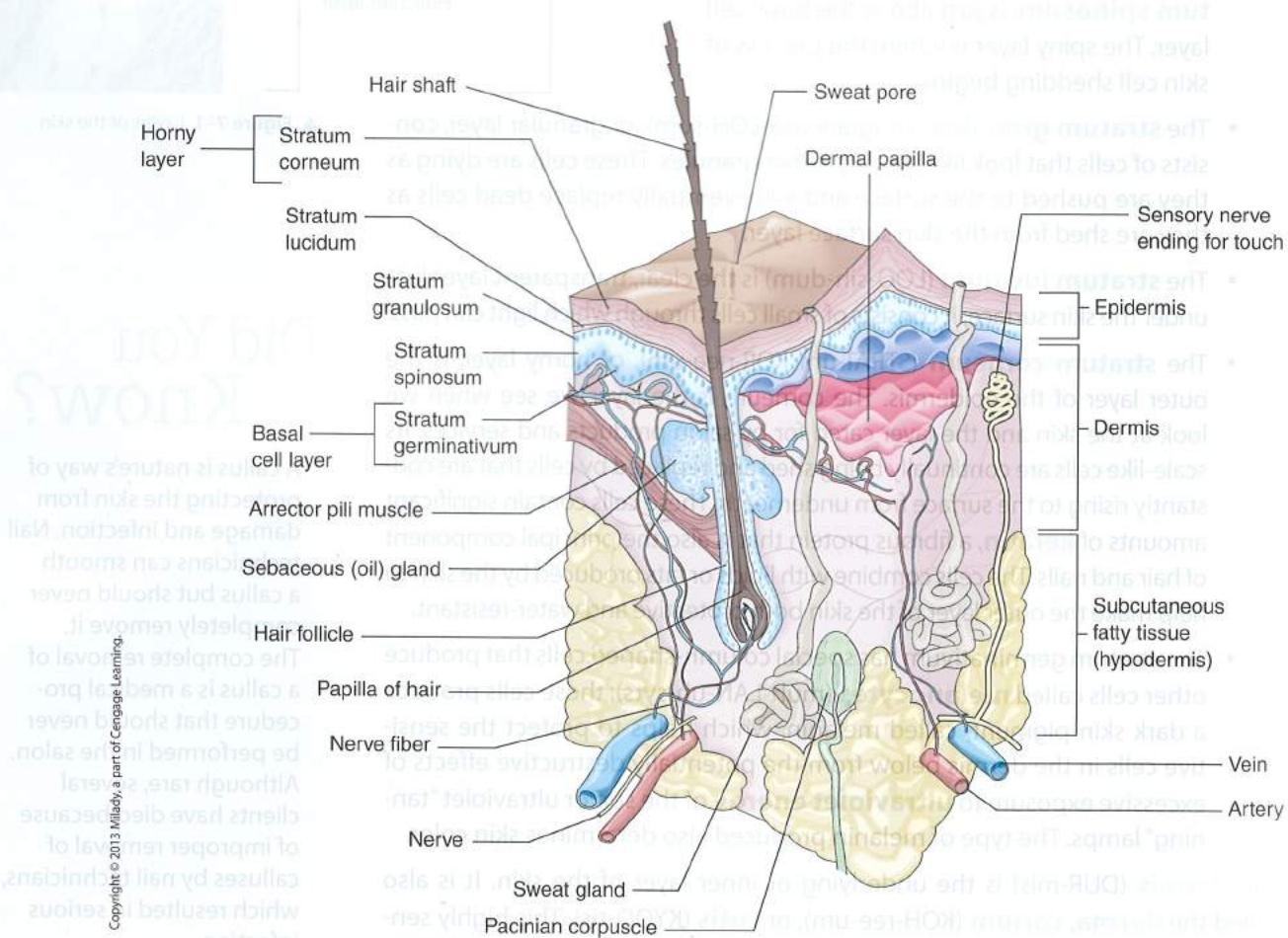
▲ Figure 7–1 Layers of the skin.

Did You Know?

A callus is nature's way of protecting the skin from damage and infection. Nail technicians can smooth a callus but should never completely remove it. The complete removal of a callus is a medical procedure that should never be performed in the salon. Although rare, several clients have died because of improper removal of calluses by nail technicians, which resulted in serious infection.

sweat glands, oil glands, and hair follicles as well as **arrector pili muscles** (tiny involuntary muscles at the base of the hair follicles that cause goose bumps) and papillae (small cone-shaped projections of elastic tissue that point upward into the epidermis). The dermis is made up of two layers: the papillary, or superficial layer; and the reticular, or deeper layer (**Figure 7–2**).

- The **papillary layer** (PAP-uh-lair-ee) is the outer layer of the dermis, directly beneath the epidermis. Here you will find the dermal papillae (puh-PIL-eye), which are small, cone-shaped elevations at the bottom of the hair follicles. Some papillae contain looped capillaries, and others contain small epidermal structures called **tactile corpuscles** (TAK-tile KOR-pusuls), with nerve endings that are sensitive to touch and pressure. This layer also contains melanocytes, the pigment-producing cells. The top of the papillary layer where it joins the epidermis is called the epidermal–dermal junction.
- The **reticular layer** (ruh-TIK-yuh-lur) is the deeper layer of the dermis that supplies the skin with all of its oxygen and nutrients. It contains the following structures within its network:
 - Fat cells
 - Sweat glands
 - Blood vessels
 - Hair follicles



▲ Figure 7–2 Structures of the skin.

- Lymph vessels
- Arrector pili muscles
- Oil glands
- Nerve endings

The **subcutaneous tissue** (sub-kyoo-TAY-nee-us) is a fatty layer found below the dermis. This fat tissue is also called **adipose** or **subcutis** (sub-KYOO-tis) tissue, and varies in thickness according to the age, gender, weight and general health of the individual. It gives smoothness and contour to the body, contains fats for use as energy, and also acts as a protective cushion for the skin and underlying structures.

How the Skin Is Nourished

Blood supplies nutrients and oxygen to the skin. Nutrients are molecules from food, such as protein, carbohydrates, and fats. These nutrients are necessary for cell life, repair, and growth.

Lymph, the clear fluids of the body that resemble blood plasma but contain only water and other colorless substances, bathe the skin cells, remove toxins and other cellular waste, and have immune functions that help protect the skin and body against disease. Networks of arteries and lymph vessels in the subcutaneous tissue send their smaller branches to hair papillae, hair follicles, and skin glands. The skin cannot be nourished from the outside in; it can only get nourishment from foods that we eat.

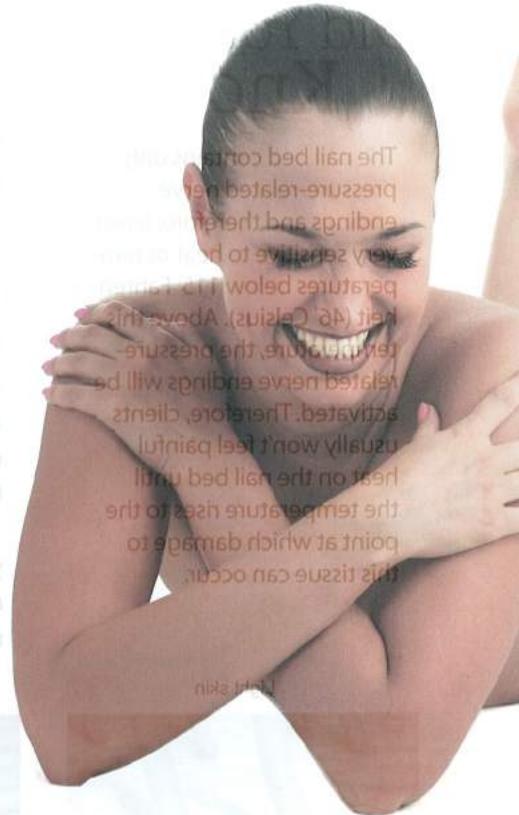
Nerves of the Skin

The skin is covered with surface endings of the following nerve fibers:

- **Motor nerve fibers** are distributed to the arrector pili muscles attached to the hair follicles. These muscles can cause goose bumps when a person is frightened or cold.
- **Sensory nerve fibers** react to heat, cold, touch, pressure, and pain. These sensory receptors send messages to the brain.
- **Secretory nerve fibers** are distributed to the sweat and oil glands of the skin. Secretory nerves, which are part of the autonomic nervous system, regulate the excretion of perspiration from the sweat glands and control the flow of sebum (a fatty or oily secretion of the sebaceous glands) to the surface of the skin.

Activity

Next time you're smoothing a callus, pay close attention. You'll come to a point where a thin layer of protective callus skin is all that remains. That's the time to stop removing additional layers of the callus. Check yourself to ensure that a thin, protective layer of callus skin remains to prevent blisters, skin damage, and possibly infection. If the area feels like soft, new skin, you have removed too much and may have put your client at risk of harmful infections.



Did You Know?

The nail bed contains only pressure-related nerve endings and therefore, is not very sensitive to heat or temperatures below 115° Fahrenheit (46° Celsius). Above this temperature, the pressure-related nerve endings will be activated. Therefore, clients usually won't feel painful heat on the nail bed until the temperature rises to the point at which damage to this tissue can occur.

Sense of Touch

The papillary layer of the dermis houses the nerve endings that provide the body with the sense of touch. These nerve endings register basic sensations, such as touch, pain, heat, cold, and pressure. Nerve endings are most abundant in the fingertips, where they are needed most. Complex sensations, such as vibrations, seem to depend on the sensitivity of a combination of these nerve endings.

Skin Color

The color of the skin—whether fair, medium, or dark—depends primarily on **melanin**, the tiny grains of pigment (coloring matter) deposited into cells in the basal cell layer of the epidermis and the papillary layers of the dermis. The color of the skin is a hereditary trait and varies among races and nationalities. Genes determine the amount and type of pigment produced in an individual.

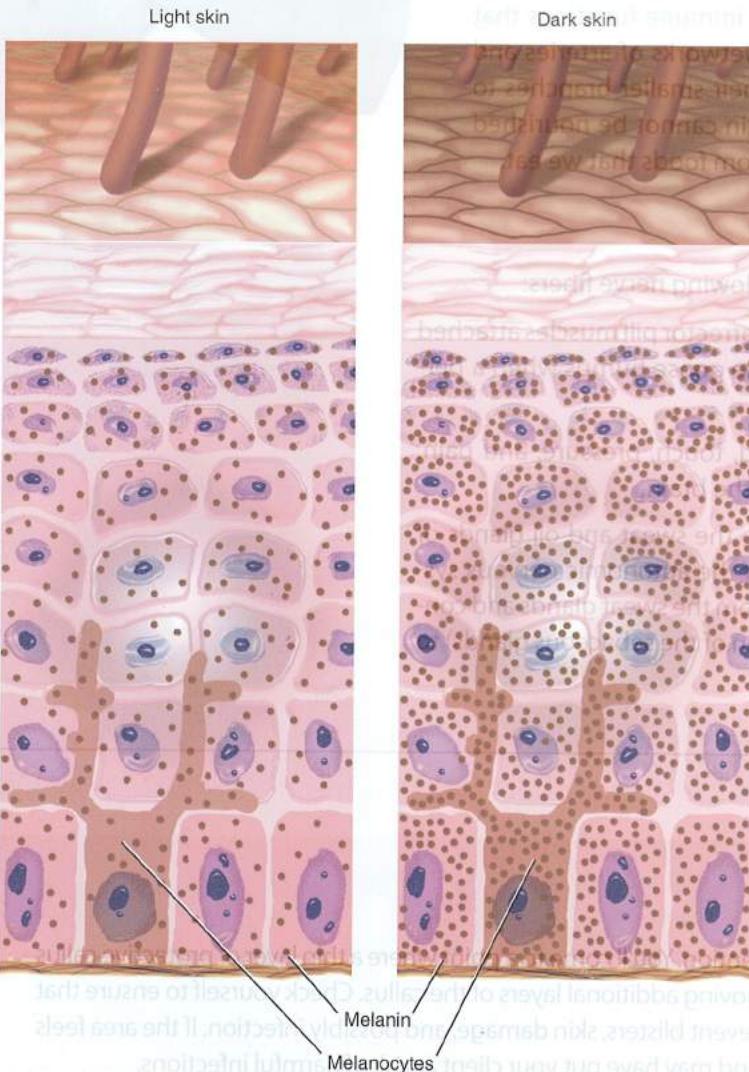
The body produces two types of melanin: *pheomelanin*, which is red to yellow in color, and *eumelanin*, which is dark brown to black. People with light-colored skin mostly produce pheomelanin, while those with dark-colored skin mostly produce eumelanin. In addition, individuals differ in the size of melanin particles which can create variations in skin shade.

Melanin helps to protect sensitive cells against excessive UV exposure, but that's not all that is needed to prevent skin damage. Daily use of a sunscreen with a sun protection factor (SPF) of 15 up to 50 can help the melanin in the skin protect it from burning and from receiving damage that can lead to skin cancer or premature aging. Sunscreen products with SPF values less than 15 may help prevent sunburn but will not help prevent skin cancer or premature aging. Sunscreens with SPF above 50 are no more effective at blocking UV, so they are unnecessary to use (Figure 7-3).

Strength and Flexibility of the Skin

The skin gets its strength, form, and flexibility from two specific structures composed of flexible protein fibers found within the dermis. These two structures, which make up 70 percent of the dermis, are called collagen and elastin.

Collagen is a fibrous protein that gives the skin form and strength. This fiber makes up a large portion of the dermis and helps give structural support to the skin by holding together all the structures found in this layer.



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▲ Figure 7-3 Melanocytes in the epidermis produce melanin.

When collagen fibers are healthy, they allow the skin to stretch and contract as necessary. If collagen fibers become weakened due to age, a lack of moisture, environmental damage such as sun tanning, routine unprotected sun exposure, or frequent changes in weight, the skin will begin to lose its tone and suppleness. Wrinkles and sagging are often the result of collagen fibers losing their strength.

Collagen fibers are interwoven with **elastin**, a protein similar to collagen that forms elastic tissue. This fiber gives the skin its flexibility and elasticity. Elastin helps the skin regain its shape, even after being repeatedly stretched or expanded.

Both of these fibers are important to the overall health and appearance of the skin. As we age, these fibers weaken, which results in a loss of elasticity to create skin sagging.

A majority of scientists now believe that most signs of skin aging under the age of 50 are caused by previous sun exposure. Keeping the skin healthy, protected, moisturized, and free of disease will slow the weakening process and help keep the skin looking young longer.

Glands of the Skin

The skin contains two types of duct glands that extract materials from the blood to form new substances: the **sudoriferous glands** (sood-uh-RIF-uhrus) or **sweat glands**, and the **sebaceous glands** (sih-BAY-shus) or oil glands (Figure 7–4).

Sudoriferous (Sweat) Glands

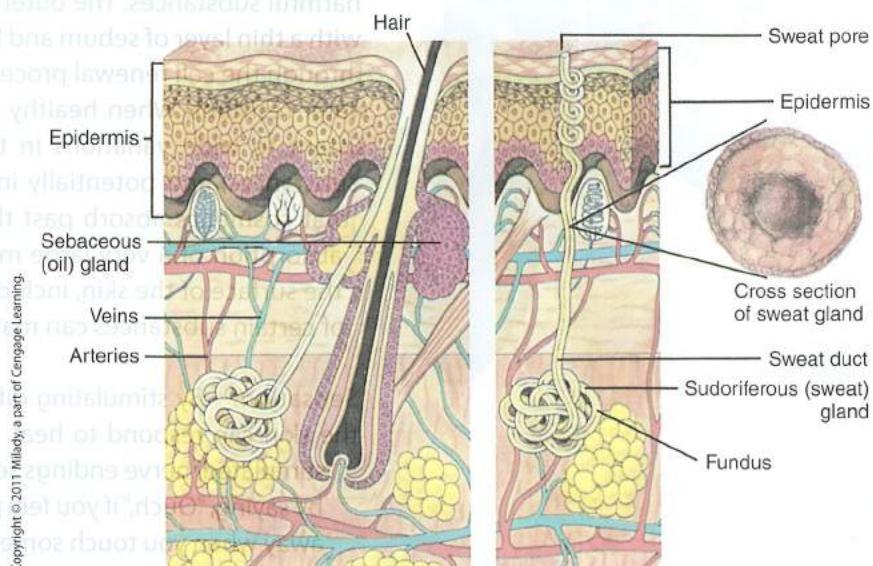
The sudoriferous or sweat glands, which excrete sweat from the skin, consist of a coiled base, or **secretory coil**, and a tube-like duct that opens at the surface of the skin to form the sweat pore. Practically all the parts of the body are supplied with sweat glands, but they are much more numerous on the palms, soles, and forehead and in the armpits.

The sweat glands regulate body temperature and help to eliminate waste products from the body. The evaporation of sweat cools the skin surface. The activity of these glands is greatly increased by heat, exercise, emotions, and certain drugs.

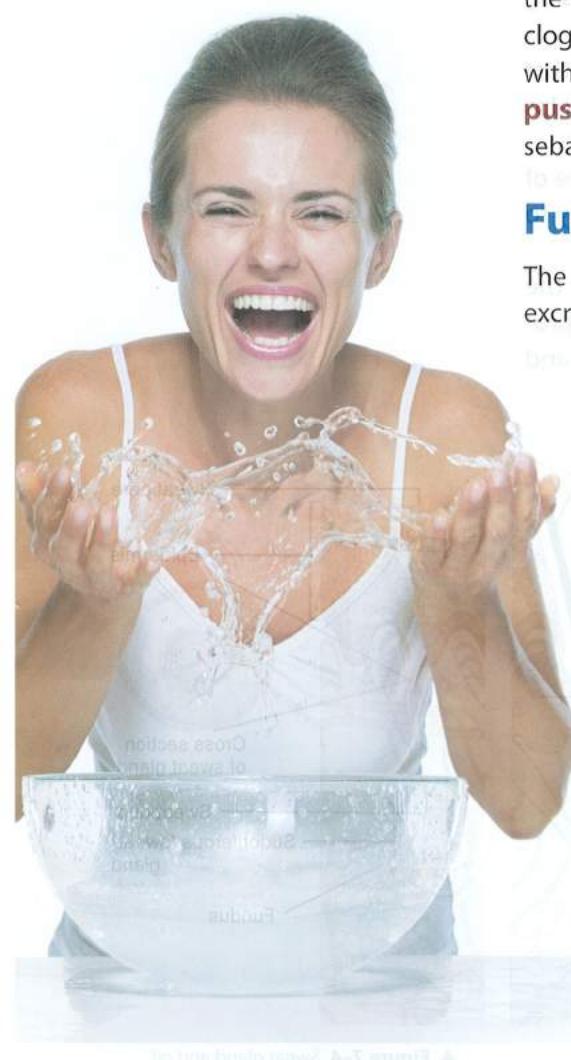
The excretion of sweat is controlled by the nervous system. Normally, one to two pints of liquids containing salts are eliminated daily through sweat pores in the skin.

Sebaceous (Oil) Glands

The sebaceous or oil glands of the skin are connected to the hair follicles. They consist of little sacs with ducts that open into the follicles. These glands secrete sebum, a fatty or oily secretion that lubricates the skin and preserves the softness of the hair. Sebum is made up of about 25 percent squalene. Squalene is an excellent moisturizer and lubricant that replenishes skin lipids while softening and smoothing. Squalene helps maintain the skin in good condition and is

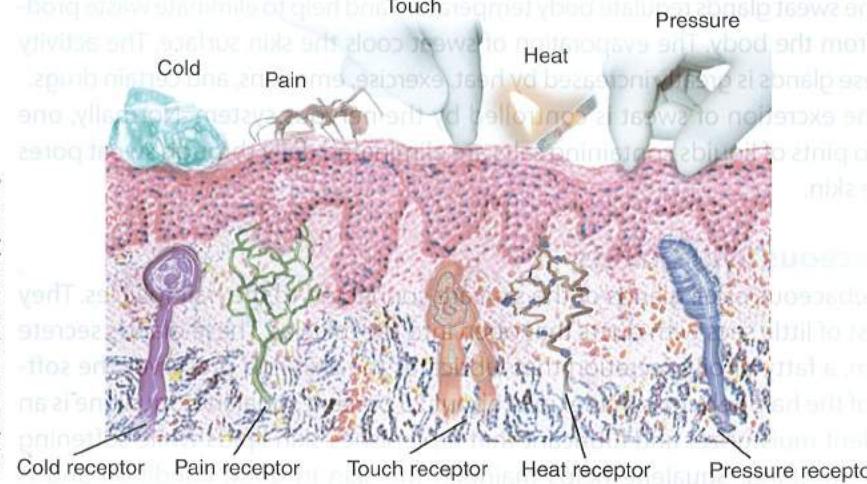


▲ Figure 7–4 Sweat gland and oil production.



► **Figure 7-5** Sensory nerve endings in the skin.

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also a major component of olive oil. With the exception of the palms and soles, these glands are found in all parts of the body, particularly in the face and scalp, where they are larger.

Ordinarily, sebum flows through the oil ducts leading to the mouths of the hair follicles. However, when the sebum hardens and the duct becomes clogged, a pore impaction or **comedo** (plural: comedones), a hair follicle filled with keratin and sebum, is formed, which may lead to an **acne papule** or **pustule**. Acne is a skin disorder characterized by chronic inflammation of the sebaceous glands from retained secretions and bacteria. □ **LO1**

To understand how the skin is affected by different substances, it is helpful to identify its principal functions.

Functions of the Skin

The principal functions of the skin are protection, sensation, heat regulation, excretion, and secretion.

Protection. The skin is a highly efficient barrier that protects the body from injury and bacterial, fungal, or viral invasion or absorption of harmful substances. The outermost layer of the epidermis is covered with a thin layer of sebum and fatty lipids between the cells produced through the cell renewal process, which help to make it chemical and water-resistant. When healthy and intact, this outermost layer is resistant to wide variations in temperature, minor injuries, chemical substances, and potentially infectious microorganisms. It is a myth that cosmetics absorb past the epidermis. The epidermis prevents absorption of a very large majority of what comes in contact with the surface of the skin, including cosmetics ingredients. Only traces of certain substances can make it past this effective barrier.

Sensation. By stimulating different types of sensory nerve endings, the skin can respond to heat, cold, touch, pressure, and pain. When stimulated, nerve endings send messages to the brain. You respond by saying, "Ouch," if you feel pain, by scratching an itch, or by pulling away when you touch something hot. Some sensory nerve endings are located near hair follicles (**Figure 7-5**).

Heat Regulation. The skin protects the body from the environment while helping to maintain a constant internal temperature of about 98.6 degrees Fahrenheit (37 degrees Celsius). As changes occur in the outside temperature, the blood and sweat glands of the skin help maintain a constant body temperature by making the necessary adjustments, for example, allowing the body to be cooled by the evaporation of sweat.

Excretion. Perspiration from the sweat glands is excreted through the skin. Water lost through perspiration also removes salt and other chemical substances.

Secretion. Sebum is an oil secreted by the sebaceous glands. This oil lubricates the skin, keeping it soft and pliable. Sebum also helps keeps hair soft, shiny, and in good condition. Emotional stress and hormone imbalances can increase the flow of sebum and can sometimes become excessive.

It is a myth that any significant amount of cosmetic ingredients can penetrate the skin. Absorption past the epidermis is limited to very few substances and only in tiny amounts. Very small amounts of some substances may be absorbed between the skin cells and through the hair follicles and sebaceous gland openings. Even so, cosmetic products are designed to not penetrate past the epidermis, making the skin a barrier to absorption. **LO2**



■ MAINTAINING SKIN HEALTH

For your own benefit, as well as the benefit of your clients, you should have a basic understanding of how best to maintain healthy skin. To keep the skin and the body healthy, the adage "You are what you eat" still holds true. Proper dietary choices help to regulate hydration (maintaining a healthy level of water in the body), oil production, and proper functioning of the cells. Eating foods found in all three basic food groups—fats, carbohydrates, and proteins—is the best way to support the health of the skin.

Vitamins and Dietary Supplements

Vitamins play an important role in the skin's health, often aiding in healing, softening, and fighting diseases of the skin. Vitamins such as A, C, D, and E have all been shown to have positive effects on the skin's health when taken internally. Although experts agree that taking vitamins internally is still the best way to support the health of the skin, external applications have only limited value when applied to the skin. Vitamins are nutritional supplements, not cosmetic ingredients. In fact, the law prohibits manufacturers from claiming that any cosmetic has nutritional value. It is best when vitamins come from foods and not from supplements. Vitamin supplements can play a role in healthy living but are a poor substitute for a proper and healthy diet. The ingestion of vitamins may help the skin in significant ways if a deficiency exists, but even so, it's best to get your vitamins from a balanced diet, not pills:

- **Vitamin A** supports the overall health of the skin and aids in the health, function, and repair



of skin cells. It has been shown to improve the skin's elasticity and thickness. Some common sources are milk, eggs, chicken, and fish.

- **Vitamin C** is an important substance needed for proper repair of the skin and various tissues. This vitamin aids in, and even speeds up, the healing processes of the body. Vitamin C is also vitally important in fighting the aging process and promotes the production of collagen in the skin's dermal tissues, keeping the skin healthy and firm. Some common sources are strawberries, oranges, peas, and broccoli.
- **Vitamin D** enables the body to properly absorb and use calcium, the element needed for proper bone development and maintenance. Vitamin D also promotes healthy, rapid healing of the skin. Some common sources are oily fish and dairy products.
- **Vitamin E** helps protect the skin from the harmful effects of the sun's rays. Some common sources are avocados, tomatoes, spinach, salmon, and blackberries.

All the nutrients that the body needs for proper functioning and survival must come primarily from the foods we eat, which is why a balanced diet is so important. If a person's daily food consumption is lacking in nutrients, he or she should eat better and not rely on vitamins and mineral supplements. Vitamins are supplements: they cannot make up for poor nutrition or unhealthy eating.

Clients will occasionally ask you about nutrition and their skin. While it is important that the nail professional know the basics of nutrition, nail technicians are not registered dieticians and should never give nutritional advice. Instead, refer the client to a registered dietician.

Water and the Skin

Our bodies are mostly water: it is an essential item that no person can live without. To function properly, the body and skin both rely heavily on the benefits of water. Water composes approximately 60 percent of our body's total weight.

Research suggests that the benefits of water on human health and functioning are many:

- Even mild dehydration will slow metabolism by as much as 3 percent.
- Drinking lots of water can help stop hunger pangs for many dieters.
- Cracked skin on the feet and lips are often early warning signs of dehydration.
- Lack of water is a principal cause of daytime fatigue.
- A 2 percent drop in body water can trigger fuzzy short-term memory and trouble with basic math and may cause difficulty focusing on a computer screen or printed page.
- Much of the water that a body needs can come from many sources, including foods and drink.
- Drinking excessive amounts of water can lead to a potentially dangerous condition called hyperhydrosis.

Drinking clean water is essential to the health of the skin and body because it sustains the health of the cells, aids in the elimination of toxins and other waste, helps regulate the body's temperature, and aids in proper digestion. All these functions, when performing properly, help keep the skin healthy, vital, and attractive.

The amount of water needed by an individual varies, depending on body weight and the level of daily physical activity (**Figure 7–6**). There is no magic formula that tells us how much water we should drink every day; however, fortunately, the brain is always on the lookout to keep us healthy and will let us know that we feel thirsty long before our bodies become dehydrated. According to recommendations from the Mayo Clinic, women in general should consume approximately 9 cups of water per day, and men should drink 12 cups. This water can come from any type of beverage, including juices, tea, coffee, and many foods. It can be dangerous to consume large quantities of water over a short period, so be sure not to drink too much water. A condition called water intoxication can occur when too much water is consumed in a short period, causing tissues to suddenly swell with excess fluid. This is very rare, and usually occurs only in infants under 6 months of age and sometimes in athletes who have been sweating heavily. ■ **LO3**



▲ **Figure 7–6** Water is essential for human skin.

■ AGING OF THE SKIN

Aging of the skin is a process that takes many years and can be influenced by many different factors. One does not necessarily age as one's parents have.

Many outside factors such as the sun, environment, health habits, getting enough sleep and exercise, and maintaining a healthy lifestyle greatly influence the signs of skin aging to a large extent; it has been estimated that heredity may be responsible for only 15 percent of the factors that determine how skin ages.

The Sun and Its Effects

The sun and its ultraviolet (UV) energy have the greatest negative impact on how our skin ages. Approximately 80 to 85 percent of our skin's aging is caused by the sun. As we age, the collagen and elastin fibers of the skin naturally weaken. This weakening happens at a much faster rate when the skin is frequently exposed to ultraviolet energy without proper protection. The UV energy of the sun reaches the skin in two different forms, as UVA and UVB energy. UV is not considered to be "light," since it is not visible to the human eye; therefore, the proper term is "UV energy." UVA and UVB energy influence the skin at different levels. UVA energy is deeper penetrating than visible light and causes the skin to tan by affecting the melanocytes, the cells of the epidermis that are responsible for producing melanin—the skin pigment. UV energy can weaken the collagen and elastin fibers, causing wrinkling and sagging in the tissues. UVB energy can cause sunburns. Melanin is designed to help protect the skin from UV energy, but can be altered or destroyed by large, frequent doses of UV energy exposure. Although UVB penetration is not as deep as UVA, both are damaging to the skin and may damage the eyes as well. On a positive note, UVB energy contributes to the body's synthesis of vitamin D and other important minerals. The amount of sun exposure necessary for vitamin D synthesis is



approximately 10 minutes per day; vitamin D can also be ingested from milk or vitamin-D-fortified orange juice.

If clients seek additional professional advice on how to protect their skin from the sun, refer them to a physician or a licensed **esthetician**, a specialist in cleansing, preservation of health, and beautification of the skin and body. However, as a consultant to your clients, you may wish to advise them about the necessary precautions to take when they are exposed to the sun:

- Before going out into the sun, wear a protective moisturizer or lotion with a sunscreen of at least SPF 15 on all areas of potential exposure.
- Avoid prolonged exposure to the sun during peak hours, when UV exposure is highest. This is usually between 10 A.M. and 3 P.M.
- Sunscreen should be applied *before* going out into the sun, not after.
- Apply sunscreen liberally and as directed! Many people apply too thin of a layer to protect the skin. This is a very common problem, so take care.
- Reapply after swimming or any activities that result in heavy perspiration. If the skin is exposed to hours of sun, such as during a boat trip or a day at the beach, sunscreen should be applied periodically throughout the day as a precaution. Water-resistant sunscreens are more effective under these conditions.
- Use a broad-spectrum sunscreen that filters out both UVA and UVB energy; check the expiration dates printed on the bottle to make sure that the sunscreen has not expired.
- Avoid exposing children younger than 6 months to direct sunlight.
- If your skin is prone to burning easily, wear a hat, protective clothing, and high SPF sunscreens when participating in outdoor activities. Redheads and blue-eyed blondes with pale skin are particularly susceptible to sun damage.
- In addition to following the above precautions, clients should be advised to regularly see a physician specializing in dermatology for check-ups of the skin, especially if any changes in coloration, size, or shape of a mole are detected, or if the skin bleeds unexpectedly or a lesion or scrape does not heal quickly.
- Home self-examinations can be an effective way to check for signs of potential skin cancer between scheduled doctor visits. When performing a self-care exam, clients should be advised to check for any changes in existing moles and pay attention to any new visible growths on the skin.

Skin Aging and the Environment

While sun exposure may play a major role in how the skin ages, changes in our environment also greatly influence this aging process. Pollutants in the air from factories, automobile exhaust, and even second-hand smoke can all influence the appearance and overall health of our skin. While

certain pollutants may lead to irritation or other types of **adverse skin reactions** that affect the surface appearance of the skin, they can also adversely alter the health of the underlying cells and tissues.

The best defense against these pollutants is the simplest one: follow a good daily skin care routine. Routine washing at night helps to remove the buildup of pollutants that have settled on the skin's surface throughout the day. The application of daily moisturizers, protective lotions, and even foundation products all help to protect the skin from airborne pollutants.

Aging and Lifestyle

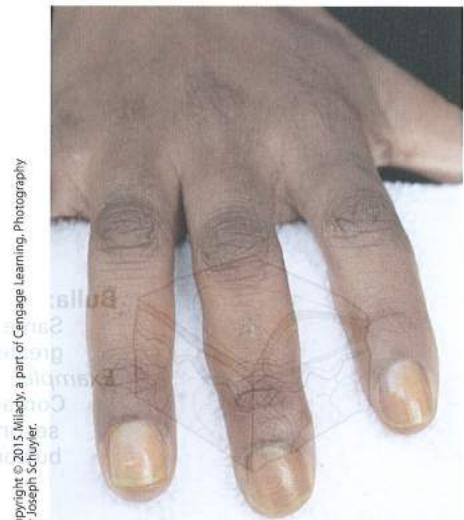
Aging of the skin cannot be blamed entirely on the outside influences of the sun or wind. What we choose to put into our bodies also has a profound effect on the overall aging process. The impact of poor choices can be seen most visibly on the skin. Smoking, drinking, illicit drug use, and making poor dietary choices all greatly influence the aging process. It is the responsibility of the practitioner to be aware of how these habits affect the skin, tactfully point out the effects to clients, and refer them to a physician or licensed esthetician.

Smoking and tobacco use may not only cause cancer, but have also been linked to premature aging and wrinkling of the skin. Inhaling nicotine in tobacco causes the contraction and weakening of the blood vessels and small capillaries that supply blood to the tissues. In turn, this contraction and weakening causes decreased circulation to the tissues. Eventually, the tissues are deprived of essential oxygen, and the effect of this becomes evident on the skin's surface. The skin may appear yellowish or gray in color and can have a dull appearance. The smoke can absorb into the nail plate or artificial nail enhancement and cause yellow stains (**Figure 7–7**).

The use of illicit drugs of abuse can affect the skin as much as smoking tobacco does. Some of these drugs have been shown to interfere with the body's intake of oxygen, thus affecting healthy cell growth. Both illicit and prescribed drugs can aggravate serious skin conditions, such as acne. Others can cause dryness, hypersensitivity to sunlight, or allergic reactions on the skin's surface.

The overuse of alcohol can have an equally damaging effect on the skin. Heavy or excessive intake of alcohol can overdilate blood vessels and capillaries, which over time may weaken fragile capillary walls to cause a condition called **telangiectasias** (te-lanj-ec-tay-jas). This condition may also be caused by tobacco use, sun exposure, or other environmental factors. Both smoking and drinking contribute to the aging process on their own, but the combination of the two can be devastating to the tissues and the appearance of the skin. The constant dilation and contraction of tiny capillaries and blood vessels, which can lead to deprivation of oxygen and water to the tissues, can quickly make the skin appear lifeless and dull. It is very difficult for the skin to adjust and repair itself. Usually, the damage done by these lifestyle habits is hard to reverse or diminish.

Like any other organ of the body, the skin is susceptible to a variety of diseases, disorders, and ailments. In your work as a nail technician you will often see skin disorders, so you must be prepared to recognize certain common skin conditions and know what services you can and cannot perform on that client's skin. Skin disorders should only be treated by a physician. Any healing or medicinal preparations must be prescribed by a physician. Nail technicians must never attempt to diagnose, treat, or prescribe treatment for any abnormal conditions of the nails, skin, hands or feet. Clients with abnormal skin or nails must be referred to a physician.



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▲ **Figure 7–7** Nail damage caused by smoking.

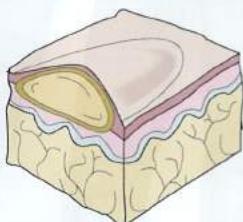
It is very important that a nail salon does not serve a client who is suffering from an open wound or visibly inflamed skin. The nail professional should be able to recognize abnormal conditions and recommend that the client see a physician to avoid more serious consequences. **LO4**

DISORDERS OF THE SKIN

Listed below are a number of important terms relating to skin disorders that you should know.

Skin Lesions

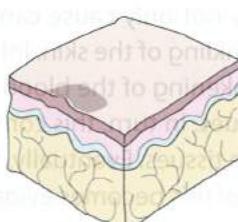
A **lesion** (LEE-zhun) is a mark on the skin. Certain lesions could indicate an injury or damage that changes the structure of tissues or organs. There are three types of lesions: primary, secondary, and tertiary. The nail technician is concerned with primary and secondary lesions only. If you are familiar with the principal skin lesions, you will be better equipped to recognize abnormal conditions that may not be treated in a salon (Figure 7–8).

**Bulla:**

Same as a vesicle only greater than 0.5 cm

Example:

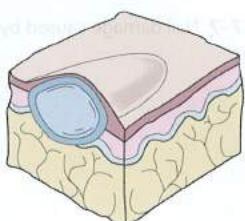
Contact dermatitis, large second-degree burns, bulous impetigo, pemphigus

**Macule:**

Localized changes in skin color of less than 1 cm in diameter

Example:

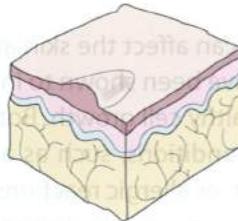
Freckle

**Tubercle:**

Solid and elevated; however, it extends deeper than papules into the dermis or subcutaneous tissues, 0.5–2 cm

Example:

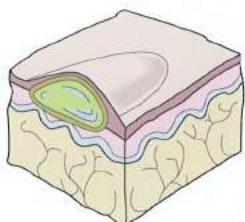
Lipoma, erythema, nodosum, cyst

**Papule:**

Solid, elevated lesion less than 0.5 cm in diameter

Example:

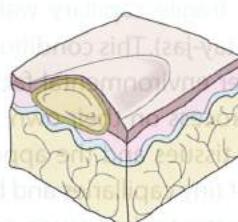
Warts, elevated nevi

**Pustule:**

Vesicles or bullae that become filled with pus, usually described as less than 0.5 cm in diameter

Example:

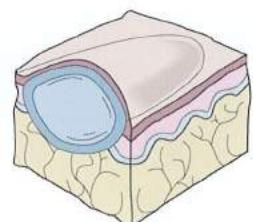
Acne, impetigo, furuncles, carbuncles, folliculitis

**Vesicle:**

Accumulation of fluid between the upper layers of the skin; elevated mass containing serous fluid; less than 0.5 cm

Example:

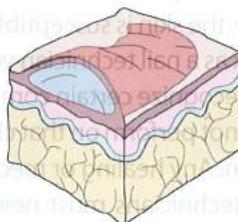
Herpes simplex, herpes zoster, chickenpox

**Nodule/Tumor:**

The same as a nodule only greater than 2 cm

Example:

Carcinoma (such as advanced breast carcinoma); **not** basal cell or squamous cell of the skin

**Wheal:**

Localized edema in the epidermis causing irregular elevation that may be red or pale

Example:

Insect bite or a hive

▲ Figure 7–8 Primary skin lesions.

The terms for the lesions listed below often indicate differences in the area of the skin layers affected and the size of the lesion. These disorders cannot be diagnosed by a nail technician or treated in the salon. They are presented only so that you can more easily spot abnormal conditions and know that a client who has them should be referred to a physician.

Primary Lesions

Primary lesions are briefly summarized below:

- **Bulla** (BULL-uh) (plural: bullae). A large blister containing a watery fluid; similar to a vesicle but larger (**Figure 7–9**).
- **Cyst** (SIST). A closed, abnormally developed sac containing fluid or pus that is above or below the skin.
- **Macule** (MAK-yool) (plural: maculae) (MAK-yuh-ly). A spot or discoloration on the skin, such as a freckle. Macules are neither raised nor sunken.
- **Papule** (PAP-yool). A pimple; a small, circumscribed elevation on the skin that contains no fluid but may develop pus.
- **Pustule** (PUS-chool). An inflamed pimple containing pus (**Figure 7–10**).
- **Tubercle** (TOO-bur-kul). An abnormal, rounded, solid lump above, within, or under the skin; larger than a papule.
- **Tumor** (TOO-mur). A swelling; an abnormal cell mass resulting from excessive multiplication of cells that varies in size, shape, and color. Nodules are also referred to as tumors but are smaller bumps caused by conditions such as scar tissue, fatty deposits, or infections.
- **Vesicle** (VES-ih-kel). A small blister or sac containing clear fluid, lying within or just beneath the epidermis. Poison ivy and poison oak, for example, produce vesicles (**Figure 7–11**).
- **Wheal** (WHEEL). An itchy, swollen lesion that lasts only a few hours; caused by a blow, the bite of an insect, urticaria (skin allergy), or the sting of a nettle. Examples include hives and mosquito bites.

Secondary Lesions

Secondary skin lesions develop in the later stages of disease (**Figure 7–12**).

These lesions include the following:

- **Crust** Dead cells that form over a wound or blemish while it is healing; an accumulation of sebum and pus, sometimes mixed with epidermal material. An example is the scab on a sore.
- **Excoriation** (ek-skor-ee-AY-shun). A skin sore or abrasion produced by scratching or scraping.
- **Fissure** (FISH-ur). A crack in the skin that penetrates the dermis, such as chapped hands or lips.
- **Keloid** (KEE-loyd). A thick scar resulting from excessive growth of fibrous tissue (**Figure 7–13**).
- **Scale** Any thin plate of epidermal flakes, dry, or oily. An example is abnormal or excessive dandruff.
- **Scar or cicatrix** (SIK-uh-triks). A light-colored, slightly raised mark on the skin formed after an injury or lesion of the skin has healed.



▲ Figure 7–9 Bullae.

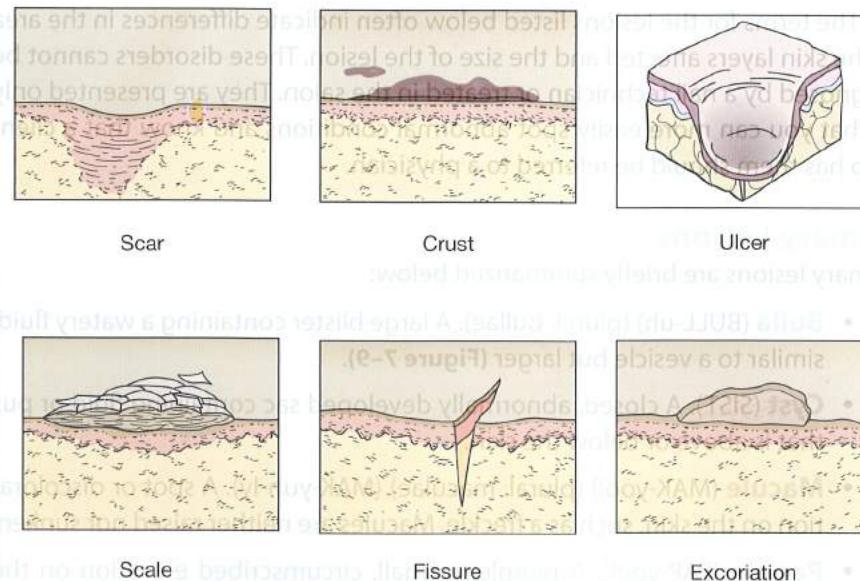


▲ Figure 7–10 Papules and pustules.



▲ Figure 7–11 Poison oak vesicles.

► **Figure 7–12** Secondary skin lesions.



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▲ **Figure 7–13** Keloids.



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Photography by Joseph Schuyler.

▲ **Figure 7–14** Eczema.



Photo courtesy of Centers for Disease Control and Prevention (CDC).

- **Ulcer** (UL-sur). An open lesion on the skin or mucous membrane of the body, accompanied by pus and loss of skin depth.
- **Hematoma** (HEE-mah-toh-mah). A collection of blood that is trapped underneath the nail or skin. This blood can result in pain if pressure builds up between the nail plate and the nail bed; the excess blood may need to be drained by a physician.

Disorders of the Sudoriferous (Sweat) Glands

- **Anhidrosis** (an-hih-DROH-sis). A deficiency in perspiration, often a result of fever or certain skin diseases.
- **Bromhidrosis** (broh-mih-DROH-sis). A foul-smelling perspiration, usually noticeable in the armpits or on the feet.
- **Hyperhidrosis** (hy-per-hy-DROH-sis). Excessive sweating with unknown causes. People with hyperhidrosis may sweat even when the temperature is cool or when they are at complete rest. This is a medical condition that is treatable.
- **Miliaria rubra** (mil-ee-AIR-ee-ah ROOB-rah). Prickly heat; acute inflammatory disorder of the sweat glands, characterized by the eruption of small red vesicles and accompanied by burning, itching skin. Caused by blockage of the sweat glands.

Skin Inflammations

- **Dermatitis** (dur-muh-TY-tis). An abnormal inflammatory condition of the skin. The lesions come in various forms, such as vesicles or papules.
- **Eczema** (EG-zuh-muh). An inflammatory, painful itching disease of the skin; it is acute or chronic in nature and presents in many forms: from flakey or dry itchy skin to moist lesions. There are several different types of eczema. Eczema is not contagious and can be treated by a physician (**Figure 7–14**).

- **Psoriasis** (suh-RY-uh-sis). A skin disease characterized by red patches covered with silver-white scales usually found on the scalp, elbows, knees, chest, and lower back. Psoriasis is caused by the skin cells turning over faster than normal. It rarely occurs on the face. If irritated, bleeding points occur. Psoriasis can also affect the nail plates, causing them to develop surface pits, red spots on the nail bed, or other related symptoms. Psoriasis is not contagious (**Figure 7–15**).

Pigmentation Disorders

Pigment can be affected by internal factors such as heredity or hormonal fluctuations, or by outside factors such as prolonged exposure to the sun. Abnormal coloration accompanies every skin disorder and many systemic disorders. A change in pigmentation can also be observed when certain drugs are being taken internally. The following terms relate to changes in the pigmentation of the skin.

- **Albinism** (AL-bi-niz-em). Congenital leukoderma, or the absence of melanin pigment of the body, including the skin, hair, and eyes. Hair is silky white. The skin is pinkish white and will not tan. The eyes are pink, and the skin is sensitive to light and ages more rapidly.
- **Chloasma** (kloh-AZ-mah). A condition characterized by increased pigmentation on the skin or dark spots that are not elevated. Chloasma are incorrectly called liver spots, even though they have nothing to do with the liver. They are generally pools of melanin caused by cumulative sun exposure.
- **Lentigenes** (len-TIJ-e-neeze) (singular: lentigo) (len-TY-goh). The technical term for freckles. Small yellow- to brown-colored spots on skin exposed to sunlight.
- **Leukoderma** (loo-koh-DUR-muh). A skin disorder characterized by light abnormal patches and caused by a burn or congenital disease that destroys the pigment-producing cells. It is classified as vitiligo and albinism (**Figure 7–16**).
- **Nevus** (NEE-vus). A small or large malformation of the skin due to abnormal pigmentation or dilated capillaries; commonly known as a birthmark.
- **Stain**. An abnormal brown or wine-colored skin discoloration with a circular and irregular shape. Its permanent color is due to the presence of darker pigment. Stains occur during aging; after certain diseases; and after the disappearance of moles, freckles, and liver spots. The cause is unknown (**Figure 7–17**).



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Photography by Joseph Schuyler.

▲ Figure 7–15 Psoriasis.

CAUTION:

Do not treat or remove hair from moles. Never attempt to treat any mole, skin tag, or other skin growth. These are medical procedures, and their removal is not within the scope of practice for which nail technicians are licensed.



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Photography by Joseph Schuyler.

▲ Figure 7–16 Leukoderma.

▲ Figure 7–17 Port wine stain.



▲ Figure 7–18 Vitiligo.

Did You Know?

Clients with the following abnormal skin conditions and disorders should always be referred to a physician:

- Open wounds or red, irritated and/or inflamed skin.
- Basal cell carcinoma (a form of skin cancer).
- Squamous cell carcinoma (a form of skin cancer).
- Malignant melanoma (a serious form of skin cancer).
- Anhidrosis (a deficiency in perspiration often resulting from fever or skin disease).
- Hyperhidrosis (excessive sweating caused by heat or general body weakness).
- Eczema (an inflammatory, painful itching disease of the skin).
- Irregular mole (a mole that changes shape, color, or size).
- Verruca (an infectious wart).
- Psoriasis

- **Tan.** A change in the pigmentation of skin caused by exposure to ultraviolet energy from tanning beds or the sun.
- **Vitiligo** (vih-til-EYE-goh). Milky-white spots (leukoderma) of the skin. Vitiligo is hereditary and may be related to thyroid conditions. Skin with this condition must be carefully protected from overexposure to any source of UV energy (**Figure 7–18**).

Hypertrophies of the Skin

A **hypertrophy** (hy-PUR-truh-fee) of the skin is an abnormal growth of the skin. Many hypertrophies are benign, or harmless.

- **Keratoma** (kair-uh-TOH-muh). An acquired and protective, superficial, thickened patch of epidermis commonly known as a callus, which is caused by pressure or friction on the hands and feet. If the thickening grows inward, it is called a corn.
- **Mole.** A small, brownish spot or blemish on the skin, ranging in color from pale tan to brown or bluish black. Some moles are small and flat, resembling freckles; others are raised and darker in color. Large dark hairs often occur in moles. Any change in a mole requires medical attention.
- **Skin tag.** A small brown or flesh-colored outgrowth of the skin. Skin tags occur most frequently on the neck of an older person. They can be easily removed by a dermatologist or qualified medical practitioner and should never be removed in the salon (**Figure 7–19**).
- **Verruca** (vuh-ROO-kuh). The technical term for wart; the hypertrophy of the papillae and epidermis. It is caused by a virus and is infectious. Verruca can spread from one location to another, particularly along a scratch in the skin.



▲ Figure 7–19 Skin tags.

Skin Cancer

Skin cancer—primarily caused from frequent overexposure to the sun—comes in three distinct forms, varying in severity. Each is named for the type of cells that it affects.

- **Basal cell carcinoma** (BAY-zul SEL kar-sin-OH-muh) is the most common type and the least severe. It is often characterized by light or pearly nodules (**Figure 7–20**).
- **Squamous (SKWAY-mus) cell carcinoma** is more serious than basal cell carcinoma and is often characterized by scaly red papules or nodules (**Figure 7–21**).

- **Malignant melanoma** (muh-LIG-nent mel-uh-NOH-muh), the third and most serious form of skin cancer is often characterized by black or dark brown patches on the skin that may appear uneven in texture, jagged, or raised (**Figure 7-22**).

Malignant melanomas often appear on individuals who do not receive regular sun exposure and are most commonly found on areas of the body that are not regularly exposed. This disease is referred to as the "city person's cancer." Malignant melanoma is the least common but most dangerous type of skin cancer.

If detected early, an individual with any of these three forms of skin cancer has a good chance for survival. It is important for a nail technician to be able to recognize the appearance of serious skin disorders in order to better serve clients. It is also important to remember that a nail technician should NEVER attempt to diagnose a skin or nail disorder or recommend treatment, but instead should ALWAYS sensitively suggest that the client seek the advice of a dermatologist or other qualified medical professional.

The American Cancer Society recommends using the ABCDE cancer checklist to help make potential skin cancer easier to recognize (**Figure 7-23**). When checking existing moles, look for changes in any of the following:

- Asymmetry.** One half of the mole does not match the other half.
- Border irregularity.** The edges of the mole are ragged or notched.
- Color.** The color of the mole is not the same all over. There may be shades of tan, brown, or black and sometimes even patches of red, blue, or white.
- Diameter.** The mole is wider than about 1/4" (although doctors are now finding melanomas that are smaller).



▲ **Figure 7-20** Basal cell carcinoma.

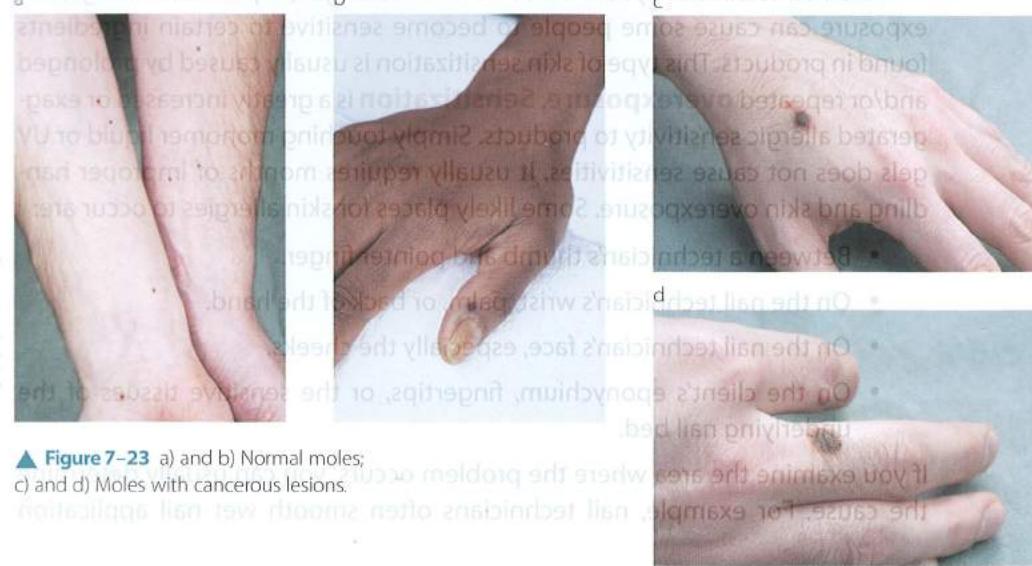


▲ **Figure 7-21** Squamous cell carcinoma.



▲ **Figure 7-22** Malignant melanoma.

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Photography by Joseph Schuyler.



▲ **Figure 7-23** a) and b) Normal moles;
c) and d) Moles with cancerous lesions.

E. Evolution. The mole evolves or changes; it may include darkening or variations in color, it may itch or hurt; it may change in shape or growth.

If any of the above changes to a mole are noticed, refer the client to a physician for examination. For more information, contact the American Cancer Society at www.cancer.org or (800) ACS-2345. **LO5**

■ PREVENTING SKIN PROBLEMS IN THE SALON

Skin problems are common in every facet of the professional salon industry. Nail, skin, and hair services can all cause problems for the sensitive client. Fortunately, the vast majority of finger nail-related problems can be easily avoided—if you understand how!

Dermatitis

As explained above, dermatitis is a medical term for abnormal skin inflammation. There are many kinds of dermatitis, but only one is important in the salon. **Contact dermatitis** is the most common avoidable skin disease for nail technicians. Contact dermatitis is caused by touching certain substances to the skin. This type of dermatitis can be short or long term, depending on the cause. Contact dermatitis can have several causes. When the skin is irritated by a substance, it is called **irritant contact dermatitis**. It is also possible to become allergic to an ingredient in a product; this is called **allergic contact dermatitis**.

Prolonged or Repeated Contact

The first most common reason for allergic reactions is prolonged or repeated direct skin contact. This type of skin problem does not occur overnight. Monomer liquid and polymer powder, nail wraps, and UV gels are all capable of causing allergic reactions. In general, it takes from 4 to 6 months of repeated exposure before sensitive clients show symptoms.

As a nail technician, you are also at risk. Prolonged, repeated, or long-term exposure can cause some people to become sensitive to certain ingredients found in products. This type of skin sensitization is usually caused by prolonged and/or repeated **overexposure**. **Sensitization** is a greatly increased or exaggerated allergic sensitivity to products. Simply touching monomer liquid or UV gels does not cause sensitivities. It usually requires months of improper handling and skin overexposure. Some likely places for skin allergies to occur are:

- Between a technician's thumb and pointer finger.
- On the nail technician's wrist, palm, or back of the hand.
- On the nail technician's face, especially the cheeks.
- On the client's eponychium, fingertips, or the sensitive tissues of the underlying nail bed.

If you examine the area where the problem occurs, you can usually determine the cause. For example, nail technicians often smooth wet nail application

brushes with their fingers. This is both prolonged and repeated contact! Eventually the area may become sore and inflamed.

The same problem occurs when technicians lay their arms on the towels contaminated with UV gel, monomer liquid and polymer powder, or filings. The palms and fingertips may be overexposed by picking up containers that have residual UV gel or monomer liquid on the outside. Small amounts of product on your hands are often transferred to the cheeks or face. Direct product contact with the skin is the cause of these facial irritations, not the vapors. Nail enhancement product vapors will not cause a skin allergy.

Touching a client's skin with any monomer liquid and polymer powder or UV gel has the same effect. This is the most common reason for client sensitivities. With each exposure during a service, the risk of skin sensitization increases; this helps explain why it is extremely important that you always leave a tiny, free margin (approximately 1/16") between the nail enhancement application and the living skin.

Improper Product Consistency

The second most common reason for an allergy is improper product consistency. If too much monomer liquid is used, the result is an overly wet bead. Many technicians do not realize that the **initiator**—a special ingredient found in polymer powders that is needed to start the chemical reaction that causes the monomer liquid to harden or polymerize—can only harden a certain amount of the monomer liquid. Wet beads are incorrectly balanced. Beads with a consistency that is too wet will harden with some monomer liquid trapped inside. This extra monomer liquid may eventually work its way down to the nail bed and can cause an allergic reaction, especially for clients with highly damaged or overly thin nail plates. This situation also makes the fresh filings more likely to cause an allergic reaction when the nail technician's skin is exposed. It is very important to use only the polymer powders that were specifically designed to work with the monomer liquids of your choice. Using the incorrect polymer powder with your monomer liquid may result in improper curing (hardening), leading to a service breakdown and an increased risk of adverse skin reactions.

Service breakdown and an increased risk of adverse skin reactions are also problems that can occur with UV gel nail enhancements. In fact, many things can cause UV gels to improperly cure, including:

- Using a traditional or LED-style UV lamp unit not specifically designed for the chosen UV gel system.
- Applying product too thickly.
- Too short of a time under the UV lamp.
- Dirty lamps in the UV lamp unit.

Did You Know?

One of the most important rules of being a good nail technician is: *Never touch any nail enhancement product to the skin—the client's or yours.*



- Old lamps that should be changed.

- Using a UV light unit not specifically designed for the chosen UV gel system.

What is the difference between a UV bulb and a UV lamp? A UV bulb is designed to emit the correct UV energy needed to cure UV gel nail enhancements. There are a number of different bulbs that are used to cure UV gels, e.g., 4- or 9-watt bulb and LED bulb—each emit UV energy.

A UV lamp (incorrectly referred to by some as a UV light) is a specialized electronic device that powers and controls UV lamps to cure UV gel nail enhancements. UV nail lamps may look similar at first, but there are big differences! The differences include the number and type of lamps in the unit, the distance the lamps are from the bottom of the unit where the hand is placed, the internal electronic components that cause the lamps to emit UV energy, and the overall size of the unit. These differences will all affect the curing power of the unit.

Remember that wattage is a measure of how much electricity the lamp consumes and does not indicate how much UV energy the lamps produce. Wattage is much like the measurement miles per gallon, which tells you how much gasoline it will take to drive your car a certain distance. Miles per gallon will not tell you how fast the car can go, just as wattage does not indicate how much UV energy a lamp will produce. For example, if a lamp unit has four lamps in it and each is 9 watts, then it is called a 36-watt lamp unit. Likewise, if the lamp unit only has three lamps and is also 9 watts, then it is called a 27-watt lamp unit. Wattage does not indicate how much UV energy a UV lamp unit will emit or which wavelengths of UV energy are produced, which can vary greatly. This is why it is best to always select the UV lamp unit designed for the UV gel system of your choice.

Undercuring UV or LED Gel Enhancements

A third problem that can cause allergic reactions is undercuring the gel enhancements. Several thin coatings and longer exposures lead to the best and most complete cure. Refer to the manufacturer's instructions to determine how best to cure the UV or LED curing product of your choice and always follow these directions. UV gels are cured by a UV lamp and UV lights inside the unit (see sidebar). If the UV lights are dirty or have been used for too long, the unit may not provide enough energy to fully cure the enhancement. It is very important to always use UV lamp units that were specifically designed for the UV gel system you choose. There is no such thing as a UV lamp that works for all gel systems. If the incorrect UV or LED lamp is used, service breakdown and adverse skin reactions become much more likely. Also, if the nail technician's arm, wrist, hands, or fingers are overexposed to dusts from undercured artificial nails, the potential for developing allergic reactions becomes more likely. However, even if properly cured, it is best to avoid skin overexposure to fresh filings, since they may cause adverse skin reactions.

There are several other ways in which UV or LED gel services can cause irritation or allergic reaction including:

- The soft, gooey layer on top of gel enhancements must never come in contact with soft tissue. It is partially cured UV gel.

- Using extra large or oversized brushes. Brushes that are too large do not save time—they cause skin exposure and may lead to allergic reactions.
- Mixing product lines or custom blending your own special mixture can also create chemical imbalances, which lead to allergic reactions. Do not take unnecessary risks. Always use products exactly as instructed and never mix your own products. If you do, do not be surprised when you or your clients develop skin problems.

It is estimated that adverse skin reactions—such as irritation or allergy—of the hands affect as much as 30 percent of all nail technicians sometime during their careers. Skin problems and allergies force many good nail technicians to give up successful careers. No one should suffer from any work-related allergy or irritation. With care, they are easily avoided.

Allergic Contact Dermatitis

Allergy-causing substances can damage the epidermis. When the skin is damaged by an allergy-causing substance, the immune system springs into action. It floods the tissue with water, trying to dilute the irritant. This is why swelling occurs.

The body is trying to remedy the situation. The immune system also tells the blood to release chemicals, called **histamines**, which enlarge the vessels around the injury. Blood can then rush to the scene more quickly and help remove the allergy-causing substance.

You can see and feel all the extra blood under the skin. The entire area becomes red and warm and may throb. It is the histamines that cause the itchy feeling that often accompanies allergic contact dermatitis. After everything calms down, the swelling will go away. The surrounding skin is often left damaged, scaly, cracked, and dry. Unfortunately, skin allergies often are permanent, meaning once you become sensitive to a particular ingredient, you will always be sensitive, and continued exposure may increase sensitivity and lead to a worsening of the visible skin symptoms. If you can avoid repeated and/or prolonged contact with the allergy-causing substance, the symptoms may go away, but you will still be allergic to the ingredient which caused the reaction to occur.

Remember, to avoid allergies, use the following precautions when working with monomer liquids and polymer powders or UV gels:

- Never smooth the enhancement surface with additional liquid monomer.
- Never use monomer liquid to clean up the edges, under the nail, or the sidewalls.
- Never touch any monomer liquids, UV or LED gels, adhesives, or fresh enhancement dusts/filings to the skin.
- Never touch the bristles of the nail application brush with your fingers.
- Never mix your own special product blends.
- Always use a bead that has a medium consistency, never wet. Avoid using excess monomer liquid.
- Always follow the manufacturer's instructions exactly as they are printed!

CAUTION:

Once a client or technician becomes allergic, things will only get worse if you continue using the same techniques. It is best to discontinue use of the products in question until you figure out what is wrong. Medications and illness do not make clients sensitive to nail products. Only prolonged and repeated contact with uncured or partially cured UV gel or monomer liquids causes these allergies.

Irritant Contact Dermatitis

Unlike allergies, irritant contact dermatitis (irritation) can be temporary, and the damage caused to you or your clients will usually reverse itself after exposure is discontinued. Corrosives are one exception. A corrosive, such as a high-pH callus softener or alpha hydroxy acid peel, are types of irritants that can cause irreversible damage to living skin.

Surprisingly, tap water is a very common salon irritant. Hands that remain damp for long periods often become sore, cracked, and chapped. Avoiding the problem is simple. Always completely dry the hands. Regularly use moisturizing hand creams to compensate for loss of skin oils caused by hand washing.

- Frequent hand washing, especially in hard water, can further irritate and damage the skin. Do not wash your hands excessively. Washing your hands more than 10 times a day can cause them to feel dry or become irritated and damaged. Cleansers, detergents, and hand sanitizers can worsen the problem. They increase the potential for damage by stripping away sebum and other natural skin chemicals that protect the skin. Prolonged or repeated contact with many solvents will strip away skin oils, leaving the skin dry or damaged.

Sometimes it is difficult to determine the cause of the irritation. One way to identify the irritant or allergy-causing substance is by observing the location of the reaction. Symptoms are always isolated to the contact area. The cause may be something that you may be doing to this part of the skin.

Protect Yourself

Take extreme care to keep brush handles, containers, and tabletops clean and free from product dusts and residues. Repeatedly handling and working with these items will cause overexposure if they are not kept clean. Enhancement products are not designed for skin contact!

Many serious problems can be related to contact dermatitis. Do all that you can to protect yourself and your clients so you can both enjoy nail enhancements for a long time to come! ✓ **LO6**



■ Review Questions

1. Define dermatology.
2. Briefly describe healthy skin.
3. Name the main divisions of the skin and the layers within each division.
4. List the three types of nerve fibers found in the skin.
5. Name the two types of glands contained within the skin and describe their functions.
6. What is collagen?
7. Explain the effect of overexposure to the sun on the skin.
8. What are the five important functions of the skin?
9. Why can't the skin be fed or nourished with cosmetic products?
10. What is the one essential item that no person can live without, and why is it essential to the skin and body?
11. List the factors that contribute to aging of the skin.
12. What is a skin lesion?
13. Name and describe at least five types of skin pigmentation disorders.
14. List at least six skin conditions and disorders that should be referred to a physician.
15. Name and describe the three forms of skin cancer.
16. Name the precautions that nail technicians can take to prevent allergic reactions to themselves and/or their clients.