Slide 1

Hello! Welcome to Chapter 2 of Medical Language. This chapter discusses the medical specialty of dermatology and the integumentary body system.

As we move through this chapter, we'll do more than simply scratch the surface—we will explore some deeper layers of medical knowledge. So, let's dive in and immerse ourselves in dermatology.

Slide 2

Here are the Learning Outcomes for this chapter. Remember, outcomes are your overall guide to what you need to learn. Upon completing this chapter, you should be able to:

- Identify the structures of the integumentary system.
- Describe the functions of the integumentary system.
- Describe common integumentary diseases.

Slide 3

- Describe common integumentary laboratory tests and diagnostic procedures.
- Describe common integumentary medical procedures, drugs, and surgical procedures.
- Demonstrate proficiency in medical language.

Slide 4

Dermatology is the medical specialty that studies the skin and related structures. It focuses on the anatomy and physiology of the integumentary system and uses laboratory and diagnostic tests, medical and surgical procedures, and drugs to treat integumentary diseases.

The medical word dermatology is made up of two word parts: the suffix –logy, which means "study of," and the combining form dermat/o-, which

means “skin.” Based on these parts, the literal definition of dermatology is “study of the skin.”

Slide 5

The integumentary system is a large, flat, flexible body system. It covers most of the surface of the body and consists of the skin, hair, and nails. The skin is the largest organ in the human body.

The integumentary system has many functions. It is the body’s first line of defense against invading microorganisms. It is also involved in skin repair, synthesis of vitamin D, and thermoregulation. The sense of touch is part of the integumentary system, too.

Slide 6

In this course, the study of medical language always starts with the anatomy and physiology of the body system, so that’s where we’ll begin. Fortunately, the integumentary system has the fewest number of structures of any body system.

Before we dive too deeply into the specifics of this system, however, we need to take a look at some of the language involved. The word integumentary contains two word parts. The suffix –ary means “pertaining to,” and the combining form integument/o- means “skin.” Cutaneous is another adjective for the skin. The suffix –ous means “pertaining to,” and the combining form cutane/o- means “skin.” Several other combining forms also mean “skin,” and are used in other medical words about the skin. They include: cut/i-, derm/a-, dermat/o-, and derm/o-.

Slide 7

Now, let’s look at the anatomy of the skin.

The skin is also called the integument, which is where the name for this body system comes from. The skin consists of two layers: the epidermis and the dermis.

The epidermis is the thin, outermost layer of the skin. It is categorized as epithelium and is made up of epithelial tissue. The epithelium also makes up the mucous membranes that line the walls of internal cavities that connect to the outside of the body. The adjective for epidermis is epidermal.

The dermis lies below the epidermis. It is thicker than the epidermis and is categorized as connective tissue. The adjective for dermis is dermal.

Let's take a closer look at these structures on the following screens.

Slide 8

The epidermis is the thin, outermost layer of the skin. The upper layer of the epidermis is the squamous layer, and it is made up of dead cells that contain a hard, fibrous protein known as keratin. These cells form a protective layer, but they are constantly falling off in a process known as exfoliation.

In the word exfoliation, the combining form foli/o- means "leaf". To help you remember this, you can think of the leaves or foliage on a tree, which are shed just like dead skin cells.

The dead cells of the outer epidermis create a dry and slightly acidic environment that discourages disease-causing microorganisms from growing. However, normal skin flora are bacteria that are able to grow under these conditions and are harmless to the body. In fact, they are helpful because they compete for space and nutrients and keep the disease-causing microorganisms from growing. In addition, the constant shedding of cells prevents microorganisms from penetrating the skin and causing disease.

Slide 9

The deepest part of the epidermis is the basal layer. It is composed of living cells that are constantly dividing and being forced to the surface.

The epidermis does not contain any blood vessels. It relies on blood vessels in the underlying dermis to provide nutrients and oxygen.

The epidermis does contain pigment cells known as melanocytes. These cells produce melanin, a dark brown or black pigment. Melanin absorbs ultraviolet light from the sun to protect the DNA in skin cells from undergoing genetic mutations.

Slide 10

The word melanocyte contains two word parts: the suffix –cyte means "cell," and the combining form melan/o- means "black." People of all races have the same number of melanocytes in the skin. The melanocytes of people with darker skin tones simply produce more melanin than those of people with lighter skin tones. In addition, exposure to the sun's ultraviolet rays increases the rate of melanin production, causing a suntan.

When sun exposure is prolonged, the melanin in the skin is not able to absorb all of the ultraviolet rays, resulting in a sunburn. This does not mean you should avoid sunlight. In fact, sunlight in moderate amounts is necessary to convert cholesterol in the epidermis into vitamin D. Vitamin D helps the body use calcium and phosphorus and protects against many kinds of cancer.

Slide 11

The dermis lies below the epidermis. It is thicker than the epidermis and is made up of connective tissue. It contains collagen fibers, which are firm, white protein. It also contains elastin fibers, which are elastic, yellow protein.

The dermis also contains arteries, veins, and nerves. In addition, integumentary structures including the hair follicles, sebaceous glands, and sweat glands reside in the dermis.

Slide 12

This diagram shows the skin and subcutaneous tissue. Notice the epidermal and dermal layers that make up the skin. Also, take note of the other integumentary structures found in the dermis—the hair follicles, sebaceous glands, and sudoriferous or sweat glands.

Below the dermis lies a type of connective tissue called the subcutaneous layer. We will discuss this layer more in a few minutes.

Slide 13

Nerves in the dermis are stimulated by light touch, pressure, vibration, pain, and temperature. A dermatome is a specific area on the skin that sends sensory information from the skin to a spinal nerve and the spinal cord.

So, what happens when the nerves in the dermis are stimulated? Imagine you touch something hot. This sensation from the dermatome is carried as sensory information by a nerve from the skin to the spinal cord. The spinal cord immediately sends out a motor command to a muscle to make you move your hand away from the heat.

Be aware that the word dermatome is also the name of a surgical instrument used to cut the skin. The suffix –tome has two meanings: “instrument used to cut” and “area with distinct edges.” The first meaning applies to the instrument, and the second to the sensory areas on the skin.

Slide 14

Here we have a diagram of the dermatomes in the body. Each dermatome is named according to the level at which the spinal nerve enters the spinal cord. Trauma to the spinal cord causes anesthesia in the skin.

If you notice, in this illustration there is no dermatome for the skin of the face. That is because the skin of the face sends sensory information to the brain through the cranial nerves rather than a dermatome.

Slide 15

Now, let's look more closely at some of the structures in the dermis.

Sebaceous glands, or oil glands, are a type of exocrine gland. An exocrine gland is any gland that secretes a substance through a duct. Sebaceous glands secrete sebum, or oil, through a duct that goes into a hair follicle. Sebum coats the hair shaft and moisturizes the skin's surface. The oil from sebaceous glands is what leaves a fingerprint behind when you touch a smooth surface.

Slide 16

Sudoriferous glands, more commonly called sweat glands, are another type of exocrine gland. They secrete sweat through a small duct that opens through a pore in the skin. Sweat contains water, sodium, and small amounts body wastes. It is the sodium in sweat that gives it its salty taste.

Sweat itself is odorless. When bacteria on the skin's surface digest the sweat, their waste products produce the odor associated with sweat.

The process of sweating is known as diaphoresis and sweat is called perspiration. Sweating helps to regulate the body temperature as water in the sweat evaporates from the skin and cools the body.

Slide 17

Hair covers most of the body, and its consistency and color vary from one part of the body to the next and from one person to another. Additional facial, axillary, and pubic hairs appear during puberty.

Melanocytes give hair its color. Dark hair contains melanin, but blond hair and red hair contain a variant of melanin that contains more sulfur. As a person ages, the melanocytes stop producing melanin, causing the hair to turn gray or white.

Each hair forms in a hair follicle in the dermis. Hair cells are filled with keratin, which makes the hair shaft strong. Most of the time, hair lies flat

against the skin's surface. When the skin is cold or when strong emotions are experienced, the hairs stand up. This is known as piloerection.

Slide 18

During piloerection, a tiny muscle at the base of the hair follicle contracts. This contraction is what causes the hair to stand up. Piloerection is commonly referred to as goosebumps.

Pil/o- is a combining form that means "hair." The combining form erect/o- means "stand up," and the suffix -ion means "action or condition." So, the literal translation of piloerection is "the action or condition of the hair standing up." Another combining form for hair is trich/o-.

Slide 19

Now let's look at the nails.

Nails cover and protect the distal ends of the fingers and toes because these areas are easily injured.

Each nail consists of a nail plate, nail bed, cuticle, lunula, and nail root.

- The nail plate is composed of dead cells that contain keratin. It is hard and translucent. It is the large, flat part of the nail and is what most people envision when they think of the nails.
- The nail root is located under the skin on the upper surface of the finger. It produces the cells of the nail plate.
- The lunula is the white half-moon at the base of each fingernail. The name uses the combining form lun/o-, which means "moon."
- The cuticle is the edge of dead epidermal cells around the proximal base of the nail.
- The nail bed lies beneath the nail plate. It contains nerves and blood vessels and is sometimes referred to as the quick of the nail. The nail bed is normally pink in color but can become bluish if a person's blood has a decreased oxygen level.

Slide 20

The nail is composed of both living and dead cells. The nail root produces the keratin-containing cells that form the lunula. As those cells grow out from the lunula, they die and harden to form the nail plate.

Slide 21

The subcutaneous tissue is a loose, connective tissue directly beneath the dermis of the skin. It is sometimes referred to as the subcu, which may be spelled s-u-b-Q or s-u-b-c-u.

Subcutaneous tissue is composed of adipose or fatty tissue. It provides a layer of cushion and insulation that keeps the body warm. Adipose tissue contains lipocytes that store fat as an energy reserve for the body. The word lipocytes includes the combining form lip/o-, which means “fat.”

The thickness of the subcutaneous layer varies because of the amount of fat stored there. It is very thin over the back of the hand but thicker over the abdomen. Metabolism and dietary intake of fats and sugars affect the amount of fat stored in lipocytes.

Slide 22

Before we move on, let’s review the anatomy of the skin.

The epidermis is the outermost layer of the skin. The epidermis has two layers—the outer squamous layer and the inner basal layer.

The dermis lies under the epidermis. It contains blood vessels that nourish the skin. It also contains oil glands, sweat glands, and hair follicles.

The subcutaneous tissue is not part of the skin, but it does lie beneath the dermis. It provides cushioning and insulation for the body.

Slide 23

Now let's look at the of the physiology of the integumentary system.

The integumentary system has many functions. Some relate to the body as a whole; others relate to other individual body systems. On this and the following screens, we will look at six specific functions: protection, repair, sensation, vitamin D synthesis, thermoregulation, and homeostasis.

As we mentioned earlier, the integument is the body's first line of defense and protection against injury and infection. The acidic nature of the epidermis discourages microorganism growth. Keratin in the epidermal cells makes the skin waterproof. Sweat and sebum secreted by the skin contain antibodies and enzymes that kill bacteria.

Other integumentary structures serve protective functions, too. The hair on the head protects the skin from ultraviolet rays of the sun. The nails protect the distal ends of the fingers and toes from injury. The cuticle around the nail plate prevents microorganisms from infecting the finger and toe tissues.

Slide 24

Repair is a second function of the skin. When a small injury occurs, the skin is able to repair itself. Cells in the basal epidermal layer move upward and cover the wound.

When a wound is deeper, a blood clot forms and many cells come together to form a scab. The scab eventually falls off as new cells from the dermis and the basal layer of the epidermis fill in the wound.

Slide 25

The third function of the integumentary system is sensation. Sensory receptors in the dermis respond to light touch, pressure, vibration, pain, or temperature. The nervous system relays and interprets skin sensations. In this way, the integumentary system complements the work of the nervous system.

Slide 26

Vitamin D synthesis is the fourth important integumentary function. Synthesis is the process of putting separate components together to make a new substance. In the case of the skin, ultraviolet rays from the sun convert cholesterol in the epidermis into vitamin D. The amount of vitamin D produced depends on the amount of sun exposure.

About twenty to forty-five minutes of sunlight per week produces sufficient amounts of vitamin D to meet the body's needs. Vitamin D is stored in lipocytes in the subcutaneous tissue.

Vitamin D helps the body absorb and use calcium from foods. In this way, the integumentary system complements the work of the skeletal and muscular systems. It also helps protects the entire body against some types of cancer.

Slide 27

The fifth integumentary function is thermoregulation, which is the process of controlling and adjusting the body's temperature. The integumentary system assists in thermoregulation in several ways:

- Subcutaneous tissue stores a layer of fat that conserves internal body heat.
- Piloerector muscle contraction produces goosebumps that create heat at the skin's surface.
- Sudoriferous glands produce sweat that cools the skin when the body is hot.
- Dermal blood vessels dilate to release heat from the skin when the body is hot.

Slide 28

The sixth and final integumentary function we will discuss is homeostasis, which is the process of maintaining the balance, equilibrium, and stability of all body systems and their functions. Thermoregulation is one aspect of homeostasis.

The integumentary system helps many different body systems work together to maintain homeostasis. As a result, many skin conditions can signal other medical conditions. For example, failure of facial hair to appear during adolescence may signal an endocrine disorder. Yellowish discoloration of the skin can indicate liver disease. Blue coloration of the skin around the mouth and under the nails indicates oxygenation problems.

Slide 29

We are ready now to discuss diseases of the integumentary system. This section is lengthier than the anatomy and physiology sections, but don't let that get under your skin! The first category we will look at includes general words associated with many different kinds of skin diseases.

Dermatitis is any infection or inflammation of the skin—and it applies to a lot of different skin diseases. The term uses the word root dermat/o- for "skin," and the suffix –itis, which means "infection of or inflammation of."

Edema is swelling from excessive amounts of fluid that move from the blood into the dermis or subcutaneous tissue. Edema is caused by local inflammation, allergic reactions, or infections. Large areas of edema are caused by diseases of the cardiovascular or urinary systems. Edema is not a constructed term built from word parts.

Hemorrhage is an injury to the blood vessels that releases blood into the skin. The process is also known as extravasation. There are several types of hemorrhage:

- Petechiae are pinpoint hemorrhages from ruptured capillaries.
- Contusions are hemorrhages of larger amounts of blood. A contusion 3 cm in diameter or larger is called an ecchymosis. Ecchymoses and contusions are more commonly called bruises.
- Hematoma is an elevated localized collection of blood under the skin. It has two word parts: the suffix –oma, which means "mass or tumor", and the combining form hemat/o-, which means "blood."

A lesion is any area of visible damage on the skin or a variation from normal skin. Lesions may be caused by either disease or injury.

Slide 30

This foot shows severe edema. Fingertip pressure on the area of edema displaces the fluid and produces a deep indentation in the tissues. This is known as pitting edema because pressure will cause a pit or depression in the skin.

Slide 31

Here is an illustration of the 8 different kinds of skin lesions. Notice that some lesions are elevated. These include cysts, papules, pustules, vesicles, and wheals. Other lesions are flat or nearly flat against the skin, including macules and scales. One type of lesion, fissures, actually cause small crevices in the skin.

Lesions can also be divided into categories according to what is inside of them. Some are semisolid, some contain fluid, some contain pus, and some do not have contents.

Lesions are measured using metric units. Their size is typically expressed in centimeters or millimeters.

Slide 32

Neoplasm is another general integumentary term. A neoplasm is a new growth on the skin, and it can be benign or malignant. If a neoplasm is benign, or noncancerous, it may still need to be removed, especially if it is large. A malignant neoplasm is cancerous. These growths always need to be removed to prevent the spread of the cancer. The prefix neo- means “new”, and the suffix -plasm means “growth.

Pruritus is a fancy medical word for the simple skin condition of itching. Itching is associated with many skin diseases, especially allergic reactions on the skin. Note that the spelling of pruritus differs from the typical suffix –itis. This word ends in

-itus because pruritus is a Latin noun, not a term constructed from word parts.

Rash is a familiar term, and it refers to a red or pink skin lesion that is flat or raised, itchy or not itchy. Certain skin diseases, such as those associated with chickenpox or measles, have a special appearance to the rash that helps the doctor make the diagnosis.

Our last general term is xeroderma. This is excessively dry skin. This skin dryness can mean something serious, like dehydration or vitamin A deficiency. It can also be the result of aging, cold weather, or low humidity. Xeroderma is constructed from two word parts: the suffix –derma, meaning “skin,” and the combining form xer/o-, meaning “dry.”

Slide 33

Now let’s move on to the next category: changes in skin color.

Albinism is a genetic mutation in which there are a normal number of melanocytes in the epidermis, but they do not produce any melanin. As a result, there is no coloration to the skin, hair, or the iris of the eye. This disorder also occurs in animals, most frequently in rabbits with white fur and pink eyes.

Cyanosis is a bluish-purple discoloration of the skin and nails due to a decreased level of oxygen in the blood. It is caused by cardiac or respiratory disease. The patient is said to be cyanotic. It has two word parts: the suffix –osis, meaning “condition or process,” and the combining form cyan/o-, meaning “blue.”

Erythema is a red discoloration of the skin. It can be in just one area because of a local infection, or it can affect large areas of skin, like a sunburn. The affected area of skin is said to be erythematous. Erythema has a similar spelling to erythrocyte, which is a red blood cell.

Slide 34

Jaundice comes from a French word that means “yellow.” Jaundice is a yellowish discoloration of the skin, mucous membranes, and whites of the eyes. It happens with liver disease when the liver cannot process bilirubin anymore. Jaundice is also called icterus, and the patient is said to be jaundiced or icteric. A patient without jaundice is said to be anicteric.

Necrosis has two word parts: the suffix –osis means “condition or process,” and the combining form necr/o- means “dead tissue.” Necrosis is gray-to-black discoloration where the skin has died due to a burn, skin ulcer, wound, or poor blood supply to the tissue. The affected area is described as necrotic. If this area develops a bacterial infection, it is called gangrene, and the area is gangrenous.

Vitiligo is an autoimmune disease in which the melanocytes are slowly destroyed in irregular and ever-enlarging areas. White patches of depigmentation occur within normally pigmented skin.

Slide 35

This image shows a patient with a necrotic hand caused by frostbite. The necrosis shows on the tips of the first two fingers. These fingertips may need to be amputated due to a lack of blood flow. The patient’s ring finger and little finger have necrosis at their bases, too.

Slide 36

This patient has areas of depigmentation on the jaw due to vitiligo. These areas will expand over time as the autoimmune disorder progresses.

At the other end of the spectrum from vitiligo are pigmentation issues associated with pregnancy. During pregnancy, melanocyte-stimulating hormone from the pituitary gland in the brain becomes active and causes a dark pigmented area on the face, which is known as chloasma or the mask of pregnancy. A dark vertical dark line on the abdominal wall may also develop. This is known as the linea nigra.

Slide 37

We are ready to move on to skin injuries.

An abrasion is a sliding or scraping injury that mechanically removes the epidermis. It is also known as a brush burn.

A blister is a fluid-filled sac with a thin, transparent covering of epidermal cells. It is caused by a repetitive rubbing injury that separates the epidermis from the dermis, releasing tissue fluid. You have probably had a blister on your heel from wearing new shoes or on your hand if you've spent hours raking the leaves in the yard.

Burns can be caused by several things. Heat from fire, hot objects, steam, or boiling water can burn the skin. Electrical current from lightning or electrical cords, chemicals, and radiation from the sun or from x-rays can burn the epidermis or dermis. Burns can be classified into several types:

- A superficial burn involves only the epidermis. There is redness, pain, and swelling, but no blisters. It is also called a first-degree burn.
- A partial-thickness burn includes the epidermis and the upper part of the dermis. There is redness, pain, and swelling, as with a first-degree burn, but there are also blisters or larger blisters called bullae. It is also called a second-degree burn.
- A full-thickness burn involves the epidermis, the entire dermis, and sometimes the subcutaneous tissue. The area is black. If the nerves in the dermis have been burned, then there is no sensation or pain; this is called anesthesia. It is also called a third-degree burn.

Slide 38

This patient's leg has a partial-thickness burn. The epidermis has separated from the dermis, releasing tissue fluid that formed into a large bulla.

Slide 39

A callus is caused by repetitive rubbing that causes the epidermis to gradually thicken into an elevated pad. A corn is a callus with a hard, central pointed area that causes pain.

A cicatrix is better known as a scar, and the name comes from the Latin word for scar. It is composed of collagen and forms as an injury heals.

An excoriation is a superficial injury with a sharp object, like a thorn, that creates a linear scratch on the skin.

A keloid is a firm, abnormally large scar. It grows larger than the original injury due to an overproduction of collagen. Unlike a scar, a keloid does grow smaller over time.

Slide 40

This patient has keloids on the chest. Each keloid continues to grow until it is much larger than the original injury. Depending on its location and size, a keloid can be cosmetically unacceptable to the patient.

Slide 41

A laceration is a linear penetrating wound. It can have clean-cut edges or torn, ragged skin at the edges.

A pressure injury is caused by epidermal and dermal break down. This results in a shallow or deep sore—or ulcer—in the skin. It is caused by constant pressure on the skin that decreases blood flow to the area. It often occurs over bony areas, like the hip or sacrum in patients that must lie or sit down a lot.

A pressure injury is also referred to as a pressure ulcer, bedsore, or decubitus ulcer. Decubitus is a Latin word that means “lying down.”

Slide 42

This deep laceration of the forearm was caused by a piece of glass that penetrated the epidermis and the dermis, down to the adipose tissue in the subcutaneous layer. It will require stitches to close.

Slide 43

This pressure injury on the patient's heel was caused by lying on the back for long periods of time. The epidermis, dermis, and even the subcutaneous tissue layers are gone, exposing the muscle layer. This injury will require aggressive treatment in order to heal. While it remains open, it invites infection.

Slide 44

On the next few screens we will consider skin infections.

An abscess is a localized pus-containing pocket under the skin. It is caused by a bacterial infection, usually by the bacterium *Staphylococcus aureus*. If the abscess develops around a hair follicle, it is called a furuncle. A carbuncle is made up of several furuncles connected by channels to the subcutaneous tissue or the skin surface.

Cellulitis has two word parts. The suffix –itis means "infection of or inflammation of" and the combining form cellul/o- means "cell." However, in cellulitis, more than just a single cell is involved. It is infection and inflammation of the connective tissues of the skin and muscle. It develops from a superficial cut, scratch, insect bite, blister, or splinter that becomes infected. The infecting bacteria produce enzymes that allow the infection to spread to the deeper tissue layers. Often, there is erythema as a red streak along the skin, with warmth and pain.

Herpes is a viral infection, not a bacterial infection. It is caused by the herpes simplex virus, and it involves clusters of vesicles, erythema, edema, and pain. The vesicles rupture, releasing clear fluid that forms crusts. There are several types of herpes:

- Herpes simplex virus type 1 causes vesicles—commonly called cold sores or fever blisters—on the lips. It tends to recur during illness and stress.

- Herpes simplex virus type 2 is a sexually transmitted disease that causes vesicles in the genital area, and it is often called genital herpes. These also tend to recur during illness or stress
- Herpes whitlow is infection at the distal fingernail. It is caused by contact with type 1 or type 2, and it enters through a small tear in the cuticle.
- Herpes varicella-zoster causes chickenpox. Later in life, it can come back and cause the very painful skin condition known as shingles.

Slide 45

This shows the vesicles and crusts of shingles. Note how the vesicles occur in clusters with clear, fluid-containing tops. These break open and then form a crust.

The lesions of shingles occur along a dermatome.

Slide 46

Tinea is a skin infection that is caused by a fungus. It causes severe itching and burning with red, scaly lesions. Tinea is a Latin word for "worm," because the round lesions were originally thought to be caused by a worm. Different types of tinea are named according to where they occur on the body:

- Tinea capitis occurs on the scalp and causes hair loss. Capitis is Latin for "of the head."
- Tinea corporis occurs the trunk and extremities. Corporis is Latin for "of the body."
- Tinea cruris occurs in the groin and genital areas. It is also known as "jock itch." Cruris is Latin for "of the leg."
- Tinea pedis occurs on the feet. It is commonly known as "athlete's foot." Pedis is Latin for "of the foot."

A verruca is a rough, irregular skin lesion caused by the human papillomavirus. It occurs on the hands, fingers, or soles of the feet. It is commonly called a wart. Warts are treated with a topical keratolytic drug to break down keratin in the wart.

Slide 47

This image shows the round lesions of tinea capitis. This infection causes itching and hair loss. Remember that the infection is caused by a fungus—not a worm—in spite of the name.

Slide 48

Now let's look at two skin infestations. An infestation is a condition caused by an insect, not a bacterium, virus, or fungus.

Pediculosis is an infestation of lice and their eggs, which are called nits. The lice and nits are in the scalp, hair, eyelashes, and genital hair. Lice are transmitted when you share a comb or hat with an infected person. Schools sometimes have lice epidemics because kids tend to share combs and hats.

Scabies is an infestation of parasitic mites that tunnel under the skin and produce itchy vesicles. Scabies in humans is caused by the same parasite that causes mange in dogs.

Slide 49

Let's move on to two allergic skin conditions.

We briefly mentioned dermatitis earlier. It is redness and inflammation of the skin caused by disease or injury. Contact dermatitis is a special type of dermatitis caused by physical contact with an allergen or irritant. Some examples include chemicals in deodorant, soap, detergent, makeup, and urine. Contact with metals, synthetic products like Latex gloves, plants like poison ivy, or animals can also cause this condition. The condition remains for several days.

Urticaria is a local allergic reaction to food, plants, animals, insect bites, or drugs. It is caused by the release of histamines, and it involves raised areas of redness and edema that occur suddenly. It is also known as hives. Each individual area is called a wheal and a large area is a welt.

Slide 50

This severe contact dermatitis was due to contact with a new deodorant whose chemical ingredients caused irritation. This reaction required several days of treatment before going away.

Slide 51

Now, let's go to the next category, benign neoplasms of the skin. Remember that benign is noncancerous and that a neoplasm is a new growth.

Actinic keratosis involves raised, rough areas that feel like sandpaper. It develops after chronic exposure to the sun. In fact, the combining form actin/o- means "rays of the sun." This is also called solar keratosis, and it can develop into skin cancer.

Hemangioma has three word parts: the suffix –oma, meaning "mass or tumor;" the combining form hem/o-, meaning "blood;" and the combining form angi/o-, meaning "blood vessel." A hemangioma is a mass of superficial, dilated blood vessels that is present at birth. Fortunately, these lesions usually disappear without treatment by age 3.

Lipoma has two word parts: the suffix –oma means "mass or tumor," and the combining form lip/o- means "fat." It is a rounded growth of adipose or fatty tissue in the skin. It does not need to be treated unless it is large and the patient wants it removed.

A nevus is another skin lesion that is present at birth. It comes in a variety of shapes and colors. One type is a mole. Another type is a birthmark known as a port wine stain. It is a red-to-purple color and is irregularly shaped. It often occurs on the head and neck.

Slide 52

This child has a hemangioma of the face between her eyes. The bright red color comes from the large number of dilated blood vessels.

Slide 53

This nevus is a mole that is pigmented, round, and elevated. Other moles are flat, darker in color, and sometimes contain a hair.

Slide 54

Papilloma is a soft, flesh-colored growth that protrudes from the skin. It grows as a flap or polyp on a stalk. It is commonly called a skin tag.

Senile lentigo are light-to-dark brown, flat macules that occur on the skin in areas exposed to the sun, like the hands or face. They are also called age spots or liver spots.

Syndactyly is a condition in which the skin and tissues between the toes or fingers are joined. It has a very unusual spelling. The suffix –dactyly means “condition of fingers or toes,” and syn- means “together.” The term polydactyly uses the same suffix with the prefix poly-, which means “many.” Polydactyly refers to someone with a condition of extra fingers or toes.

Slide 55

In this patient with syndactyly, the skin and tissues of the second and third toes are fused together.

Slide 56

Now, let’s look at malignant neoplasms of the skin. A malignant neoplasm is commonly known as cancer. It is caused by chronic exposure to ultraviolet light radiation from the sun. It is more common in older adults due to a lifetime of sun exposure. It is also more common in fair-skinned persons because they have less melanin to absorb radiation.

There are three primary types of skin cancer. We will work our way from the bottom of the skin layer up to the surface of the skin.

Basal cell carcinoma begins in the basal or bottom layer of the epidermis. It is the most common type of cancer, and it is slow growing. It appears as a raised, pearly bump. It does not metastasize to other parts of the body.

Malignant melanoma begins in the melanocytes of the epidermis. It is the most dangerous cancer. It grows quickly and can spread to other parts of the body. It is built from two word parts, the suffix –oma, meaning "mass or tumor," and the combining form melan/o-, meaning "black."

Squamous cell carcinoma is the third primary type of skin cancer. It begins in the flat squamous cells of the superficial layer of the epidermis. It often develops from an actinic keratosis and appears as a red bump or ulcer. It is the second most common type of skin cancer and it grows slowly.

In addition to the three primary types, there is a fourth type of skin cancer called Kaposi sarcoma. It affects the skin and subcutaneous tissue, as well as the mucous membranes and internal organs. It develops as elevated, irregular, dark reddish-blue masses on the skin. This previously rare cancer is now seen in AIDS patients because their immune system is impaired and cannot fight against the cancer cells.

Slide 57

Using sunscreen and avoiding prolonged sun exposure—particularly at midday—helps decrease skin cancer risk. Skin self-examination is also important. When conducting a skin self-exam, use The American Cancer Society's memory aid to remember what a malignant melanoma looks like:

- A, for asymmetry: The lesion is not symmetric. One side is different from the other. This is called asymmetry.
- B, for border. The border or edge of the lesion is irregular.
- C, for color. The color varies from black to brown to red in the same lesion.

- D, for diameter. The diameter is greater than 6 millimeters, which is 1⁄4 of an inch.

Slide 58

This malignant melanoma of the skin has the four typical ABCD characteristics: asymmetry, irregular borders, varying color, and large diameter. A fifth characteristic—an increase in size—would be noted over time.

Slide 59

There are three autoimmune disorders with skin symptoms, and we will consider those now. Autoimmune means that there is an immune response that is directed not against a pathogen or foreign substance, but against a person's own body tissues. You can remember this by thinking about the prefix aut/o-, which means "self."

Psoriasis is an autoimmune disorder that produces too many abnormal epidermal cells. The skin is itchy and red with slivery scales and plaques on the scalp, elbows, hands, and knees. Illness and stress can cause flareups, and the condition has a hereditary component.

Scleroderma has two word parts: the suffix –derma means "skin," and the combining form scler/o- means "hard." In this autoimmune disorder, the skin and internal organs harden due to abnormal deposits of collagen.

Systemic lupus erythematosus, abbreviated S-L-E, is an autoimmune disorder in which collagen in the skin and connective tissue deteriorates. There is often an unusual characteristic butterfly-shaped red rash over the nose and cheeks. It also causes joint pain and fatigue.

Slide 60

This patient has psoriasis on the arm and elbow areas. Psoriasis produces elevated, red lesions that are topped by silvery scales and plaques. Elbows and knees are common sites of psoriasis.

Slide 61

Now let's move away from the skin itself and look at diseases of the other integumentary structures. We will begin with the sebaceous glands.

Acne vulgaris is a chronic skin condition of the face, shoulders, and back. It appears during adolescence when the sebaceous glands produce large amounts of sebum. This sebum can harden and block a hair follicle, making a red papule on the skin. The sebum may turn black when it is exposed to the air, causing a blackhead. If bacteria on the skin feed on the sebum and produce infection, pustules or whiteheads form. Collectively, the lesions of acne vulgaris are known as comedos. In severe cystic acne, the comedos form deep, pus-filled cysts.

Rosacea is a Latin word that means "rose colored." Acne rosacea is a chronic skin condition in middle-aged patients. The sebaceous glands secrete too much sebum, and the skin has blotchy erythema and dilated blood vessels. Acne rosacea is made worse by heat, cold, stress, emotions, certain foods, alcoholic beverages, and sunlight. In addition, male patients with acne rosacea can develop an irregular, erythematous enlargement of the nose known as rhinophyma. This word contains two word parts: rhin/o- means "nose" and the suffix –phyma means "growth or tumor."

Seborrhea is also an overproduction of sebum, but at a time other than adolescence. There are oily areas between dry, scaly skin. There can also be crusty, yellow exudates from leaking tissue fluids. In babies, this is called cradle cap. In children and adults, it is called eczema. It often appears after illness or stress, but is also caused by allergies.

Slide 62

This teenage girl has acne vulgaris with small and large papules and a pustule. Increased secretions of the sebaceous glands during puberty trigger the onset of acne vulgaris.

Slide 63

This patient's face shows the blotchy, rose-colored redness and dilated blood vessels of acne rosacea. Even the eyelids and the neck are affected.

Slide 64

Now let's turn to diseases of the sweat glands. The two diseases of the sweat glands we present here are the opposites of each other.

Anhidrosis is the congenital absence of sweat glands. No sweat is produced and the patient is unable to tolerate heat.

Diaphoresis involves profuse sweating. It may point to a serious, underlying condition, like myocardial infarction, hyperthyroidism, hypoglycemia, or withdrawal from narcotic drugs.

Slide 65

There are also diseases of the hair. We will consider two here.

Alopecia is loss of hair from the scalp. It can be caused by diseases, like tinea capitis, or by chemotherapy drugs. Chronic hair loss typically begins in middle age. In men, decreased testosterone levels cause the hair follicles to shrink. Hair on top of the scalp thins, and male pattern baldness occurs. In women, menopause causes decreased estradiol levels in the blood, causing the hair to thin.

Hirsutism is the presence of excessive, dark hair on the forearms and upper lip of a woman. It is caused by a tumor of the adrenal cortex that triggers increased production of male hormone.

Slide 66

We'll finish up our discussion of integumentary diseases now by looking at two diseases of the nails.

Clubbing and cyanosis is an abnormal downward curve and bluish coloration of the fingernails. It is also accompanied by stunted growth of the fingers. It is associated with a chronic lack of oxygen in patients with cystic fibrosis.

Onychomycosis is a fungal infection of the nails. The nail root is infected and so the nail itself is deformed as it grows. This is a long word, but it only has three word parts. The suffix –osis means "condition," the combining form onych/o- means "fingernail or toenail," and the combining form myc/o- means "fungus."

Slide 67

Onychomycosis can involve one or all of the nails of the hands or feet. The nail is discolored, misshapen, thickened, and raised up from the nail bed.

Slide 68

Now we move to a whole new section: laboratory and diagnostic procedures.

Allergy skin testing is done to determine what things a patient is allergic to. Allergens—like animal dander, foods, plants, or pollens—are intradermally injected in a liquid form. If the patient is allergic to that allergen, a wheal will form at the site. Allergens can also be scratched into the skin rather than injected, and this is referred to as a scratch test.

A culture and sensitivity test—commonly referred to as a C&S—takes a fluid specimen from an ulcer, wound, burn, laceration, or skin infection and applies it to a culture dish. The bacterium grows into colonies that are identified to make a diagnosis. The colonies are then tested to see

which antibiotic drug they are sensitive to. That antibiotic drug is then used to treat the infection.

A RAST test is a blood test to measure the amount of the immunoglobulin IgE that is produced when the patient's blood is mixed with a specific allergen. It shows which allergen the patient is allergic to and how severe an allergy is.

Slide 69

This patient has undergone allergy skin testing. His back shows a number of wheals where the body's immune response was triggered by the injected antigen. The size of the wheal corresponds to the degree of the allergic reaction to that antigen. No wheal formation means that the patient is not allergic to that antigen.

Slide 70

A skin scraping uses the edge of a scalpel to scrape some cells from a skin lesion. These cells are examined under the microscope to make a diagnosis of tinea.

The Tzanck test was named for Dr. Tzanck, a Russian dermatologist. A skin scraping is done to obtain fluid from a vesicle. The fluid is put on a slide, stained, and examined under a microscope. Herpes virus infections and shingles show characteristic giant cells with the herpes virus in them.

The Wood's lamp or light was invented by Dr. Robert Wood, and American physicist. It uses an ultraviolet light to highlight areas of abnormal skin. In a dark room, ultraviolet light makes vitiligo appear bright white and tinea capitis appear blue-green because the fungus fluoresces in the dark.

Slide 71

Now let's move on to medical procedures of the skin. There are a number of procedures that can be performed on the skin.

Botox injections are used to treat deep wrinkles. The drug Botox is injected into the muscles to release wrinkle lines. It keeps the muscle from contracting and creating wrinkles. Injections are only effective for a few months.

Collagen injections use a solution of liquid collagen injected into wrinkles or acne scars. The injection plumps up the skin and decreases the depth of the wrinkle or scar.

Cryolipolysis is a noninvasive procedure that uses a cold device placed on the skin. The device targets and freezes fat cells, causing them to crystalize and die. It is popularly known by the name CoolSculpting, and it does not freeze skin cells or cause frostbite. In a few weeks, the body naturally eliminates the dead fat cells, reducing the unwanted fat deposits.

Slide 72

This patient is receiving a Botox injection in the forehead. The drug Botox is actually a diluted neurotoxin from the bacterium *Clostridium botulinum* type A that causes food poisoning and is present in canned goods with bulging ends.

Slide 73

Cryosurgery has 3 word parts: the suffix –ery means “process,” the combining form cry/o- means “cold,” and the combining form surg/o- means “operative procedure.” So, cryosurgery is a process of using cold during an operative procedure. In cryosurgery, liquid nitrogen, which is very cold, is sprayed or painted on a wart, mole, or other benign lesion or onto a small malignant lesion to freeze and kill it.

Curettage is a French word that means “a scraping.” It uses an instrument called a curet to scrape off a superficial skin lesion. A curet is a metal instrument with a small, sharp-edged ring on the end.

Debridement is a procedure that removes or debrides necrotic tissue from a burn, wound, or ulcer. It is done to prevent infection and to create a clean, raw surface that can heal or receive a skin graft. Debridement is a French word and it should be pronounced using its French pronunciation, deh-BREED-maw. However, you may hear an English-sounding pronunciation by healthcare professionals of deh-BREED-ment. There are several types of debridement:

- Mechanical debridement uses a wet dressing that dries and pulls off dead tissue when it is removed.
- Topical debridement uses enzyme drugs to chemically dissolve away dead tissue. Sterilized maggots may also be used.
- Surgical debridement is done under anesthesia and uses a scalpel, scissors, or curet.

Screen 74

Electrosurgery uses electricity that passes through an electrode to remove warts, skin tags, moles, and small malignant skin lesions. The electricity evaporates the intracellular contents and kills the cells. There are three types, all of which are typically done in a dermatologist's office:

- Fulguration uses an electrode held away from the skin that transmits a spark of electricity to the skin.
- Electrodesiccation uses an electrode that touches the skin to deliver the electrical current.
- Electrosection uses a wire loop electrode that cuts the lesion.

Incision and drainage—abbreviated I & D—is an incision made into the skin to remove fluid or pus from a cyst. A scalpel is used to make an incision and the contents of the incised lesion are manually expressed or allowed to drain out.

Laser surgery uses pulses of laser light to remove birthmarks, tattoos, unwanted hair, or superficial blood vessels. The laser has specific wavelengths of light that only react to certain colors to break up that color and the tissue around it. Surrounding tissue of a different color is unharmed.

Skin examination is conducted during every visit to the dermatologist. It involves the examination of the patient's skin or a single lesion, rash, or tumor.

Slide 75

This dermatologist is using a magnifying lens to examine a lesion on the patient's shoulder. This area may need to be biopsied to obtain a diagnosis.

Slide 76

Skin resurfacing involves the removal of part of the epidermis. It is used to treat scars, wrinkles, tattoos, or large pores to improve the surface appearance of the skin. There are four types:

- Chemical peel uses a topical liquid chemical to remove the epidermis.
- Dermabrasion uses a spinning wire brush to mechanically abrade or scrape away the epidermis.
- Laser skin resurfacing uses a laser to vaporize the epidermis. It is also known as a laser peel.
- Microdermabrasion uses small aluminum oxide crystals to remove the epidermis.

Skin turgor assessment is done by health care professionals to assess a patient's level of hydration. In this procedure, a fold of skin is pinched between the thumb and fingertips. The skin should flatten immediately upon release. If the skin is dehydrated, the skin remains elevated or flattens slowly.

Suturing is done to bring the edges of the skin together after a laceration or injury. Suturing is also done at the end of major surgeries that require a skin incision.

Finally, ultherapy uses ultrasound waves directed at the dermis and subcutaneous tissue. It stimulates production of new collagen to lift and tighten skin on the face and neck.

Slide 77

After an anesthetic drug was given to numb the area, this laceration of the forearm was sutured or sewn closed in two layers. The first layer brought together the deeper tissues, and the second closed the skin edges. After a week, the skin sutures were removed. The deeper sutures were made of a material that is absorbed by the body, and they did not need to be removed.

Slide 78

Now we'll look at some of the drugs used to treat diseases and conditions of the skin.

Anesthetic drugs provide temporary numbness of the skin during procedures that involve cutting or suturing.

Antibiotic drugs are used to treat bacterial infections of the skin or acne vulgaris. They may be applied topically or given orally.

Antifungal drugs are used to treat fungal infections. When used to treat skin infections like ringworm, they are given topically. When used to treat nail infections, they may be topical or oral.

Antipruritic drugs decrease itching associated with some skin diseases. You can remember this because they use the combining form prurit/o-, which means itching. They may be topical or oral.

Antiviral drugs are used to treat viral infections of the skin. As with many of the other drugs, they may be topically or orally administered.

Coal tar drugs are used to treat psoriasis. They slow multiplication of epidermal cells to decrease itching. These drugs are applied topically.

Slide 79

Corticosteroid drugs suppress the immune response and are used to treat inflammation associated with many skin diseases. They may be topical or oral.

Drugs for alopecia improve blood flow to the scalp to increase hair growth. They may be topically applied or taken orally.

Drugs for infestations treat pediculosis, or lice. They are applied topically as a lotion and shampoo.

Photodynamic therapy, abbreviated PDT, is used to treat cancer of the skin in combination with a laser light and a light-sensitizing drug.

Psoralen drugs are used with ultraviolet light to treat psoriasis. It is helpful that both the drug category and the condition it treats begin with the unusual letter combination “ps.”

Vitamin A-type drugs are used topically or orally to treat acne vulgaris and severe cystic acne.

Slide 80

The administration of drugs often involves the skin. Topical drugs are applied right on the skin for a local effect. Transdermal drug patches, on the other hand, are placed on the skin, but the drug is absorbed through the skin and transported through the blood to exert a systemic effect. The term transdermal means “pertaining to through the skin.”

An intradermal injection uses a needle inserted just within the epidermis. This type of injection is commonly used for tuberculosis testing and allergy testing. The hypodermic route of administration uses a needle to inject liquid as well, but the needle is inserted all the way to the subcutaneous tissue.

Slide 81

This illustration shows a hypodermic injection. Note how the needle goes through the epidermal and dermal layers down to the subcutaneous tissue. The needle is generally inserted at a forty-five-degree angle.

Slide 82

Now we are ready to look at some surgical procedures for the skin.

Biopsy is abbreviated Bx. It has two word parts: the suffix –opsy means "process of viewing," and the combining form bi/o- means "living tissue." A biopsy removes all or part of a skin lesion or tumor. The biopsy specimen is sent to the pathology department for examination under the microscope to make a diagnosis. There are four types of skin biopsies:

- Excisional biopsy uses a scalpel to remove the entire skin lesion or tumor. The combining form excis/o- means "cut out."
- Incisional biopsy uses a scalpel but only removes part of a skin lesion or tumor. The combining form incis/o- means "cut into."
- Punch biopsy uses a circular metal cutter to remove a plug-shaped core of tissue from the lesion that includes the epidermis, dermis, and subcutaneous tissue.
- Shave biopsy uses a scalpel or razor blade to shave off a superficial skin lesion.

Slide 83

This is a punch biopsy, in which a circular metal cutter penetrates deeply into the skin and subcutaneous tissue.

Slide 84

Dermatoplasty has two word parts: the suffix –plasty means "process of reshaping by surgery," and the combining form dermat/o- means "skin." Dermatoplasty is any type of plastic surgery to the skin and includes procedures like skin grafting, keloid removal, and facelift.

Liposuction, or suction-assisted lipectomy, is a surgery to remove excessive deposits of fat from the breasts, abdomen, hips, legs, or buttocks by suctioning out the subcutaneous tissue. Ultrasonic-assisted liposuction uses ultrasound waves to break up the fatty tissue before removal.

Mohs surgery is a way to remove skin cancers, particularly those with irregular shapes and depths. An operating microscope is used during the surgery to examine each layer that is removed. If the layer shows cancerous cells, more tissue is removed until no trace of the cancer remains. This technique was developed by Dr. Frederic Mohs in 1936.

Rhytidectomy has two word parts: the suffix –ectomy means "surgical removal," and rhytid/o- means "wrinkle." A rhytidectomy removes wrinkles and tightens up loose skin on the face; it is also called a facelift. A blepharoplasty is often done with a rhytidectomy to remove fat and drooping skin from the eyelids. The combining form blephar/o- means "eyelid."

Slide 85

This plastic surgeon is performing liposuction to remove fat from the patient's thigh. Lines drawn on the skin show the areas of greatest fat deposits. Both legs will be done to achieve a symmetrical result.

Slide 86

Let's finish up surgical procedures by talking about skin grafting.

Skin grafting uses human or artificial skin to provide a temporary covering or permanent layer of skin over a burn or wound. A dermatome is a surgical instrument used to create a skin graft. Don't confuse that with the dermatome we talked about earlier that sends sensory information to the spinal cord. The two terms are spelled the same and pronounced the same, but they are very different things.

There are three types of skin grafts:

- An allograft is a skin graft taken from a cadaver or dead body. This is a temporary skin graft just used to protect the skin and prevent infection until a permanent skin graft can be done.
- An autograft is a skin graft taken from another part of the patient's own body. This is a permanent skin graft.
- A synthetic skin graft is made of collagen fibers that gradually disintegrate as the patient's own skin grows into it.

Slide 87

Before we finish up this chapter, let's take a minute to review the abbreviations you've seen.

Bx
biopsy

C&S
culture and sensitivity

Derm
dermatology (short form)

HAI
healthcare-associated infection

HSV
herpes simplex virus

I&D
incision and drainage

IgE
immunoglobulin E

PDT
photodynamic therapy

PUVA
psoralen (drug and) ultraviolet A (light therapy)

SLE
systemic lupus erythematosus

Slide 88

SQ
subcutaneous

subcu
subcutaneous (short form)

subQ
subcutaneous (short form)

UVB
ultraviolet light B

Slide 89