There’s a lot more to skin than meets the eye.

WHAT MAKES UP ABOUT 16 percent of a person’s weight, its outer surface is an accumulation of dead cells and the thickness of this organ varies by location? For those who need to utilize a lifeline to answer the question, a few more clues might be helpful. The surface area of this structure is around 18 to 20 square feet and its color is the only body part to start a war. In case you have not figured it out, the answer is skin and its derivatives, hair and nails.

The skin has been subjected to a number of unusual practices over the years including bleaching it pale white. Some of these customs presented a danger since the pores absorbed the materials and slowly poisoned the blood and organs. Modern medicine is aware of these dangers and has learned to appreciate the intricacies of the skin. Forester, Elizabeth, What is the Function of Skin, Discovery Health, http://health.howstuffworks.com/skin-care/information/anatomy/function-of-skin.htm. In fact, this organ has its own medical specialty, dermatology, and physicians who practice in this area utilize both medical and surgical techniques to treat a variety of conditions. Dermatology, http://en.wikipedia.org/wiki/Dermatology.
This article will provide an overview of the integumentary system including an anatomical discussion of this system and a review of the disease processes of interest to lawyers.

**THE ANATOMY OF THE SKIN** • The skin constitutes the largest organ in the body and it is part of the integumentary system. This word is derived from the Latin, integere, which means “to cover.” Merriam Webster Dictionary. Therefore, skin is the covering of the body. The skin is considered an organ because it consists of tissues that are joined together structurally to accomplish a specific function. Disease of the Skin and Subcutaneous Tissue, Advanced Anatomy and Physiology, Contexo Media, 2010 at 176.

On a very basic level, skin is much like the paint on the outside of a house. It has multiple layers, is visible for all to see and acts as a protective barrier. Skin, however, is much more complex and serves a number of important functions in homeostasis, the ability of a system to regulate its internal environment in order to maintain a stable, constant condition. Homeostasis, Wikipedia, http://en.wikipedia.org/wiki/Homeostasis. These roles include the regulation of the body’s temperature by shivering or sweating, water balance, absorption of materials, synthesis of hormones and the ability to detect sensations such as heat, cold, and pain through nerve endings. The Integumentary System, http://www.emc.maricopa.edu/faculty/farabee/biobk/biobook-integusys.html. See also, The Skin and Its Functions, Anatomy and Physiology; Cliff Notes, http://www.cliffsnotes.com/study_guide/The-Skin-and-Its-Functions.topicArticleId-22032/articleId-21894.html. Acidic secretions from glands within the skin also hinder the growth of fungi. Id. This organ’s primary functions, however, are to create a protective covering that repels the entry of foreign substances into the body such as germs, bacteria, and viruses and to retard the loss of body fluids. Id.

**The Color And Thickness Of Skin**

The skin’s color and texture are premised upon a person’s genetic makeup and are probative of an individual’s family history. The color of skin is based upon melanocytes and all races have the same amount of these cells. Melanocytes produce the pigment melanin which is responsible for the color of skin. Darker-skinned people have more and larger melanosomes than those with lighter skin. Skin of Color, American Academy of Dermatology, http://www.aad.org/public/publications/pamphlets/general_skin.html. As a rule of thumb, however, individuals with ancestors from tropical regions and higher altitudes have darker skin than those with descendants from subtropical regions. What Determines Skin Color, Answers.com., http://wiki.answers.com/Q/What_determines_the_skin_color. Occasionally people are born without melanin and are dubbed albinos. This genetically based condition causes the hair, skin and eyes, to be white or very light in color. Melanin: Skin Color and Freckles, Raising-Redheads.com, http://www.raising-redheads.com/melanin.html.

While the thickness of skin differs depending upon its location and frequency of use, the eyelids have the thinnest membranes while the palms of the hands and the soles of the feet have the thickest surfaces. Skin Anatomy: How the Skin Protects You, About.com, http://seniorliving.about.com/od/healthnutrition/a/skinanatomy.htm. The density of skin is also determined by age, the amount of sun exposure a person has experienced, and the person’s health. For instance, diabetes, aging, and thyroid disorders can negatively affect the thickness of skin. Skin Qualities — Skin Thickness, Real Age, http://www.realage.com/look-young-stay-sharp/simply-beautiful-skin/skin-thickness. This is important because thinner-skinned people are more susceptible to burns and injuries, and the foot problems of diabetics are well known. Jerrold S. Petrofsky et. al., The Influence of Aging and Diabetes on Skin and Subcutaneous Fat Thickness in Different Regions of the
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The Layers Of The Skin

Skin is much deeper and more complex than its visible surface. In reality, this organ consists of three layers which differ in function, thickness, and strength. These include the epidermis, dermis, and a fatty layer of subcutaneous tissue, the hypodermis or subcutis. Anatomy of Skin, National Cancer Institute, SEER Training Modules, http://training.seer.cancer.gov/melanoma/anatomy.

The epidermis is the surface layer that acts as the initial barrier to keep foreign substances out of the body. Jason Swanson, Epidermis, Loyola University Medical Education Network, http://www.med-dean.luc. This layer is somewhat translucent so light can partially pass through it. The epidermis has no blood vessels so it must rely on the deeper skin layers for nutrients and oxygen. Skin Anatomy: How the Skin Protects You, About.com, supra. Even though the epidermis appears dormant, it is continually at work forming new cells at the bottom of this layer. When the cells are ready, they make their journey towards the top of the epidermis. As the newer cells reach the outer surface of the skin, the older cells die and fall off, a process known as desquamation. Your Skin, http://kidshealth.org/kid/hbw/skin.html. This cycle allows a person to obtain a new epidermis every 35 to 45 days as millions of these dead cells are discarded on a daily basis. Skin (Integumentary System), Body Guide, ADAM, supra. Therefore, this layer provides the skin with its elasticity by allowing for stretching while resisting distortion and sagging. Integumentary System, Wikipedia, http://en.wikipedia.org/wiki/Integumentary_system.

Surprisingly, the connective tissue fibers of the dermis are arranged in an irregular and haphazard manner that allows the skin to flex with the movements of the body while stretching and contracting without giving in to the stress of the forces being applied. Disease of the Skin and Subcutaneous Tissue, Advanced Anatomy and Physiology, supra at 175.

The dermis can be as much as 40 times thicker than the epidermis. At its meeting point with the epidermis, the surface of the dermis contains blood vessels, nerves, hair roots, sweat glands and sebum, an oily substance that helps lubricate the skin. Definition of Dermis, MedicineNet.com, http://www.medterms.com/script/main/art.asp?articlekey=2958. The dermis is also known as the “true skin” and its major components are collagen, a protein that adds firmness and strength, reticular fibers, which add support, and elastic fibers, which provide flexibility to the structure. Skin (Integumentary System), Body Guide, ADAM, supra. Therefore, this layer provides the skin with its elasticity by allowing for stretching while resisting distortion and sagging. Integumentary System, Wikipedia, http://en.wikipedia.org/wiki/Integumentary_system.

The dermis contains a number of specialized cells and structures that provide a variety of important functions. These include:
• Hair follicles;
• Sebaceous (oil), apocrine (scent) and eccrine (sweat) glands;
• Blood vessels; and
• Specialized nerve cells that transmit the sensation of pressure, pain, and touch.


Hair is located on most visible surfaces of the body but the strands are much more complicated than they appear. Heather Brannon, *The Biology of Hair*, Dermatology, About.com, [http://dermatology.about.com/cs/hairanatomy/a/hairbiology.htm](http://dermatology.about.com/cs/hairanatomy/a/hairbiology.htm). People have about five million hair fibers and 150,000 of these are concentrated on the scalp. Hair Anatomy, The Hair /Hair Loss Guide, [http://www.afraidtoask.com/hair/hair-anatomy.html](http://www.afraidtoask.com/hair/hair-anatomy.html). Each piece of hair originates from a pocket in the dermis, the hair follicle. This pocket has a bulb-shaped appearance which is fed by small blood vessels that provide nutrients and remove waste. Sebaceous glands adjacent to the hair root discharge sebum, an oil that protects and provides the hair with its sheen. Id. The part of hair that protrudes up from the skin is the shaft and it is made up of the protein keratin. Heather Brannon, *The Biology of Hair*, Dermatology, About.com, supra. The primarily purpose of hair is to provide a protective covering; scalp hair protects against overexposure to the sun, the eyebrows prevent sweat from running into the eyes, and nose hair filters dust from the air. *Skin (Integumentary System)*, Body Guide, ADAM, supra.

Sweat glands are used to regulate the body’s temperature and consist of long, coiled tubes embedded in the dermis. It is at this location that sweat is manufactured and released to the outer surface of the skin when needed for thermoregulation. Craig Freudenrich, *How Sweat Works*, Discovery Health, [http://health.howstuffworks.com/skin-care/information/sweat.htm](http://health.howstuffworks.com/skin-care/information/sweat.htm). Sweat also flushes metabolic waste products to the surface for their disposal from the body. *Disease of the Skin and Subcutaneous Tissue*, Advanced Anatomy and Physiology, supra. at 175.

There are two kinds of sweat glands, eccrine and apocrine. The first is the most numerous type found throughout the body, especially in the hands, forehead, and soles of the feet. Craig Freudenrich, *How Sweat Works*, Discovery Health, supra. The secretions from the eccrine glands are clear and consist primarily of water and sodium chloride which gives sweat its salty taste. These glands discharge their secretions directly onto the skin surface. *Sweat Gland*, Wikipedia, [http://en.wikipedia.org/wiki/Sweat_gland](http://en.wikipedia.org/wiki/Sweat_gland). On the other hand, the apocrine gland is confined to the armpits and groin areas and their white or yellow-like secretions are discharged into the hair follicles. The eccrine glands are smaller and are active from birth while the apocrine glands become active at puberty and release an odor. Craig Freudenrich, *How Sweat Works*, Discovery Health, supra.

Anyone who has pricked a finger knows that the skin is filled with nerve endings that produce a pain response. More than one million sensory receptors are found throughout the skin and they are in constant communication with the brain and the environment. This process is what allows the skin to satisfy its function as an organ. *The Nerves of the skin*, Babor, [http://www.babor.eu/L/0/The-nerves-of-the-skin.1344.0.html](http://www.babor.eu/L/0/The-nerves-of-the-skin.1344.0.html).

Sensory perception is critical in the avoidance of pressure, traumatic or mechanical forces, and extremes of temperature. This perception is accomplished by a variety of specialized structures in the skin. For instance, Merkel cells and Meissner corpuscles contained in the epidermis detect light touch. Pressure, however, is the function of Pacini corpuscles which are located deep within the dermis or subcutaneous tissue. Amirlak, Bardia, et. al., *Skin Anatomy*, eMedicine, [http://emedicine.medscape.com/article/1294744-overview](http://emedicine.medscape.com/article/1294744-overview). These nerve