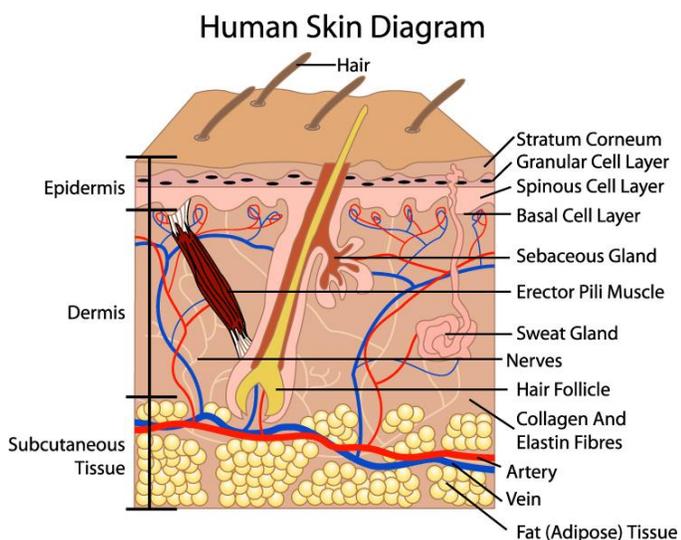


Old & Old-looking Skin

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Skin is a complex organ with multiple layers and functions. Other than holding our insides in and sensing touch and temperature, skin provides a protective barrier against hazardous substances, infections, and mechanical, thermal and physical injury. It prevents loss of moisture and regulates temperature by sweating. It reduces harmful effects of UV radiation while using that light to make vitamin D.



The top layer, the epidermis, contains protective barrier cells, melanocytes which confer skin color and a base membrane that separates it from more sensitive structures below. Under the epidermis is the dermis, the workhorse of skin. It contains sweat glands, hair follicles with muscles to hold them erect, collagen to give firmness, elastin to provide elasticity, sebaceous glands to make a protective oil layer, tiny blood vessels, and nerves. Below it all is the subcutaneous layer of fat, blood vessels and nerves.

Throughout all the layers is a complex, stacked layering of lipids (waxy, fatty substances) containing cholesterol, ceramides and sphingomyelin. These lipid layers, along with collagen and elastin hold together all the other

structures and are termed connective tissue. It is this structure that many skin cream ingredients profess to repair and bolster.

The big three skin destroyers are natural aging, called senescence, tobacco and ultra-violet radiation (UV). They work via different mechanisms, but all lead to sagging dry thin skin with wrinkles, irregular sallow color, brown “age” spots, and visible blood vessels. Aged skin is less likely to resist injury, infection and cold.

Senescence is an aging process that occurs in all organs in which functional capacity declines, old cells die at a faster rate (also called programmed death) and the capacity to regenerate declines with age. Losing our hormones contributes. Normal age-related cell, connective tissue and subcutaneous fat loss cause wrinkling, thinning, itching and sagging.

Absent extraordinary physical stresses, our genes largely determine the rate of senescence. The more rapid the process, the older the skin looks. People with progeria, who have a defect that impairs cells’ ability to divide and make new cells, look ancient in their teens and almost always die by age 20. Other genetic forms of senescence result from defective gene repair mechanisms.

Exposure to UV radiation is one of the most important factors contributing to skin aging and cancers. We may long for the beauty of deeply tanned skin, but by middle age that skin is deeply wrinkled, sagging, dry and leathery. It is the Oriental ladies with their sun-blocking parasols who are the ones who retain beautiful skin past middle age.

There are three main types of UV radiation, UVA, UVB, and UVC. We previously thought that UVA caused DNA damage that leads to cancer and UVB burned and tanned the skin. Actually both do both, albeit via different mechanisms. UVC does not usually penetrate the atmosphere, but when it does, it can also play a role in causing DNA damage.

UV radiation damages most skin cell types, causing wrinkling, loss of elasticity, irregular pigmentation, tiny

visible broken blood vessels and skin tumors. UV radiation also causes funny-looking pigmented spots and crusty lesions that can lead to cancer, and accelerates changes associated with normal aging.

In addition to damaging DNA, UV radiation also induces oxidative injury. Normal unstressed cells keep a balance between potentially damaging reactive oxygen byproducts (ROS) and a variety of antioxidant enzymes in the cell that neutralize ROS. ROSs are natural byproducts of metabolism, but are also generated when cells are exposed to UV radiation, toxins, pro-oxidants or inflammation. Under those conditions ROSs may overwhelm the cells' capacity to neutralize them. Oxidative stress accelerates normal skin aging also.

This is why people take anti-oxidants and cosmetic companies put anti-oxidants in skin products. Since there is no guarantee that the anti-oxidants we eat, take as pills or smear on our skin actually neutralize ROS, it's better to avoid excess ROS in the first place.

Smoking causes significant skin damage, some of which resolves over time after quitting. There are thousands of chemicals including nicotine in tobacco smoke. These chemicals trigger ROS production and an influx of enzymes that destroy collagen and elastin. They constrict blood vessels, depriving skin of oxygen and nutrition. They induce the influx of and damage by a particular type of inflammatory cells called mast cells.

Smoking prematurely loosens skin around the eyes causing deep crow's feet, makes the skin more susceptible to 'age spots' and turns the cigarette- holding fingers yellowish brown. In some people it increases hair loss and risk of psoriasis.

Dehydration and loss of body fat also make skin look aged, without actually destroying it. Very thin middle aged people generally look older than their age because their skin doesn't have the fat that would normally puff it out and fill in wrinkles. For the same reason, dehydration increases wrinkles, just like drying plums makes the wrinkles of prunes.

Good nutrition is necessary for healthy skin. Skin is one of the most actively renewed organs in the body as we continually slough off then replace the top layers of cells. We need a full complement of nutrients to do so, including protein, vitamins, minerals and energy from carbohydrate and fat.

Cosmetic companies single out particular nutrients for skin health, usually because the names sound good and seem intuitively connected to a positive result. Take vitamin C for example. Vitamin C is necessary for cross-linking collagen protein, making it stiff. This helps connective tissue to keep skin taut. But vitamin C alone can't stimulate collagen production. We need energy, protein and a full complement of micronutrients to make the protein so that there's something to cross-link. For someone who is not deficient, a vitamin C supplement or cream won't boost extra collagen production or firmness.

We can't change our genetically determined senescence rate, but we certainly can choose a lifestyle that does not worsen skin aging. Tobacco and smoke avoidance and using clothing and sun block to protect against UV radiation go a long way to minimize premature aging skin damage. Eating healthfully, with enough calories, protein and nutrients to replenish skin structures and plump out wrinkles, makes skin look better regardless of its degree of aging.

A few references:

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