

[NARRATOR:] Skin covers all our bodies, but its color varies from person to person. To understand why, we need to peer inside its layers. [music plays] Skin cells and their allies--hair, sweat and oil glands--form a first line of defense from the environment. Skin's three main layers are each a distinct community of cells with different jobs. To see what gives skin its color, we need to focus on the outermost layer-- the epidermis-- and two important cell types: keratinocytes and melanocytes. The keratinocytes are the cells that form the surface of the skin and are on the frontline for taking insults from the environment. Deeper down in the epidermis, right at the base of the layer, we find the melanocytes. These star-shaped cells produce the important pigment melanin. Let's zoom inside a melanocyte to see how this works. Melanin is produced inside what look like spheres throughout the melanocyte. These are the melanosomes. Chemical reactions inside melanosomes turn the amino acid tyrosine into melanin. The proportion of two main forms of melanin produced-- a reddish-yellow type versus a black-brown type; the total amount of melanin in each melanosome; and the number of melanosomes in the epidermis-- all vary from person to person and determine their skin color. Melanosomes are the melanin factories inside melanocytes. But for melanin to do its job, melanosomes need to be transported to the keratinocytes via the melanocytes' long projections. Inside the keratinocytes, some melanosomes form a cap around the cell nucleus. The melanin inside the melanosomes absorbs the ultraviolet energy from sunlight, reducing the amount of ultraviolet radiation that reaches the nucleus and, in particular, the DNA inside the nucleus. Ultraviolet radiation can cause mutations in DNA that can lead to cancer. When ultraviolet radiation increases, melanin production increases, and more melanosomes are delivered to keratinocytes. Most people can adjust to greater exposure to the sun by turning up melanin production and tanning. But their genetic inheritance determines both the baseline color of their skin and how much it can tan.