5.1D: Skin Color

Skin color is determined largely by the amount of melanin pigment produced by melanocytes in the skin.

LEARNING OBJECTIVE

Explain how differing degrees of pigmentation are produced

KEY TAKEAWAYS

Key Points

• Skin color is mainly determined by a pigment called melanin.
• Melanin is produced by melanocytes through a process called melanogenesis.
• The difference in skin color between lightly and darkly pigmented individuals is due to their level of melanocyte activity; it is not due to the number of melanocytes in their skin.

Key Terms

• melanin: Any of a group of naturally occurring dark pigments responsible for the color of skin.
• melanocyte: A cell in the skin that produces the pigment melanin.
• keratinocytes: Cells that take up and store melanin.
• eumelanin: The type of melanin mainly responsible for brown and black skin.
• **stratum basale**: The epidermal layer where melanocytes are found.

## Melanin

Skin color is largely determined by a pigment called melanin but other things are involved. Your skin is made up of three main layers, and the most superficial of these is called the epidermis. The epidermis itself is made up of several different layers.

![Image: Cross-section of skin showing melanin in melanocytes](https://med.libretexts.org/Bookshelves/Anatomy_and_Physiology/Book%3A_Anatomy_and_Physiology_(Boundless)/5%3A_I...

The deepest of the epidermal layers is called the stratum basale or stratum germinativum. In this layer lie important cells called melanocytes. Their name is derived from two parts: melano-, which means black or darkness, and -cyte, which means cell.

Melanocytes are irregularly shaped cells that produce and store a pigment called melanin. The most abundant type of melanin is called eumelanin. This pigment is stored in organelles called melanosomes.

Eumelanin is responsible for the brown and black pigmentation of human skin or the lack thereof if little of it is produced. The production of melanin is called melanogenesis—genesis means formation or development.

### How Skin Color is Determined

Regardless of background, every person has largely the same number of melanocytes, but the genetics of each person is what determines how much melanin is produced and how it is distributed throughout the skin. For example, light skinned individuals may have darker places like nipples and moles. Conversely, dark skinned individuals have a lighter tone to the palms of their hands.

Another critical factor, exposure to sunlight, triggers the production of melanin as well. This is what gives us a tan. The melanin produced in response to the sun’s rays protects our skin and the rest of the body from the harmful effects of the
sun’s burn and cancer-inducing U.V. radiation.

The Role of Keratinocytes

People with darker skin have more active melanocytes compared to people with lighter skin. However, the pigment of our skin also involves the most abundant cells of our epidermis, the keratinocytes.

While melanocytes produce, store, and release melanin, keratinocytes are the largest recipients of this pigment. The transfer of melanin from melanocytes to keratinocytes occurs thanks to the long tentacles each melanocyte extends to upwards of 40 keratinocytes.

If a person is unable to produce melanin, they have a condition called albinism.

Other Skin Color Determinants

Tanned Skin: Exposure to UV radiation through tanning causes changes in the pigmentation of the skin by increasing melanin production.

Besides melanin, other factors play a role in general or local skin color. These include:

1. The amount of carotene found in the stratum corneum of the epidermis and the deepest layer of the skin, the hypodermis. Carotene is a yellow-orange pigment found in carrots. Your skin may turn this color if you eat a lot of carotene-rich foods. The skin may turn yellow due to another factor, called icterus or jaundice, which occurs with serious liver disease. In this instance, bile pigments are deposited within the skin and impart a yellow color to it.

2. The amount of oxygen-saturated hemoglobin found in the blood vessels of the middle layer of our skin, the dermis. Hemoglobin is the iron-containing protein pigment of our blood cells. A lack of oxygen saturation imparts a paler, grayer, or bluer color to the skin. Skin may also become paler as a result of anemia (a reduced number of hemoglobin and/or red blood cells), low blood pressure, or poor circulation of blood.

3. Conversely, light-skinned individuals (compared to dark-skinned ones) may have a rosy effect to their skin thanks to the relatively more oxygen-rich hemoglobin flowing through the blood vessels of their dermis. Red-colored skin may also occur as a result of blood vessels in or near the skin dilating (expanding) due to embarrassment, fever, allergy, or inflammation.

4. Finally, the skin may have red, black, blue, purple, and green bruises—all as a result of the escape of blood into surrounding tissues. As the blood (namely, the hemoglobin) disintegrates and is processed and removed by various cells, it and the bruise changes color with time.

LICENSES AND ATTRIBUTIONS

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