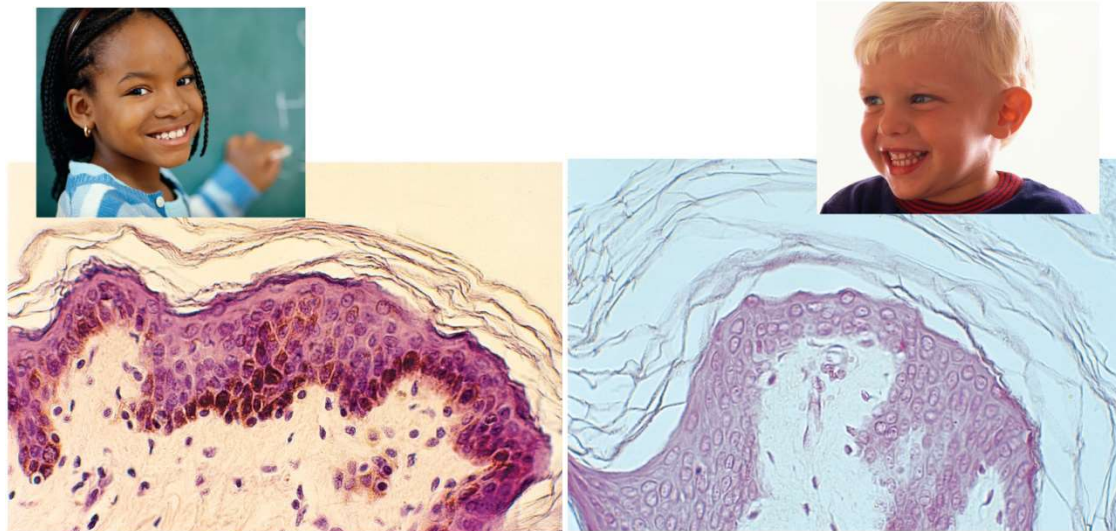


## Chapter 5.7

# Skin Color



# Skin Color

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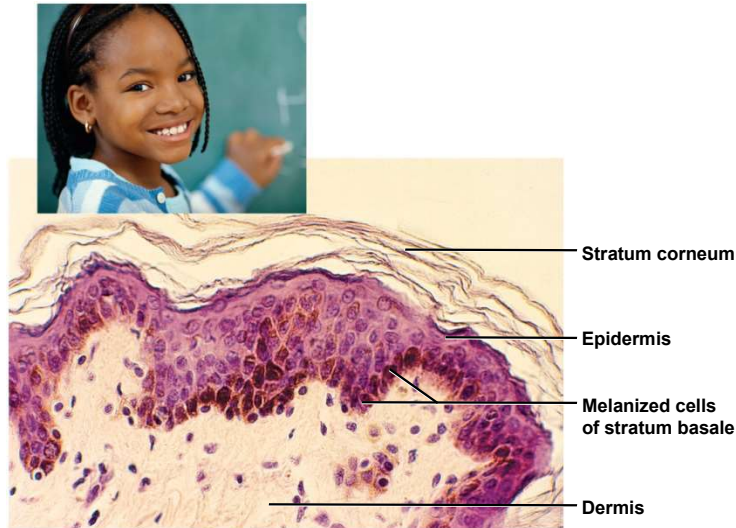
- **Melanin** – most significant factor in skin color
  - produced by melanocytes // secreted by melanocytes and reabsorbed by other cells
  - accumulate in the keratinocytes of stratum basale and stratum spinosum
  - eumelanin – brownish black
  - pheomelanin - a reddish yellow sulfur-containing pigment
  - mixture and concentration of pigment molecules determine actual skin color

# Skin Color

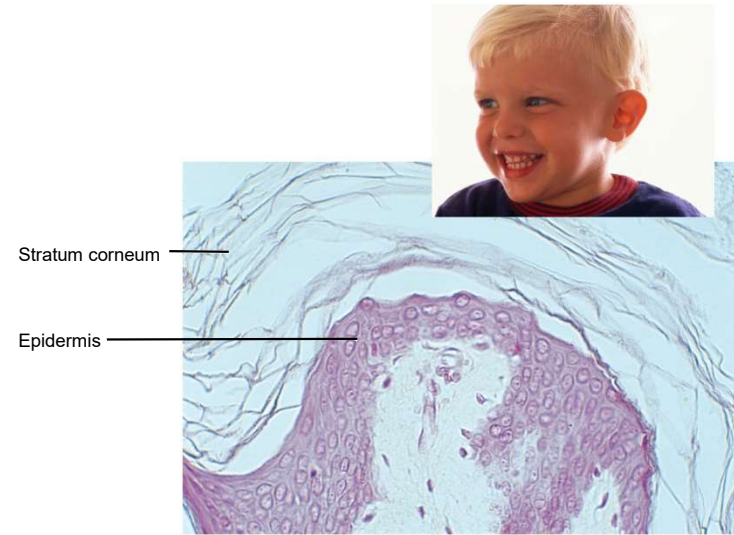
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- People of **different skin colors** have the **same number of melanocytes**
  - **dark skinned people**
    - **produce greater quantities of melanin**
    - melanin granules in keratinocytes more spread out than tightly clumped
    - melanin breaks down more slowly
    - melanized cells seen throughout the epidermis
  - **light skinned people**
    - melanin clumped near keratinocyte nucleus
    - **melanin breaks down more rapidly**
    - little seen beyond stratum basale
- Amount of melanin also **varies with exposure to ultraviolet (UV) rays of sunlight**

# Other Factors in Skin Color



(a) Dark skin



(b) Light skin

- **hemoglobin** - red pigment of red blood cells /// adds reddish to pinkish hue to skin
- **carotene** - yellow pigment acquired from egg yolks and yellow/orange vegetables /// concentrates in stratum corneum and subcutaneous fat

# Abnormal Skin Colors

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- **cyanosis** - blueness of the skin from deficiency of oxygen in the circulating blood
  - airway obstruction (drowning or choking)
  - lung diseases (emphysema or respiratory arrest)
  - cold weather or cardiac arrest
- **erythema** – abnormal redness of the skin due to dilated cutaneous vessels /// exercise, hot weather, sunburn, anger, or embarrassment
- **pallor** – pale or ashen color when there is so little blood flow through the skin that the white color of dermal collagen shows through /// emotional stress, low blood pressure, circulatory shock, cold, anemia

# Abnormal Skin Colors

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- **albinism** – genetic lack of melanin that results in white hair, pale skin, and pink eyes /// have inherited recessive, nonfunctional tyrosinase allele
- **jaundice** - yellowing of skin and sclera due to excess of bilirubin in blood /// cancer, hepatitis, cirrhosis, other compromised liver function
- **hematoma – (bruise)** mass of clotted blood showing through skin

# Evolution of Skin Color

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- skin color – one of the most conspicuous sign of human variation
- results from combination of evolutionary selection pressures /// especially differences in exposure to ultraviolet radiation (UVR)
- UVR has two adverse effects:
  - causes skin cancer
  - breaks down folic acid needed for normal cell division, fertility, and fetal development
- UVR has a desirable effect /// stimulates synthesis of vitamin D necessary for dietary calcium absorption
- populations native to the tropics and their descendants tend to have well-melanized skin to screen out excessive UVR
- populations native to far northern or southern latitudes where the sunlight is weak, tend to have light skin to allow for adequate UVR penetration

# Evolution of Skin Color

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- ancestral skin color is a compromise between vitamin D and folic acid requirements
- women have skin averaging about 4% lighter than men /// need greater amounts of vitamin D and folic acid to support pregnancy and lactation
- high altitude and dry air increases skin pigmentation /// e.g. Andes, Tibet, Ethiopia
- UV radiation accounts for up to 77% of variation in human skin color
- other exceptions:
  - migration, cultural differences in clothing and shelter
  - intermarriage of people of different geographic ancestries
  - darwinian sexual selection – a preference in mate choice for partners of light or dark complexion