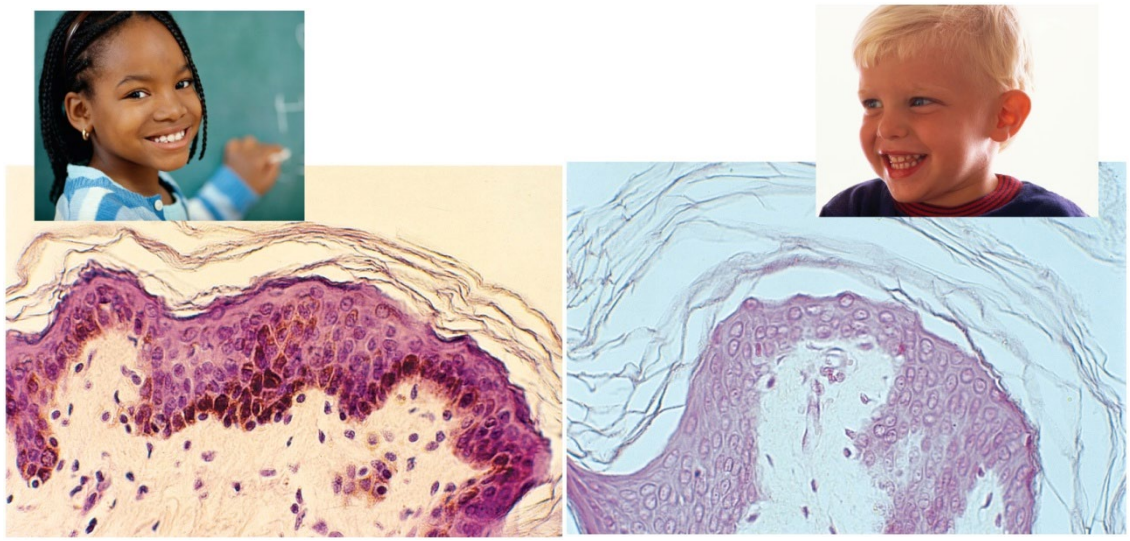
Chapter 5.7

Skin Color



Skin Color

Melanin – most significant factor in skin color

– pigment 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

•People of different skin colors have the **same number of melanocytes**

–**dark skinned people**

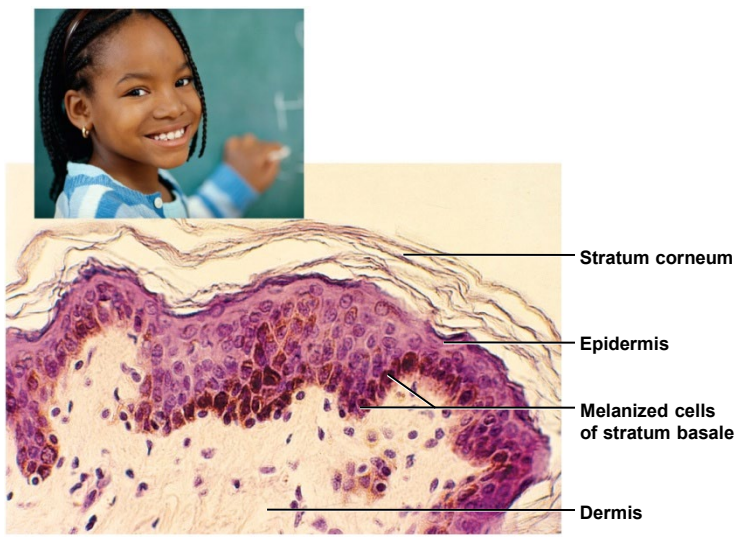
•produce greater quantities of melanin
•melanin granules in keratinocytes more spread out than tightly clumped
•melanin breaks down more slowly
•melanized cells seen throughout the epidermis

–**light skinned people**

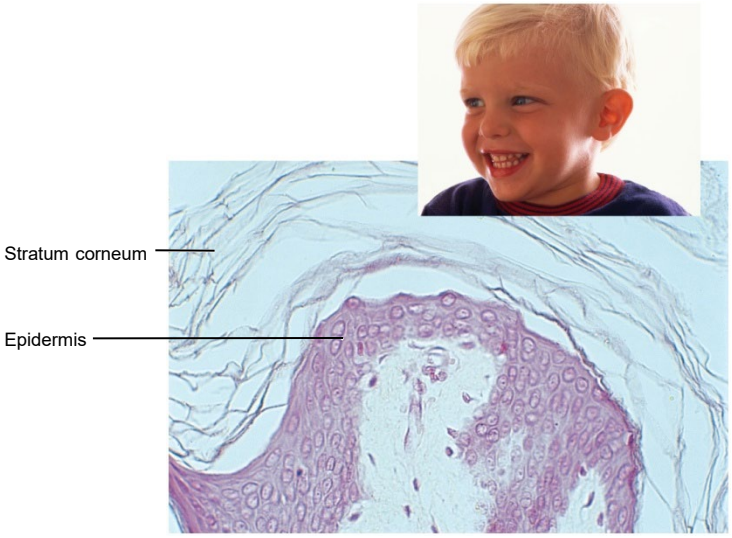
•melanin clumped near keratinocyte nucleus
•melanin breaks down more rapidly
•little seen beyond stratum basale

•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

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

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

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

Evolution of Skin Color

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