

Melanocytes Encyclopedia Article

Melanocytes

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Melanocytes

Melanocytes are pigment (melanin)-producing cells found in the deepest or basal layer of the **epidermis**. They are dendritic cells with cytoplasmic extensions that stretch out to contact other cells (keratocytes) in the epidermis.

Melanocytes originate as melanoblasts in the neural crest cells of the embryo at about seven weeks gestation. The melanoblasts migrate into the developing **dermis** and differentiate into melanocytes.

Melanocytes contain submicroscopic organelles called melanosomes that synthesize melanin. Melanin is transferred into keratocytes and **hair** follicles via the dendritic processes of melanocytes. Skin and hair color is primarily determined by the presence and distribution of melanin and can be brown-black (eumelanin) and yellow-red (pheomelanin) in coloration. This gives skin and hair its distinctive color and hue.

The various races of people all have approximately the same number of melanocytes in their skin. Darker-skinned people have appreciable amounts of melanin in all layer of the epidermis. Light-skinned people have relatively little melanin in the epidermis except in deeply pigmented areas such as the nipples. Albino individuals do not have fewer melanocytes in their epidermis than non-albinos, but rather they have a mutant gene that prevents the synthesis of melanin due to a missing enzyme.

Within the melanosome of the melanocyte, the enzyme tyrosinase oxidizes tyrosine to dihydroxyphenylalanine (DOPA) and then to DOPA quinone. Further non-enzymatic oxidation and polymerization results in the production of melanin.

The primary function of melanocytes is to protect the skin from solar UV damage through the production of melanin. The polymer melanin has the unique capability to absorb light of wavelengths ranging from 200-2400 nm. It has also been shown to be a free oxygen-radical scavenger, protecting the metabolically active keratinocytes of the epidermis from any free radicals that are generated by UV irradiation. In so doing, melanin reduces UV damage effects such as aging, wrinkling, and cutaneous neoplasms (skin cancers). The protective function of melanin is illustrated by the high incidence of skin cancers in sun-exposed epidermis of light-skinned, blue-eyed, easily sunburned individuals and albinos. Dark skin is much less likely to form skin cancers and ages more slowly than light skin.

Levels of **hormones** such as **estrogen**, **progesterone**, melanocyte stimulating hormone (MSH), and adrenocorticotrophic hormone (ACTH), can affect distribution of melanin in the epidermis. In pregnant women, this can be seen as "the mask of pregnancy." Chronic illnesses such as Addison's disease, **liver** disease and **hyperthyroidism** can also present with unusual distribution of melanin.