MELANOCYTES/MELANOGENESIS

Milestones in Melanocytes/Melanogenesis

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Melanocytes and their production of melanin pigment (a process called melanogenesis) have important roles in determining the physiology of human skin. The amount and type of melanin produced, as well as its eventual distribution in the epidermis, dramatically affects visible color, which ultimately determines the various functions of the pigment, such as photoprotection. ''Normal'' pigmentation is regulated by >250 genes (as per the latest count), and they function during the development, migration, survival, proliferation, and differentiation of melanocytes and their precursors (melanoblasts). Disruptions of skin pigmentation can occur at all of these stages, and mutations in these pigment-related genes typically lead to characteristic pigmentary diseases. Pigmentation in the lower species is critical for survival (as camouflage), thermal regulation, etc. In humans, however, it is important not only for cosmetic reasons but also to protect the skin from UV damage and the subsequent risk of skin cancers. With respect to susceptibility to skin cancers, melanocyte function seems to be important at many levels in addition to the simple sunscreen effect of the melanin pigment *per se*. The chemical and enzymatic processes involved in the synthesis of different types of melanins have also been gradually elucidated. The study of genes involved in regulating mammalian pigmentation has had a dramatic advantage owing to the visible effects of mutations in these genes, and pigment variants of mice, fish, birds, and other species have been collected for centuries, providing a rich resource for understanding the complex nature of their interactions. Combined with the dramatic advances in methods for gene sequencing, and functional analysis, our understanding of the complex regulation of human skin pigmentation—and its disruptions in pigmentary diseases—has advanced rapidly.

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