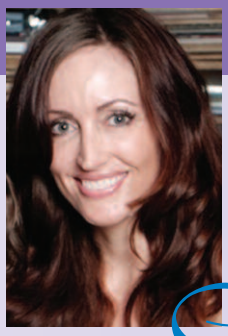

Melanogenesis

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It all starts with our eyes. Our eyes are light meters, registering the amount of UV to which we are exposed. The light is registered by the pituitary gland which then releases POMC (proopiomelanocortin) which is cleaved enzymatically into signaling peptides, one of which is α-MSH. The primary roll of α-MSH is that it binds to melanocortin 1 receptor (MC1R). This attachment stimulates the production and release of melanin.

The melanocyte is located at the basal layer of the skin, firmly attached to the dermal-epidermal junction. It is a long-lived, slow cycling skin cell. The implication of this is if damage occurs to the cell, it will take a long time to resolve. It is a dendritic cell, with long "arms" supplying up to 36 surrounding keratinocytes with pigment. They work in synergy with the keratinocyte, forming part of the skin's natural barrier function. It creates 2 types of pigmentation; brown pigment (eumelanin) and red pigment (pheomelanin). The production of pigmentation requires a lot of energy and therefore releases free radicals.

After α-MSH settles on the melanocortin 1 receptor (MC1R), the melanocyte is stimulated to produce melanin. The enzyme Tyrosinase oxidizes Tyrosine, a non-essential amino acid (meaning it can be produced within the body) used by cells to synthesize proteins. In this case, to create the melanosome carrying the pigmentation. Then L-Dopa and Dopa Quinone create the melanin clear colored granule. The melanin containing melanosome then moves along the melanocyte dendrite and transfers to the keratinocyte, when IPD (immediate pigment darkening) occurs. It is only upon transfer to the keratinocyte that the melanin granules take on a darkened appearance. The pigment then settles over the keratinocytes DNA to protect it from UV exposure and radiation.

As the predominant cell of the epidermis, the keratinocyte makes up 70 to 80% of the cellular population. Working in synergy with the melanocyte, it is responsible for generating and maintaining the skin barrier defense systems. It has an 8 to 10 day life cycle from mitosis to arriving in the stratum corneum, then 5 to 10 days to desquamate (age dependent). Being hydrophobic it repels water. It is the cell that creates the epidermis, hair and nails and has an unlimited stem cell source. It communicates with all other cells within the epidermis and dermis controlling such functions as activating the innate immune system.

The keratinocyte migrates from the basal layer, through the spiny and granular, eventually metabolizing into a cornfield cell at the stratum corneum, eventually sloughing off.

The residual pigmentation marks and blemishes left on the skin after years of chronic and acute sun exposure is due to one or more of the processes going wrong. If the melanocyte suffers DNA damage, one may have uncontrolled pigment production. If the cells are unhealthy, the melanocyte dendrites may shorten, "dumping" pigmentation into the cells immediately surrounding it vs. evenly spreading distribution. If the keratinocyte DNA is damaged there may be a lack of communication between the cells so melanogenesis is never "switched off." The keratinocytes may also get saturated with pigment, causing excess pigment to accumulate at the dermal epidermal junction, only oxidizing and appearing as pigmentation spots years later.

With an understanding of what cells and systems are involved with pigmentation creation, and what can subsequently go wrong, we now turn our attention to what skin care ingredients we have at our disposal to correct the damage.

Vitamin A is one of the most important ingredients to be included in a pigmentation regimen. As one of the key regulators of DNA of the melanocyte and keratinocyte, we can correct the damage done through UV radiation or free radical formation, and thereby see an improvement in the appearance of pigmentation.

Other important considerations are Vitamin B3, niacinimide to stop the transfer of pigment from the melanocyte to the keratinocyte, Vitamin C to inhibit tyrosinase activity; Vitamin E, along with other antioxidants, as free radical scavengers; and sunscreen to protect from further damage. Cosmetic Needling is a great tool to help improve the absorption of your topically applied products and may result in a faster resolution in the appearance of the pigmentation.

Some controversial ingredient considerations include the use of Hydroquinone, a powerful tyrosinase inhibitor, but with complications of use including rebound pigmentation and toxicity to all skin cells. Kojic acid is another controversial ingredient that may cause fragmentation of DNA and skin sensitivity when used in the high percentages required to see an improvement. Alternatives would be SepiWhite MSH, where clinical studies have shown its effectiveness at being a melanin stimulating hormone antagonist.

Candace is a Licensed Esthetician and Master Trainer for DermaConcepts, exclusive distributor of Environ Skin Care in the USA, and hosts advanced trainings on this pharmaceutical grade line. She holds certificates for internationally recognized programs including Advanced Skin Analysis, Dermal Needling and Oncology Esthetics, and is a proficient public speaker at medical and skin care conferences throughout the USA. Her belief is to never stop learning, in hopes of sharing the knowledge gained by her continued studies. Born in South Africa, and having personal experience battling Melasma, she feels her passion for skin care is her biggest asset. She can be contacted at candace@dermaconcepts.com ▲