

MELANOGENESIS AND HYDROQUINONE

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SUMMARY

Mammalian melanocytes synthesize melanin in specific intracellular organelles, the melanosomes, which are afterward carried along melanocytic dendrites, injected into keratinocytes and, finally, degraded and eliminated by the epidermal turnover. Melanogenesis, i.e., the synthesis of melanosomes and melanin, is a cascade of events controlled by factors which are either internal and external to the melanocyte. Melanins are divided into eumelanins, pheomelanins, mixed melanins, trichochromes, neuromelanins, and, recently oxymelanins. The role of sulphhydrylic compounds (cystein and glutation) for determining the kind of melanin, in particular for pheomelanins, does not seem to be due to their absolute presence or absence, but rather to their concentration in a certain moment. Eumelanogenesis and pheomelanogenesis are conditioned by a balance between tyrosinase and natural melanogenic inhibitors, as lactic acid, ascorbic acid and glutathione.

Among agents that are capable to interfere with melanocytic metabolism there are various cytotoxic compounds, some of which are selective for the melanocyte, as hydroquinone (HQ) and his derivatives. HQ is a compound capable of inhibiting melanogenesis acting as a substrate for tyrosinase. This competitive action does not seem to inactivate tyrosinase, thus the activity is reversible. The tendency of HQ to undergo hydroxylation and dehydrogenation, with formation of highly reacting quinones, i.e., hydroxybenzoquinone, p-benzoquinone and their derivatives, may suggest a biochemical base to understand the melanocytic cytotoxic effects, interfering with melanization and causing focal degradation of melanosomes. The complex activity of HQ on pigmentation, although not yet completely known, might also explain the main side-effects of topically-applied HQ, i.e., toxic depigmentation and exogenous ochronosis, as the active concentration is next to the toxic one.

KEY WORDS:

melanogenesis, hydroquinone, selective effects

MELANOGENESIS

Skin pigmentation due to melanin is regulated by two components: 1) the pigmentation constitutively

expressed, according with the genetic program, independed of exposure to ultraviolet (UV) rays (constitutional skin tanning); 2) the pigmentation due to direct exposure to UV (immediate and

