

inflammatory cells through induced expression of adhesion molecules such as E-selectin and intercellular adhesion molecule 1 on endothelial cells and keratinocytes. UVR has been shown to activate phospholipase A₂, resulting in increases in eicosanoids such as prostaglandin E₂, which is known to be a potent inducer of sunburn erythema. The role of eicosanoids in this reaction has been verified by studies showing that nonsteroidal anti-inflammatory drugs (NSAIDs) can reduce sunburn erythema.

Epidermal changes in sunburn include the induction of “sunburn cells,” which are keratinocytes undergoing p53-dependent apoptosis as a defense, with elimination of cells that harbor UV-B–induced structural DNA damage.

VITAMIN D SYNTHESIS AND PHOTOCHEMISTRY Cutaneous exposure to UV-B causes photolysis of epidermal 7-dehydrocholesterol, converting it to pre-vitamin D₃, which then undergoes temperature-dependent isomerization to form the stable hormone vitamin D₃. This compound diffuses to the dermal vasculature and circulates to the liver and kidney, where it is converted to the dihydroxylated functional hormone 1,25-dihydroxyvitamin D₃. Vitamin D metabolites from the circulation and those produced in the skin itself can augment epidermal differentiation signaling and inhibit keratinocyte proliferation. These effects are exploited therapeutically in psoriasis with the topical application of synthetic vitamin D analogues. In addition, vitamin D is increasingly thought to have beneficial effects in several other inflammatory conditions, and some evidence suggests that—besides its classic physiologic effects on calcium metabolism and bone homeostasis—it is associated with a reduced risk of various internal malignancies. There is controversy regarding the risk-to-benefit ratio of sun exposure for vitamin D homeostasis. At present, it is important to emphasize that no clear-cut evidence suggests that the use of sunscreens substantially diminishes vitamin D levels. Since aging also substantially decreases the ability of human skin to photocatalytically produce vitamin D₃, the widespread use of sunscreens that filter out UV-B has led to concerns that the elderly might be unduly susceptible to vitamin D deficiency. However,