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Curcumin-induced apoptosis in the repair of burns and photo-damaged skin

Madalene C Y Heng
UCLA School of Medicine, USA


Phosphorylase kinase is an enzyme released five mins after injury. This dual specificity enzyme phosphorylates both serine and tyrosine moieties necessary to activate downstream NF- κ B (released 30 mins post-injury) resulting in gene transcription of multiple injury-induced processes, including inflammation and scarring. Curcumin, a selective and non-competitive phosphorylase kinase inhibitor, blocks NK- κ B-dependent processes, resulting in healing of damaged tissue (burns) with minimal scarring. Photo-damaged skin from UVB and UVA injury is further complicated by DNA damage, with the formation of cells with increased potential for tumor transformation. The DNA Damage Repair (DDR) Pathway, triggered by DSBs (double stranded breaks) is governed at its entry by a family of phosphatidylinositol 3-kinases - ATR, ATM and DNA-PK, that control Cell Cycle Arrest, Nucleotide Excision/Repair and DNA strand replication respectively. Phosphorylase kinase has also been shown to phosphorylate the phosphatidylinositol 3-kinases, thus initiating the laborious DNA Damage Repair Pathway that often results in survival of DNA damaged cells with an increased risk of tumor transformation. Curcumin, by inhibiting phosphorylase kinase, therefore, blocks the entry

into the DNA Damage Repair Pathway, resulting in Curcumin-induced apoptosis, which not only induces early removal of DNA damaged cells but also allows the space for replacement by new healthy undamaged cells. This process results in the rapid repair of burns and sunburns and decreases the risk of survival of DNA damaged cells with increased risk of photo-carcinogenesis. In chronically photo-damaged skin, the removal of premalignant and early malignant cells by Curcumin-induced apoptosis is also beneficial in the management of photo-damaged skin. In this presentation, we have included clinical examples of the salutary effects of topical Curcumin in burns and photo-damaged skin.

Speaker Biography

Madalene C Y Heng is a Professor of Medicine/Dermatology, David Geffen UCLA School of Medicine. After completion of 25 years in full-time academia, she is currently in private practice as a Dermatologist in Camarillo, California. She is the author of over 85 publications, in peer-reviewed journals. She is a reviewer of multiple journals with Editorial positions in others. Her expertise includes an interest in the biochemistry and pathophysiology of disease including acne, wound healing and psoriasis. She is the Inventor of Curcumin gel.

e: madaleneheng@aol.com

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