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Investigation of shikonin as a novel scar remediation therapy

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Zi Cao, a Chinese herb, has been clinically used to treat burns and manage scars in China for thousands of years; however, the pharmacological mechanisms underpinning its reported actions in skin are unclear. Shikonin, an active component extracted from Zi Cao has been demonstrated to induce apoptosis in cancer cell lines. Apoptosis is known to be an essential part of scar tissue remodelling; we therefore hypothesized that Shikonin may induce apoptosis in scar-related cells and this may underpin the successful clinical use of Zi Cao. The effects of Shikonin on skin cell viability, proliferation and collagen metabolism were measured by Alamar Blue, CyQUANT assay and Sirius Red stain, respectively. In addition, Western blot and qRT-PCR were used to detect the changes of protein and gene expression in hypertrophic scar-derived human fibroblasts treated with Shikonin. We present here the first detailed in vitro study examining the effects of Shikonin on the functional responses of scar-related cells, and the mechanisms underlying these responses. Our data suggests that Shikonin inhibits cell viability and proliferation and reduces the amount of collagen present in scar-derived fibroblasts. Further investigation revealed that Shikonin induces apoptosis in scar fibroblasts by differentially regulating caspase 3, Bcl-2, phospho-Erk1/2 and phospho-p38 expression. In addition, Shikonin reduces collagen production in scar fibroblasts by down-regulating collagen I, collagen III and alpha-smooth muscle actin gene expression. In conclusion, we demonstrate that Shikonin induces apoptosis and decreases collagen production in scar fibroblasts and may therefore hold potential as a novel scar remediation therapy.

Biography

Xie has completed her M.D. in 2004 and Ph.D. in 2008 from Queensland University of Technology (QUT). She was a Research Fellow at QUT and currently she is the head of Skin Repair and Regeneration, Affiliated Hospital of Ningxia Medical University. Dr Xie's research focus on the development of human skin equivalent wound model and the investigation of novel therapies for wound healing and scar remediation. She has published papers in high ranking journals such as J Invest Dermatol, Tissue Eng and J Control Release. She has been a reviewer for several journals including Molecular Pharmaceutics, Proces Biochemistry and Virology Journal.

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