Ying Gu, J Clin Exp Dermatol Res 2014, 5:2
http://dx.doi.org/10.4172/2155-9554.C1.013

OMICS Group Conferences
Accelerating Scientific Discovery

4th International Conference on
Clinical & Experimental Dermatology
April 14-16, 2014 Hilton San Antonio Airport, TX, USA

A novel chemically-modified curcumin "normalizes" impaired wound healing in experimental diabetes

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Accelerated aging in skin and impaired wound healing are among the severe complications in patients with diabetes. Prolonged or chronic inflammation in diabetes can result in elevated levels of pro-inflammatory cytokines, matrix metalloproteinases (MMPs) and other inflammatory mediators, which can lead to excessive degradation of newly-synthesized (non-crosslinked) collagen and pile-up of older cross-linked collagen (i.e., accelerated aging of the skin) and delayed wound healing. Curcumin has significant regulatory effects on inflammatory mediators, but is characterized by poor solubility and low bioactivity. Recently, we developed a series of chemically-modified-curcumins (CMCs) with increased solubility and zinc-binding activity, which greatly enhanced their therapeutic efficacy. In the current study, a novel tri-ketonic chemically-modified-curcumin, CMC2.24, (in contrast to the natural di-ketonic compound), demonstrated significant efficacy on skin atrophy and healing of standardized skin wounds in streptozotocin-induced diabetic rats. Topical application of 1% and 3% CMC 2.24 or systemic administration of CMC 2.24 significantly improved wound healing at 7, 14, and 30 days with no effect on the severe hyperglycemia, assessed by gross and histologic measurements. Densitometric analysis of gelatin zymograms revealed that MMP-9 was increased 125% in the diabetic wounds relative to non-diabetic wounds, and the topical and systemic effects of CMC2.24 on this proteinase showed the same pattern of efficacy as that seen for wound-healing.

Biography

Ying Gu has received her DDS and Ph.D. degrees and resident studies from Stony Brook University School of Dental Medicine. She is currently an Assistant Professor in the Department of General Dentistry, Stony Brook University. She has published book chapters and papers in reputed journals and serving as the reviewer of multiple journals.

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