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Flavonoids as Potential Wound-Healing Molecules: Emphasis on Pathways Perspective

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Abstract

Wounds are considered to be a serious problem that affects the healthcare sector in many countries, primarily due to diabetes and obesity. Wounds become worse because of unhealthy lifestyles and habits. Wound healing is a complicated physiological process that is essential for restoring the epithelial barrier after an injury. Numerous studies have reported that flavonoids possess wound-healing properties due to their well-acclaimed anti-inflammatory, angiogenesis, re-epithelialization, and antioxidant effects. They have been shown to be able to act on the wound-healing process via expression of biomarkers respective to the pathways that mainly include Wnt/ β -catenin, Hippo, Transforming Growth Factor-beta (TGF- β), Hedgehog, c-Jun N-Terminal Kinase (JNK), NF-E2-related factor 2/antioxidant responsive element (Nrf2/ARE), Nuclear Factor Kappa B (NF- κ B), MAPK/ERK, Ras/Raf/MEK/ERK, phosphatidylinositol 3-kinase (PI3K)/Akt, Nitric oxide (NO) pathways, etc. Hence, we have compiled existing evidence on the manipulation of flavonoids towards achieving skin wound healing, together with current limitations and future perspectives in support of these polyphenolic compounds as safe wound-healing agents, in this review. © 2023 by the authors.

Author Keywords

flavonoids; natural products; pathways; scar; signaling; wound healing

Index Keywords

angiopoietin 1, angiopoietin receptor, antibiotic agent, beta catenin, biological marker, flavonoid, focal adhesion kinase, immunoglobulin enhancer binding protein, mitogen activated protein kinase, mitogen activated protein kinase 1, nitric oxide, phosphatidylinositol 3 kinase, polyphenol derivative, protein kinase B, Raf protein, Ras protein, sonic hedgehog protein, stress activated protein kinase, Tie 1 receptor, transcription factor Nrf2, transforming growth factor beta, Wnt protein, flavonoid, immunoglobulin enhancer binding protein, phosphatidylinositol 3 kinase; angiogenesis, antibacterial activity, antiinflammatory activity, antioxidant activity, antioxidant responsive element, canonical Wnt signaling, chronic wound, clinical trial (topic), drug efficacy, drug mechanism, epithelization, hippo signaling, human, JNK signaling, MAPK signaling, morbidity, mortality, NF κ B signaling, nonhuman, Nrf2 signaling, Pi3K/Akt signaling, protein expression, Review, signal transduction, skin injury, socioeconomics, TGF beta signaling, wound healing, wound infection, metabolism, physiology, wound healing; Flavonoids, NF-kappa B, Phosphatidylinositol 3-Kinases, Signal Transduction, Wound Healing

Chemicals/CAS

angiopoietin 1, 186270-49-5; mitogen activated protein kinase, 142243-02-5; mitogen activated protein kinase 1, 137632-08-7; nitric oxide, 10102-43-9; phosphatidylinositol 3 kinase, 115926-52-8; protein kinase B, 148640-14-6; stress activated protein kinase, 155215-87-5; Flavonoids; NF-kappa B; Phosphatidylinositol 3-Kinases

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