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ROLE OF CURCUMIN AGAINST MODELED MICROGRAVITY-INDUCED INFLAMMATORY PATHWAYS

Abstract

The phytochemical curcumin (diferuloylmethane) is the yellow pigment from the rhizome of the turmeric (Curcuma longa) plant. Turmeric is used as a dietary spice, coloring agent in foods and textiles, and a treatment for a wide variety of ailments. It is widely used in traditional Indian medicine to cure biliary disorders, anorexia, cough, diabetic wounds, hepatic disorders, rheumatism, and sinusitis. Various studies have shown that curcumin modulates numerous targets that include growth factors, growth factor receptors, transcription factors, cytokines, enzymes, and genes regulating apoptosis. The microgravity environment experienced during space travel can stimulate the activation of several pro-inflammatory signaling pathways that regulate gene expression. Specifically lengthy exposure to microgravity leads to oxidative stress and may induce transcription factor Nuclear Factor (NF)–B resulting in hazardous physiological effects. The activation of this transcription factor has been shown to regulate the expression of over 200 genes that control the immune system, growth, and inflammation. NF-B activation is linked to cancer, atherosclerosis, myocardial infarction, diabetes, allergy, asthma, arthritis, Crohn's disease, multiple sclerosis, Alzheimer's disease, osteoporosis, psoriasis, and septic shock. In an effort to study the effect of curcumin on modeled microgravity-induced NF-B activation, curcumin-treated cells were subjected to modeled microgravity for various time period and the effect on NF-B signaling pathway was evaluated. We demonstrate that curcumin suppressed the activation of modeled microgravity-induced NF-B and NF-B-regulated gene products matrix metalloproteinase 9 and cyclooxygenase-2.