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Curcumin and Endothelial Function: Evidence and Mechanisms of Protective Effects.

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Abstract

BACKGROUND: The endothelium is a large paracrine organ regulating cell growth, vascular tone and thrombogenicity as well as platelet and leukocyte interactions. Endothelial function can be assessed by non-invasive techniques [e.g. flow-mediated vasodilation, nitroglycerin-mediated dilation and pulse wave velocity] and measuring specific circulating biomarkers [cell adhesion molecules, endothelial microparticles and endothelial progenitor cells]. Impaired endothelial function plays a key role in the development of atherosclerosis, arterial hypertension, heart failure, ischemia-reperfusion injury, Alzheimer's disease and other conditions. Endothelial function is also involved in growth and proliferation of tumor cells.

METHODS: We performed a literature review and assessed the role of the natural polyphenol, curcumin, as a potential inexpensive, well-tolerated, and safe agent for improving endothelial function.

RESULTS: Curcumin exerts several positive pharmacological effects; these include anti-inflammatory, antioxidant, anti-hypertensive, anti-cancer, antiviral, anti-infective and wound-healing properties. Specifically, curcumin's anti-inflammatory effects are thought to be caused by reducing trans-endothelial monocyte migration by reduction of mRNA and protein expression of intercellular adhesion molecule-1, vascular cell adhesion molecule-1 and P-selectin and by modulating NFκB, JNK, p38 and STAT-3 in endothelial cells. Dietary curcumin supplementation can also increase antioxidant activity through the induction of heme oxygenase-1, a scavenger of free radicals, and by reduction of reactive oxygen species and Nox-2.

CONCLUSIONS: Curcumin appears to improve endothelial function but additional research is needed to determine the precise mechanism(s) and biomarkers involved in curcumin's therapeutic effects on endothelial dysfunction.

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KEYWORDS: Adhesion molecules.; Curcumin; Endothelial function; Flow-mediated vasodilation; Nitroglycerin-mediated dilation; Pulse wave velocity

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