

# **Carnosol, an antioxidant in rosemary, suppresses inducible nitric oxide synthase through down-regulating nuclear factor-kB in mouse macrophages.**

梁有志

Lo;A.H.;Liang;Y.C.;Lin-Shiau;S.Y.;Ho;C.T. and Lin;J.K.

## **Abstract**

PubMed search results for "Carnosol is a naturally occurring phytopolyphenol found in rosemary. Carnosol functions as antioxidant and anticarcinogen. In the present study, we compared the antioxidant activity of carnosol and other compounds extracted from rosemary. Carnosol showed potent antioxidative activity in alpha,alpha-diphenyl-beta-picrylhydrazyl (DPPH) free radicals scavenge and DNA protection from Fenton reaction. High concentrations of nitric oxide (NO) are produced by inducible NO synthase (iNOS) in inflammation and multiple stages of carcinogenesis. Treatment of mouse macrophage RAW 264.7 cell line with carnosol markedly reduced lipopolysaccharide (LPS)-stimulated NO production in a concentration-related manner with an IC50 of 9.4 microM; but other tested compounds had slight effects. Western blot, reverse transcription-polymerase chain reaction, and northern blot analyses demonstrated that carnosol decreased LPS-induced iNOS mRNA and protein expression. Carnosol treatment showed reduction of nuclear factor-kappaB (NF-kappaB) subunits translocation and NF-kappaB DNA binding activity in activated macrophages. Carnosol also showed inhibition of iNOS and NF-kappaB promoter activity in transient transfection assay. These activities were referred to down-regulation of inhibitor kappaB (IkappaB) kinase (IKK) activity by carnosol (5 microM), thus inhibited LPS-induced phosphorylation as well as degradation of IkappaBalpha. Carnosol also inhibited LPS-induced p38 and p44/42 mitogen-activated protein kinase (MAPK) activation at a higher concentration (20 microM). These results suggest that carnosol suppresses the NO production and iNOS gene expression by inhibiting NF-kappaB activation, and provide possible mechanisms for its anti-inflammatory and chemopreventive action."