Comparative study on inhibitory activity of zerumbone and zerumbone 2,3-epoxide on NF-κB activation and NO production

Giang P.M., Son P.T., Jin H.Z., Lee J.H., Lee J.J.
Faculty of Chemistry, College of Natural Science, Vietnam National University, Hanoi, 19 Le Thanh Tong Str., Hanoi, Viet Nam; Anticancer Research Laboratory, Korea Research Institute of Bioscience and Biotechnology, Yuseong, Daejeon 305-600, South Korea

Abstract: In the present study the significant role of the α,β-unsaturated carbonyl structure in the anti-inflammatory activity of the natural humulane sesquiterpenoids zerumbone and zerumbone 2,3-epoxide was evidenced from a comparative study of the ability of zerumbone and zerumbone 2,3-epoxide to inhibit NF-κB activation and NO production in LPS (lipopolysaccharide)- stimulated RAW 264.7 cells. The IC_{50} of these compounds were 1.97 μM ± 0.18 and 30.11 μM ± 4.10 in the NF-κB activation assay and 3.58 μM ± 0.46 and 34.7 μM ± 3.72 in the nitric oxide production assay, respectively.

Author Keywords: NF-κB; NO production; Zerumbone; Zerumbone-2,3-epoxide
Index Keywords: immunoglobulin enhancer binding protein; lipopolysaccharide; nitric oxide; sesquiterpenoid; unclassified drug; zerumbone; zerumbone 2,3 epoxide; animal cell; article; controlled study; cytotoxicity; drug activity; drug structure; IC 50; mouse; nonhuman

Year: 2009
Source title: Scientia Pharmaceutica
Volume: 77
Issue: 3
Page : 589-595
Cited by: 1
Link: Scorpus Link
Chemicals/CAS: nitric oxide, 10102-43-9
Correspondence Address: Giang, P. M.; Faculty of Chemistry, College of Natural Science, Vietnam National University, Hanoi, 19 Le Thanh Tong Str., Hanoi, Viet Nam; email: phanminhgiang@yahoo.com
ISSN: 368709
CODEN: SCPHA
DOI: 10.3797/scipharm.0907-16
Language of Original Document: English
Abbreviated Source Title: Scientia Pharmaceutica
Document Type: Article
Source: Scopus
Authors with affiliations:

- Giang, P.M., Faculty of Chemistry, College of Natural Science, Vietnam National University, Hanoi, 19 Le Thanh Tong Str., Hanoi, Viet Nam

- Son, P.T., Faculty of Chemistry, College of Natural Science, Vietnam National University, Hanoi, 19 Le Thanh Tong Str., Hanoi, Viet Nam
- Jin, H.Z., Anticancer Research Laboratory, Korea Research Institute of Bioscience and Biotechnology, Yuseong, Daejeon 305-600, South Korea
- Lee, J.H., Anticancer Research Laboratory, Korea Research Institute of Bioscience and Biotechnology, Yuseong, Daejeon 305-600, South Korea
- Lee, J.J., Anticancer Research Laboratory, Korea Research Institute of Bioscience and Biotechnology, Yuseong, Daejeon 305-600, South Korea

References:

- Yamamoto, Y., Gaynor, R.B., Therapeutic potential of inhibition of the NF-κB pathway in the treatment of inflammation and cancer (2001) Journal of Clinical Investigation, 107 (2), pp. 135-142
- Zingarelli, B., Sheehan, M., Wong, H.R., Nuclear factor-κB as a therapeutic target in critical care medicine (2003) Critical Care Medicine, 31 (1 SUPPL.), pp. S105-S111
- Makarov, S.S., NF-κB as a therapeutic target in chronic inflammation: Recent advances (2000) Mol Med Today, 6, pp. 441-447. , doi:10.1016/S1357-4310(00)01814-1
- Epinat, J.C., Gilmore, T.D., Diverse agents act at multiple levels to inhibit the Rel/NF-κB signal transduction pathway (1999) Oncogene, 18, pp. 6896-6909. , doi:10.1038/sj.onc.1203218
- Murakami, A., Takahashi, D., Kinoshita, T., Koshimizu, K., Kim, H.W., Yoshihiro, A., Nakamura, Y., Ohigashi, H., Zerumbone, a Southeast Asian ginger sesquiterpene, markedly suppresses free radical generation, proinflammatory protein production, and cancer cell proliferation accompanied by apoptosis: The α,β-unsaturated carbonyl group is a prerequisite (2002) Carcinogenesis, 23 (5), pp. 795-802
- Takada, Y., Murakami, A., Aggarwal, B.B., Zerumbone abolishes NF-κB and IκB kinase activation leading to suppression of antiapoptotic and metastatic gene expression, upregulation of apoptosis, and downregulation of invasion (2005) Oncogene, 24 (46), pp. 6957-6969. , DOI 10.1038/sj.onc.1208845, PII 1208845
- Murakami, A., Shigemori, T., Ohigashi, H., Zingiberaceous and citrus constituents, 1′-acetoxychavicol acetate, zerumbone, auraptene, and nobiletin, suppress lipopolysaccharide-induced cyclooxygenase-2 expression in RAW264.7 murine macrophages through different modes of action (2005) Journal of Nutrition, 135 (12), pp. 2987S-2992S. , http://www.nutrition.org/cgi/reprint/135/12/2987S
- Lee, J.H., Kooth Hwang, B.Y., Lee, J.J., Kaurane diterpene, kamenbakaurin, inhibits NF-κB by directly targeting the DNA-binding activity of p50 and blocks the expresion of antiapoptotic NF-κB target genes (2002) J Biol Chem, 277, pp. 18411-18420. , doi:10.1074/jbc.M201368200
- Rungeler, P., Castro, V., Mora, G., Goren, N., Vichnewski, W., Pahl, H.L., Merfort, I., Schmidt, T.J., Inhibition of transcription factor NF-κB by sesquiterpene lactones: A proposed molecular mechanism of action (1999) Bioorganic and Medicinal Chemistry, 7 (11), pp. 2343-2352. , DOI 10.1016/S0968-0896(99)00195-9, PII S0968089699001959
- Phan, M.G., Van, N.H., Phan, T.S., Sesquiterpenoids from the rhizomes of Curcuma zedoaria (Berg.) Roscoe of Vietnam (1998) Tap Chi Hoa Hoc [J Chem], 36, pp. 70-73. , Vietnam
- Vo, V.C., (1997) Dictionary of Vietnamese Medicinal Plants, p. 741. , Ho Chi Minh city: Medicine
- Kitayama, T., Yamamoto, K., Utsumi, R., Takatani, M., Hili, R.K., Kawai, Y., Sawada, S., Okamoto, T., Chemistry of zerumbone. 2. Regulation of ring bond cleavage and unique antibacterial activities of zerumbone derivatives (2001) Biosci Biotechnol Biochem, (65), pp. 2193-2199. , doi:10.1271/bbb.65.2193
- Matthes, H.W.D., Luu, B., Ourisson, G., Cytotoxic components of Zingiber zerumbet, Curcuma zedoaria and C. domestica

(1980) Phytochemistry, 19, pp. 2643-2650. , doi:10.1016/S0031-9422(00)83937-0