# 紅球薑消炎、止痛之活性成分研究

# Anti-inflammatory and Anti-nociceptive Constituents of Zingiber zerumbet Smith


## 中文摘要

許多薑科植物及其成分已被報導指出具有諸多生理活性，如抗癌、抗菌以及抗發炎等。在東南亞，紅球薑(Zingiber zerumbet Smith)被當作藥用植物或食物香料之用，故頗具開發之潛力。本研究利用層析法分離紅球薑之根莖部，得到 zerumbone、3-O-methyl-kaempferol、kaempferol-3-O-(2,4-O-diacetyl-α-L-rhamnopyranoside)及 kaempferol-3- O-(3,4-O-diacetyl-α-L-rhamnopyranoside)。接著分析紅球薑不同生長時期之水分及成分含量，發現栽種時間越久，主成分 zerumbone 含量越高且水分含量越少。而栽種後第 5 個月 zerumbone 含量驟升，因此我們認為紅球薑種植 5 個月後為最經濟的採收時節。抗發炎評估試驗方面，首先利用 LPS 誘導 RAW264.7 巨噬細胞抗發炎模式篩選分離得到之紅球薑成分，發現 zerumbone 及 3-O-methyl-kaempferol 具有抑制 NO 產生，其 IC50 值分別為 4.37 及 24.35 μM，且抑制 iNOS 及 COX-2 蛋白表現。上述結果顯示：zerumbone 抗發炎能力較明顯，因此探討其作用機轉。結果發現 zerumbone 可刺激 HO-1 表現且呈現劑量依存性，當加入 HO-1 抑制劑時 zerumbone 抑制 NO 效果則明現下降，表示 zerumbone 可藉由刺激 HO-1 表現而抑制 iNOS 及 NO 產生。鹿角菜膠誘導小鼠足掌發炎試驗發現，zerumbone (10 mg/kg)於誘導前 1 小時口服給予，可顯著抑制小鼠足掌發炎腫脹。再利用輻射熱源引發大鼠痛閥與醋酸誘導小鼠疼痛扭體試驗評估 zerumbone 的鎮痛效果。結果顯示：zerumbone 對大鼠輻射熱源並無顯著之延遲痛閥效果；zerumbone 於低劑量下顯示些微抑制扭體次數，而在 50 mg/kg 劑量之下則明顯有止痛之效用。本論文證實，紅球薑之主要成分 zerumbone 具有消炎、止痛之活性。

## 英文摘要

Many pharmacological actions have been reported in Zingiberaceae plants extract and compounds. In Southeast Asia, Zingiber zerumbet Smith (Zingiberaceae) has been widely used as herbs and spice. In this study, zerumbone, 3-O-methyl kaempferol, kaempferol-3-O-(2, 4-di-O- acetyl-α-L-rhamnopyranoside), and kaempferol-3-O-(3, 4-di-O-acetyl-α- L-rhamnopyranoside) have been isolated from the rhizome of Z. zerumbet. In addition, compounds and water content of Z. zerumbet in different growth periods were analyzed monthly. The results indicated more-mature rhizomes were richer in zerumbone and lower in moisture which suggest that the economic cultivation period of Z. zerumbet is the 5th month after seeding because zerumbone is dramatically increased at that time. On the other hand, the inhibitiory effects of compounds of Z. zerumbet on NO and PGE2 production from lipopolysaccharide (LPS)-induced RAW 264.7 macrophages were measured for screen the anti-inflammatiory activity. Among these compounds, zerumbone and 3-O-methyl kaempferol exhibited potent NO inhibitory activities with IC50 value of 4.37 and 24.35 μM respectively. They also significantly suppressed iNOS and COX-2 expression in dose-dependent manner. As zerumbone showed greater anti-inflammatory effects than 3-O-methyl kaempferol, the mechanism action of zerumbone was further investigated. Zerumbone induced HO-1 protein expression in the presence of LPS and showed dose-dependent manner. Treatment of the HO-1 inhibitor, SnPP (20 ?峪), suppressed the inhibitory activities of the zerumbone on LPS-induced NO production. In vivo study, pretreatment of zerumbone (10 mg/kg) significantly attenuated carrageenan induced paw edema in mice. Futhermore, the antinociceptive effect of zerumbone was evaluated by acetic acid-induced writhing response and plantar test. Treatment with zerumbone does not inhibit the pain response induced by radiant heat in rat’s plantar. However, acetic acid-induce writhing response was significantly reduced by treatment with zerumbone (50 mg/kg). According to above results, zerumbone is the major component of Z. zerumbet and possess anti-inflammation and antinociceptive effects.