# 人參皂苷 Rb1 對 U-937 細胞發炎物質調控機制之探討

# Regulatory mechanisms of ginsenoside Rb1 on inflammatory substances in U-937 cells

## 中文摘要

本研究目的主要探討在以脂多醣刺激發炎反應下，給予類人類巨噬細胞 U-937 人參皂苷 Rb1，對細胞發炎反應之影響及其調節機制。實驗係以人類單核/類巨噬細胞(human monocytes/macrophages-like cells- U-937)爲體外實驗的模式。將細胞培養於含 10% 胎牛血清之 RPMI 1640 培養液中，並置於 37℃ 、含 5% $CO_2$ 的細胞培養箱中，以 phorbol 12-myristate 13-acetate (PMA)誘導細胞分化爲巨噬細胞，之後更換爲 0.1%牛血清蛋白之新鮮培養液，並添加不同濃度的人參皂苷 Rb1，而培養液中人參皂苷 Rb1 最終濃度分別爲 5, 10, 25, 50, 100 μg/ml，於 1 小時後再給予脂多醣(lipopolysacchrides; LPS)刺激細胞產生發炎反應。細胞培養 1 小時後，收集細胞懸浮液，進行 NF-κB 路徑相關物質等分析。培養 23 小時後，收集培養液與細胞懸浮液，分析培養液中腫瘤壞死因子-α(tumor necrosis factor; TNF-α)、可溶性細胞間黏著分子-1 (soluble intercellular adhesion molecule-1; sICAM-1)分泌量、細胞內環氧化酶-2 (cyclooxygenase-2; COX-2)蛋白質表現量。結果顯示：給予細胞人參皂苷 Rb1 於 10-100 μg/ml 劑量下可降低 LPS 所誘導之 TNF-α 分泌量($p < 0.05$)，於 5-100 μg/ml 劑量下可抑制 sICAM-1 分泌量($p < 0.05$)，於 25-100 μg/ml 劑量可抑制細胞內 COX-2 蛋白質表現量($p < 0.05$)。在 NF-κB 路徑指標方面，在 50-100 μg/ml 劑量下可顯著增加 NF-κB p65 表現量($p < 0.05$)，而在 100 μg/ml 劑量下可顯著增加 IκBα 表現量($p < 0.05$)。由結果得知，人參皂苷 Rb1 可藉由抑制 U-937 細胞中 NF-κB 路徑活化，降低促發炎物質的生成，而具有抗發炎之功能。

## 英文摘要

This study investigated the effects of ginsenoside Rb1 (98.8% purity) on cell regulation of inflammatory responses in human monocytes/macrophages-like U-937 cells after lipopolysacchrides (LPS) stimulation. The U-937 cells were cultured in RPMI 1640 medium supplemented with 10% fetal calf serum. The cells were incubated at 37℃ and 5% $CO_2$ atmosphere. The U-937 cells were treated with phorbol 12-myristate 13-acetate (PMA) for differentiation into macrophages. Subsequently, the medium was replaced by fresh medium containing 0.1% bovine serum albumin and added different concentrations of ginsenoside Rb1 (5, 10, 25, 50, 100 μg/ml). After 1-hour incubation, LPS was added to induce the inflammatory response. After 1 hour, cells were collected for NF-kB assays. After 23- hour incubation, the medium was collected for TNF-α, soluble intercellular adhesion

molecule-1 (sICAM-1) assays and cells were collected for the determination of COX-2 protein expression. The results showed that ginsenoside Rb1 at 10-100 μg/ml inhibited LPS-induced TNF-a ($p < 0.05$) and suppressed sICAM-1 scretion and COX-2 expression at 5-100 μg/ml and 5-100 μg/ml, respectively ($p < 0.05$). The expression of NF-kB p65 subunit was also increased when treated with ginsenoside Rb1 (50 and 100 mg/ml), and ginsenoside Rb1 at the dose of 100 mg/ml increased IkBa levels. Therefore, ginsenoside Rb1 might inhibit pro-inflammatory substances through suppressing the activation of NF-kB pathway in U-937 cells.