十字花科蔬菜衍生物對Lipopolysaccharide %

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Effects of cruciferous vegetable derivatives in lipopolysaccharide activated macrophage induced angiogenesis

中文摘要

本研究主要探討十字花科蔬菜衍生物 benzyl isothiocyanate (BITC) 、phenylethyl isothiocyanate (PEITC) 與 indole-3-carbinol (I3C) 對於 內皮 新生 影響。將 菌內毒素 lipopolysaccharide (LPS) 加入 與 內皮共同培養 顯示，以 Greiss reagent 測得培養液中一氧 氮 生成與以 matrigel 分析 內皮 類 生成皆有增加的現象，而 BITC、PEITC 與 I3C 的添加則可抑制 NO 與類 的生成。爲探討此抑制 作用 是否因影響 故，因而使用 LPS 與 BITC、PEITC 或 I3C 共同處理 condition medium (Co-BITC-CM, Co-PEITC-CM, Co-I3C-CM) 投予 內皮 ，結果指 Co-BITC-CM, Co-PEITC-CM 與 Co-I3C-CM 中含較低濃度 一氧氮，且 Co-I3C-CM 可抑制 內皮 類 生成的作用，且此抑制伴隨著較低 內皮生長因子 vascular endothelial growth factor (VEGF)的釋放與較低基質金屬蛋白?MMP-9 (matrix metalloproteinase-9) 性，此外投與 NO 抑制劑 L-NAME 亦有相類似 結果。然而 Co-BITC-CM 與 Co-PEITC-CM 雖可抑制 內皮 類 的生成與 MMP- 9 的 性，反而可以促進 VEGF 釋放。此外 BITC、PEITC、I3C 與 L-NAME 對於 內皮 影響亦被分析，因而以 LPS condition medium (CM) 處理 內皮 ，並於 BITC、PEITC 與 I3C 存在下偵測 新生相關因子的影響。結果顯示，I3C 與 L-NAME 亦可抑制經 CM 內皮 培養基內一氧 氮 生成、 內皮 類 生成、MMP- 9 性與 VEGF 分泌，而 BITC 與 PEITC 亦可抑制經 CM 內皮 培養基內一氧 氮 生成、 內皮 類 生成與 MMP- 9 性，但亦增加 內皮生長因子生成。總而言 ，十字花科蔬菜衍生物 BITC、PEITC 與 I3C 可同時藉由抑制 LPS ，以及影響 內皮 的作用而具有抗 新生 作用，且其中 I3C 抑制作用主要藉由 NO 抑制，而 BITC 與 PEITC 抑制作用則與 NO 無關。

英文摘要

The aim of this study was to investigate the roles of cruciferous vegetable derivatives, BITC (benzyl isothiocyanate), PEITC (phenylethyl isothiocyanate), and indole-3-carbinol (I3C), in activated macrophage-induced angiogenesis. After co-culturing macrophages and vascular endothelial cells, we observed that the nitric oxide (NO) production and tube formation were significantly enhanced by LPS (lipopolysaccharide), and cotreatment with BITC, PEITC, and I3C significantly inhibited such enhancement. To clarify the inhibitory roles of BITC, PEITC, and I3C on macrophages, LPS and BITC-, PEITC-, I3C-, or NO inhibitor- (Nitro-L-arginine methyl ester, L-NAME) treated macrophage condition medium was used to cultivate vascular endothelial cells. The tube formation, vascular endothelial growth factor (VEGF) secretion, and matrix metalloproteinase-9 (MMP-9) activity were suppressed by I3C and L-NAME, and tube formation and MMP-9 activity were suppressed but VEGF secretion was enhanced by BITC and PEITC in vascular endothelial cells. To understand whether BITC or PEITC or I3C or L-NAME also affected vascular endothelial cells, we used LPS-activated macrophages condition medium (CM) to treat to vascular endothelial cells. The results showed that addition of I3C and L-NAME inhibited CM-induced NO production, tube formation, VEGF secretion and, MMP-9 activity in vascular endothelial cells. BITC and PEITC inhibited CM-induced NO production, tube formation, and MMP-9 activity in vascular endothelial cells, but stimulated CM-induced VEGF secretion. In summary, we demonstrate that the cruciferous vegetable derivatives, BITC, PEITC, and I3C, not only inhibits LPS stimulated macrophage activation but also affects vascular endothelial cells to inhibit macrophage-induced angiogenesis. Additionally, the inhibitory effect of I3C is dependent upon NO production, whereas the effects of BITC and PEITC are irrelevant to NO.