

山藥黏多醣免疫調節活性的研究

Immunostimulatory activities of yam tuber mucilages

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摘要

從三種山藥「台農一號(TN1)、台農二號(TN2)及名間長紅(MJ)」抽取的黏多醣(10mg/ml)，以及香菇多醣(Len, 0.05mg/ml)進行餵食 BALB/c 小鼠五週，觀察對於非特異性免疫活性與特異性免疫活性之免疫調節活性評估。非特異性免疫活性包含淋巴細胞亞群的分佈、顆粒性白血球和單核球細胞的吞噬作用、自然殺手細胞活性的分析。同時亦測試山藥黏質多醣對老鼠腹腔巨噬細胞與巨噬細胞株(RAW264.7)體外吞噬作用之影響。而特異性免疫活性之評估則以 OVA 抗原(ovalbumin)免疫老鼠後，利用 ELISA 分析專一性抗體產生濃度的高低；並以 MTT 定量法測試老鼠脾臟細胞受 OVA 刺激後的分裂能力。本研究結果顯示，TN2 及 MJ 組老鼠周邊血液中 T cell(CD3(上標 +))總數顯著增加($p < 0.01$)，而其中增加的又以輔助 T 細胞(T helper cell, CD4(上標 +))($p < 0.05$)為最顯著。而 BALB/c 小白鼠周邊血液中單核球細胞的吞噬能力在第一週時 MJ 組($p < 0.05$)、TN1 和 TN2 組($p < 0.01$)有顯著性增加，而顆粒性白血球的吞噬能力則皆無明顯變化。但至第三週時，四種樣品皆顯著促進顆粒性白血球之吞噬能力；而單核球細胞之吞噬能力除 TN2 組外其餘三種樣品皆呈顯著增加。而四種樣品在試管中亦均能促進老鼠腹腔巨噬細胞與巨噬細胞株(RAW264.7)之吞噬能力。自然殺手細胞毒殺能力的測定結果發現：Effector cell 和 Target cell 比例從 5 : 1 至 40 : 1 時，MJ 組自然殺手細胞毒殺能力均比對照組有顯著增加($p < 0.01$)。以 OVA 抗原免疫 BALB/c 小白鼠後，結果發現香菇多醣和三種山藥黏質多醣皆可促進專一性抗 OVA 抗體 IgG 和 IgM 之生成，而其中以 TN1 和香菇多醣效果較顯著。比較 OVA 免疫後老鼠的脾臟細胞在 OVA 抗原刺激後之分裂能力，亦發現香菇多醣和三種山藥黏質多醣組老鼠脾臟細胞增生的能力均較對照組強。

Abstract

The purified mucilages from three Taiwanese yam cultivars, including *Dioscorea alata* L. cv. Tainong 1 (TN1), *D. alata* L. cv. Tainong 2 (TN2), and *D. alata* L. var. *purpurea* (Roxb.) cv. Ming-Jen (MJ), and the commercial lentinan (Len) were used to evaluate the immunostimulatory effects on the murine innate and adaptive immunity. BALB/c mice were grouped and administrated orally with 0.5 ml of TN1, TN2, MJ daily for 5 weeks.

The positive and negative controls were fed with lentinan and distilled water, respectively. Blood samples were drawn from the retroorbital sinus on day 7 and 21, and the lymphocyte subpopulation, phagocytosis of granulocyte and monocyte were analyzed by flow cytometry. The mice were sacrificed on day 36, and the splenocytes were harvested for determinations of natural killer (NK) cell cytotoxicity activity. The stimulation index on the phagocytosis of peritoneal macrophages and the RAW264.7 cell line by yam mucilage were also determined in vitro. The results showed that all three mucilages, especially MJ yam, could elevate the number of T helper cells in the peripheral blood and enhance the phagocytic activity of granulocyte, monocytes and macrophages both ex vivo and in vitro tests. Increased splenic cytotoxic activity following the administration of mucilages from MJ yam was observed. Furthermore, the production of specific antiovalbumin (OVA) antibody and OVA-stimulated splenic cell proliferation were also enhanced by all mucilage groups. It is suggested that the tuber mucilage may function as an immunomodulatory substance.