金線連多醣對小鼠免疫反應調節之研究

The immunomodulating effects of the water-soluble polysaccharide from Anoectochilus formosanus Hayata

中文摘要

金線連自古即有「藥王」或「藥虎」之稱，具多種保健功效。然而目前金線連對於調節免疫功能之研究報告尚少，我們的初步實驗顯示金線連熱水抽取液具有抗癌、免疫調節和促進益生菌增生的功能。此免疫調節作用的主要成分是否即爲金線連多醣很值得進一步探討。

本論文利用金線連水溶性多醣(AFP)爲研究材料，以 BALB/c 小白鼠爲實驗動物，每日灌食 339.3mg/mouse 及 33.93mg/mouse 之 AFP，爲期五週，整體性評估金線連多醣對宿主非特異性免疫功能及腸道淋巴細胞之影響。動物實驗結果顯示，經長期餵食金線連多醣後之小鼠，周邊血液中淋巴細胞的比率漸趨恆定與對照組無明顯差異，自然殺手細胞的活性則呈現下降的趨勢，而周邊血液中吞噬細胞的活性明顯下降。爲進一步探討 AFP 對吞噬細胞免疫調節作用的可能機制，亦在試管中評估 AFP 對於巨噬細胞株 RAW 264.7 吞噬作用之影響。結果發現 AFP 會降低 RAW 264.7 巨噬細胞株的吞噬能力，而吞噬細胞受 LPS 刺激後 NO 分泌量也會受金線連多醣之抑制而顯著減少；但金線連多醣並不會降低 RAW 264.7 細胞株被 LPS 刺激後所分泌之與發炎反應有關的細胞激素。此外，在試管中觀察純化的金線連多醣對益生菌 Lactobacillus rhamnosus GG (ATCC53103)、Lactobacillus fermentum P.C.C.生長之影響，結果發現金線連多醣可促進腸道益生菌的增生，只是促進效果不若菊醣明顯。

整體而言，AFP 可明顯抑制小鼠吞噬細胞之吞噬能力、LPS 刺激巨噬細胞後 NO 的分泌量，且可微量促進益生菌之生長，然而 AFP 對免疫系統之調控機轉，仍有賴更進一步的實驗來證實。

英文摘要

Anectohiluss formosanus Hayata is known to have hepatoprotective, antioxidant, and anticancer activities, and to relief syndromes derived from diabetic complications. Our previous study has already demonstrated that A. formosanus crude extract exhibited some immunomodulating activities. Since most immunomodulating activities of traditional Chinese herbs are accredited to their polysaccharide components, we present our study of those immunomodulating activities using a polysaccharide-enriched A. formosamus fraction.

To analyze the effect of A. formosamus polysaccharide (AFP) on innate immunity, we have two experimental groups of BALB/c mice (ten per group) on a regular feeding schedule for five weeks with a daily oral dose of either 33.94ug/mouse or

339.3ug/mouse. Also included is a control group of 10 mice without APF feeding. At the ending of five-week feeding period, spleens were collected for analyzeing their innate immunity. There were no significant differences in the ratio of lymphocytes subpopulation among most test and control groups. Biologic activities analyzed were proliferation assay, cytokine productions, and NK cytotoxicity assay. While there was no difference in proliferation assay, we did see some differences in the latter two assays. The production of interleukin 2 (IL2) increased, and that of IL4 and tumor necrosis factor-alpha (TNF-a) decreased, when compared to the control group. In addition, the phagocytic activity of neutrophils and monocytes derived from peripheral blood showed marked decrease in the AFP treated groups. It seems that AFP has some detected effects on the activity of phagocytosis. We evaluated further the effects of AFP on phagocytosis and cytokine production in vitro using RAW 264.7, a macrophage cell line. As demonstrated above, AFP also suppressed the phagocytic activity and the NO production in RAW 264.7. Furthermore, AFP has some prebiotic effect which can enhance the growth of Lactobacillus rhamnosus GG (ATCC53103) and Lactobacillus fermentum P.C.C. in vitro. In conclusion, AFP is shown here to contain some immunomodulating activities, although the prebiotic and immunostimulating effects of purified AFP are less significant comparing to those of A. formosanus crude water extract.