探討大豆蛋白降血脂之作用機轉

The Mechanism of Hypolipidemic Effect of Soybean Protein

中文摘要

非透析部份大豆蛋白水解物 (undialyzed soybean protein hydrolysate; USPH) 爲大豆酸沉澱蛋白 (soybean acid precipitated protein; APP) 經胃蛋白酶消化後之產物。本研究目的是探討高膽固醇飲食條件下，USPH 降低血脂質之作用機轉。將 40 隻 SD 大白鼠隨機分爲四組：CC 組 (19.7%酪蛋白)、APP 組 (5% APP + 14.7%酪蛋白)、USPH 組 (5% USPH + 14.7%酪蛋白)、以及 ISO 組 (19.7%酪蛋白 + 0.00125%大豆異黃酮素)。實驗爲期 12 週，所有飼料中均添加 0.5%膽固醇。結果顯示：當在飼料中以 USPH 取代酪蛋白時，與 CC 組比較，可顯著降低大白鼠血漿總膽固醇、三酸甘油酯、LDL-C 濃度，並可降低 LDL-C/HDL-C 比值 ($p < 0.05$)。肝臟方面，USPH 可顯著降低肝中膽固醇和三酸甘油酯含量 ($p < 0.05$)，但各組間 7α-hydroxylase 酵素活性無統計上差異 ($p > 0.05$)。糞便方面，USPH 之糞便固醇、膽酸、以及含氮化物排出量皆顯著高於 CC 組 ($p < 0.05$)。此外，於體外實驗中發現，當與酪蛋白比較，USPH 可顯著降低膽固醇之乳糜溶解度 ($p < 0.05$)。綜合以上結果：USPH 可能類似膳食纖維般在腸道中與膽固醇結合增加排出，並抑制其吸收，進而降低肝臟中脂質的堆積，最終可降低血膽固醇濃度，因此或許可用於心血管疾病之預防。

英文摘要

The aim of this study is to investigate the mechanism of hypolipidemic effect of undialyzed soybean protein hydrolysate (USPH), which is hydrolyzed by pepsin from soybean acid precipitated protein (APP), in SD rats fed cholesterol-rich diet. Forty SD rats were divided into four groups: CC group (19.7% casein), APP group (5% APP + 14.7% casein), USPH group (5% USPH + 14.7% casein), and ISO group (19.7% casein + 0.00125% soybean isoflavone). All groups were fed 0.5% cholesterol diet. After the 12-week experimental period, the results showed that USPH could significantly lower plasma total cholesterol, triglycerides, and LDL-C concentrations compared with CC group ($p < 0.05$). Additionally, the LDL-C/HDL-C ratio also decreased markedly ($p < 0.05$). Liver cholesterol and triglycerides contents were significantly lower than CC group ($p < 0.05$). However, there were no differences between 7α- hydroxylase activity of each group. Fecal excretion of neutral steroids, bile acids, and nitrogen compounds were significantly higher in USPH group than in CC group ($p < 0.05$). In vitro study also showed USPH could obviously decrease cholesterol micellar solubility compared with casein ($p < 0.05$). In conclusion, USPH, similar with dietary fiber, may lower plasma cholesterol by enhancing excretion and

inhibiting absorption, and decreasing lipid accumulation in liver. We suggested that USPH may be useful for prevention of cardiovascular disease.