補充綜合抗氧化維生素改善高血脂症抽煙者血中抗氧化狀態與降低(二價鐵離子/三價鐵離子)之比值

Supplementation with combined antioxidant vitamins improves antioxidant status and decreases the ratio of iron(II) to iron(III) in hyperlipidemic smokers

中文摘要

此研究之目的爲探討男性高血脂症抽煙者補充不同劑量的綜合抗氧化維生素(beta-胡蘿蔔素+維生素 C+維生素 E)對其血壓、血脂質、抗氧化維生素狀態、抗氧化物質及酵素活性與血漿鐵離子之影響。42 位男性高血脂症抽煙者(35-78 歲)，隨機分成兩組: 相對低劑量組(n=22) (15 mg beta-胡蘿蔔素/日+ 500 mg 維生素 C/日+ 400 mg 維生素 E/日)；相對高劑量組(n=20) (30 mg beta-胡蘿蔔素/日+ 1000 mg 維生素 C/日+ 800 mg 維生素 E/日)。分別於研究第 0 星期、第 3 星期和第 6 星期禁食隔夜後抽血作生化檢驗，並做 24 小時飲食回憶記錄。於研究期間，相對低與高劑量組間飲食攝取並無統計上之不同。不論相對低或高劑量組，於研究期間其血壓、血漿總三酸甘油酯、總膽固醇、低密度脂蛋白膽固醇與高密度脂蛋白膽固醇濃度皆未明顯改變，但總三酸甘油酯濃度有下降趨勢，推測其可能是因補充時間不夠長。本研究於研究前，不論相對低或高劑量組血漿中抗氧化維生素濃度並無不同，但於抗氧化維生素補充後，血漿中抗氧化維生素濃度均上升。於相對低劑量組，血漿中 beta-胡蘿蔔素、維生素 C 及維生素 E 濃度，於第 3 星期分別提高 78%、40%、73%;於第 6 星期分別提高 205%、98%、130%。而相對高劑量組，血漿中 beta-胡蘿蔔素、維生素 C 及維生素 E 濃度，於第 3 星期分別提高 118%、92%、99%;於第 6 星期分別提高 235%、216%、198%。血漿中抗氧化維生素濃度之上升受補充劑量與時間長短的影響。兩組紅血球中還原型麩胱甘月太(glutathione)濃度與研究前相較，於第 3 星期有意義增加。而至第 6 星期，相對低或高劑量組之還原型麩胱甘月太濃度分別上升 39 和 32%。相對低與高劑量組過氧化氫酉每(catalase)活性，於第六星期分別上升 53%和 45%。但是，相對低和高劑量組，於第三星期或第六星期間並無差異。本研究發現於高血脂症抽煙者體內總血漿鐵濃度較一般人高。而兩組血漿中二價鐵離子濃度與(二價鐵離子/三價鐵離子)之

比值亦因綜合抗氧化維生素之補充而下降，推測因補充綜合
抗氧化維生素，可減少游離二價鐵對體內脂質過氧化傷害之
發生。但此結果不受補充劑量之影響。總言之，補充 6 星期
的綜合抗氧化維生素提高男性高血脂症抽煙者血中抗氧化
維生素濃度、抗氧化物質濃度及酵素活性，減少游離二價
鐵離子，但對血壓和血脂質並無影響。而補充相對高劑量
對體內抗氧化物質濃度增加、酵素活性增強及對血漿游離
二價鐵離子濃度之減少並無加成效果。

英文摘要

The purpose of this study was to investigate the effects of combined antioxidant vitamins (beta-carotene + vitamin C + vitamin E) on blood pressure, plasma lipids, antioxidant status, antioxidative enzyme activity, and plasma iron in male hyperlipidemic smokers. Forty-two male hyperlipidemic smokers (35-78 years) were randomly divided into two groups, relatively low antioxidant group (LA, n=22) (15 mg beta-carotene/d + 500 mg vitamin C/d + 400 mg vitamin E/d) and relatively high antioxidant group (HA, n=20) (30 mg beta-carotene/d + 1000 mg vitamin C/d + 800 mg vitamin E/d). Blood samples were drawn after overnight fasting and 24-h dietary recall was recorded at week 0, 3, and 6. In the experimental period, there were no significant differences in dietary intake, blood pressure, plasma total triglycerides , total cholesterol, LDL-cholesterol, and HDL-cholesterol between these two groups. Only plasma total triglycerides had a tendency to decrease in both groups. It may result from too short for the duration of the supplementation. However, plasma antioxidant vitamin concentrations were significantly elevated after supplementation. In the LA group, plasma beta-carotene, vitamin C, and vitamin E concentrations were increased by 78, 46, and 73%, respectively, at week 3, and by 205, 99, and 130%, respectively, at week 6. In the HA group, plasma beta-carotene, vitamin C, and vitamin E concentrations were increased by 118, 92, and 99%, respectively, at week 3, and by 235, 216, and 198%, respectively, at week 6. Both the dosage and the duration affected plasma antioxidant vitamin concentrations. The reduced glutathione (GSH) levels were significantly increased in both groups at week 3 as compared to the respective baselines. The levels of GSH were elevated by 39% and 32% in the LA and HA groups, respectively, at week 6. Catalase activity in the LA and HA group was increased by

40% and 84% at week 6, respectively. However, there were no significant differences in catalase activity between these two groups both at week 3 and 6. This study showed that hyperlipidemic smokers had higher plasma iron than normal healthy humans. Plasma ferrous ion concentration and the ratio of iron (II) to iron (III) were decreased in both groups after antioxidant vitamin supplementation, which may reduce the damage of lipid peroxidation. No significant effect of the dosage on plasma iron was observed. In conclusion, male hyperlipidemic smokers had higher plasma antioxidant vitamin concentrations, glutathione levels, and antioxidative enzyme activity, but lower ferrous ion after 6 week antioxidant vitamin supplementation. However, no significant effects on blood pressure and plasma lipids were observed. Relatively high doses of supplementation had no additive effect.