糙米、米麩與精白米對鼠大腸癌前期病變預防效果之探討

Preventive effects of brown rice, rice bran and polished rice on preneoplastic lesions of colon in rats

中文摘要

本研究藉由化學誘發大腸癌發生之動物模式，探討糙米、米麩與精白米對大腸癌前期病變的預防效果，並且評估是否與調控促發炎蛋白表現與抗氧化防禦機制相關。將 F344 鼠分爲控制組(C)、糙米組(40%糙米，BR)、低劑量米麩組(1.1%米麩，LB)、中劑量米麩(2.2%米麩，MB)、高劑量米麩組(4.4%米麩，HB)、低劑量精白米組(8.9% 精白米，LR)、中劑量精白米組(17.8%精白米，MR)與高劑量精白米組(35.6%精白米，HR)，並腹腔注射 1,2-dimethylhydrazine (DMH)誘發大腸癌發生，於實驗期 17 週後將動物犧牲。分析項目爲大腸的異常腺窩病灶(Aberrant crypt foci, ACF)、黏液素分泌型態、黏液素缺乏病灶(Mucin-depleted foci, MDF)與腫瘤，大腸黏膜的第二型環氧酶(Cyclooxygenase-2, COX-2)和誘導型一氧化氮合成酶(Inducible nitric oxide synthase, iNOS)等促發炎蛋白表現量，肝臟和血漿的硫巴比妥酸反應物質(Thiobarbituric acid reactive substances, TBARS)濃度以及肝臟的超氧化物歧化酶(Superoxide dismutase, SOD)、觸酶(Catalase,CAT)活性和麩胱甘肽(Glutathione, GSH)濃度。實驗結果顯示，米麩顯著減少總 ACF 數、總異常腺窩(Aberrant crypt, AC)數、含 1 或 2 個腺窩的 ACF 以及小型 ACF 數($P<0.05$)，並且有降低大型 ACF 數的趨勢($P<0.1$)。米麩有減少同時分泌 Sulfomucin 和 Sialomucin 的 ACF 數的趨勢($P<0.1$)。糙米和米麩顯著降低中間段大腸黏膜的 COX-2 蛋白質表現量($P<0.05$)。另外，糙米、米麩與精白米未顯著影響 MDF、腫瘤形成、血漿和肝臟的 TBARS 濃度以及肝臟的抗氧化相關指標。因此本研究的結論爲米麩可抑制 ACF 形成以及 COX-2 蛋白質表現量，並且抑制黏液素型態轉變，具有延緩大腸癌進展的潛力。

英文摘要

The purpose of this study was to investigate the effects of brown rice, rice bran and polished rice on preneoplastic lesions of colon. F344 rats were fed control diet (C), 40% brown rice diet (BR), 1.1% rice bran diet (LB), 2.2% rice bran diet (MB), 4.4% rice bran diet (HB), 8.9% polished rice diet (LR), 17.8% polished rice diet (MR) and 35.6% polished rice diet (HR) and administrated 1,2-dimethylhydrazine (DMH) by i.p. injection. After 17 weeks of experimental period, rats were sacrificed and colons were removed to examine for aberrant crypt foci (ACF), mucin and mucin-depleted foci (MDF). Colonic mucosa was examined for pro-inflammatory cyclooxygenase-2 (COX-2) and inducible nitric oxide synthase (iNOS) protein expression. Liver and plasma were examined for thiobarbituric acid reactive substances (TBARS) level.

Liver was examined for superoxide dismutase (SOD), catalase (CAT) activity and glutathione (GSH) level. The results showed that rice bran significantly reduced the number of total ACF, total aberrant crypts (AC), ACF containing 1 or 2 crypts and small ACF ($P < 0.05$). Rice bran reduced the number of large ACF and ACF secreting both sulfomucin and sialomucin ($P < 0.1$). Brown rice and rice bran significantly reduced COX-2 protein expression of middle colonic mucosa ($P < 0.05$). Brown rice, rice bran and polished rice did not significantly affect MDF, tumor formation, plasma and hepatic TBARS level, and hepatic antioxidant-associated parameters. This study indicates that rice bran inhibits colonic ACF formation, pro-inflammatory COX-2 protein expression of colonic mucosa and inhibits mucin alteration, suggesting that rice bran has the potential for deferring colon carcinogenesis.