四種混合麥芽發酵液降血脂之探討

廖東垣、林麗雲 ; 顏裕鴻

E-mail: 9608238@mail.dyu.edu.tw

摘 要

本論文先對自製麥芽發酵液進行一般成份、營養素分析及抗氧化、抗發炎能力分析，結果測得麥芽發酵液中總多元酚含量為66.5ppm；抑制一氧化氮(NO)之形成能力的半衰濃度為92.7 mg/mL；抑制前列腺素(PGE2)形成的半衰濃度為120.2 mg/mL，可見麥芽發酵液具有抗發炎之能力。另外麥芽發酵液抗LDL氧化及抗醣化效果優於控制組，延緩速率為控制組之10.5倍。 在探討麥芽發酵液對倉鼠降血脂之能力上，試驗以38隻六週齡之雄性倉鼠為實驗對象，隨機分成控制組(C組，6隻)，高血脂組(H-0組，8隻)，含發酵液6%組(H-6組，8隻)，含發酵液12%組(H-12組，8隻)，含發酵液18%組(H-18組，8隻)，實驗為期六週，每兩天記錄其飼料攝食量及增重。六週後犧牲倉鼠收集血液及肝臟等樣品並分析血清中總膽固醇(TC)、三酸甘油酯(TG)、低脂密度膽固醇(LDL-C)及高脂密度膽固醇(HDL-C)和肝臟中的TC及TG。結果顯示，飼料攝取量各組並無顯著性的差異(P>0.05)，而各組體重則有顯著差異性；在高血脂組方面，其血清中TC、TG及HDL-C有顯著差異性(P

關鍵詞 : 麥類發酵液、降血脂

目錄

參考文獻

參考文獻 1.潘威仁。2005。朱紅栓菌生物活性探討。南台科技大學生物科技系碩士論文。台南。 2.甯鈞慧。擠壓加工蕎麥粉對倉鼠血脂質及抗凝血因子之影響。食品營養研究所論文。2004。靜宜大學。台中。 3.劉立綱。2002。桑椹萃取物降血脂及預防動脈粥狀硬化形成之作用。中山醫學大學生物化學研究所碩士論文。台中。 4.劉士銘。2003。探討大豆蛋白降血脂之作用機轉。臺北醫學大學保健營養學

系碩士論文。台北。 5.劉生連、黃榮貞、陳炯明、周清水。1966。自動製麴機製麴與手工製麴之比較。中國農業化學會誌4(1,2):34-37。 6.劉耀仁。2004。數種鳳梨的果實發育與自然開花的抑制。國立屏東科技大學農園生產系碩士論文。屏東。 7.林禎。1996。保健食品之簡介。食品工業月刊11:14-15。 8.高血壓防治手冊。2004。行政院衛生署。第156頁。遠流出版公司。台北，台灣。 9.金惠民。1995。疾病．營養與膳食療養。第183至188頁。華香園出版社。台北，台灣。 10.許瑛玿。2002。紅龍果種籽成份分析。國立成功大學化學系碩士論文。台南。 11.趙文婉、張珍田、周淑姿。2002。淺淡植物類化學物質對抗自由基之機制。食品工業 34(2):49-60。 12.張為憲。1992。高等食品化學。第105-135頁。華香園出版社。台北，台灣。 13.鄭明清。2004。數種芹菜精油成份分析及其降血脂之研究，大葉大學生物產業科技學系碩士論文。彰化。 14.陳秀貞。2004。Leflunomide之抗發炎及其抗血小板凝集作用。中原大學化學研究所碩士論文。中壢。 15.斯崇文。1993。腸道菌群失調。中國大百科全書現代醫學卷。第112-113頁。中國大百科全書出版社。北京，中國。 16.孫蓓菁。2002。多種水溶性及脂溶性維生素含量之測定-毛細管電泳及其他方法之評估。屏東科技大學食品科學系碩士論文。屏東。 17.楊雅露。蕎麥芽抗氧化及降血脂活性之研究。2006。弘光科技大學。台中。 18.吳文騰。2003。生物產業技術概論。第219-274頁。國立清華大學出版社。新竹，台灣。 19.王秀育。2006。熱處理對包種茶品質及抗氧化性之影響。大葉大學生物產業科技學系碩士論文。彰化。 20.王心芬。2004。五種黑色食品與其複方組合對血脂及LDL氧化之影響。國立臺灣大學食品科技研究所碩士論文。台北。 21.王怡晶。2003。蕎麥:化學組成與機能特性，食品工業發展研究所，35(12): 17-29。 22.于守洋、崔洪斌。2003。新世紀保健食品全集。第574頁。九州圖書文物有限公司。台北，台灣。 23.Ajlounim, S.O., Beelman, R.B. Thomposn, D.B. and Mau, J.L. 1995. Change in soluble sugar in various tissues of cultivated mushrooms, Agaricus bisporus during postharvest storage. In “ Food Flavors ”, Gold Coast Ingredients ING. pp. 1865-1880. 24.Asgary, S., Naderi, G., Sarrafzadegan, N., Ghassemi, N., Boshtam, M. Rafie, A., 1999. Antioxidant effect of flavonoids on hemoglobin glycosylation. Pharm. Acta. Helv. 7:223-226. 25.Bonafaccia, G., Marocchini, M. and Kreft, I. 2003. Composition and technological properties of the flourand bran from common and tartary buckwheat. Food Chem. 80:9-15. 26.Bonataccia, G. and Kreft, I. 1994. Technological and Qualitative characteristics of food products made with buckwheat. Fagopyrum 14:35-42. 27.Cianflone, K., Yasruel, Z., Rodriguez, M.A., Vas, D. and Sniderman, A.D. 1990. Regulation of apo B secretion from HepG2 cell: evidence for a critical role for cholesterol ester synthesis in the response to a fatty acid challenge. J Lipid Res.31:2045-2055. 28.Duthie, S. J. and Dobson, V. L. 1999. Dietary flavonoids protect human colonocyte DNA from oxidative attack in vitro. Eur.J. Nutr. 38:28-34. 29.Edited by Cody, Middleton Jr., E., Harborne J. B. and Beretz, A. Alan R. Liss, New York. pp. 283-299. 30.Elia, G., Amici, C., Rossi, A. and Santoro, MG. 1996. Modulation of prostalandin Al-induced thermotolearance by quercetin in human leukemic cell: role of heat shock protein 70. Cancer Res. 56:210-217. 31.FDA. 1992. Bacteriological Analytical Manual. Association of official chemists. Washington, D. C. 32.Gerster, H. 1996. Intermediate cancer bio markers and their use in carotene studies in humans. Int. J. vitam. Nutr. Res. 66:3-18. 33.Halliwell, B., Aruoma, O. I., Mufite, G. and Bomford A. 1988. Bleomycin - detectable iron in serum from leukaemic patients before and after chemotherapy. Therapeutic implications for treatment with oxidant-gene rating drug. FEBS Left. 241:202-204. 34.Halliwell, B., Murcia, M. A. S. and Aruoma, O, I, 1995. Free radicals and antioxidants in food in vivo: What they do and how they work. Crit. Rev. Food Sci Nutr. 35:7-20. 35.Hansen, R. K., Oesterreich, S. and Lemieux, P. 1997. Quercetin inhibitor heat shock protein induction but not heat shock factor DNA-binding in human breast carcinoma cells. Biochem. Biophys.Res.Commun.239:851-856 36.Hegsted, D. 1986. Serum-cholesterol response to dietary cholesterol: a re-evaluation. Am J. Clin Nutr.44:299-305. 37.Horigome, T. and Cho, Y. S. 1992. Dietary casein and soybean protein affect the concentrations of serum cholesterol, triglyceride and free amino acids in rats. J. Nutr. 122:2273-2282. 38.Hyslop, P. A., Hinshaw, D. B., Halsy, W. A., Jachson, J. H. and Cochrane, C. G. 1988. Mechanisms of oxidant - mediated injury. Biol. Chem. 263:1665-1675. 39.Ihme, N., Kiesewetter, H., Jung, F., Hoffmann, K. H., Birk, A., Muller, A. and Grutzner, K. I. 1996. Legoedema protection from a buckwheat herb tea in patients with chronic venous insufficiency: a single-centre, randomised, double-blind, placed-controlled clinical trial. Eur. J. Clin. Pharmacol. 50:443-447. 40.Iwata, K., Miwa, S., Inayama, T., Sasaki, H., Soeda, K. and Sugahara, T., 1990. Effects of kangra buckwheat on spontaneously hypertensive rats. J. Kagawa Nutr. College 21:55-61. Alonso, R., Orue, E. and Marzo, F. 1998. Effects of extrusion and conventional processing methods on protein and antinutritional factor contents in pea seeds. Food Chem. 63:505-512. 41.Jenkins, K. J., Hidiroglou, M. and Collins, F. W. 1993. Influence of various flavonoids and simple phenolice on development of excudative diathesis in the chick. J. Agric. Food Chem. 41:441-445. 42.Jenkins, K. J., Hidiroglou, M. and Collins, F. W. 1993. Influence of various flavonoids and simple phenolics on development of exudative diathesis in the chick. J. Agric. Food Chem. 41:441-445. 43.John, R.B., Lisa, J.W. and Huff, M.W. 1999. Acyl coenzyme A: cholesterol acyltransterase inhibition and hepatic apolipoprotein B secretion. Clin. Chinm. Acat 286:231-242. 44.Kaul, T. N., Middleton Jr., E. and Ogra, P. L. 1985. Antiviral effect of flavonoids on human viruses. J. Med. Virol. 15:71-79. 45.Kawaii, S., Tomono, Y., Katase, E., Ogawa, K. and Yano, M. 1999. Antiproliferative activity of flavonoids on several cancer cell lines. Biosci. Biotech. Biochem. 63:896-899. 46.Kayashita, J., Shimaoka, I., and Nakajyoh, M. 1995. Hypo cholesterolemic effect of buckwheat protein extract in rat fed cholesterol enriched dirts. Nutr. Res. 15:691-698. 47.Kayashita, J., Shimaoka, I., Nakajoh, M., Kishida, N. and Kato, N. 1999. Consumption of a buckwheat protein extract retards 7, 12-dimethylbenz [α] anthracene-induced mammary carcinogenesis in rats. Biosci. Biotech. Biochem. 63:1837 - 1839. 48.Kayashita, J., Shimaoka, I., Nakajoh, M., Yamazaki, M. and Kato, N. (1997) Consumption of buckiwheat protein lower splasma cholesteroland raises fecalneutral sterols in cholesterol-fed rats because of;its low digestibility. J.Nutr. 127:1395-1400. 49.Kayashita, J., Shimaoka, I., Nakajyoh, M. and Kato, N. 1996. Feeding of buckwheat protein extract reduces hepatic triglyceride concentration, adipose tissue weight, and hepatic lipogenesis in rats. J. Nutr Biochem.7:555-559. 50.Knekt, P.; Kumpulainen, J., Jarvinen, R., Rissanen, H., Heliovaara, M., Reunanen, A., Hakulinen, T. and Aromaa, A. 2002. Flavonoid intake and risk of chronic diseases. Am. J. Clin. Nutr. 76:560-568. 51.Lapre, J.A., West, C.E., Lovati, M.R., Sirtor, C.R. and Beynen, A.C. 1989. Dietary animal proteins and cholesterol metabolism in rats. Int J Vitam Res. 59:93-100. 52.Li, S. Q. and Zhang, Q.

H. 2001. Advances in the development of functional foods from buckwheat. Crit. Rev. Food Sci. Nutr. 41:451-464. 53.Lindahl, T. 1993. Instability and decay of the primary structure of DNA Nature 362:709-715. 54.Liu, Z., Ishikawa, W., Huang, X., Tomotake, H., Kayashita, J., Watanabe, H. and Kato, N. A. 2001. Buckwheat protein product up presses, 2- dimethylhydrazine - induced colon carinogenesis in rats by reducing cell proliferation. J. Nutr. 131:1850-1853. 55.Loft, S. and Poulsen, H. E. 1996. Cancer risk and oxidative DNA damage in man. J. Mol. Med. 74:297-312. 56.Matsubara, Y., Kumamoto, H., Iizuka, Y., Murakami, T., Okamoto, H. and Yokoi, K. 1985. Structure and hypertensive effect of flavonoids glycosides in citrus unshiu peelings. Agric Biol. Chem. 49:909-914. 57.Middleton, E. and Kandaswami, C. 1992. Effects of flavonoids on immune and inflammatory cell functions. Biochem, Pharmacol. 43:1167-1179. 58.Miyazaki, A. and Koga, T. 2002. Pravastatin sodium, an inhibitor of 3-hydroxy-3-methylglutatyl coenzyme A reductase, decreases serum total cholesterol in Japanese white rabbits by two different mechanisms. Atherosclerosis 162:299-306 59.Mizui, T., Sato, H., Hirose, F, and Doteuchi, M. 1987. Effect of antiperoxidative drugs on gastric damage induced by ethanol in rats. Life Sci. 41:755-763. 60.Murakami, J., Kondo, Y., Toda, Y., Kitojima, H. and Kameo, K. 2002. Effect of taurine on cholesterol metabolism in hamsters: Up-regulation of low density lipoprotein (LDL) receptor by taurine. Life Sci. 70:2355-2366. 61.Narahara, H., Kopyama, Y., Yoshida, T., Ueda, S. P. and Taguchi, H. 1982. Growth and enzyme production in a solid-state culture of Aspergillus oryzae. J. Ferment. Technol. 60(4): 311-319. 62.Nelson, N. 1944. A photomeric adaptation of the Somogyi method for the determination of glucose. J. Biol. Chem. 153:375-380. 63.Newnham, H.H. and Barter, P.J. 1992. Changes in particle size of high density lipoproteins during incubation with very low density lipoproteins, cholestery ester transfer protein and lipoprotein. Biochem. Biophys. Acta. 1125:294-304. 64.Nicolosi, R.J. and Wilson, T.A. 1997. The anti-atherogenic effect of dietary soybean protein concentrate in hamster. Nur Res.17:1457-1467. 65.Oshida, M., Saki, T., Hosokawa, N., Marui, N., Matsunoto, K. and Fujioka, A. 1990. The effect of quercetin on cell cycle progression and growth of human gastric cancer cells. FEBS Lett. 260:10-13. 66.Pisha, E. and Pezzuto, J. M. 1994. Fruits and vegetables containing compounds that demonstrate pharmacological activity in humans. In Economic and Medical Plant Research, vol.6; Wagner, H., Hikino, H., Fransworth, N. R., Eds.; Academic Press: London, UK, pp.189-233. 67.Rotelli, A. E., Guardia, T., Juarez, A. O., Rocha. N. E. and Pelzer, L. E. 2003. Comparative study of flavonoids in experimental models of inflammation. Pharmacol Res. 48:601-606. 68.Ruch, R. J., Cheng, S. and Klaungig, J. E. 1989. Prevention of cytotoxicity and inhibition of intercellular communication by antioxidant catechin isolated from Chinese green tea. Carcinogensis. 10: 1003-1008. 69.Sanchez de Medina, F., Galvez, J., Romero, J. A. and Zarzuelo, A. 1996. Effect of quercitrin on acute and chronic experimental colitis in the rat. J. Pharmacol. Exp. Ther. 278:771-779. 70.Sies, H. 1991. Oxidative Stress: from basic research to clinical application. Am. J. Met. 91:31s-38s. 71.Somogyi, M. 1952. Notes on sugar determination. J. Biol. Chem. 195:19-23. 72.Sugano, M. and Imaizumi K. 1995. Effect of different saturated fatty acid as interesterified triacylglyceriods on lipid metabolism in rats and hamster. J. Nutr. Biochem. 6:195-200. 73.Sure, B., 1995. Nutritive value of proteins in buckwheat and their role as supplement to proteins in cereal grain. J. Agric. Food chem. 34:764. 74.Tomotake, H., Shimaoka, I., Kayashita, J., Yokoyama, F. and Nakajyoh, M. 2000. A buckwheat protein product suppresses gullstone formation and plasma cholesterol more strongly then soy protein isolate in hamsters. J. Nutr. 130:1070-1674. 75.Trnovsky, J., Letoureneau, R., Haggog, E., Boucher, W. and Theoharides, T. C. 1993. Quercetin-induced expression of rat mast cell protase II and accumulation of secretory granules in rat basophilic leukaemia cell. Biochem. Pharmacol. 46:2315-2316. 76.Tsai, C. E., Teng, L, and Lin, Yuling. 2005. Effect of young barley leaf essence on serum lipids in hamsters. Nutr. Sci J. 80:26-27 77.Varma. S. D. 1986. Inhibition of aldose reductase by flavonoids: possible attenuation of diabetic complications. Prog. Clin. Biol. Res. 213:343-358. 78.Vlietinck, A. J., Vanden Berght, D. A. and Haemers, A. 1988. Present status and prospects of flavonoids as anti-viral agents. In Progress in Clinical and Biological Research. Vol.280. 79.Velioglu, Y. S., Mazza, G., Gao, L., and Oomah. B. D. 1998. Antioxidant activity and total phenolics in selected fruit, vegetables, and grain products. J. Agr. Food Chem. 46: 4113-4117. 80.Wang, M. Y. and Liehr, J. G. 1995. Lipid hydroperoxide-induced endogenous DNA adducts in hamsters: possible mechanism of lipid hydroperoxide-mediated carcinogenesis. Arch. Biochem. Biophys. 316:38 - 46. 81.Yazzie, D.; Vanderjagt, D.J.; Pastuszyn, A.; Okolo, A.; Glew, R.H. 1994. The Amino Acid and Mineral Content of Baobab（Adansonia digitata L.）Leaves. J. Food Comp. Anal. 7, 189-193. 82.Yildizogle-Ari. N., Altan, V. M., Altinkurt, O. and Ozturk, Y. 1991. Pharmacological effects of rutin. Phytotherapy Res. 5:19-23. 83.Yin, L. J., Pan, C. L. and Jiang, S. T. 2002. Effect of lactic acid bacterial fermentation on the characteristics of minced mackerel. J. Food Sci. 67: 786-792. 84.Zarkadas, C.G., Zarkadas, G. C., Karatzas, C.N., Khalili, A.D., Nguyen, Q. 1986. Rapid method for determining esmosine, isodesmosine, 5-hydroxylysine, tryptophan, lysinoalanine and the amino sugars in proteins and tissues. J.Chromatogr. 378, 67-76. 85.Zarkadas, C.G., Drouliscos, N., Karatzas, C.J. 1988. Comparison of the total protein, nitrogen and amino acid composition of selected additives and ingredients used in composite meat products. J. Agric. Food Chem. 36, 1131-1146. 86.Zhang, Z., Wilson, R.P., 1998. A modified enzymatic assay for quantifying choline in fish tissue and commom feed ingredients. J. Agric. Food Chem. 46, 3673-3676.