Evaluation Bioactivity of Extracellular Low Molecular Polysaccharides from Coriolus Versicolor LH1

鄭元凱、楊博文

E-mail: 360549@mail.dyu.edu.tw

ABSTRACT

The extracellular low molecular polysaccharides from submerged fermentation culture of Coriolus versicolor LH1 new strain in Taiwan has been analyzed the abilities of antioxidant and α-glucosidase inhibition in this research. The extracellular culture medium was processed in ethanol precipitation method to obtain the precipitated, and then went on dialysis with membrane to obtain the small molecular low molecular polysaccharides mixture (the molecular weight is less than 12-16 kDa). The seven low molecular polysaccharides mixture mixture fractions were obtained after seperation from HP20 macroporous adsorption resins. The abilities of antioxidant were owing to the scavenging assays of the diphenylpicrylhydrazyl (DPPH) and the hydroxyl radical (OH), and the ability of blood sugar regulation was owing to the α-glucosidase inhibition where was existed in the human intestines and hydrolyzed the starch. Finally, Better low-molecular-weight polysaccharides fraction on during DEAE Sepharose CL-6B anion-exchange column. To obtain the best atioxidant and enzyme inhibition activity of low molecular weight polysaccharide fraction . The results showed, extracellular low molecular Polysaccharides from submerged fermentation culture of Coriolus versicolor LH1. Get seven low molecular polysaccharides mixture mixture fractions were obtained after seperation from HP20 macroporous adsorption resins. By the Diphenylpicrylhydrazyl (DPPH) 、hydroxyl radical (OH) and the α-glucosidase inhibition analysis. Found best effect of fraction-2 andfraction-5, using a DEAE Sepharose CL-6B anion-exchange column can be divided into two signals. Against two signals for components analysis、UV full wavelength detection、molecular weight analysis use HPLC-RI(Refractive Index) Detector and FT-IR analysis.

Keywords : Coriolus versicolor, Low molecular weight polysaccharide, Diphenylpicrylhydrazyl (DPPH), hydroxyl radical (OH), α-glucosidase inhibition

Table of Contents

REFERENCES

1. 刁治民、魏克家、吳保鋒。2006。食用菌學。青海人民出版社: 591-593。 2. 王伯徹、陳啟楨、華傑。1998 。食藥用菇類的培養與應用。 財團法人食品工業發展研究所。第 M87-019 號，187 頁。 3. 王伯徹。1990。藥用真菌系列報導(八)雲芝。食品工業。22(10):59-62。 4. 卯曉嵐。1989。中國的食用和藥用大型真菌。微生物學通報16:290-297。 5. 李俊峰。2003。雲芝的生物學特徵:藥理作用及應用前景。安徽農業科學。31(3):509-510。 6. 李建武、余瑞元、陳麗蓉。1997。生物化學實驗原理與方法。第59-93頁。藝軒圖書出版社。台北，臺灣。 7. 巫熒撰。2009。綠藻水解物對α-葡萄糖..與α-澱粉.之抑制與活性物質的純化。海洋大學食品科學系。 8. 呂淑芳。2002。靈芝之機能性與其分析方法。 食品工業。-70- 34(11):3-10。 9. 吳國榮、程光宇、陳勝藍、鄒玉珍。1995。液態雲芝蛋白多醣的分離及其鑑定。南京師大學報18(1):88~93。 10. 肖崇厚、陳蘊如。1989。中藥化學。 第323-360頁。上海科學技術出版社。上海，中國。 11. 沈雍智。2005。探討麩胺酸的添加對於液態發酵生產松杉靈芝 菌多醣體和靈芝酸之研究 。國立中央大學化學工程與材料工程 -74- 所。 12. 陳俞臻。2011。雲芝LH-1 的皂.分離純化與活性成份研究。大葉大學生物產業科技所。 13. 馮杏儀。2010。大孔吸附樹脂在環境科學中的應用。華南師範大學。2-5。 14. 黃鉦中。2010。雲芝子實體多醣分離純化及其抗氧化能力分析之研究。大葉大學生物產業科技學系。 15. 黃慧琪、張麗杰。2009。皂素的生物活性與化學成分之探討。化學。67(1)1-12。 16. 黃健政。2005。油/水乳化系統中多酚化合物對兩價鐵離子的螯合作用與抗氧化能力的表現。行政院國家科學委員會專題研究計畫。21-22。 17. 程光宇、吳國榮、鄒玉珍、陳勝藍。1998。深層培養雲芝菌絲體蛋白多醣體的提取及性質。植物資源與環境7(4):19~23。 18. 楊士賢。2006。引響雲芝菌絲體與多醣體批次饋料發酵產程控制參數因子之探討:116。大葉大學碩士論文。台灣。 19. 劉國凌、寧正祥、郭紅輝。2010。苦瓜果實中多醣的分離純化及性質分析。食品科學。 20. 戴郁軌、朱凱俊。1982。真菌名詞辭典。第2467頁。名山出版社。台北，臺灣。 21. Ainsworth, G. C., Sparrow, F. K. and Sussman, A. S. 1973. Vol.IVA. A Taxonomic Review with Keys: Ascomycetes and Fungi Imperfecti. Academic Press, Inc. The Fungi. p. 621. New York. 22. Cheng G-Y WG-R, Zhou Y-Z, cheng S-L. 1998. Extaction and characterization -75- of proteoglycan from the mycelium of Polysictus versicolor(L.) Fr. by submerged culture .Zhiwu Ziyuan Yu Huanjing. 7(4):19-23. 23. Cherng, I. H. and Chiang, H. C. 1995. Three new triterpenoids from Antrodia cinnamomea. J. Natural Products. 58:365-371. 24. Cherng, I. H., Wu, DP. and Chiang, H. C. 1996. Triterpenoids from Antrodia cinnamomea. Phytochemistry. 41:263-267. 25. Cuixian Yang., Ning He., Xueping Ling., Meiling Ye., Chenxiao Zhang., Wenyao Shao., Chuanyi Yao., ZhiyuanWang., Qingbiao Li. 2008. The isolation and characterization of polysaccharides from longan pulp 26. Dai, Y. Y., Chuang C. H., Tsai, C. C., Sio, H. M., Huang, S. C., Chen, J. C., and Hu, M. L. 2003. The protection of Antrodia camphorata against acute hepatotoxicity of alcohol in rats. J of Food and Drug Anal. 11:177-185. 27. Duduku K., Rosalam S., and Rajesh N. 2010. A review of the antioxidantpotential of medicinal plant species. Food and Bioproducts Processing.157:17. 28. Gang-Liang Huang, Man-Xi Liu and Xin-Ya Mei,. 2004. Synthesis, (1-3)-b-D-glucanase-binding ability,and phytoalexinelicitor activity of a mixtureof 3,4-epoxybutyl(1-3)-b-Doligoglucosides. 1453 – 1457. 29. Halliwell, B., Gutteridge, J. M. C. and Aruoma, O. I. 1987. The deoxyribose method: Asimple "test-tube" assay for determination of rate constants forreactions of hydroxyl radicals. Anal. Biochem. 165: 215-219. 30. H. X. WANG., Ng TB，Liu WK，Ooi VEC，and Chang ST. 1996. Plysaccharide—Peptide complexes from the cultured mycelia of the mushroom Corious versicolor and their culture medium activate mouse lymphocytes and macrophages the International Journal of Biochemistry &Cell Biology.(5):601-607. 31. Hostettmann K, Marston A. 1995. Saponins. New York: Cambridge University Press. p.548. -76- 32. Jian, C. and Yusuf, C. 2003. Polysaccharopeptides of Coriolus versicolor:Ohysio logical activity,uses,and production.Biotechnology Advances 21:109-122 33. Jean-Paul, V., Lynn, H., Aede de, G. , Harry, G. 2007. Saponins, classification and occurrence in the plant kingdom. Phytochemistry68:275-297. 34. Jie Xiao., Jian Sun., Lingyun Yao., Qingsheng Zhao., Liwei Wang., Xiaodong Wang., Xiaofan Yuan., Bing Zhao. 2012. Physicochemical characteristics of ultrasonic extracted polysaccharides from cordyceps cephalosporium mycelia. 35. Keji, T., Ruixin N., Longjun J., Quansheng C. 2009. Anti-athletic fatigueactivity of saponins (Ginsenosides)from American ginseng (Panaxquinquefolium L.) . African Journal of Pharmacy and Pharmacology.3(6):301-306. 36. Liyan Zhao., Yanhong Dong., Guitang Chen., Qiuhui Hua., 2010. Extraction, purification, characterization and antitumor activity of polysaccharides from Ganoderma lucidum. 37. Milgate, J. and Roberts, D. C. K. 1995. The nutritional and Biological significance of saponins. Nutritiom Research.15:1223-1249 38. Moor, G. E, Gerner, RE, and Franklin, H. A. 1967. Culture of Normal Human Leukocytes. J. Amer. Med. Assn. 199:519. 39. Ng TB., and Chan WY.

1997. Polysaccharopeptide from the mushroom Coriolus versicolor possesses analgesic activity but dose not produce adverse effects on female reproductive or embeyonic development in mice General Pharmacology: The Vascular System. 29(2):269-273. 40. Oleszek, W. A. 2006. Chromatographic determination of plant saponins.Journal of Chromatography A . 967:147-162. 41. Rau U, Kuenz A, Wray, Nimtz M, Wrenger J and Cicek H. 2009. production and structural analysis of the polysaccharide secreted by Trametes (Corious)vesicolor ATCC 200801 .Applied Microbiology and Biotechnology.81(5):827-837. 42. Sadeq Hassan Al-Sheraji., Amin Ismail., Mohd Yazid Manap., Shuhaimi Mustafa., Rokiah Mohd Yusof., Fouad Abdulrahman Hassan. 2012. Purification, -77- characterization and antioxidant activity of polysaccharides extracted from the fibrous pulp of Mangifera pajang fruits. 43. Sandula J, Kogan G, Kancurakova M, and machova E. 1999. Microbial (1??)-[beta]—glucans ,their preparation,Characterization and immunomodulatory activity .Carbohydrate Polymers.38(3):247-253. 44. Shobana, S., Sreerama, Y. N. and Malleshi, N. G. 2009. Composition and enzyme inhibitory properties of finger millet (Eleusine coracana L.) seedcoat phenolics: Mode of inhibition of α -glucosidase and pancreaticamylase. Food -73-Chemistry 115: 1268 – 1273. 45. Sone, Y., Okuda, R., Wada, N., Kishida, E., and Misaki, A. 1985. Structures and antitumor activaties of the polysaccharides isolated from fruiting body and the growing culture of mycelium of Ganoderma lucidum.Agric.Biol.Chem.49:2641-2645. 46. Ting, L., Jianwen, Liu., Xiaodong, Z., Guang, J. 2007. Antidiabetic activityof lipophilic (-)-epigallocatechin-3-gallate derivative under its role of α -glucosidase inhibition. Biomedicine & Pharmacotherapy 61:91-96. 47. Turner, W. B. and Aldridge, D. C. 1983. Fungal Metabolites II.p.304-365. Academic Press, New York, USA. 48. Wang HX, Ng TB, Liu WK, Ooi VEC, and Chang ST. 1996. Polysaccharide—peptide complexes from the culture mycelia of the mushroom Coriolus versicolor and their culture medium activate mouse lymphocytes and macrophages. The International Journal of Biochemistry & CellBiology.28(5):601-607. 49. Willians, W. B., Cuvelier, M. E. and Berset, C. 1995. Use of free radical method to evaluate antioxidant activity. Lebe.-Wisse. Technol. 28: 25-30. 50. Xiao Feng, X., Jin Hui, Z., Li Ming, W., Liang Hu, F., Jing Z. 2009. HPLC determination of adenosine in royal jelly.Food Chemistry 115:715-719. -78- 51. Yamaguchi., T., Takamura, H., Matoba, T., Terao, J. 1998. HPLC method forevaluation of the free radical-scavenging activity of foods by using1,1-diphenyl-2-picrylhydrazy Biosci. Biotechnol. Biochem., 62(6),1201-1204. 52. Yang QYaZ, Y. F. 1993. A. Protein bound polysaccharide-PSP.In Proceedings of PSP International Symposium(Edited by yang,Q.Y.and Kwok,C.Y.)23-34.Fundan Univeersity Press,Shanghai,China. 53. Ying Shi., Jianchun Sheng., Fangmei Yang., Qiuhui Hu. 2007. Purification and identification of polysaccharide derived from Chlorella pyrenoidosa. 54. Yuanfeng Wang., Lan Yu., Jiachen Zhang., Jianbo Xiao., Xinlin Wei. 2010. Study on the purification and characterization of a polysaccharide conjugate from tea flowers