

# Medicinal Mushrooms - Readings and References

## Fungi, Medicine & Good Health - Nutraceuticals

Cordyceps, Grifola, Maitake, Lentinula, Shiitake, Ganoderma, Reishi, Ling Zhi, Tremmella, Poria, Silver Ear, Pleurotus:  
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"War," said Faust, "is universal - so implicit in nature that, indeed, without it life would not be possible. You doubt me?. I assure you that even fungi fight wars, in the soil beneath your feet. They battle each other for territory, for dominance, for room to grow. Which ancient combat has been going on so long that the fungi have learned to create weapons. This golden dew is one such, a chemical poison lethal to its rivals. By good fortune it is also lethal to *our* enemy."

From: Jack Faust. by Swanwick, Michael. Avon Books, 1997.

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2. Beinfield, H., 1997. Medicinal mushrooms: help yourself to a serving of health. Nature's Impact, December.
3. Chang R, 1996. Functional properties of edible mushrooms. Nutr Rev 54(11), S91-S93
4. Chilton, J. 1993. What are the health benefits of mushrooms? Let's Live, Dec., pp. 24-29.
5. Dharmananda, S., 1988. Medicinal Mushrooms. Bestways Magazine, July, pp. 54-58.
6. Hobbs, C. 1997. Overcoming Chronic Fatigue (Traditional remedies for a modern disease). Veggie Life, Jan. Vol 5: #5, pp. 56-59.
7. Hobbs, C., 1997. Mushroom medicine. Vegetarian Times, Nov. pp. 96-98.
8. Hobbs, C., 1997. Medicine mushrooms. Herbs for Health, pp. 52-53. Jan/Feb.
9. Jones, 1997. An ancient Chinese secret promotes longevity and endurance. Healthy & Natural Journal, vol. 3, issue 3, pp. 90-93.
10. Jones, K., 1997. Shiitake: medicine in a mushroom. Herbs for Health. pp. 48-50, 54. Jan/Feb.
11. Law, David, 1996. Fungi as a platform for new medicine. Mushroom World, December, 1996.
12. McDougall, H. 1998. Detoxification. Veggie Life, March, pp 30 - 35.
13. Smith, C. 1994. Gold medal herbs. Natural Health May/June, pp. 85-87
14. Shirota, M, 1996. What You Should Know About Medicinal Mushrooms. Explore! vol. 7, issue 2, pp. 48-52.
15. Stanislaus, C., 1996. Ling zhi- medicine of kings. New Editions Health World, pp. 38-41.
16. Steinman, D., 1995. Potent protectors. Natural Health, Nov-Dec. pp. 92-95; 134-135.
17. Weil, A. 1993. Boost immunity with mushrooms. Natural Health, May-June, pp. 12-16.
18. Wiley, C. 1991. The medicinal side of mushrooms. Vegetarian Times, March 1991.

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### Some Research Papers on Medicinal Mushrooms

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1. Adachi, K., Nanba, H., Otsuka, M., and Kuroda, H. 1988. Blood Pressure Lowering Activity Present in the Fruit Body of *Grifola frondosa* (Maitake), *Chem. Phann. Bull.* 36:1000-1006.
2. Adachi, K., Nanba, H., and Kuroda, H. 1987. Potentiation of Host-Mediated Antitumor Activity in Mice by Beta-glucan Obtained from *Grifola frondosa* (Maitake), *Chem. Pharm. Bull.* 35:262-270.
3. Akiyama, Y. et al. 1981. Immunological characteristics of anti-tumor polysaccharides lentinan and its analogues, as immune adjuvants. In *Manipulation of Host Defense Mechanisms*, Aoki, T. et al. (eds.). Amsterdam: Excerpta Medica (International Congress Series 576).
4. Amagase H. et al. 1984. L.E.M. May be Effective Against Treating Hepatitis B Cases. Abstr. 197 Gastroenterology World Congress, Lisbon
5. Antoniou L.D., et al. 1977. Reversal of Uraemic Impotence by Zinc. *Lancet* 2:895-98
6. Aoki T. Et al. 1984. Antibodies to HTLV-1 and HTLV-3 in Sera from Two Japanese Patients: One with possible Pre-A.I.D.S. *Lancet* 2:936
7. Aoki T, 1987. Low natural killer syndrome: clinical and immunologic features. *Nat Immun Cell Growth Regul* 6(3), 116-128
8. Arinaga S, 1992. Enhanced induction of lymphokine-activated killer activity after lentinan administration in patients with gastric carcinoma. *Int J Immunopharmacol* 14(4), 535-53
9. Arinaga S, 1992. Enhanced production of interleukin 1 and tumor necrosis factor by peripheral monocytes after lentinan administration in patients with gastric carcinoma. *Int J Immunopharmacol* 14(1), 43-47
10. Balon TW, Jasman AP, Zhu JS. A fermentation product of *Cordyceps sinensis* increases whole-body insulin sensitivity in rats. *J Altern Complement Med.* 2002 Jun;8(3):315-23.
11. Bao X, Fang J, Li X. Structural characterization and immunomodulating activity of a complex glucan from spores of *Ganoderma lucidum*. *Biosci Biotechnol Biochem.* 2001 Nov;65(11):2384-91.
12. Brauer D, Kimmons T, Phillips M. Effects of management on the yield and high-molecular-weight polysaccharide content of shiitake (*Lentinula edodes*) mushrooms. *J Agric Food Chem.* 2002 Sep 11;50(19):5333-7.
13. Benedict, RG & LR Brady. 1972. Antimicrobial activity of mushroom metabolites. *J. Pharm. Sci.* 61: 1820-1822.
14. Bobek P, 1991. Cholesterol-lowering effect of the mushroom *Pleurotus ostreatus* in hereditary hypercholesterolemic rats. *Ann Nutr Metab* 35(4), 191-19
15. Bok JW, et al. 1999. Antitumor sterols from the mycelia of *Cordyceps sinensis*. *Phytochemistry.* Aug;51(7):891-8.
16. Borchers AT, et al. 1999. Mushrooms, tumors, and immunity. *Proc Soc Exp Biol Med.* Sep;221(4):281-93. Review.
17. Breene W. M. 1989. Nutritional & Medicinal Value of Exotic Mushrooms. *Shiitake Mushrooms. The Proceeding of a National Symposium & Trade Show University of Minnesota* 100-102
18. Broadbent, D. 1966. Antibiotics produced by fungi. *Bot. Rev.* 32: 219-242.
19. Brodziak L, 1984. Nutritive value of the mushroom *Lentinus edodes* (Berk.) Sing. (shiitake) compared with that of other edible mushrooms *Rocz Panstw Zakl Hig* 35(1), 59-62
20. Chang, R. 1993. Limitations and Potential applications of *Ganoderma* and related fungal polyglycans in clinical ontology; First International Conference on Mushroom Biology and

## Mushroom products: 96

21. Chang, R. 1994. Effective dose of ganoderma in humans. In Proc. Contributed Symposium 59A, B. 5th Intl. Mycol. Congr., Buchanan PK, Hseu RS and Moncalvo JM (eds), Taipei, p. 101-13.
22. Chang, R. 1996. The Central Importance of the beta-glucan receptor as the basis of immunologic bioactivity of ganoderma polysaccharides, In Reishi, Mizuno T, Kim BK (eds), II Yang Press, Seoul, p.177-9
23. Chang, R. Y. 1996. Potential Application of Ganoderma Polysaccharides in the Immune Surveillance and Chemoprevention of Cancer. 153-160 In: Royse, D.J. (ed). 1996. Mushroom Biology and Mushroom Products. Proceedings of the Second International Congress.
24. Cheng HH, Hou WC, Lu ML. Interactions of lipid metabolism and intestinal physiology with *Tremella fuciformis* Berk edible mushroom in rats fed a high-cholesterol diet with or without Nebacitin. *J Agric Food Chem.* 2002 Dec 4;50(25):7438-43.
25. Cheng Q, 1992. Effect of cordyceps sinensis on cellular immunity in rats with chronic renal insufficiency *Chung Hua I Hsueh Tsa Chih (Taipei)* 72(1), 27-29
26. Chen, A. W., 1997. Topical Use of Ganoderma Mushrooms. *The Mushroom Growers Newsletter* V (11), March 1997.
27. Chen, J & R Jiang. 1980. A pharmacognostical study of the Chinese drug Lingzhi (Ganoderma). *Acta. Pharm. Sin.* 15:244
28. Chen JR, 1993. The effects of Chinese herbs on improving survival and inhibiting anti-ds DNA antibody production in lupus mice. *Am J Chin Med* 21(3-4), 257-26
29. Chen, K & W Zhang. 1987. Advances on anti-aging herbal medicines in China. *Abstracts of Chinese Medicines.* 1:309-330
30. Chen WC, 1995. Effects of Ganoderma lucidum and krestin on cellular immunocompetence in gamma-ray-irradiated mice. *Am J Chin Med* 23(1), 71-80
31. Chen YJ, 1997. Effect of Cordyceps sinensis on the proliferation and differentiation of human leukemic U937 cells. *Life Sci* 60(25), 2349-2359 (1997)
32. Cheng Q, 1992. Effect of cordyceps sinensis on cellular immunity in rats with chronic renal insufficiency. *Chung Hua I Hsueh Tsa Chih (Taipei)* 72(1), 27-29
33. Chihara, G., Maeda, Y. Y. 1969 . Inhibition of mouse sarcoma 180 by polysaccharides from *lentinus edodes*, *Nature*, vol. 222, pg. 687.
34. Chihara G, 1969. Study on the antineoplastic activity and analysis of active fractions of *Polyporaceae*, *Lentinus edodes* and other basidiomycetes. *Nippon Rinsho* 27(6), 1739-174
35. Chihara G, 1970. Antitumor polysaccharides, lentinan and pachymaran. *Saishin Igaku* 25(5), 1043-1048
36. Chihara G, et. al. 1970. Fractionation and purification of the polysaccharides with marked antitumor activity, especially lentinan, from *Lentinus edodes* (Berk.) Sing. (an edible mushroom). *Cancer Res* 30(11), 2776-278
37. Chihara G, 1987. Antitumor and metastasis-inhibitory activities of lentinan as an immunomodulator: an overview. *Cancer Detect Prev Suppl* 1, 423-443
38. Chiu JH, et al.1998. Cordyceps sinensis increases the expression of major histocompatibility complex class II antigens on human hepatoma cell line HA22T/VGH cells. *Am J Chin Med.* 1998;26(2):159-70.
39. Cochran K.W. et al. 1967 . Botanical Sources of Influenza Inhibitors" - Anti - Microbial Agents

## &amp; Chemotherapy 515

40. Christov G, 1965. Studies on the antitumoral activity of Actinomycetes by the in vitro method. Dokl Bolg Akad Nauk 18(6), 573-57
41. Cozens, D.D. et al. 1981a. The effect of lentinan on fertility and general reproductive performance of the rat. Toxicol. Lett. 9:55-64.
42. Currie CR, Wong B, Stuart AE, Schultz TR, Rehner SA, Mueller UG, Sung GH, Spatafora JW, Straus NA. Ancient tripartite coevolution in the attine ant-microbe symbiosis. Science. 2003 Jan 17;299(5605):386-8.
43. Cutler R.G. 1991. Anti-Oxidants & Ageing. Ann J. Clin. Nutr. 53:373S-379S
44. Czop, J.K., Austen, K.F. 1985. A beta-Glucan inhibit able receptor on human monocytes, J. Immunol. 134, 2588-593.
45. Daly J.N. et al. 1988. Immune & Metabolic Effects of Arginine in the Surgical Patient" . Annal Surg. 208(4):512-23
46. Dennart, G. and D. Tucker. 1973. Antitumor polysaccharide Lentinan, a T cell adjuvant. J. Natl. Cancer Inst. 51:1729.
47. deVere White RW, Hackman RM, Soares SE, Beckett LA, Sun B. Effects of a mushroom mycelium extract on the treatment of prostate cancer. Urology. 2002 Oct;60(4):640-4.
48. Ding, G. 1987. Anti-arrhythmia agents in traditional Chinese medicines. From Abstracts of Chinese Medicines 1:287-308.
49. Diplock A.T. 1991. Anti-Oxidant Nutrients & Disease Prevention: An Overview. Am J. Clin Nutr. 53:189S-193S
50. Du DJ, 1986. Antitumor activity of Cordyceps sinensis and cultured Cordyceps mycelia. Chung Yao Tung Pao 11(7), 51-54
51. Eisman J.A. et al. 1988. Rapid Turnover of 1,25 Dihydroxy Vitamin D Receptor in Human Target Cells. Endocrinol. 122:1613-21
52. Espenshade, M. A. & E. W. Griffith. 1966. Tumor-inhibiting basidiomycetes. isolation and cultivation in the laboratory. Mycologia 58: 511-517.
53. Fehser J. et al. 1989. The Effect of Lentinan on Superoxide Dismutase Enzyme Activity in Vitro. Immunopharmacol. (Immunotoxicol.) 11(1):55-61
54. Feofilova EP, et al. 1998. [Lipid composition of fruiting bodies and submerged mycelium from *Lentinus edodes* (Berk.) Sing]. Mikrobiologiya. 1998 Sep-Oct;67(5):655-9.
55. Finkelstein MP, Aynehchi S, Samadi AA, Drinis S, Choudhury MS, Tazaki H, Konno S. Chemosensitization of carmustine with maitake beta-glucan on androgen-independent prostatic cancer cells: involvement of glyoxalase I. J Altern Complement Med. 2002 Oct;8(5):573-80.
56. Flynn, V.T. 1991. Is the shiitake mushroom an aphrodisiac and a cause of longevity? From: Science and Cultivation of Edible Fungi (Maher, ed.). Rotterdam: Balkema.
57. Fruehauf JP, 1982. The effect of lentinan on production of interleukin-1 by human monocytes. Immunopharmacology 5(1), 65-7.
58. Fu, H. and Z. Wang. 1982. The clinical effects of Ganoderma lucidium spore preparations in 10 cases of atrophic myotonia. J. Trad. Chin. Med. 2:63-65.
59. Fujita, A., et. al. 1969. Determination of vitamin D by thin layer chromatography. II. Determination of vitamin D in Shiitake *Lentinus edodes*. Vitamins 40: 129-135.
60. Gan KH, et al. 1998. Mediation of the cytotoxicity of lanostanoids and steroids of Ganoderma

- tsugae through apoptosis and cell cycle. *J Nat Prod.* Apr; 61(4): 485-487.
61. Gao, B. and G. Yang. 1991. Effects of Ganoderma pplanatum polysaccharide on cellular and humoral immunity in normal and sarcoma 180 transplanted mice. *Phytother. Res.* 5:134- 138. From CA 115:85011v.
  62. Gao Q, et al. 1996. Characterisation of acidic heteroglycans from Tremella fuciformis Berk with cytokine stimulating activity. *Carbohydr Res.*; 288: 135-142.
  63. Gao QP, et al. 1996 Aug. Characterization and cytokine stimulating activities of heteroglycans from Tremella fuciformis. *Planta Med.*; 62(4): 297-302.
  64. Gao Q, et al. 1997. Characterization and cytokine-stimulating activities of acidic heteroglycans from Tremella fuciformis. *Planta Med.*; 63(5): 457-460.
  65. Gao Y, Zhou S, Wen J, Huang M, Xu A. Mechanism of the antiulcerogenic effect of Ganoderma lucidum polysaccharides on indomethacin-induced lesions in the rat. *Life Sci.* 2002 Dec 27;72 (6):731-45.
  66. Garland C.F. et al. 1989. Serum 25 Hydroxy-Vitamin D & Colon Cancer: 8 Year Prospective Study. *Lancet* 2:1176-78
  67. Geng, S. et al. 1985. Treatment of Hyperlipidemia with Cultivated Cordyceps-A Double Blind, Randomized Placebo Control Trial. *Chin. J. Integ. Med.* 5(11), 652.
  68. Gentao, L & R. Xu. 1985. Immuno-pharmacologic activity of Cordyceps sinensis (berk.) Sacc. *Chi J Int Trad & West Med.* 21(6): 622-624.
  69. Ghafar MA, Golliday E, Bingham J, Mansukhani MM, Anastasiadis AG, Katz AE. Regression of prostate cancer following administration of Genistein Combined Polysaccharide (GCP), a nutritional supplement: a case report. *J Altern Complement Med.* 2002 Aug;8(4):493-7.
  70. Ghafar MA, Golliday E, Bingham J, Mansukhani MM, Anastasiadis AG, Katz AE. Regression of prostate cancer following administration of Genistein Combined Polysaccharide (GCP), a nutritional supplement: a case report. *J Altern Complement Med.* 2002 Aug;8(4):493-7.
  71. Ghoneum, M., M. Wimbley, F. Salem, A. Mcklain, N. Attallan, G. Gill., 1995. Immunodulatory and anticancer effects of active hemicellulose compound (AHCC). *Int. Journal of Immunotherapy* XI (1) 23-28.
  72. Gong, M. et al. 1990. Molecular structure and immunoactivity of the polysaccharide from Cordyceps sinensis. *Shengwu Huaxue Zazl.* 6:486-492. From CA 1 14:94819w.
  73. Gordon M, et al. 1998. A placebo-controlled trial of the immune modulator, lentinan, in HIV-positive patients: a phase I/II trial. *J Med.* 29(5-6):305-30.
  74. Goulet N.R. et al. 1960. Differential & Specific of Echo Viruses by Plant Extracts" - *Proc. Soc. Exp. Biol. Med.* 103-96
  75. Grabski AC, et al. 1998. Immobilization of manganese peroxidase from Lentinula edodes and its biocatalytic generation of MnIII-chelate as a chemical oxidant of chlorophenols. *Biotechnol Bioeng.* 1998 Oct 20;60(2):204-15.
  76. Guan YJ, 1992. Effect of Cordyceps sinensis on T-lymphocyte subsets in chronic renal failure. *Chung Kuo Chung Hsi I Chieh Ho Tsa Chih* 12(6), 338-339
  77. Gunde-Cimerman, N.G. and A. Cimerman, 1995. Pleurotus fruiting bodies contain the inhibitor of 3-hydroxy-3-methylglutaryl-Coenzyme A Reductase-Lovastatin®. *Experimental Mycology* 19:1-6.
  78. Guo DZ, et al. 1984. Preliminary observation on carboxyl-methyl Poria cocos polysaccharide

- (CMPCP) in treating chronic viral hepatitis. *J Tradit Chin Med.* Dec 1; 4(4): 282.
79. Haak-Frendscho M, 1993. Ling Zhi-8: a novel T cell mitogen induces cytokine production and upregulation of ICAM-1 expression. *Cell Immunol* 150(1), 101-11
  80. Hamano K, et al. 1999. The preoperative administration of lentinan ameliorated the impairment of natural killer activity after cardiopulmonary bypass. *Int J Immunopharmacol.* Aug;21(8):531-40.
  81. Hamuro J, 1994. Synergistic antimetastatic effects of lentinan and interleukin 2 with pre- and post-operative treatments. *Jpn J Cancer Res* 85(12), 1288-1297
  82. Harada, T., & Kanetaka, T. 1987. [oral administration of LEM with EP3 improved the hepatic functions of hepatitis-B patients in vivo without serious side effects] *Kantansui*, vol.14, pg.327.
  83. Hartoma T.R. et al. 1977. Zinc Plasma Androgens and Male Sterility. *Lancet* 2:1125-26
  84. Hatanaka K. et al. 1989. Synthesis of an Inhibitor of Human Immuno-Deficiency Virus Infection. *Jpn. J. Cancer Res.* 80:95-98
  85. Hattori T, et al. 1992. Studies on antinephritic effects of plant components (3): Effect of pachyman, a main component of *Poria cocos* Wolf on original-type anti-GBM nephritis in rats and its mechanisms. *Jpn J Pharmacol.* May 1; 59(1): 89-96.
  86. Hatvani N, Kredics L, Antal Z, Mecs I. Changes in activity of extracellular enzymes in dual cultures of *Lentinula edodes* and mycoparasitic *Trichoderma* strains. *J Appl Microbiol.* 2002;92 (3):415-23.
  87. Hayakawa K, Mitsuhashi N, Saito Y, et al. Effect of Krestin (PSK) as adjuvant treatment on the prognosis after radical radiotherapy in patients with non-small cell lung cancer. *Anticancer Res* 13:1815-20, 1993.
  88. Hazama S, 1995. Clinical effects and immunological analysis of intraabdominal and intrapleural injection of lentinan for malignant ascites and pleural effusion of gastric carcinoma *Gan To Kagaku Ryoho* 22(11), 1595-1597
  89. Herlyn D, 1985. Monoclonal antibody-dependent murine macrophage-mediated cytotoxicity against human tumors is stimulated by lentinan. *Jpn J Cancer Res* 76(1), 37-42
  90. Heyland DK. In search of the magic nutraceutical: problems with current approaches. *J Nutr.* 2001 Sep;131(9 Suppl):2591S-5S.
  91. Hirasawa M, et al. 1999. Three kinds of antibacterial substances from *Lentinus edodes* (Berk.) Sing. (Shiitake, an edible mushroom). *Int J Antimicrob Agents.* Feb;11(2):151-7.
  92. Hishida I, 1988. Antitumor activity exhibited by orally administered extract from fruit body of *Grifola frondosa* (maitake). *Chem Pharm Bull (Tokyo)* 36(5), 1819-1827
  93. Hockaday TD. Two herbal preparations, *Cordyceps Cs4* and *Cogent db*: do they act on blood glucose, insulin sensitivity, and diabetes as "viscous dietary fibers?". *J Altern Complement Med.* 2002 Aug;8(4):403-5.
  94. Hokama Y. et al. 1981. In Vitro Inhibition of Platelet Aggregation with Low dalton Compounds from Aqueous Dialysates of Edible Fungi. *Res. Comm. Chem. Pathol. & Pharmacol.* 31:177-80
  95. - Honma, H., Oshima, S., Watanabe, S. et al. (1982). Clinical efficacy of schizophyllan (SPG) in treatment of lung cancers. A Randomized controlled study. *Haigan* 22: 499-512.
  96. Hong, Z. & Y. Li. 1990. Immuno-pharmacological functions of *Cordyceps*. *Chi J Int Trad & West Med.* 10(9): 570-571.
  97. Horiuchi Y, Kimura R, Kato N, Fujii T, Seki M, Endo T, Kato T, Kawashima K. Evolutional

- study on acetylcholine expression. *Life Sci.* 2003 Feb 28;72(15):1745-1756.
98. Hu H, Ahn NS, Yang X, Lee YS, Kang KS. Ganoderma lucidum extract induces cell cycle arrest and apoptosis in MCF-7 human breast cancer cell. *Int J Cancer.* 2002 Nov 20;102(3):250-3.
  99. Hugenholtz J, Smid EJ. Nutraceutical production with food-grade microorganisms. *Curr Opin Biotechnol.* 2002 Oct;13(5):497-507.
  100. Hsu MJ, Lee SS, Lin WW. Polysaccharide purified from Ganoderma lucidum inhibits spontaneous and Fas-mediated apoptosis in human neutrophils through activation of the phosphatidylinositol 3 kinase/Akt signaling pathway. *J Leukoc Biol.* 2002 Jul;72(1):207-16.
  101. Iino Y, Yokoe T, Ohwada S, et al. Eight-year results of adjuvant immunochemotherapies vs chemotherapy in the treatment of operable breast cancer. 18th International Congress of Chemotherapy. June 27-July 2, 1993, Stockholm, Sweden, p. 162, 1993.
  102. Ikekawa T, 1969. Antitumor activity of aqueous extracts of edible mushrooms. *Cancer Res* 29 (3), 734-735
  103. Ikumoto, T. et al 1991. Physiologically active compounds in the extracts from Tockukaso and cultured mycelia of Cordyceps and Isaria. *Yakugaku Zasshi* 111(9): 504-509.
  104. Inoue A, Kodama N, Nanba H. Effect of maitake (*Grifola frondosa*) D-fraction on the control of the T lymph node Th-1/Th-2 proportion. *Biol Pharm Bull.* 2002 Apr;25(4):536-40.
  105. Irinoda, K. 1992. Stimulation of microbicidal host defense mechanisms against aerosol influenza virus infection by lentinan. *Int. j Immunopharmacol.* 14:971-977.
  106. Ishii K, Kita T, Hirata J, et al. Antitumor effect of PSK and its combined effect with CDDP on ovarian serous adenocarcinoma-bearing nude mice. *Nippon Sanka Fujinka Gakkai Zasshi* 45:333-9, 1993.
  107. Ishizuka T, 1995. Effects of interferon-gamma on cell differentiation and cytokine production of a human monoblast cell line, U937. *Inflammation* 19(6), 627-636 (1995)
  108. Ito H, 1972. Antitumor activity of Basidiomycetes. *Nippon Yakurigaku Zasshi* 68(4), 429-44
  109. James, J. S. 1986. Shiitake, Lentinen, and AIDS/ARC. *Aid Treatment News.* 19:1-6.
  110. Jennemann R, et al. 1999. Basidiolipids from *Agaricus* are novel immune adjuvants. *Immunobiology.* Jun;200(2):277-89.
  111. Jia, YF., Zhou, XB., Meng, H., and Zhang, LX. Effects of Ling-Zhi on hemopoietic system in mice - immunopharmacological study (11). In *The research on ganoderma (part I)*. Zhu S. and Mori M. (eds). Shanghai Med. U. Press, Shanghai, P. 284-288.
  112. Jingyi W, et al. 1997. Observation on the effects of Chinese medicine zhenxuanyin for improving cerebral blood flow in rats with cerebral ischemia. *J Tradit Chin Med.* Dec;17(4):299-303.
  113. Jong, S.C., J.M. Birmingham and S.H. Pai, 1991. Immuno-modulatory substances of fungal origin. *Journal of Immunol. Immunopharmacol.* Vol. XI, N. 3.
  114. Jong, S.C. and J.M. Birmingham, 1992. Medicinal effects of the mushroom Ganoderma. *Adv. Appl. Microbiol.* 37:101-134.
  115. Jong SC, 1993. Medicinal and therapeutic value of the shiitake mushroom. *Adv Appl Microbiol* 39, 153-184
  116. Kabir Y, 1987. Effect of shiitake (*Lentinus edodes*) and maitake (*Grifola frondosa*) mushrooms on blood pressure and plasma lipids of spontaneously hypertensive rats. *J Nutr Sci Vitaminol*

- (Tokyo) 33(5), 341-346
117. Kahlos, K. et al., 1996. Preliminary tests of antiviral activity of two *Inonotus obliquus* strains. *Fitoptera* 6 (4) 344-7.
  118. Kanayama H, et al. 1983. A new antitumor polysaccharide from the mycelia of *Poria cocos* Wolf. *Chem Pharm Bull (Tokyo)*. Mar 1; 31(3): 1115-1118.
  119. Kanayama H, et al. 1986. [Studies on the antitumor-active polysaccharides from the mycelia of *Poria cocos* Wolf. I. Fractionation and purification of antitumor polysaccharide H11]. *Yakugaku Zasshi*. Mar 1; 106(3): 199-205. Japanese.
  120. Kanayama H, et al. 1986. [Studies on the antitumor-active polysaccharides from the mycelia of *Poria cocos* Wolf. II. Structural analysis of antitumor polysaccharide H11]. *Yakugaku Zasshi*. Mar 1; 106(3): 206-211. Japanese.
  121. Kanayama H, et al. 1986. [Studies on the antitumor active polysaccharides from the mycelia of *Poria cocos* Wolf. III. Antitumor activity against mouse tumors]. *Yakugaku Zasshi*. Apr 1; 106(4): 307-312. Japanese.
  122. Kanemoto, M. 1983. Acute Oral Toxicity Study of *Lentinus Edodes* Mycelial Powder (*Moncelium rtm* powder) in Male and Female Mice, Biotechnical Research Laboratories, Inc., Tech. Report No. 830916A, Oct. 20.
  123. Kato, T., et al. 1979. Reduction of serum X-proline-dipeptidyl-aminopeptidase activity in tumor-bearing mice and reversal of reduced enzyme activity by lentinan, an anti-tumor polysaccharide, *Experimentia*, vol. 35 (3), pg. 409.
  124. Kawagishi et al., 1991. "Hericenones C, D and E, Stimulators of nerve growth factor (NGF)-synthesis from the mushroom *Herichium erinaceum*." *Tetrahedron Letters*, vol. 32, no. 35, pp. 4561-4564.
  125. Kawagishi et al., 1994. Erinacines A, B, C, strong stimulators of nerve growth factor synthesis, from the mycelia of *Herichium erinaceum*. *Tetrahedron Letters* 35 (10): 1569-1572.
  126. Kawagishi H, 1997. A lectin from mycelia of the fungus *Ganoderma lucidum*. *Phytochemistry* 44(1), 7-10
  127. Keogh E.J. and Impotence Study Group of Western Australia . 1991. Medical Management of Impotence. *Mod. Med. Australia* 2:51-65
  128. Kiho T, 1993. Polysaccharides in fungi. XXXII. Hypoglycemic activity and chemical properties of a polysaccharide from the cultural mycelium of *Cordyceps sinensis*. *Biol Pharm Bull* 16(12), 1291-1293
  129. Kiho T, et al. 1995. Polysaccharides in fungi. XXXV. Anti diabetic activity of an acidic polysaccharide from the fruiting bodies of *Tremella aurantia*. *Biol Pharm Bull.*; 18(12): 1627-1629.
  130. Kiho T, 1996. Polysaccharides in fungi. XXXVI. Hypoglycemic activity of a polysaccharide (CS-F30) from the cultural mycelium of *Cordyceps sinensis* and its effect on glucose metabolism in mouse liver. *Biol Pharm Bull* 19(2), 294-296
  131. Kiho T, et al. 1999. Structural features and hypoglycemic activity of a polysaccharide (CS-F10) from the cultured mycelium of *Cordyceps sinensis*. *Biol Pharm Bull*. Sep;22(9):966-70.
  132. Kim, B.K., H.W. Kim and E.C. Choi, 1994. Anti-HIV effects of *Ganoderma lucidum*. In : *Ganoderma: Systematics, Phytopathology & Pharmacology: Proceedings of Contributed Symposium 59 A,B*. 5th International Mycological Congress. Vancouver.

133. Kim, B.K., H.W. Kim and E.C. Choi, 1996. Medicinal Efficacies of *Ganoderma lucidum* (XV) Anti-HIV Activities of *Ganoderma lucidum*. 187-194. In: Royse, D.J. (ed). 1996. Mushroom Biology and Mushroom Products. Proceedings of the Second International Congress.
134. Kim DH, et al.1999. Beta-glucuronidase-inhibitory activity and hepatoprotective effect of *Ganoderma lucidum*. *Biol Pharm Bull*. 1999 Feb;22(2):162-4.
135. Kim HS, et al. 1999. In vitro chemopreventive effects of plant polysaccharides (*Aloe barbadensis miller*, *Lentinus edodes*, *Ganoderma lucidum* and *Coriolus versicolor*). *Carcinogenesis*. Aug;20(8):1637-40.
136. Kim KC, et al. 1999. *Ganoderma lucidum* extract protects DNA from strand breakage caused by hydroxyl radical and UV irradiation. *Int J Mol Med*. Sep;4(3):273-7.
137. Kim JR, Yeon SH, Kim HS, Ahn YJ. Larvicidal activity against *Plutella xylostella* of cordycepin from the fruiting body of *Cordyceps militaris*. *Pest Manag Sci*. 2002 Jul;58(7):713-7.
138. Kim RS, 1997. Suppressive effects of *Ganoderma lucidum* on proliferation of peripheral blood mononuclear cells. *Mol Cells* 7(1), 52-5
139. Kim SW, Hwang HJ, Xu CP, Sung JM, Choi JW, Yun JW. Optimization of submerged culture process for the production of mycelial biomass and exo-polysaccharides by *Cordyceps militaris* C738. *J Appl Microbiol*. 2003;94(1):120-6.
140. Kobayashi H, Kumagai F, Itagaki T, Koyama T, Inokuchi N, Iwama M, Ohgi K, Irie M. Amino acid sequence and characterization of a nuclease (nuclease Le3) from *Lentinus edodes*. *Biosci Biotechnol Biochem*. 2002 Jun;66(6):1345-55.
141. Kodama N, Komuta K, Nanba H. Can maitake MD-fraction aid cancer patients? *Altern Med Rev*. 2002 Jun;7(3):236-9. Review.
142. Kodama N, Harada N, Nanba H. A Polysaccharide, Extract From *Grifola frondosa*, Induces Th-1 Dominant Responses in Carcinoma-Bearing BALB/c Mice. *Jpn J Pharmacol*. 2002 Dec;90(4):357-60.
143. Kodama N, Komuta K, Sakai N, Nanba H. Effects of D-Fraction, a Polysaccharide from *Grifola frondosa* on Tumor Growth Involve Activation of NK Cells. *Biol Pharm Bull*. 2002 Dec;25(12):1647-50.
144. Koh JH, Kim JM, Chang UJ, Suh HJ. Hypocholesterolemic Effect of Hot-Water Extract from Mycelia of *Cordyceps sinensis*. *Biol Pharm Bull*. 2003 Jan;26(1):84-7.
145. Koh JH, Yu KW, Suh HJ, Choi YM, Ahn TS. Activation of macrophages and the intestinal immune system by an orally administered decoction from cultured mycelia of *Cordyceps sinensis*. *Biosci Biotechnol Biochem*. 2002 Feb;66(2):407-11.
146. Konishi, H. 1988. Polysaccharides-contg. extracts from Heterobasidiae as anti inflammatory agents. *Jpn. Kokai Tokkyo Koho 63 JP 63, 183, 537 [88,183,537]*.
147. Koyama K, 1997. Antinociceptive components of *Ganoderma lucidum*. *Planta Med* 63(3), 224-227 (1997)
148. Kubo, K., H. Aoki, & H. Nanba, 1994. Anti-diabetic activity present in the fruit body *Grifola frondosa* (Maitake). *Biol. Pharm. Bull*. 17, 8: 1106-1110.
149. Kubo K, 1996. The effect of maitake mushrooms on liver and serum lipids. *Altern Ther Health Med* 2(5), 62-66
150. Kuo YC, 1994. Growth inhibitors against tumor cells in *Cordyceps sinensis* other than cordycepin and polysaccharides. *Cancer Invest* 12(6), 611-615

151. Kuo YC, 1996. *Cordyceps sinensis* as an immunomodulatory agent. *Am J Chin Med* 24(2), 111-125 (1996)
152. Kupin, V. (1994) A new biological response modifier - *ganoderma lucidum* - and its application in oncology. In Proceedings from the 6th international symposium on *ganoderma lucidum*. Seoul, II Yang, p.36-37.
153. Kurashige S, 1997. Effects of *Lentinus edodes*, *Grifola frondosa* and *Pleurotus ostreatus* administration on cancer outbreak, and activities of macrophages and lymphocytes in mice treated with a carcinogen, N-butyl-N-butanolnitrosoamine. *Immunopharmacol Immunotoxicol* 19(2), 175-183
154. Lee, SS., Chen, FD., Chang, SC., et al. 1984. In vivo anti-tumor effects of crude extracts from the mycelium of *ganoderma lucidum*. *J. of Chinese Oncology Society* 5(3): 22-28.
155. Lei J, 1992. Pharmacological study on *Cordyceps sinensis* (Berk.) Sacc. and *ze-e Cordyceps* *Chung Kuo Chung Yao Tsa Chih* 17(6), 364-366
156. Lei LS, 1993. Effects of *Ganoderma* polysaccharides on the activity of DNA polymerase alpha of splenocytes and immune function in aged mice. *Yao Hsueh Hsueh Pao* 28(8), 577-58
157. Li SP, Su ZR, Dong TT, Tsim KW. The fruiting body and its caterpillar host of *Cordyceps sinensis* show close resemblance in main constituents and anti-oxidation activity. *Phytomedicine*. 2002 May;9(4):319-24.
158. Lieu CW. 1992. The effect of *Ganoderma lucidum* on induction of differentiation in leukemic U937 cells. *Anticancer Res* 12(4), 1211-1215
159. Lin CY. 1999. Inhibition of activated human mesangial cell proliferation by the natural product of *Cordyceps sinensis* (H1-A): an implication for treatment of IgA mesangial nephropathy. *J Lab Clin Med*. Jan;133(1):55-63.
160. Lin JM, 1993. Evaluation of the anti-inflammatory and liver-protective effects of *anoectochilus formosanus*, *ganoderma lucidum* and *gynostemma pentaphyllum* in rats. *Am J Chin Med* 21(1), 59-69
161. Lin JM, 1995. Radical scavenger and antihepatotoxic activity of *Ganoderma formosanus*, *Ganoderma lucidum* and *Ganoderma neo-japonicum*. *J Ethnopharmacol* 47(1), 33-4
162. Lin WH, 1997. Dimerization of the N-terminal amphipathic alpha-helix domain of the fungal immunomodulatory protein from *Ganoderma tsugae* (Fip-gts) defined by a yeast two-hybrid system and site-directed mutagenesis. *J Biol Chem* 272(32), 20044-20048
163. Lin, Z.-B, 1993. Advances in the pharmacology of *Tremella* polysaccharides. *Mushroom Biology and Mushroom Products*. S.T. Chang et al., pp. 293-298. The Chinese University Press.
164. Lin, Y. & G. Wu, 1988. Protective effect of *Polyporus umbellatus* polysaccharide on toxic hepatitis in mice. 9:345-348, from *Abstracts of Chinese Medicines* 1: 444.
165. Lin, Y. et al., 1987. A double-blind treatment of 72 cases of chronic hepatitis with *Lentinan* injection. *New Drugs and Clinical Remedies* 6:362-363, from *Abstracts of Chinese Medicines* 2:325.
166. \_\_\_\_\_, 1989. Pharmacological and gastronomic effects of fungi and its applications. *Chemical Times*, No.1, p. 12-21.
167. Lin PZ, 1984. Inhibitory effect of *Cordyceps* on carcinogenesis of the forestomach in mice. *Chung Hua Chung Liu Tsa Chih* 6(5), 335-337
168. Liu ZY, et al. 1993. [Effect of improving memory and inhibiting acetylcholinesterase activity by

- invigorating-qi and warming-yang recipe, *Poria cocos*]. *Chung Kuo Chung Hsi I Chieh Ho Tsa Chih*. Nov 1; 13(11): 675-676. Chinese.
169. Liu, C. 1992. Effects of *Cordyceps sinensis* on in vitro natural killer cells. *Chung-Kua, chung Hsi I Chieh Ho Tsa Chih* 12: 267-269, 259.
  170. Liu YC, et al. 1995. [Effects of *poria cocos* on ototoxicity induced by kanamycin in guinea-pigs]. *Chung Kuo Chung Hsi I Chieh Ho Tsa Chih*. Jul 1; 15(7): 422-423. Chinese.
  171. Liu F, et al. 1999; Analysis of immunomodulating cytokine mRNAs in the mouse induced by mushroom polysaccharides. *Life Sci*. 64(12):1005-11.
  172. Liu X, Yuan JP, Chung CK, Chen XJ. Antitumor activity of the sporoderm-broken germinating spores of *Ganoderma lucidum*. *Cancer Lett*. 2002 Aug 28;182(2):155-61.
  173. Lu H, Kyo E, Uesaka T, Katoh O, Watanabe H. Prevention of development of N,N'-dimethylhydrazine-induced colon tumors by a water-soluble extract from cultured medium of *Ganoderma lucidum* (Rei-shi) mycelia in male ICR mice. *Int J Mol Med*. 2002 Feb;9(2):113-7.
  174. Lu ZW, 1995. Psychoneuroimmunological effects of morphine and the immunoprotection of *Ganoderma polysaccharides* peptide in morphine-dependent mice. *Sheng Li Ko Hsueh Chin Chan* 26(1), 45-49
  175. Luo J, Zhao YY, Li ZB. A new lanostane-type triterpene from the fruiting bodies of *Ganoderma lucidum*. *J Asian Nat Prod Res*. 2002 Jun;4(2):129-34.
  176. Ma J, Ye Q, Hua Y, Zhang D, Cooper R, Chang MN, Chang JY, Sun HH. New lanostanoids from the mushroom *Ganoderma lucidum*. *J Nat Prod*. 2002 Jan;65(1):72-5.
  177. Maeda YY, 1996. Two genes controlling acute phase responses by the antitumor polysaccharide, lentinan. *Immunogenetics* 43(4), 215-219
  178. Maeda YY & G. Chihara. 1971. Lentinin, a new immuno-accelerator of cell mediated response. *Nature (London)* 229: 634.
  179. Manabe N, 1996. Effects of the mycelial extract of cultured *Cordyceps sinensis* on in vivo hepatic energy metabolism in the mouse. *Jpn J Pharmacol* 70(1), 85-88.
  180. Manohar V, Talpur NA, Echard BW, Lieberman S, Preuss HG. Effects of a water-soluble extract of maitake mushroom on circulating glucose/insulin concentrations in KK mice. *Diabetes Obes Metab*. 2002 Jan;4(1):43-8.
  181. Masayasu, N., et al. 1987. The Effects of the Alcohol Deposit Fraction LAP of LEM in Reinforcing the Macrophages Phagocytosis Ability, *J. Japanese Reticuloendothelial System Res. Assoc.*, vol. 27(1), pp. 201-207.
  182. Matsuoka H, 1995. Usefulness of lymphocyte subset change as an indicator for predicting survival time and effectiveness of treatment with the immunopotentiator lentinan. *Anticancer Res* 15(5B), 2291-2296
  183. Matsuoka H, 1997. Lentinan potentiates immunity and prolongs the survival time of some patients. *Anticancer Res* 17(4A), 2751-2755
  184. Mau JL, Lin HC, Chen CC. Antioxidant properties of several medicinal mushrooms. *J Agric Food Chem*. 2002 Oct 9;50(21):6072-7.
  185. Mitomi, T., Tsuchiya, S., Iijima, N., et al. 1992. Randomized control study on adjuvant immunochemotherapy with PSK in curatively resected colorectal cancer. *Diseases of the Colon & Rectum*. 35(2):123-30.
  186. Mattila P, Salo-Vaananen P, Konko K, Aro H, Jalava T. Basic composition and amino acid

- contents of mushrooms cultivated in Finland. *J Agric Food Chem.* 2002 Oct 23;50(22):6419-22.
187. Miyamoto, T., Abe, T., Hasunuma, K. 1985. Japan Kokai Tokkyo Koho JP60, 199,80 [85,199.810] (CI. A61K7/06). *Appl.* 84/5,977. 24 Mar 1984.
  188. Miyazaki T, 1981. Studies on fungal polysaccharides. XXVII. Structural examination of a water-soluble, antitumor polysaccharide of *Ganoderma lucidum*. *Chem Pharm Bull (Tokyo)* 29(12), 3611-3616
  189. Miyakoshi H, 1984. Acting mechanisms of Lentinan in human--I. Augmentation of DNA synthesis and immunoglobulin production of peripheral mononuclear cells. *Int J Immunopharmacol* 6(4), 365-371
  190. Miyakoshi H, 1984. Acting mechanisms of Lentinan in human--II. Enhancement of non-specific cell-mediated cytotoxicity as an interferon inducer. *Int J Immunopharmacol* 6(4), 373-379
  191. Mizoguchi, Y. et al. 1987. Protection of liver cells against experimental damage by extract of cultured *Lentinus edodes* mycelia (LEM). *Gast. Japonica* 22:459-464.
  192. Mizoguchi, Y., et al. 1987. Determination of IL-1 Activity in the Supernatant of a Macrophage Culture Treated with LEM, *Kantansui*, vol. 15(1), pp. 127-135.
  193. Mizoguchi, Y. 1987. The Effects of LEM on the Induction of anti-TNP-SRBC Antibody Producing Cells by PWM Stimulation, *Kantansui*, vol. 15(1), pp. 127-135.
  194. Mizono M, 1996. Preparation and specificity of antibodies to an anti-tumor beta-glucan, lentinan. *Biochem Mol Biol Int* 39(4), 679-685 (1996)
  195. Mizuno, T., 1988. Development and utilization of bioactive substances from medicinal and edible mushroom fungi. II. *Ganoderma lucidum*. *Chemical Times* 1989 (3) 50-60.
  196. Mizuno, T., Hagiwara, T., Nakamura, T., Ito, H. Shimura, K. Sumiya, T., Asakura, A. 1990. Antitumor activity and some properties of water-insoluble hetero-glycans from "Himematsutake," the fruiting body of *Agaricus blazei* Murill. *Agricultural & Biological Chemistry* 54. Tokyo. pp. 2897-2905.
  197. Mizuno T, 1992. Antitumor-active polysaccharides isolated from the fruiting body of *Herichium erinaceum*, an edible and medicinal mushroom called yamabushitake or houtou. *Biosci Biotechnol Biochem* 56(2), 347-348
  198. Mizuno, T., H. Saito, T. Nishitoba, & H. Kawagishi, 1995. Antitumor active substances from mushrooms. *Food Reviews International* 11: 23-61.
  199. Mizuno, T. 1996. A development on anti tumor polysaccharides from mushroom fungi. *FFI Journal*, 167:69-85.
  200. Mlodecki H, 1968. Tryptophan content in some edible mushrooms. *Rocz Panstw Zakl Hig* 19 (4), 453-457
  201. Mori, H. 1987. Effect of immunostimulants and antitumor agents on tumor necrosis factor (TNF) production. *Int. J. Immunopharmacol.* 9: 881-882.
  202. Morinaga H, 1994. An in vivo study of hepatic and splenic interleukin-1 beta mRNA expression following oral PSK or LEM administration. *Jpn J Cancer Res* 85(12), 1298-1303
  203. Muhlbacher F. & Kapadia C. 1982. Glutamine Metabolism in Skeletal Muscle Role of Glucocorticoids. *Langenbeck's Arch. Chir.* 357:203 (abstr.)
  204. Murakami M, 1997. Decreased pulmonary perfusion in hypersensitivity pneumonitis caused by Shiitake mushroom spores. *J Intern Med* 241(1), 85-88 (1997)
  205. Murata T, 1996. Lentinan enhances sensitivity of mouse colon 26 tumor to cis-

- diamminedichloroplatinum (II) and decreases glutathione transferase expression. *Jpn J Cancer Res* 87(11), 1171-1178
206. Murcia MA, Martinez-Tome M, Jimenez AM, Vera AM, Honrubia M, Parras P. Antioxidant activity of edible fungi (truffles and mushrooms): losses during industrial processing. *J Food Prot.* 2002 Oct;65(10):1614-22.
  207. Nakamura K, et al. 1999. Inhibitory effect of *Cordyceps sinensis* on spontaneous liver metastasis of Lewis lung carcinoma and B16 melanoma cells in syngeneic mice. *Jpn J Pharmacol.* 1999 Mar;79(3):335-41.
  208. Nakamura K. 1999. Activation of in vivo Kupffer cell function by oral administration of *Cordyceps sinensis* in rats. *Jpn J Pharmacol.* 1999 Apr;79(4):505-8.
  209. Nakano H, et al. 1999. A multi-institutional prospective study of lentinan in advanced gastric cancer patients with unresectable and recurrent diseases: effect on prolongation of survival and improvement of quality of life. Kanagawa Lentinan Research Group. *Hepatogastroenterology.* Jul-Aug;46(28):2662-8.
  210. Nakazato H, Koike A, Saji S, et al. Efficacy of immunochemotherapy as adjuvant treatment after curative resection of gastric cancer. Study Group of Immunochemotherapy with PSK for Gastric Cancer. *Lancet* 343(8906):1122-6, 1994.
  211. Nanba, H. 1987. The chemical structure of an antitumor polysaccharide in fruitbodies of *Grifola frondosa* (Maitake). *Chem. Pharm. Bull.* 35:1162-8
  212. Nanba, H. 1995. Results of Non-Controlled Clinical Study for Various Cancer Patients Using Maitake D-Fraction. *Explore!* vol. 6, no. 5: 19-21.
  213. Nanba H. 1995. Activity of maitake D-fraction to inhibit carcinogenesis and metastasis. *Ann N Y Acad Sci;* 768:243-5 1995
  214. Narui T, et al. 1980. A polysaccharide produced by laboratory cultivation of *Poria cocos* Wolf. *Carbohydr Res.* Dec 1; 87(1): 161-163.
  215. Nemoto Y, Satoh K, Toriizuka K, Hirai Y, Tobe T, Sakagami H, Nakashima H, Ida Y. Cytotoxic and radical scavenging activity of blended herbal extracts. *In Vivo.* 2002 Sep-Oct;16 (5):327-32.
  216. Ng TB. 1998. A review of research on the protein-bound polysaccharide (polysaccharopeptide, PSP) from the mushroom *Coriolus versicolor* (Basidiomycetes: Polyporaceae). *Gen Pharmacol.* 1998 Jan;30(1):1-4.
  217. Ng ML, Yap AT. Inhibition of Human Colon Carcinoma Development by Lentinan from Shiitake Mushrooms (*Lentinus edodes*). *J Altern Complement Med.* 2002 Oct;8(5):581-9
  218. Nunoshiba, T., et. al. 1990. Antimutagenic activity of hoelen extracts. *Sci. Eng. Rev. Doshisha Univ.* 30:266-272.
  219. Odani S, et al. 1999. The inhibitory properties and primary structure of a novel serine proteinase inhibitor from the fruiting body of the basidiomycete, *Lentinus edodes*. *Eur J Biochem.* Jun;262 (3):915-23.
  220. O'Dorisio M.S. et al. 1985. Vasoactive Intestinal Polypeptide & Neuropeptide Modulation of the Immune Response. *J. Immunol.* 135:792S-796S
  221. Ogawa K, 1994. Study on intratumor administration of lentinan--primary changes in cancerous tissues. *Gan To Kagaku Ryoho* 21(13), 2101-2104
  222. Ogawa T, et al. 1999. Effects of 5'-DFUR and lentinan on cytokines and PyNPase against AH66

- ascites hepatoma in rats. *Anticancer Res.* Jan-Feb;19(1A):375-9.
223. Oguchi, Y. 1987. Effect of PSK on cytotoxicity against sarcoma180 in tumor-bearing mice. *Anticancer Research. Pt. B* 7:681-4.
  224. Ohmori T, 1986. Antitumor activity of protein-bound polysaccharide from *Cordyceps ophioglossoides* in mice. *Jpn J Cancer Res* 77(12), 1256-126
  225. Ohno N, 1985. Neutral and acidic antitumor polysaccharides extracted from cultured fruit bodies of *Grifola frondosa*. *Chem Pharm Bull (Tokyo)* 33(3), 1181-118
  226. Ohno, N., K. Iino, T. Takeyama, I. Suzuki, K. Sato, S. Oikawa, T. Miyazaki, & T. Yadomae, 1985. Structural characterization and antitumor activity of the extracts from matted mycelium of cultured *Grifola frondosa*. *Chem. Pharm. Bull.* 33 (8) 3395-3401.
  227. Ohtsuru, M., 1992 Anti-Obesity Activity Exhibited by Orally Administered Powder of Maitake Mushroom (*Grifola frondosa*), Anshin, July, pp. 198.
  228. Okamura M, 1994. Distribution of ascorbic acid analogs and associated glycosides in mushrooms. *J Nutr Sci Vitaminol (Tokyo)* 40(2), 81-9
  229. Okamoto, K., et al. 1993. Antimicrobial chlorinated orcinol derivatives from mycelium of *Herichium erinaceus*. *Phytochemistry*, vol. 34, no. 5, pp. 1445-1446.
  230. Okazaki M, Adachi Y, Ohno N, Yadomae. 1995. Structure-activity relationship of (1 $\rightarrow$ 3)-beta-D-glucans in the induction of cytokine production from macrophages, in vitro. *Biol Pharm Bull*; 18(10):1320-7.
  231. Okuda, T., Yoshioka, T., et al. 1972. Anti-complementary activity of anti-tumor polysaccharides, *Nature, New Biol.*, vol. 238, pg. 59.
  232. Olsen R. et al. 1989. In: *Bio-Medical Applications of Chiton & its Derivatives - Chitin & Chitosan* Eds. S.K. Jak-Brack et al. Elsevier Science Pub. 813-28
  233. Ooi LS, Liu F, Ooi VE, Ng TB, Fung MC. Gene expression of immunomodulatory cytokines induced by *Narcissus tazetta* lectin in the mouse. *Biochem Cell Biol.* 2002;80(2):271-7.
  234. Otsuka M, 1996. Influences of a shiitake (*Lentinus edodes*)-fructo-oligosaccharide mixture (SK-204) on experimental pulmonary thrombosis in rats *Yakugaku Zasshi* 116(2), 169-173 (1996)
  235. Park EJ, 1997. Antifibrotic effects of a polysaccharide extracted from *Ganoderma lucidum*, glycyrrhizin, and pentoxifylline in rats with cirrhosis induced by biliary obstruction. *Biol Pharm Bull* 20(4), 417-420
  236. Pochanavanich P, Suntornsuk W. Fungal chitosan production and its characterization. *Lett Appl Microbiol.* 2002;35(1):17-21.
  237. Rafique M, 1995. Effects of intraportal administration of chemoimmunotherapeutic agents on natural killer cell activity in the rat liver. *J Surg Oncol* 60(3), 154-159
  238. Salvucci O, 1996. Differential regulation of interleukin-12- and interleukin-15-induced natural killer cell activation by interleukin-4. *Eur J Immunol* 26(11), 2736-2741
  239. Sasaki T, 1976. Further study of the structure of lentinan, an anti-tumor polysaccharide from *Lentinus edodes*. *Carbohydr Res* 47(1), 99-104
  240. Sato T, et al. 1998. Transformation of the edible basidiomycete *Lentinus edodes* by restriction enzyme-mediated integration of plasmid DNA. *Biosci Biotechnol Biochem.* 1998 Dec;62 (12):2346-50.
  241. Scharf, M. B. et al. 1989. Comparative Effects of Prazosin and Hydrochlorothiazide on Sexual Function in Hypertensive Men. *Am. J. Med.* 86 Supp 18:110-112

242. Schillings RT & HW Ruekies. 1968. Poricin, an acidic protein with anti-tumor activity from a basidiomycete. II. Crystalization, composition and properties. Arch. Biochem. Biophys. 127: 672-679.
243. Schinella GR, Tournier HA, Prieto JM, Mordujovich D, Rios JL. Antioxidant activity of anti-inflammatory plant extracts. Life Sci. 2002 Jan 18;70(9):1023-33.
244. Shao G, 1985. Treatment of hyperlipidemia with cultivated Cordyceps--a double-blind, randomized placebo control trial. Chung Hsi I Chieh Ho Tsa Chih 5(11), 652-65
245. Shieh YH, Liu CF, Huang YK, Yang JY, Wu IL, Lin CH, Li SC. Evaluation of the hepatic and renal-protective effects of Ganoderma lucidum in mice. Am J Chin Med. 2001;29(3-4):501-7.
246. Shimada Y, Morita T, Sugiyama K. Effects of Lentinus edodes on fatty acid and molecular species profiles of phosphatidylcholine in rats fed different levels of corn oil. Biosci Biotechnol Biochem. 2002 Aug;66(8):1759-63.
247. Shi, JH. 1993. PSP for the protection of the tumorous patients during chemotherapy. In 1993 PSP Intl Symposium, Yang QY and Kwok CY (eds.), Fudan U. Press, Shanghai, p.271-2
248. Shi YL, James AE, Benzie IF, Buswell JA. Mushroom-derived preparations in the prevention of H<sub>2</sub>O<sub>2</sub>-induced oxidative damage to cellular DNA. Teratog Carcinog Mutagen. 2002;22(2):103-11.
249. Sia GM, et al. 1999. Effects of shiitake (*Lentinus edodes*) extract on human neutrophils and the U937 monocytic cell line. Phytother Res. 1999 Mar;13(2):133-7.
250. Sliva D, Labarrere C, Slivova V, Sedlak M, Lloyd FP Jr, Ho NW. Ganoderma lucidum suppresses motility of highly invasive breast and prostate cancer cells. Biochem Biophys Res Commun. 2002 Nov 8;298(4):603-12.
251. Smriga M, et al. 1995. Hoelen (*Poria Cocos Wolf*) and ginseng (*Panax Ginseng C. A. Meyer*), the ingredients of a Chinese prescription DX-9386, individually promote hippocampal long-term potentiation in vivo. Biol Pharm Bull. Apr 1; 18(4): 518-522.
252. Snow E.C. 1985. Insulin & Growth Hormone Function as Minor Growth Factors that Potentiate Lymphocyte Activation. J. Immunol. 135 Suppl.740-746.
253. Soo, T.S., 1994. The therapeutic value of Ganoderma lucidum. Proceedings of Contributed Symposium 59 A,B. 5th International Mycological Congress. Vancouver. pp. 105-113.
254. Soo, T. S. 1996. Effective Dosage of the extract of Ganoderma lucidum in the Treatment of Various Ailments. 177-186 In: Royse, D.J. (ed). 1996. Mushroom Biology and Mushroom Products. Proceedings of the Second International Congress.
255. Sorimachi, K., et al. 1990. Anti-Viral Activity of Water-solubilized Lignin Derivatives in vitro, Agri. Biol. Chem., vol.54(5), pp.1337-1339.
256. Spittler A, 1997. Effects of 1 alpha,25-dihydroxyvitamin D<sub>3</sub> and cytokines on the expression of MHC antigens, complement receptors and other antigens on human blood monocytes and U937 cells: role in cell differentiation, activation and phagocytosis. Immunology 90(2), 286-293 (1997)
257. Stackl W. Et al. 1988. Intracavernous Injection of Prostaglandin E1 in Impotent Men. J. Urol 140:67-68
258. Stavinoha, W. 1993. Short term dietary supplementation with ganoderma lucidum slows development and growth of microadenomatous lesions in the colon .... Presented at the 5th international symposium on ganoderma lucidum, Seoul, Korea on June 17, 1993.

259. Stavinoha, W., Satsangi, N., & Weintraub, S. 1995. Study of the antiinflammatory efficacy of *Ganoderma lucidum*. In B.-K. Kim, & Y.S. Kim (Eds.), *Recent Advances in Ganoderma lucidum research* (pp. 3-7). Seoul Korea: The Pharmaceutical Society of Korea. Stavinoha, W., Slana, J., Weintraub, S., & Mobley, P. (1991). The Antiinflammatory activity of *Ganoderma lucidum*. *Third International Symposium on Ganoderma lucidum*, 9-21.
260. Suga, T., Shiio, T., Maeda, YY., Chihara, G. 1994. Anti tumor activity of lenytinan in murine syngeneic and autochthonous hosts and its suppressive effect on 3 methylcholanthrene induced carcinogenesis. *Cancer Res.* 44:5132-7.
261. Sugano, N. et al. 1982. Anticarcinogenic actions of water soluble and alcohol insoluble fractions of culture medium of *Lentinus edodes* mycelia. *Cancer Letters* 17: 109-114.
262. Sun L, Cai H, Xu W, Hu Y, Lin Z. CaMV 35S promoter directs beta-glucuronidase expression in *Ganoderma lucidum* and *Pleurotus citrinopileatus*. *Mol Biotechnol.* 2002 Mar;20(3):239-44.
263. Suzuki M, 1994. Curative effects of combination therapy with lentinan and interleukin-2 against established murine tumors, and the role of CD8-positive T cells. *Cancer Immunol Immunother* 38(1), 1-8
264. Szedlay G. Is the widely used medicinal fungus the *Ganoderma lucidum* (Fr.) Karst. sensu stricto? (A short review). *Acta Microbiol Immunol Hung.* 2002;49(2-3):235-43. Review.
265. Taguchi T. et al. 1985. End Point Results of Phase 3 Study of Lentinan. *Japanese J. Cancer Chemother.* 12:366-78
266. Taguchi, T.1987. Clinical efficacy of lentinan on patients with stomach cancer: end point results of four-year follow-up survey. *Cancer Detection & Prevention. Suppl.* 1:333-49.
267. Takehara, M. et al. 1983. Antitumor effects of virus-like particles from *Lentinus edodes* (Shiitake) on Ehrlich Ascites Carcinoma in mice. *Archiv Virology* 68: 297-301.
268. Takeshita K, 1991. Diversity of complement activation by lentinan, an antitumor polysaccharide, in gastric cancer patients *Nippon Geka Gakkai Zasshi* 92(1), 5-11
269. Takeshita K, 1993. Effect of lentinan on lymphocyte subsets of peripheral blood, lymph nodes, and tumor tissues in patients with gastric cancer. *Surg Today* 23(2), 125-129
270. Takatsuki F, 1995. Lentinan augments skin reaction induced by bradykinin: its correlation with vascular dilatation and hemorrhage responses and antitumor activities. *Int J Immunopharmacol* 17(6), 465-474
271. Takeshita K, 1996. Monocyte function associated with intermittent lentinan therapy after resection of gastric cancer. *Surg Oncol* 5(1), 23-28
272. Talpur NA, Echard BW, Fan AY, Jaffari O, Bagchi D, Preuss HG. Antihypertensive and metabolic effects of whole Maitake mushroom powder and its fractions in two rat strains. *Mol Cell Biochem.* 2002 Aug;237(1-2):129-36.
273. Talorete TP, Isoda H, Maekawa T. *Agaricus blazei* (class Basidiomycotina) aqueous extract enhances the expression of c-Jun protein in MCF7 cells. *J Agric Food Chem.* 2002 Aug 28;50(18):5162-6.
274. Tamura R, 1997. Effects of lentinan on abnormal ingestive behaviors induced by tumor necrosis factor. *Physiol Behav* 61(3), 399-410
275. Tan YH, 1994. High concentrations of mannitol in the shiitake mushroom *Lentinula edodes*. *Microbios* 78(318), 31-35 (1994)
276. Tani M, 1993. Augmentation of lymphokine-activated killer cell activity by lentinan. *Anticancer*

Res 13(5C), 1773-1776

277. Tochikura S.T. et al. 1987. Suppression Human Immuno-Deficiency Virus Replication by 3-Azido -3- Deoxythymidine in Various Human Haematopoetic Cell Lines Invitro: Augmentation by the Effect of Lentinan. JPN. J. Cancer Res. (Gann) 78:583
278. Tochikura, T.S., et al. 1988. Inhibition (in vitro) of replication and of the cyptopathic effect of human immunodeficiency virus by an extract of the culture medium of *Lentinus edodes* mycelia, Med. Microbiol. Immunol., vol. 177, pp.235-244.
279. Tokuzen, R., & Okabe, M. 1976. Combined effect of cycloctidine and lentinan on spontaneous mammary tumors in mice, Gann, vol. 67, pg. 327.
280. Torisu M, Hayashi Y, Ishimitsu T, et al. Significant prolongation of disease-free period gained by oral polysaccharide K (PSK) administration after curative surgical operation of colorectal cancer. Cancer Immunol Immunother 31:261-8, 1990.
281. Tseng J, et al. 1992. Suppression of tumor necrosis factor-alpha, interleukin-1 beta, interleukin-6 and granulocyte-monocyte colony stimulating factor secretion from human monocytes by an extract of *Poria cocos*. Chung Hua Min Kuo Wei Sheng Wu Chi Mien I Hsueh Tsa Chih. Feb 1; 25(1): 1-11.
282. Tsunoo, A., N. N. Takemoto, H. Tsuboi, M. Kamiho, A. Nemoto, H. Sasaki, M. Uchida, 1995. *Cordyceps sinensis*: its diverse effects on mammals in vitro and in vivo. New Initiatives in Mycological Research: Proceedings of the Third International Symposium of the Mycological Society of Japan.
283. Tsunoda A. & Ishida N. 1970. A Mushroom Extract as an Interferon Inducer. Ann N.Y. Acad. Sci. 173:719-26
284. Ukai S, 1972. Antitumor activity on sarcoma 180 of the polysaccharides from *Tremella fuciformis* Berk. Chem Pharm Bull (Tokyo) 20(10), 2293-2294
285. Ukai S; Kiho T; Hara C; Kuruma I; Tanaka Y 1983. Polysaccharides in fungi. XIV. Anti-inflammatory effect of the polysaccharides from the fruit bodies of several fungi. J Pharmacobiodyn, 6:12, 983-90
286. Ukiya M, Akihisa T, Tokuda H, Hirano M, Oshikubo M, Nobukuni Y, Kimura Y, Tai T, Kondo S, Nishino H. Inhibition of tumor-promoting effects by poricoic acids G and H and other lanostane-type triterpenes and cytotoxic activity of poricoic acids A and G from *Poria cocos*. J Nat Prod. 2002 Apr;65(4):462-5.
287. van der Hem LG, 1995. Ling Zhi-8: studies of a new immunomodulating agent. Transplantation 60(5), 438-443
288. Vetter J, 1995. Mineral and amino acid contents of edible, cultivated shii-take mushrooms (*Lentinus edodes*) Z Lebensm Unters Forsch 201(1), 17-19
289. Wagner, H. & A. Proksch. 1995. Immunostimulatory Drugs of Fungi and Higher Plants. In: Economic and Medical Plant research. Academic Press, NY.
290. Wan, F. and D. Huango. 1992. Anti-inflammatory and analgesic actions of artificial and fermentative *Ganoderma sinensis* (AFGS). Chung Kuo Chung Yao Tsa Chih 10: 619-622, 640.
291. Wang, G. 1993. Antitumor active polyaccharides from the Chinese mushroom Songshan lingzhi, the fruiting body of *Ganoderma tsugae*. Bioscience, Biotech. and Biochem. 57: 894-900.
292. Wang GL, 1996. The immunomodulatory effect of lentinan Yao Hsueh Hsueh Pao 31(2), 86-90
293. Wang SM, et al. 1998. Effects of a water-soluble extract of *Cordyceps sinensis* on

- steroidogenesis and capsular morphology of lipid droplets in cultured rat adrenocortical cells. *J Cell Biochem.* Jun 15; 69(4): 483-489.
294. Wang SY, 1997. The anti-tumor effect of *Ganoderma lucidum* is mediated by cytokines released from activated macrophages and T lymphocytes. *Int J Cancer* 70(6), 699-705 (1997)
  295. Wang LY, et al. 1993. [Studies on chemical constituents from solvent extracts of *Poria cocos* (Schw.) Wolf]. *Chung Kuo Chung Yao Tsa Chih.* Oct 1; 18(10): 613-614. Chinese.
  296. Wang YY, Khoo KH, Chen ST, Lin CC, Wong CH, Lin CH. Studies on the immuno-modulating and antitumor activities of *Ganoderma lucidum* (Reishi) polysaccharides: functional and proteomic analyses of a fucose-containing glycoprotein fraction responsible for the activities. *Bioorg Med Chem.* 2002 Apr;10(4):1057-62.
  297. Wasser SP, et al. 1999. Therapeutic effects of substances occurring in higher Basidiomycetes mushrooms: a modern perspective. *Crit Rev Immunol.* 1999;19(1):65-96. Review.
  298. Wasser SP. Medicinal mushrooms as a source of antitumor and immunomodulating polysaccharides. *Appl Microbiol Biotechnol.* 2002 Nov;60(3):258-74. Review.
  299. Watson R.R. et al. 1986. Selenium & Vitamins A.C.E. Nutrients with Cancer Prevention Properties. *J. Am Diet. Assoc.* 86(4):505-10
  300. Wei L, et al. 1999. Treatment of complications due to peritoneal dialysis for chronic renal failure with traditional Chinese medicine. *J Tradit Chin Med.* Mar;19(1):3-9.
  301. Weigent D.A. & Blalock J.E. 1987. Interactions Between the Neuro Endocrine and Immune Systems; Common Hormones & Receptors. *Immunol. Ref.* 100:79-1
  302. Weng SC, Chou CJ, Lin LC, Tsai WJ, Kuo YC. Immunomodulatory functions of extracts from the Chinese medicinal fungus *Cordyceps cicadae*. *J Ethnopharmacol.* 2002 Nov;83(1-2):79-85.
  303. Winkles JA, 1998. Serum- and polypeptide growth factor-inducible gene expression in mouse fibroblasts. *Prog Nucleic Acid Res Mol Biol* 58, 41-78.
  304. Won, S.J., Lee, S.S., Ke, Y.H., Lin, M.T. 1989 Enhancement of splenic NK cytotoxic activity by the extracts of *ganoderma lucidum* mycelium in mice. *J Biomed Lab Sci* 2:201-213.
  305. Wrenshall LE, et al. 1999. Modulation of macrophage and B cell function by glycosaminoglycans. *J Leukoc Biol.* Sep;66(3):391-400.
  306. Xia, E. and Q. Chen. 198. Isolation, analysis and biological activities of the polysaccharide of *Tremella fuciformis*. *ACTA Mycol. Sin.* 7:166-174.
  307. Xioa, L. 1987. Progress in the studies of Chinese drugs with immunological actions. *Zhongchengyao Yanjiu.* 3:25-27.
  308. Xiao PG, 1993. Immunological aspects of Chinese medicinal plants as antiageing drugs. *J Ethnopharmacol* 38(2-3), 167-17
  309. Xiong, H-Z. 1985. Clinical observations of 45 cases of chronic hepatitis by the treatment with *Tremella fuciformis* polysaccgaride. *Chin. f. Antibiot.* 10:363-365.
  310. Xu RH, 1992. Effects of *cordyceps sinensis* on natural killer activity and colony formation of B16 melanoma. *Chin Med J (Engl)* 105(2), 97-101
  311. Xu WH, 1988. Water-soluble constituents of *Cordyceps sinenses* (Berk.) Sacc.--the nucleosides. *Chung Yao Tung Pao* 13(4), 34-36
  312. Xo, W. Z. et al. 1988. Effects of *Cordyceps* on monoamine oxidase and immunity. *Sha J Trad Chinese Med* 1: 48-49.
  313. Yamada, Y., H. Nanba, H. Kuroda, 1990. Antitumor effect of orally administered extracts from

- fruitbody of *Grifola frondosa* (Maitake). *Chemotherapy* (Tokyo) 38, 8: 790-796.
314. Yamaguchi N, 1990. Augmentation of various immune reactivities of tumor-bearing hosts with an extract of *Cordyceps sinensis*. *Biotherapy* 2(3), 199-20.
  315. Yang BK, Kim DH, Jeong SC, Das S, Choi YS, Shin JS, Lee SC, Song CH. Hypoglycemic effect of a *Lentinus edodes* exo-polymer produced from a submerged mycelial culture. *Biosci Biotechnol Biochem*. 2002 May;66(5):937-42.
  316. Yang LY, Huang WJ, Hsieh HG, Lin CY. H1-A extracted from *Cordyceps sinensis* suppresses the proliferation of human mesangial cells and promotes apoptosis, probably by inhibiting the tyrosine phosphorylation of Bcl-2 and Bcl-XL. *J Lab Clin Med*. 2003 Jan;141(1):74-83.
  317. Yang, W, et. al. 1985. Treatment of sexual hypofunction with *Cordyceps sinensis*. *Jiangxi Zhongyiyao* 5:46-47. From: *Abstracts of Chinese Medicine* 1:401.
  318. Yang, QY and Wang, MM. 1995. The effect of *ganoderma lucidum* extract against fatigue and endurance in the absence of oxygen. In *Proc. Contributed. Symposium. 59A, B. 5th Intl Mycol. Cong.*, Buchanan, PK., Hseu, RS and Moncalvo JM., (eds), Taipei, p.101-113.
  319. Yao, PY., Gao, ZM., Fang, ST and Ke, L. 1993. Evaluation of the subsidiary effects of taking PSP orally on the chemotherapy of stomach cancer. In 1993 PSP Intl. Symposium, Yang QY and Kwok CY (eds), Fudan U. Press, Shanghai, p.269-70
  320. Yokota, Masanori. 1992. Koselkai Clinic, Tokyo, Japan, Observatory Trial at AntiObesity Activity of Maitake Mushroom (*Grifola frondosa*), Anshin, July, pp. 202.
  321. Yoon SY, et al. 1994. Antimicrobial activity of *Ganoderma lucidum* extract alone and in combination with some antibiotics. *Arch Pharm Res*. Dec;17(6):438-42.
  322. Yoshida, J. 1989. Antitumor activity of an extract of *Cordyceps sinensis* (Berk.) Sacc. against murine tumor cell line. *Japan J. Exper. Med*. 59:157-160.
  323. Yoshino S, 1990. Effect of intrapleural and/or intraperitoneal lentinan therapy in carcinomatous pleuritis and peritonitis *Gan To Kagaku Ryoho* 17(8), 1588-159
  324. Yu SJ, 1996. Fu-Ling (*Poria cocos*), a Chinese herbal drug, modulates cytokine secretion by human peripheral blood monocytes. *Int J Immunopharmacol* 18(1), 37-4
  325. Zee-Cheng RK. 1992. Shi-quan-da-bu-tang (ten significant tonic decoction), SQT. A potent Chinese biological response modifier in cancer immunotherapy, potentiation and detoxification of anticancer drugs. *Methods Find Exp Clin Pharmacol*. Nov 1; 14(9): 725-736. Review.
  326. Zhang GL, Wang YH, Ni W, Teng HL, Lin ZB. Hepatoprotective role of *Ganoderma lucidum* polysaccharide against BCG-induced immune liver injury in mice. *World J Gastroenterol*. 2002 Aug;8(4):728-33.
  327. Zhang H, 1990. Immunopharmacological effect of *Cordyceps sinensis* *Chung Hsi I Chieh Ho Tsa Chih* 10(9), 570-571 (1990)
  328. Zhang J, 1994. Antitumor active protein-containing glycans from the Chinese mushroom songshan lingzhi, *Ganoderma tsugae* mycelium. *Biosci Biotechnol Biochem* 58(7), 1202-1205
  329. Zhang, L. and M. Yu, 1993. Influence of ling zhi on natural killer cells-Immunopharmacological study (5). From *The research on Ganoderma lucidum* (part one). Shanghai: Shanghai Medical University Press, pp. 246-253.
  330. Zhang LX, 1993. Effect of Japanese *Ganoderma Lucidum* on production of interleukin-2 from murine splenocytes *Chung Kuo Chung Hsi I Chieh Ho Tsa Chih* 13(10), 613-615
  331. Zhang J, et al. 1994 Jul. Antitumor polysaccharides from a Chinese mushroom, "yuhuangmo,"

- the fruiting body of *Pleurotus citrinopileatus*. *Biosci Biotechnol Biochem.*; 58(7): 1195-1201.
332. Zhang P, Zhang L, Cheng S. Solution properties of an alpha-(1-->3)-D-glucan from *Lentinus edodes* and its sulfated derivatives. *Carbohydr Res.* 2002 Feb 5;337(2):155-60.
333. Zhang P, Cheung PC. Evaluation of sulfated *Lentinus edodes* alpha-(1-->3)-D-glucan as a potential antitumor agent. *Biosci Biotechnol Biochem.* 2002 May;66(5):1052-6.
334. Zhang Y, Mills GL, Nair MG. Cyclooxygenase inhibitory and antioxidant compounds from the mycelia of the edible mushroom *Grifola frondosa*. *J Agric Food Chem.* 2002 Dec 18;50(26):7581-5.
335. Zhao CS, Yin WT, Wang JY, Zhang Y, Yu H, Cooper R, Smidt C, Zhu JS. CordyMax Cs-4 improves glucose metabolism and increases insulin sensitivity in normal rats. *J Altern Complement Med.* 2002 Jun;8(3):309-14.
336. Zhao Y, 1991. Inhibitory effects of alcoholic extract of *Cordyceps sinensis* on abdominal aortic thrombus formation in rabbits. *Chung Hua I Hsueh Tsa Chih (Taipei)* 71(11), 612-615
337. Zhao X, 1993. *Cordyceps sinensis* in protection of the kidney from cyclosporine A nephrotoxicity. *Chung Hua I Hsueh Tsa Chih* 73(7), 410-41
338. Zhen F, 1992. Mechanisms and therapeutic effect of *Cordyceps sinensis* (CS) on aminoglycoside induced acute renal failure (ARF) in rats. *Chung Kuo Chung Hsi I Chieh Ho Tsa Chih* 12(5), 288-29
339. Zhou L, 1990. Short-term curative effect of cultured *Cordyceps sinensis* (Berk.) Sacc. Mycelia in chronic hepatitis B. *Chung Kuo Chung Yao Tsa Chih* 15(1), 53-55
340. Zhu JS, et al. 1999. The scientific rediscovery of a precious ancient Chinese herbal regimen: *Cordyceps sinensis*: part II. *J Altern Complement Med.* 1998 Winter;4(4):429-57.
341. Zhu M, et al. 1999. Triterpene antioxidants from *ganoderma lucidum*. *Phytother Res.* Sep;13(6):529-31.



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## A Few Books on Nutraceuticals and the Medicinal Properties of Mushrooms



Medicinal Mushrooms Poster



Medicinal Herbs Poster

1. Arora, David. 2000. [Medicinal Mushrooms](#): 24" X 36" Poster
2. Chang, S.-t., J. Buswell & S-w. Chiu (eds). 1993. Mushroom Biology and Mushroom Products. Proceedings of the First international Congress. Hong Kong: The Chinese University Press. 370 pg.
3. Hobbs, C., 1995. Medicinal Mushrooms: an Exploration of Tradition, Healing and Culture. Botanica Press. 252 pg.
4. Jones, K., 1995. Shiitake: The Healing Mushroom. Healing Arts Press.
5. Jones, K., 1997. Cordyceps: Tonic Food of Ancient China. Sylvan Press.
6. Lee, W. & H & J.A. Friedrich. 1997. Medicinal Benefits of Mushrooms. Keats Publishing.
7. Mondo M.D., E. & Kitei, M. 2001. [Sugars That Heal](#). Ballantine Publishing. 288 pg.
8. Royse, D.J. (ed). 1996. Mushroom Biology and Mushroom Products. Proceedings of the Second International Congress. PennState Univ Press. 581 pg.
9. Stamets, P. 1993. [Growing Gourmet and Medicinal Mushrooms](#) by Paul Stamets. Cultivation techniques and growth requirements for 25 types of mushrooms.
10. Wagner, H. and Proksch, A., 1985. Immunostimulatory Drugs of Fungi and Higher Plants, Ecopomic and Medical Plant Research, Academic Press, New York.

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### Some TCM and Modern Uses of Mushrooms\*

Mushroom/ Uses	<i>Cordyceps sinensis</i>	<i>Lentinula edodes</i> <b>Shiitake</b>	<i>Ganoderma lucidum</i> <b>Reishi</b>	<i>Grifola frondosa</i> <b>Maitake</b>	<i>Tremella fuciformis</i> <b>Silver- Ear</b>	<i>Poria cocos</i> <b>Hoelen</b>
<b>Anti-Viral</b>	+	+	+			+
<b>Anti-Tumor</b>	+	+	+	+	+	+

<b>Immune Enhancer</b>	+	+	+	+	+	+
<b>Anti-inflammatory</b>			+		+	
<b>Blood Pressure</b>	+	+	+	+	+	
<b>Cardio-Vascular</b>	+	+	+		+	
<b>Lower Cholesterol</b>	+	+	+		+	
<b>Increase Libido</b>	+	+				
<b>Kidney Tonic</b>	+		+			
<b>Asthma / Bronchial</b>	+		+		+	
<b>Stress Reduction</b>	+		+			
<b>Diabetes</b>				+	+	
<b>Liver / Hepatitis</b>	+	+	+	+	+	+
<b>Chitin</b>	+	+	+	+	+	+

\*This table has not been evaluated by a Health Professional or Practitioner. It is merely a casual summary the results suggested by the references listed above and does not constitute claims for any product.

**Always consult a health care practitioner before taking any substance or supplement for medicinal purposes.**

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From the Preface... *Alternative Medicine: Expanding Medical Horizons* (NIH). 1994. Brian M. Berman, M.D.& David B. Larson, M.D., M.P.H., U.S Government Printing Office #017-040-00537-7.

"Unfortunately, this debate has failed to take into account the fact that the current health care crisis is primarily a crisis of chronic disease. Today almost 33 million Americans are functionally limited in their daily activities by chronic, debilitating conditions such as arthritis, allergies, pain, hypertension, cancer, depression, cardiovascular disease, and digestive problems. More than 9 million, or almost one-third, of these individuals have limitations so severe that they cannot work, attend school, or maintain a household. The U.S. Public Health Service (PHS) estimates that 70 percent of the current health care budget is spent on the treatment of these individuals; as the population grows older, such conditions will continue to consume an even larger proportion of national health care expenditures. Furthermore, the worldwide pandemic of acquired immunodeficiency syndrome is threatening to completely overwhelm the health care delivery systems in certain areas of the United States."

"While the dominant system of health care in the United States---often called "conventional medicine," or biomedicine---is extremely effective for treating infectious diseases and traumatic injuries, it is often ill equipped to handle complex, multifaceted chronic conditions. One reason is that over the years, conventional medicine has increasingly emphasized finding a single "magic bullet" solution for each condition or disease it confronts. The reality is that many chronic conditions are not amenable to such one-dimensional solutions."

"Rather, such complex conditions require equally multifaceted treatment approaches. Furthermore, it is far less expensive to prevent them from occurring in the first place than to attempt to treat the symptoms and consequences with surgery and expensive drugs, which often offer only short-term solutions..."

"Thus, for health care reform truly to succeed at reducing costs and increasing access, disease prevention must be the ultimate focus of the primary health care system rather than disease treatment. This change in emphasis can be accomplished only by restructuring the current system so that people learn that they are far better off staying healthy than relying on high technology to rescue them from a lifetime of unhealthy living. In addition, to care adequately and cost-effectively for those who already have chronic illnesses, health care reform must incorporate multifaceted approaches to the treatment of these patients, approaches that control the symptoms while alleviating the underlying causes."

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## **Therapeutic effects of substances occurring in higher Basidiomycetes mushrooms: a modern perspective.**

**Wasser SP & Weis AL. 1999. Crit Rev Immunol. 1999;19(1):65-96.**

**International Centre for Cryptogamic Plants and Fungi, Institute of Evolution, University of Haifa, Israel.**

This review highlights some of the recently isolated and identified substances of higher Basidiomycetes mushrooms origin that express promising antitumor, immune modulating, cardiovascular and hypercholesterolemia, antiviral, antibacterial, and antiparasitic effects. Medicinal mushrooms have a long history of use in folk medicine. In particular, mushrooms useful against cancers of the stomach, esophagus, lungs, etc. are known in China, Russia, Japan, Korea, as well as the U.S.A. and Canada. There are about 200 species of mushrooms that have been found to markedly inhibit the growth of different kinds of tumors. Searching for new antitumor and other medicinal substances from mushrooms and to study the medicinal value of these mushrooms have become a matter of great significance. However, most of the mushroom origin antitumor substances have not been clearly defined. Several antitumor polysaccharides such as hetero-beta-glucans and their protein complexes (e.g., xyloglucans and acidic beta-glucan-containing uronic acid), as well as dietary fibers, lectins, and terpenoids have been isolated from medicinal mushrooms. In Japan, Russia, China, and the U.S.A. several different polysaccharide antitumor agents have been developed from the fruiting body, mycelia, and culture medium of various medicinal mushrooms (*Lentinus edodes*, *Ganoderma lucidum*, *Schizophyllum commune*, *Trametes versicolor*, *Inonotus obliquus*, and *Flammulina velutipes*). Both cellular components and secondary metabolites of a large number of mushrooms have been shown to effect the immune system of the host and therefore could be used to treat a variety of disease states.

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## **Recent, Current & Planned Clinical Studies Using Mushrooms & Mushroom Derivatives for the Treatment of Diseases**

**Dr. Stefan Glueck, MD, PhD, Medical Oncologist  
The Ontario Cancer Treatment & Research Foundation**

Ontario, Canada

Summary: Shiitake, *Lentinula edodes* & Cancer therapies. Studies on-going.

**Dr. M. Ghoneum**

## **Drew University of Medicine & Science Los Angeles, CA**

Summary: Shiitake, Lentinula edodes and other unnamed mushrooms ('basidiomycetous fungi') used in a clinical study of 11 cancer patients. Study completed. Ghoneum et al. 1995. "Immunomodulatory and anticancer effects of active hemicellulose compound (AHCC)" International Journal of Immunotherapy XI (1) 23-28

## **Dr. Harry Preuss Georgetown University Washington DC**

Summary: A factor in Maitake mushrooms, Grifola frondosa, reportedly has anti-diabetic properties and helps the body control blood glucose levels by reducing insulin resistance and enhancing insulin sensitivity. Initial studies show that Maitake fractions are free from the side effects associated with conventional drug treatments.

References Compiled by: James Malachowski - Mycologist & Webmaster



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