Beta-Glucan

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BETA-GLUCAN Help on accessing alternative formats, such as Portable Document Format (PDF), Microsoft Word and PowerPoint (PPT) files, can be obtained in the alternate format help section. (PDF Version - 137 KB) This monograph is intended to serve as a guide to industry for the preparation of Product Licence Applications (PLAs) and labels for natural health product market authorization. It is not intended to be a comprehensive review of the medicinal ingredient. Notes Text in parentheses is additional optional information which can be included on the PLA and product label at the applicant's discretion. The solidus (/) indicates that the terms and/or statements are synonymous. Either term or statement may be selected by the applicant. Date February 23, 2024 Proper name(s), Common name(s), Source information Table 1. Proper name(s), Common name(s), Source information Proper name(s) Common name(s) Source information Source material(s) Part(s) Preparation beta-Glucan beta-Glucan beta-D-Glucan Avena sativa Hordeum vulgare Seed Seed bran Isolate Oat beta-Glucan Avena sativa References: Proper name: Charlton et al. 2012; EFSA 2011a,b, 2010; Queenan et al. 2007; Braaten et al. 1994; Uusitupa et al. 1992; Common names: Charlton et al. 2012; EFSA 2011a,b, 2010; Queenan et al. 2007; Braaten et al. 1994; Uusitupa et al. 1992; Source information: USDA 2023; Charlton et al. 2012; Queenan et al. 2007. Route of Administration Oral Dosage Form(s) This monograph excludes foods or food-like dosage forms as indicated in the Compendium of Monographs Guidance Document. Acceptable dosage forms for oral use are indicated in the dosage form drop-down list of the web-based Product Licence Application form for Compendial applications. Use(s) or Purpose(s) Helps reduce/lower LDL cholesterol (which is one risk factor for the development of coronary heart disease) (Charlton et al. 2012; EFSA 2011a,b,2010; AbuMweiss et al. 2010; HC 2010; Wolever et al. 2010; Delahoy et al. 2009; Queenan et al. 2007; Wood 2007; Biorklund et al. 2005; NECP 2002; Brown et al. 1999; Ripsin et al. 1992). Helps reduce/lower bad cholesterol (which is one risk factor for the development of coronary heart disease) (Charlton et al. 2012; EFSA 2011a,b, 2010; AbuMweiss et al. 2010; HC 2010; Wolever et al. 2010; Delahoy et al. 2009; Queenan et al. 2007; Wood 2007; Biorklund et al. 2005; NECP 2002; Brown et al. 1999; Ripsin et al. 1992). Provides support for healthy (postprandial) glucose metabolism (within two hours after a meal) (EFSA 2011a,b; Ulmius et al. 2011; Granfeldt et al. 2008; Panahi et al. 2007; Biorklund et al. 2005; Kabir et al. 2002). Helps improve (postprandial) glucose metabolism (within two hours after a meal) (EFSA 2011a,b; Ulmius et al 2011; Granfeldt et al. 2008; Panahi et al. 2007; Biorklund et al. 2005; Kabir et al. 2002). Source of fiber for the maintenance of good health (CFIA 2022; IOM 2005). Helps support and maintain a healthy digestive system (CFIA 2022; IOM 2005). Note: The above uses can be combined on the product label (e.g., Helps reduce/lower bad cholesterol and improve glucose metabolism). Dose(s) Subpopulation(s) Adults 18 years and older Quantity(ies) 2 - 10 grams of beta-Glucan, per day (Charlton et al. 2011; EFSA 2011a,b, 2010; AbuMweiss et al. 2010; Queenan et al. 2007; IOM 2005; Johnston et al. 1998; Braaten et al. 1994; Torronen et al. 1992; Uusitupa et al. 1992). Direction(s) for use No statement required. Duration(s) of Use No statement required. Risk Information Caution(s) and warning(s) No statement required. Contraindication(s) No statement required. Known adverse reaction(s) No statement required. Non-medicinal ingredients Must be chosen from the current Natural Health Products Ingredients Database (NHPID) and must meet the limitations outlined in the database. Storage conditions Must be established in accordance with the requirements described in the Natural Health Products Regulations. Specifications The finished product specifications must be established in accordance with the requirements described in the Natural and Non-prescription Health Products Directorate (NNHPD) Quality of Natural Health Products Guide. The medicinal ingredient must comply with the requirements outlined in the NHPID. EXAMPLE OF PRODUCT FACTS: Consult the Guidance Document, Labelling of Natural Health Products for more details. References Cited AbuMweis SS, Jew S, Ames NP. Beta-glucan from barley and its lipid lowering capacity: a meta-analysis of randomized, controlled trials. European Journal of Clinical Nutrition 2010;64:1472-1480. Biorklund M, van Rees A, Mensink RP, Onning G. Changes in serum lipids and postprandial glucose and insulin concentrations after consumption of beverages with beta-glucans from oats or barley: a randomised dose-controlled trial. European Journal of Clinical Nutrition 2005;59(11):1272-1281. Braaten JT, Wood PJ, Scott FW, Wolynetz MS, Lowe MK, Bradley-White P, Collins MW. Oat beta-glucan reduces blood cholesterol concentration in hypercholesterolemic subjects. European Journal of Clinical Nutrition 1994;48(7):465-474.

Brown L, Rosner B, Willett WW, Sacks FM. Cholesterol-lowering effects of dietary fiber: a meta-analysis. American Journal of Clinical Nutrition 1999;69(1):30-42. CFIA 2022: Canadian Food Inspection Agency, Food Labelling for Industry [Accessed 2024 February 5]. Available from: http://www.inspection.gc.ca/english/fssa/labeti/guide/ch6ae.shtml Chapter 6: The Elements Within the Nutrition Facts Table Section 6.8.1 Dietary Fibre. [Accessed 2019 May 13]. Available from: http://www.inspection.gc.ca/english/fssa/labeti/guide/ch6ae.shtml Charlton KE, Tapsell LC, Batterham MJ, O'Shea J, Thorne R, Beck E, Tosh SM. Effect of 6 weeks' consumption of ?-glucan-rich oat products on cholesterol levels in mildly hypercholesterolaemic overweight adults. British Journal of Nutrition 2012;107:1037-1047. Delahoy PJ, Magliano DJ, Webb K, Grobler M, Liew D. The relationship between reduction in low-density lipoprotein cholesterol by statins and reduction in risk of cardiovascular outcomes: an updated meta-analysis. Clinical Therapeutics 2009;31(2):236-244. EFSA 2010: Scientific Opinion: Scientific Opinion on the substantiation of a health claim related to oat beta-glucans and lowering blood cholesterol and reduced risk of (coronary) heart disease pursuant to Article 14 of Regulation (EC) No 1924/2006. EFSA Panel on Dietetic Products, Nutrition and Allergies (NDA), European Food Safety Authority (EFSA), Parma, Italy. [Accessed 2024 February 5]. Available from: http://www.efsa.europa.eu/en/efsajournal/doc/1885.pdf EFSA 2011a: Scientific Opinion: Scientific Opinion on the substantiation of health claims related to beta-glucans from oats and barley and maintenance of normal blood LDL-cholesterol concentrations (ID 1236, 1299), increase in satiety leading to a reduction in energy intake (ID 851, 852), reduction of post-prandial glycaemic responses (ID 821, 824), and ‘digestive function’ (ID 850) pursuant to Article 13(1) of Regulation (EC) No 1924/2006. EFSA Panel on Dietetic Products, Nutrition and Allergies (NDA), European Food Safety Authority (EFSA), Parma, Italy. [Accessed 2024 February 5]. Available from: http://www.efsa.europa.eu/en/efsajournal/doc/2207.pdf EFSA 2011b: Scientific Opinion: Scientific Opinion on the substantiation of a health claim related to barley beta-glucans and lowering of blood cholesterol and reduced risk of (coronary) heart disease pursuant to Article 14 or Regulation (EC) No 1924/2006. EFSA Panel on Dietetic Products, Nutrition and Allergies (DNA), European Food Safety Authority (EFSA), Parma, Italy. [Accessed 2024 February 5]. Available from: http://www.efsa.europa.eu/en/efsajournal/doc/2471.pdf Granfeldt Y, Nyberg L, Bjorck I. Muesli with 4 g oat beta-glucans lowers glucose and insulin responses after a bread meal in healthy subjects. European Journal of Clinical Nutrition 2008;62(5):600-607. HC 2010. Oat Products and Blood Cholesterol Lowering; Summary of Assessment of a Health Claim about Oat Products and Blood Cholesterol Lowering. [Accessed 2024 February 5]. Available from: http://www.hc-sc.gc.ca/fn-an/label-etiquet/claims-reclam/assess-evalu/oat-avoine-eng.php IOM 2005: Institute of Medicine of the National Academies. Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids. Food and Nutrition Board. [Accessed 2024 February 5]. Available from: http://www.nap.edu/openbook.php?record_id=10490&page=680 Johnston LRH, Hunninghake DB, Schultz K, Westereng B. Cholesterol-lowering benefits of a whole grain oat ready to eat cereal. Nutrition in Clinical Care 1998;1(1):6-12. Kabir M, Oppert JM, Vidal H, Bruzzo F, Fiquet C, Wursch P, Slama G, Rizkalla SW. Four-week low-glycemic index breakfast with a modest amount of soluble fibers in type 2 diabetic men. Metabolism 2002;51(7):819-826. Kestin M, Moss R, Clifton PM, Nestel PJ. Comparative effects of three cereal brans on plasma lipids, blood pressure, and glucose metabolism in mildly hypercholesterolemic men. American Journal of Clinical Nutrition 1990;52:661-666. NECP 2002: Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults. Third report of the National Cholesterol Education Program (NCEP) expert panel on detection, evaluation, and treatment of high blood cholesterol in adults (Adult Treatment Panel III): final report. Circulation 2002;106:3143-3421. [Accessed 2024 February 5]. Available from: http://circ.ahajournals.org/content/106/25/3143.full.pdf Panahi S, Ezatagha A, Temelli F, Vasanthan T, Vuksan V. Beta-glucan from two sources of oat concentrates affect postprandial glycemia in relation to the level of viscosity. Journal of the American College of Nutrition 2007;26(6):639-644. Queenan KM, Stewart ML, Smith KN, Thomas W, Fulcher RG, Slavin JL. Concentrated oat ?- glucan, a fermentable fiber, lowers serum cholesterol in hypercholesterolemic adults in a randomized controlled trial. Nutrition Journal 2007;6:1-8. Ripsin CM, Keenan JM, Jacobs DR Jr, Elmer PJ, Welch RR, Van Horn L, Liu K, Turnbull WH, Thye FW, Kestin M, Hegsted M, Davidson DM, Davidson MH, Dugan LD, Wahnefried WD, Beling S. Oat products and lipid lowering. A meta-analysis. Journal of the American Medical Association 1992;267(24):3317-3325. Torronen R, Kansanen L, Uusitupa M, Hanninen O, Myllymaki O, Harkonen H, Malkki Y. Effects of an oat bran concentrate on serum lipids in free-living men with mild to moderate hypercholesterolaemia. European Journal of Clinical Nutrition 1992;46(9):621-627. Ulmius M, Persson AJ, Krogh M, Olsson P, Onning G. An oat bran meal influences blood insulin levels and related gene sets in peripheral blood mononuclear cells of healthy subjects. Genes & Nutrition 2011;6(4):429-439. USDA 2023a: United States Department of Agriculture Agricultural Research Service (USDA ARS), Germplasm Resources Information Network (GRIN) – Global. U.S. National Plant Germplasm System. [Accessed 2024 February 5]. Available from: https://npgsweb.ars-grin.gov/gringlobal/taxon/taxonomysearch USDA 2023b: United States Department of Agriculture Agricultural Research Service (USDA ARS), Germplasm Resources Information

Network (GRIN) – Global. U.S. National Plant Germplasm System. [Accessed 2024 February 5]. Available from: https://npgsweb.ars-grin.gov/gringlobal/taxon/taxonomysearch Uusitupa MI, Ruuskanen E, Makinen E, Laitinen J, Toskala E, Kervinen K, Kesaniemi YA. A controlled study on the effect of beta-glucan-rich oat bran on serum lipids in hypercholesterolemic subjects: relation to apolipoprotein E phenotype. Journal of American College of Nutrition 1992;11(6):651-659. Wolever TMS, Tosh SM, Gibbs AL, Brand-Miller J, Duncan AM, Hart V, Lamarche B, Thomson BA, Duss R, Wood PJ. Physicochemical properties of oat ?-glucan influence its ability to reduce serum LDL cholesterol in humans: a randomized clinical trial. American Journal of Clinical Nutrition 2010;92(4):723-732. Wood P. Cereal ?-glucans in diet and health. Journal of Cereal Science 2007;46(3):230-238. References Reviewed Amundsen AL, Haugum B, Anderson H. Changes in serum cholesterol and sterol metabolites after intake of products enriched with an oat bran concentrate within a controlled diet. Scandinavian Journal of Nutrition 2003;47(2):68-74. Anceau CC, Nazare JA, Biorklund M, Le Coquil E, Sassolas A, Sothier M, Holm J, Landin- Olsson M, Onning G, Laville M, Moulin P. A controlled study of consumption of beta-glucan- enriched soups for 2 months by type 2 diabetic free-living subjects. British Journal of Nutrition 2010;103(3):422-428. Babineau TJ, Hackford A, Kenler A, Bistrian B, Forse RA, Fairchild PG, Heard S, Keroack M, Caushaj P, Benotti P. A phase II multicenter, double-blind, randomized, placebo-controlled study of three dosages of an immunomodulator (PGG-glucan) in high-risk surgical patients. Archives of Surgery 1994;129(11):1204-1210. Babineau TJ, Marcello P, Swails W, Kenler A, Bistrian B, Forse RA. Randomized phase I/II trial of a macrophage-specific immunomodulator (PGG-glucan) in high-risk surgical patients. Annals of Surgery 1994;220: 601-609. Bays H, Frestedt JL, Bell M, Williams C, Kolberg L, Schmelzer W, Anderson JW. Reduced viscosity Barley ?-Glucan versus placebo: a randomized controlled trial of the effects on insulin sensitivity for individuals at risk for diabetes mellitus. Nutrition Metabolism (London) 2011;16:8:58. Beck EJ, Tapsell LC, Batterham MJ, Tosh SM, Huang XF. Oat beta-glucan supplementation does not enhance the effectiveness of an energy-restricted diet in overweight women. British Journal of Nutrition 2010;103(8):1212-1222. Beer MU, Arrigoni E, Amado R. Effects of oat gum on blood cholesterol levels in healthy young men. European Journal of Clinical Nutrition 1995;49(7):517-522. Bremer JM, Scott RS, Lintott CJ. Oat bran and cholesterol reduction: evidence against specific effect. Australian and New Zealand journal of medicine 1991;21(4):422-426. Brinker F. Herb Contraindications and Drug Interactions, 4th edition. Sandy (OR): Eclectic Medical Publications; 2010. Brown GD, Herre J, Williams DL, Willment JA, Marshall AS, Gordon S. Dectin-1 mediates the biological effects of beta-glucans. The Journal of experimental medicine 2003;197(9):1119- 1124. Brown GD. Dectin-1: a signalling non-TLR pattern-recognition receptor. Nature Reviews Immunology 2006;6(1):33-43. Chen J, He J, Wildman RP, Reynolds K, Streiffer RH, Whelton PK. A randomized controlled trial of dietary fiber intake on serum lipids. European Journal of Clinical Nutrition 2006;60(1):62-68. Chen J, Seviour R. Medicinal importance of fungal beta-(1-->3), (1-->6)-glucans. Mycology Research 2007;111(6):635-652. Dais P, Perlin AS. High field, 13C-NMR spectroscopy of ?-D-glucans, amylopectin and glycogen. Carbohydrate Research 1982;100(1):103-116. Davy BM, Melby CL, Beske SD, Ho RC, Davrath LR, Davy KP. Oat consumption does not affect resting casual and ambulatory 24-h arterial blood pressure in men with high-normal blood pressure to stage I hypertension. The Journal of Nutrition 2002;132(3):394-398. Demir G, Klein HO, Molinas MN, Tuzuner N. Beta glucan induces proliferation and activation of monocytes in peripheral blood of patients with advanced breast cancer. International Immunopharmacology 2007;7(1):113-116. Estrada A, Yun CH, Van Kessel A, Li B, Hauta S, Laarveld B. Immunomodulatory activities of oat beta-glucan in vitro and in vivo. Microbiology and Immunology 1997;41(12):991-998. Felippe DJ, Rocha DESM, Maciel FM, Ade SM, Mendes NF. Infection prevention in patients with severe multiple trauma with the immunomodulator beta 1-3 polyglucose (glucan). Surgery, gynecology & obstetrics 1993;177(4):383-388. Frank J, Sundberg B, Eldin KA, Vessby B, Aman P. Yeast leavened oat breads with high or low molecular weight betaglucan do not differ in their effects on blood concentrations of lipids, insulin, or glucose in humans. Journal of Nutrition 2004;134(6):1384-1388. Gantner BN, Simmons RM, Canavera SJ, Akira S, Underhill DM. Collaborative induction of inflammatory responses by dectin-1 and Toll-like receptor 2. The Journal of experimental medicine 2003;197(9):1107-1117. Gao Y, Zhou SH, Chen G, Dai X, Ye J. A phase I/II study of a Ganoderma lucidum (Curt.: Fr.) P. Karst. Extract (ganopoly) in patients with advanced cancer. International Journal of Medicinal Mushrooms 2002;4(3):207-214. Gerhardt AL, Gallo NB. Full-fat rice bran and oat bran similarly reduce hypercholesterolemia in humans. Journal of Nutrition 1998;128(5):865-869. Goodridge HS, Simmons RM, Underhill DM. Dectin-1 stimulation by Candida albicans yeast or zymosan triggers NFAT activation in macrophages and dendritic cells. Journal of Immunology 2007;178(5):3107-3115. Gordon M, Guralnik M, Kaneko Y, Mimura T, Goodgame J, DeMarzo C, Pierce D, Baker M, Lang W. A phase II controlled study of a combination of the immune modulator, lentinan, with didanosine (ddI) in HIV patients with CD4 cells of 200-500/mm3. Journal of Medicine 1995;26(5-6):193-207. Gross O, Gewies A, Finger K, Schafer M, Sparwasser T, Peschel C, Forster I, Ruland J. Card9 controls a non-TLR signalling pathway for innate anti-fungal immunity. Nature 2006, 442(7103):651-656. Hamano K, Gohra H, Katoh T, Fujimura Y, Zempo N, Esato K. The preoperative administration of lentinan ameliorated the

impairment of natural killer activity after cardiopulmonary bypass. International Journal of Immunopharmacology 1999;21(8):531-540. Hayakawa K, Mitsuhashi N, Saito Y, Takahashi M, Katano S, Shiojima K, Furuta M, Niibe H. Effect of Krestin (PSK) as adjuvant treatment on the prognosis after radical radiotherapy in patients with non-small cell lung cancer. Anticancer Research 1993;13:1815-1820. Herre J, Gordon S, Brown GD. Dectin-1 and its role in the recognition of beta-glucans by macrophages. Molecular immunology 2004;40(12):869-876. Herre J, Marshall AS, Caron E, Edwards AD, Williams DL, Schweighoffer E, Tybulewicz V, Reis e Sousa C, Gordon S, Brown GD. Dectin-1 uses novel mechanisms for yeast phagocytosis in macrophages. Blood 2004;104(13):4038-4045. Jenkins AL, Jenkins DJA, Zdravkovic U, Würsch P, Vuksan V. Depression of the glycemic index by high levels of ?-glucan fiber in two functional foods tested in type 2 diabetes. European Journal of Clinical Nutrition 2002;56(7):622-628. Juntunen KS, Niskanen LK, Liukkonen KH, Poutanen KS, Holst JJ, Mykkanen HM. Postprandial glucose, insulin, and incretin responses to grain products in healthy subjects. American Journal of Clinical Nutrition 2002;75(2):254-262. Karmally W, Montez MG, Palmas W, Martinez W, Branstetter A, Ramakrishnan R, Holleran SF, Haffner SM, Ginsberg HN. Cholesterol-lowering benefits of oat-containing cereal in Hispanic Americans. Journal of American Dietetic Association 2005;105(6):967-970. Keenan JM, Goulson M, Shamliyan T, Knutson N, Kolberg L, Curry L. The effects of concentrated barley beta-glucan on blood lipids in a population of hypercholesterolaemic men and women. British Journal of Nutrition 2007;97(6):1162-1168. Keenan JM, Pins JJ, Frazel C, Moran A, Turnquist L. Oat ingestion reduces systolic and diastolic blood pressure in patients with mild or borderline hypertension: a pilot trial. The Journal of Family Practice 2002;51(4):369. Kempen HJ, Glatz JF, Gevers Leuven JA, van der Voort HA, Katan MB. Serum lathosterol concentration is an indicator of whole-body cholesterol synthesis in humans. Journal of Lipid Research 1988;29(9):1149-1155. Kerckhoffs DA, Hornstra G, Mensink RP. Cholesterol-lowering effect of beta-glucan from oat bran in mildly hypercholesterolemic subjects may decrease when beta-glucan is incorporated into bread and cookies. American Journal of Clinical Nutrition 2003;78(2):221-227. Knudsen KE, Jensen BB, Hansen I. Digestion of polysaccharides and other major components in the small and large intestine of pigs fed on diets consisting of oat fractions rich in beta-Dglucan. British Journal of Nutrition 1993;70(2):537-556. Leadbetter J, Ball MJ, Mann JI. Effects of increasing quantities of oat bran in hypercholesterolemic people. American Journal of Clinical Nutrition 1991;54(5):841-845. Lei LS, Lin ZB. Effects of ganoderma polysaccharides on T cell subpopulations and production of interleukin-2 in mixed lymphocytes response. Yao Hsueh Hsueh Pao 1992;27(5):331-335. Li B, Cai Y, Qi C, Hansen R, Ding C, Mitchell TC, Yan J. Orally Administered Particular ?- Glucan Modulates Tumor-capturing Dendritic Cells and Improves Anti-tumor T Cell Responses in Cancer. Clinical Cancer Research 2010;16(21):5153-5164. Liao ML, Zhao JM. The II stage clinical tests of PSP in the treatment of lung cancer, in: Yang QY, Kwok CY(eds.), Proceedings of PSP International Symposium. Shanghai, China: Fudan University Press, 1993;243-256. Liatis S, Tsapogas P, Chala E, Dimosthenopoulos C, Kyriakopoulos K, Kapantais E, Katsilambros N. The consumption of bread enriched with betaglucan reduces LDL-cholesterol and improves insulin resistance in patients with type 2 diabetes. Diabetes & Metabolism 2009;35(2):115-120. Lin YL, Liang YC, Lee SS, Chiang BL. Polysaccharide purified from Ganoderma lucidum induced activation and maturation of human monocyte-derived dendritic cells by the NF-kappaB and p38 mitogen-activated protein kinase pathways. Journal of Leukocyte Biology 2005;78(2):533-543. Lovegrove JA, Clohessy A, Milon H, Williams CM. Modest doses of beta-glucan do not reduce concentrations of potentially atherogenic lipoproteins. American Journal of Clinical Nutrition 2000;72(1):49-55. Maki KC, Galant R, Samuel P, Tesser J, Witchger MS, Ribaya-Mercado JD, Blumberg JB, Geohas J. Effects of consuming foods containing oat beta-glucan on blood pressure, carbohydrate metabolism and biomarkers of oxidative stress in men and women with elevated blood pressure. European Journal of Clinical Nutrition 2007;61(6):786-795. Maki KC, Shinnick F, Seeley MA, Veith PE, Quinn LC, Hallissey PJ, Temer A, Davidson MH. Food products containing free tall oil-based phytosterols and oat beta-glucan lower serum total and LDL cholesterol in hypercholesterolemic adults. Journal of Nutrition 2003;133(3):808-813. Morimoto T, Ogawa M, Orita K, Sugimachi K, Toge T, Dohi K, Nomura Y, Monden Y, Ogawa N. Postoperative adjuvant randomized trial comparing chemoendocrine therapy, chemotherapy and immunotherapy for patients with stage II breast cancer: 5-year results from the Nishinihon Cooperative Study Group of Adjuvant Chemoendocrine Therapy for Breast Cancer (ACETBC) of Japan. European Journal of Cancer 1996;32A(2):235-242. Nakazato H, Koike A, Saji S, Ogawa N, Sakamoto J. Efficacy of immunochemotherapy as adjuvant treatment after curative resection of gastric cancer. Study Group of Immunochemotherapy with PSK for Gastric Cancer. Lancet 1994;343(8906):1122-1126. Naumann E, van Rees AB, Onning G, Oste R, Wydra M, Mensink RP. Beta-glucan incorporated into a fruit drink effectively lowers serum LDL-cholesterol concentrations. American Journal of Clinical Nutrition 2006;83(3):601-605. Ohno N, Terui T, Chiba N, Kurachi K, Adachi Y, Yadomae T. Resistance of highly branched (1- ->3)-beta-D-glucans to formolysis. Chemical & Pharmaceutical Bulletin (Tokyo) 1995;43(6):1057-1060. Onning G, Wallmark A, Persson M, Akesson B, Elmstahl S, Oste R. Consumption of oat milk for 5 weeks lowers serum cholesterol and LDL cholesterol in free-living men with moderate hypercholesterolemia. Annals of Nutrition & Metabolism

1999;43(5):301-309. Othman RA, Moghadasian MH, Jones PJH. Cholesterol-lowering effects of oat b-glucan. Nutrition Reviews 2011;69(6):299-309. Parrish FW, Perlin AS, Reese ET. Selective enzymolysis of polyb-D-glucan and structure of the polymers. Canadian Journal of Chemistry 1960;38(11):2094-2104. Pick ME, Hawrysh ZJ, Gee MI, Toth E, Garg ML, Hardin RT. Oat bran concentrate bread products improve long-term control of diabetes: a pilot study. Journal of the American Dietetic Association 1996;96(12):1254-1261. Ramakers JD, Volman JJ, Biorklund M, Onning G, Mensink RP, Plat J. Fecal water from ileostomic patients consuming oat beta-glucan enhances immune responses in enterocytes. Molecular Nutrition and Food Research 2007;51(2):211-220. Reyna NY, Cano C, Bermudez VJ, Medina MT, Souki AJ, Ambard M, Nunez M, Ferrer MA, Inglett GE. Sweeteners and beta-glucans improve metabolic and anthropometrics variables in well controlled type 2 diabetic patients. American Journal of Therapeutics 2003;10(6):438-443. Rogers NC, Slack EC, Edwards AD, Nolte MA, Schulz O, Schweighoffer E, Williams DL, Gordon S, Tybulewicz VL, Brown GD, Reis e Sousa C. Syk-dependent cytokine induction by Dectin-1 reveals a novel pattern recognition pathway for C type lectins. Immunity 2005;22(4):507-517. Ruxton CHS and Derbyshire E. A systematic review of the association between cardiovascular risk factors and regular consumption of oats. British Food Journal 2008;110(11):1119-1132. Schorey JS, Lawrence C. The pattern recognition receptor Dectin-1: from fungi to mycobacteria. Current Drug Targets 2008;9(2):123-129. Shi JH, ChenT, Lian ZR. The clinical research of the effect 4of PSP on the immunological function of stomach cancer patients during operation and chemotherapy, in: Yang QY, Kwok CY (eds.), Proceedings of PSP International Symposium. Shanghai, China: Fudan University Press, 1993;232-240. Smith KN, Queenan KM, Thomas W, Fulcher RG, Slavin JL. Physiological effects of concentrated barley beta-glucan in mildly hypercholesterolemic adults. Journal of American College of Nutrition 2008;27(3):434-40. Sun L, Zhao Y. The biological role of dectin-1 in immune response. International reviews of immunology 2007;26(5-6):349-364. Suto M, Fukuda S, Moriya N, Watanabe W, Sasaki D, Yoshida Y. Clinical study of biological response modifiers as maintenance therapy for hepatocellular carcinoma. Cancer Chemotherapy Pharmacology 1994;33(Suppl.),S145-S148. Taylor PR, Brown GD, Herre J, Williams DL, Willment JA, Gordon S. The role of SIGNR1 and the beta-glucan receptor (dectin-1) in the nonopsonic recognition of yeast by specific macrophages. Journal of Immunology 2004;172(2):1157-1162. Taylor PR, Brown GD, Reid DM, Willment JA, Martinez-Pomares L, Gordon S, Wong SY. The beta-glucan receptor, dectin-1, is predominantly expressed on the surface of cells of the monocyte/macrophage and neutrophil lineages. Journal of Immunology 2002;169(7):3876-3882. Theuwissen E, Mensink RP. Simultaneous intake of beta-glucan and plant stanol esters affects lipid metabolism in slightly hypercholesterolemic subjects. Journal of Nutrition 2007;137(3):583-588. Toi M, HattoriT, Akagi M, Inokuchi K, Orita K, Sugimachi K, Dohi K, NomuraY, MondenY, HamadaY, MorimotoT, Ogawa N. Randomized adjuvant trial to evaluate the addition of tamoxifen and PSK to chemotherapy in patients with primary breast cancer. Cancer 1992;70(10):2475-2483. Van Horn L, Liu K, Gerber J, et al. Oats and soy in lipidlowering diets for women with hypercholesterolemia: is there synergy? Journal of the American Dietetic Association 2001;101(11):1319-1325. Vasanthan T, Temelli F, Beta-glucan isolation/concentration technologies and their impact on molecular structure and functionality. Department of Agricultural, Food and Nutritional Science, University of Alberta, Edmonton, AB, Canada. In: The Future of Barley. Cereal Foods World 2005;50(5):271-277. Volman JJ, Mensink RP, Buurman WA, Plat J. In vivo effects of dietary (1?3), (1?4)-?-D-glucans from oat on mucosal immune responses in man and mice. Scandinavian Journal of Gastroenterology 2011;46(5):603-610. Volman JJ, Mensink RP, Ramakers JD, de Winther MP, Carlsen H, Blomhoff R, Buurman WA, Plat J. Dietary (1-->3), (1-->4)-beta-D-glucans from oat activate nuclear factor-kappaB in intestinal leukocytes and enterocytes from mice. Nutrition Research 2010;30(1):40-48. Vos A, M'Rabet L, Stahl B, Boehm G, Garssen J. Immune-modulatory effects and potential working mechanisms of orally applied nondigestible carbohydrates. Critical Reviews in Immunology 2007;27(2):97-140. Wang H, Weening D, Jonkers E, Boer T, Stellaard F, Small AC, Preston T, Vonk RJ, Priebe MG. A curve fitting approach to estimate the extent of fermentation of indigestible carbohydrates. European Journal of Clinical Investigation 2008;38(11):863-868. Wang SY, Hsu ML, Hsu HC, Tzeng CH, Lee SS, Shiao MS, Ho CK. The anti-tumor effect of Ganoderma lucidum is mediated by cytokines released from activated macrophages and T lymphocytes. International Journal of Cancer 1997;70(6):699-705. Wolever TMS, Gibbs AL, Miller JB, Duncan AM, Hart V, Lamarche B, Tosh SM, Duss R. Bioactive oat ?-glucan reduces LDL cholesterol in Caucasians and non-Caucasians. Nutrition Journal 2011;10:130. Wood PJ. Oat ?-glucan physicochemical properties and physiological effects. Trends in Food Science & Technology 1991;2:311-314. Wood PJ. Evaluation of oat bran as a soluble fibre source. Characterization of oat ?-glucan and its effects on glycaemic response. Carbohydrate Polymers 1994;25(4):331-336. Wu Z, Ming J, Gao R, Wang Y, Liang Q, Yu H, Zhao G. Characterization and antioxidant activity of the complex of tea polyphenols and oat ?-glucan. Journal of Agricultural and Food Chemistry 2011;59(19):10737-10746. Xie SQ. The effect of PSP on red cell immunity: a clinical study on gastric cancer patients, in: Yang QY, Kwok CY (eds.), Proceedings of PSP International Symposium. Shanghai, China: Fudan University Press, 1993;241-242. Yatawara L, Wickramasinghe S, Nagataki M, Takamoto M, Nomura H, Ikeue

Y, Watanabe Y, Agatsuma T. Aureobasidium-Derived Soluble Branched (1,3-1,6) ?-Glucan (Sophy ?-glucan) Enhances Natural Killer Activity in Leishmania amazonensis-Infected Mice. Korean Journal of Parasitology 2009;47(4):345-351. Yun CH, Estrada A, Van Kessel A, Gajadhar A, Redmond M, Laarveld B. Immunomodulatory effects of oat beta-glucan administered intragastrically or parenterally on mice infected with Eimeria vermiformis. Microbiology and Immunology 1998;42(6):457-465. Yun CH, Estrada A, Van Kessel A, Gajadhar AA, Redmond MJ, Laarveld B. beta-(1-->3, 1-->4) oat glucan enhances resistance to Eimeria vermiformis infection in immunosuppressed mice. International Journal for Parasitology 1997;27(3):329-337. Yun CH, Estrada A, Van Kessel A, Park BC, Laarveld B. Beta-glucan, extracted from oat, enhances disease resistance against bacterial and parasitic infections. FEMS Immunology and Medical Microbiology 2003;35(1):67-75. Zhang LX, Mong H, Zhou HB. Effect of Japanese Ganoderma lucidum on production of interleukin-2 from murine splenocytes. Chinese journal of integrated traditional and Western medicine 1993;13(10):613-615. Report a problem on this page Date modified: 2019-03-01

MEDICINAL INGREDIENT(S)

Must be chosen from the current Natural Health Products Ingredients Database (NHPID) and must meet the limitations outlined in the database.

DOSAGE FORM(S)

Acceptable dosage forms for oral use are indicated in the dosage form drop-down list of the web-based Product Licence Application form for Compendial applications.

DOSE(S)

Maki KC, Galant R, Samuel P, Tesser J, Witchger MS, Ribaya-Mercado JD, Blumberg JB, Geohas J. Effects of consuming foods containing oat beta-glucan on blood pressure, carbohydrate metabolism and biomarkers of oxidative stress in men and women with elevated blood pressure. European Journal of Clinical Nutrition 2007;61(6):786-795. Maki KC, Shinnick F, Seeley MA, Veith PE, Quinn LC, Hallissey PJ, Temer A, Davidson MH. Food products containing free tall oil-based phytosterols and oat beta-glucan lower serum total and LDL cholesterol in hypercholesterolemic adults. Journal of Nutrition 2003;133(3):808-813. Morimoto T, Ogawa M, Orita K, Sugimachi K, Toge T, Dohi K, Nomura Y, Monden Y, Ogawa N. Postoperative adjuvant randomized trial comparing chemoendocrine therapy, chemotherapy and immunotherapy for patients with stage II breast cancer: 5-year results from the Nishinihon Cooperative Study Group of Adjuvant Chemoendocrine Therapy for Breast Cancer (ACETBC) of Japan. European Journal of Cancer 1996;32A(2):235-242. Nakazato H, Koike A, Saji S, Ogawa N, Sakamoto J. Efficacy of immunochemotherapy as adjuvant treatment after curative resection of gastric cancer. Study Group of Immunochemotherapy with PSK for Gastric Cancer. Lancet 1994;343(8906):1122-1126. Naumann E, van Rees AB, Onning G, Oste R, Wydra M, Mensink RP. Beta-glucan incorporated into a fruit drink effectively lowers serum LDL-cholesterol concentrations. American Journal of Clinical Nutrition 2006;83(3):601-605. Ohno N, Terui T, Chiba N, Kurachi K, Adachi Y, Yadomae T. Resistance of highly branched (1- ->3)-beta-D-glucans to formolysis. Chemical & Pharmaceutical Bulletin (Tokyo) 1995;43(6):1057-1060. Onning G, Wallmark A, Persson M, Akesson B, Elmstahl S, Oste R. Consumption of oat milk for 5 weeks lowers serum cholesterol and LDL cholesterol in free-living men with moderate hypercholesterolemia. Annals of Nutrition & Metabolism 1999;43(5):301-309. Othman RA, Moghadasian MH, Jones PJH. Cholesterol-lowering effects of oat b-glucan. Nutrition Reviews 2011;69(6):299-309. Parrish FW, Perlin AS, Reese ET. Selective enzymolysis of polyb-D-glucan and structure of the polymers. Canadian Journal of Chemistry 1960;38(11):2094-2104. Pick ME, Hawrysh ZJ, Gee MI, Toth E, Garg ML, Hardin RT. Oat bran concentrate bread products improve long-term control of diabetes: a pilot study. Journal of the American Dietetic Association 1996;96(12):1254-1261. Ramakers JD, Volman JJ, Biorklund M, Onning G, Mensink RP, Plat J. Fecal water from ileostomic patients consuming oat beta-glucan enhances immune responses in

enterocytes. Molecular Nutrition and Food Research 2007;51(2):211-220. Reyna NY, Cano C, Bermudez VJ, Medina MT, Souki AJ, Ambard M, Nunez M, Ferrer MA, Inglett GE. Sweeteners and beta-glucans improve metabolic and anthropometrics variables in well controlled type 2 diabetic patients. American Journal of Therapeutics 2003;10(6):438-443. Rogers NC, Slack EC, Edwards AD, Nolte MA, Schulz O, Schweighoffer E, Williams DL, Gordon S, Tybulewicz VL, Brown GD, Reis e Sousa C. Syk-dependent cytokine induction by Dectin-1 reveals a novel pattern recognition pathway for C type lectins. Immunity 2005;22(4):507-517. Ruxton CHS and Derbyshire E. A systematic review of the association between cardiovascular risk factors and regular consumption of oats. British Food Journal 2008;110(11):1119-1132. Schorey JS, Lawrence C. The pattern recognition receptor Dectin-1: from fungi to mycobacteria. Current Drug Targets 2008;9(2):123-129. Shi JH, ChenT, Lian ZR. The clinical research of the effect 4of PSP on the immunological function of stomach cancer patients during operation and chemotherapy, in: Yang QY, Kwok CY (eds.), Proceedings of PSP International Symposium. Shanghai, China: Fudan University Press, 1993;232-240. Smith KN, Queenan KM, Thomas W, Fulcher RG, Slavin JL. Physiological effects of concentrated barley beta-glucan in mildly hypercholesterolemic adults. Journal of American College of Nutrition 2008;27(3):434-40. Sun L, Zhao Y. The biological role of dectin-1 in immune response. International reviews of immunology 2007;26(5-6):349-364. Suto M, Fukuda S, Moriya N, Watanabe W, Sasaki D, Yoshida Y. Clinical study of biological response modifiers as maintenance therapy for hepatocellular carcinoma. Cancer Chemotherapy Pharmacology 1994;33(Suppl.),S145-S148. Taylor PR, Brown GD, Herre J, Williams DL, Willment JA, Gordon S. The role of SIGNR1 and the beta-glucan receptor (dectin-1) in the nonopsonic recognition of yeast by specific macrophages. Journal of Immunology 2004;172(2):1157-1162. Taylor PR, Brown GD, Reid DM, Willment JA, Martinez-Pomares L, Gordon S, Wong SY. The beta-glucan receptor, dectin-1, is predominantly expressed on the surface of cells of the monocyte/macrophage and neutrophil lineages. Journal of Immunology 2002;169(7):3876-3882. Theuwissen E, Mensink RP. Simultaneous intake of beta-glucan and plant stanol esters affects lipid metabolism in slightly hypercholesterolemic subjects. Journal of Nutrition 2007;137(3):583-588. Toi M, HattoriT, Akagi M, Inokuchi K, Orita K, Sugimachi K, Dohi K, NomuraY, MondenY, HamadaY, MorimotoT, Ogawa N. Randomized adjuvant trial to evaluate the addition of tamoxifen and PSK to chemotherapy in patients with primary breast cancer. Cancer 1992;70(10):2475-2483. Van Horn L, Liu K, Gerber J, et al. 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RISK INFORMATION

Caution(s) and warning(s) No statement required. Contraindication(s) No statement required. Known adverse reaction(s) No statement required.

NON-MEDICINAL INGREDIENTS

Must be chosen from the current Natural Health Products Ingredients Database (NHPID) and must meet the limitations outlined in the database.

STORAGE CONDITION(S)

Must be established in accordance with the requirements described in theNatural Health Products Regulations.

SPECIFICATIONS

The finished product specifications must be established in accordance with the requirements described in the Natural and Non-prescription Health Products Directorate (NNHPD) Quality of Natural Health Products Guide.The medicinal ingredient must comply with the requirements outlined in the NHPID.

Proper name(s)	Common name(s)	Source information		
Source material(s)	Part(s)	Preparation		
beta-Glucan	beta-Glucanbeta-D-Glucan	Avena sativaHordeum vulgare	SeedSeed bran	Isolate
Oat beta-Glucan	Avena sativa			