

Beta-glucan and Cholesterol

GENERAL INFORMATION:

- **Source material:** Oats [*Avena sativa*].
- **Dosage route:** Oral.
- **Directions of use and/or Duration of Use:** A clinical literature search did not yield any specific results pertaining to directions of use and/or duration of use.
- **Target Population:** Adults.
- **Risk Information:**
 - **Known Allergens:**
 - Do not take if you are allergic to oats.
 - **Warnings:**
 - Some individuals with Celiac disease may be sensitive to oats (Health Canada, 2007).



HUMAN HEALTH INDICATIONS:

Recommended Use or Purpose	Dosage Range
Dose Specific	
Food: 1. Oat fibre helps reduce/lower cholesterol 2. High cholesterol is a risk factor for heart disease 3. Oat fibre helps reduce/lower cholesterol, [which is] a risk factor for heart disease. (Health Canada, 2010)	0.75 g/serving
Natural Health Product/Supplement: Oat β-glucan can help reduce blood cholesterol levels (Ripsin et al., 1992).	3 g/day

B-GLUCANS

β -glucan is a water soluble fibre found in the cell wall of fungi, yeast, oat, barley and bacteria (McIntosh et al., 2005). Of the cereal grains, oats and barley contain the highest level of β -glucan at 3-7 % and 3-11% [dry weight basis], respectively (Charalampopoulos et al., 2002).

B-GLUCANS AND BLOOD CHOLESTEROL

The mechanism by which β -glucans lower LDL cholesterol is considered to be mediated by the bile acid-binding property of β -glucans, which subsequently leads to increased excretion of bile acids (Ellegard and Andersson, 2007; Lia et al., 1995; Marlett, 1997). Bile acids are derivatives of cholesterol, and their excretion increases the transport of LDL cholesterol into hepatocytes for conversion into bile acids (Nilsson et al 2007). The advantages of β -glucans over other fibres are that they exhibit high viscosities at very low concentration [1%] and are stable with pH (Sadiq Butt et al., 2008), making them particularly useful in processing. The viscosity determined by water solubility and molecular weight has been shown to affect the hypocholesterolemic effect of β -glucans (Sadiq Butt et al., 2008). In addition, oat and barley β -glucans have also been shown to be fermented by human fecal microbiota to produce short-chain fatty acids. Short-chain fatty acids also have reported hypocholesterolemic effect (Alminger and Eklund-Jonsson, 2008; Drzikova et al., 2005; Hughes et al., 2008).

A meta-analysis examined the blood cholesterol lowering effects of oat products in 20 clinical trials (Ripsin et al., 1992). This thorough analysis found consumption of approximately 3 g/day of soluble fibres from oat products lowered serum total cholesterol concentrations by 0.13–0.16 mmol/L. Although this is a modest reduction, it still represents a significant public health benefit as such a reduction experienced by many people could significantly reduce the population's overall risk of cardiovascular disease.

SAFETY AND TOXICITY:

Oats are recognized as safe based on their history of safe use. For instance, estimates from oatmeal intake alone indicates that mean intake of fibre from oatmeal in the United States is 4.5 g/day (GRAS notice for oat hull fibre, 2010). Oats may pose a risk to individuals with Celiac disease, as they can be contaminated with other grains that contain gluten (Health Canada, 2007).

CAUTIONS, WARNINGS, CONTRAINDICATIONS AND INTERACTIONS

Consult a health care practitioner prior to use if you have a pre-existing medical condition, are taking prescription medication, or are pregnant or breastfeeding.

DRUG	INTERACTION WITH B-GLUCAN
	A clinical literature search did not yield results with respect to interactions between drugs and β -glucan.

NATURAL HEALTH PRODUCTS [NHP] SUBSTANCES	INTERACTION WITH B-GLUCAN
	A clinical literature search did not yield results with respect to interactions between other NHP substances and β -glucan.

NUTRIENT	INTERACTION WITH B-GLUCAN
	A clinical literature search did not yield results with respect to interactions between other nutrients and β -glucan.

FOODS	INTERACTION WITH B-GLUCAN
	A clinical literature search did not yield results with respect to interactions between foods/food ingredients and β -glucan.

YOU MIGHT ALSO BE INTERESTED IN OUR REPORTS ON:

- **Lipid Lowering:**
- ✓ Acacia Gum and Blood Lipids
 - ✓ Psyllium and Blood Lipids
 - ✓ Guar gum and Blood lipids

REFERENCES

- Alminger, M. and Eklund-Jonsson, C. 2008. Whole-grain cereal products based on a high-fibre barley or oat genotype lower post-prandial glucose and insulin responses in healthy humans. *European Journal of Nutrition*; 47:294–300.
- Charalampopoulos, D., Wang, R., Pandiella, S.S. and Webb, C. 2002. Application of cereals and cereal components in functional foods: a review. *Int. J. Food Microbiol.*; 79(1-2):131-41.
- Drzikova, B., Dongowski, G. and Gebhardt, E. 2005. Dietary fibre-rich oat-based products affect serum lipids, microbiota, formation of short-chain fatty acids and steroids in rats. *British Journal of Nutrition*; 94:1012-1025.
- Ellegard, L. and Andersson, H. 2007. Oat bran rapidly increases bile acid excretion and bile acid synthesis: an ileostomy study. *European Journal of Clinical Nutrition*; 61:938-945.
- GRAS Notice for Oat Hull Fibre. 2010. Accessed on: March 30, 2011. Available at: www.accessdata.fda.gov/scripts/fcn/gras_notices/GRN000342.pdf
- Health Canada. 2010. Oat Products and Blood Cholesterol Lowering. Accessed on: March 30, 2011. Available at: www.hc-sc.gc.ca/fn-an/label-etiquet/claims-reclam/assess-evalu/oat-avoine-eng.php
- Health Canada. 2007. Celiac Disease and the Safety of Oats- Summary of Health Canada's Review. Accessed on: March 30, 2011. Available at: www.hc-sc.gc.ca/fn-an/securit/allerg/cel-coe/oats_cd-avoine-eng.php.
- Hughes, S.A., Shewry, P.R. and Gibson, G.R. 2008. In vitro fermentation of oat and barley derived beta-glucans by human faecal microbiota. *FEMS Microbiology Ecology*; 64:482-493.
- Lia, A., Hallmans, G. and Sandberg, A.S.. 1995. Oat beta-glucan increases bile acid excretion and a fiber-rich barley fraction increases cholesterol excretion in ileostomy subjects. *American Journal of Clinical Nutrition*; 62:1245-1251.
- Marlett, J.A. 1997. Sites and mechanisms for the hypocholesterolemic actions of soluble dietary fiber sources. *Advances in Experimental Medicine and Biology*; 427:109-121.
- McIntosh M, Stone, BA, Stanisich VA. Curdlan and other bacterial (1→3)-beta-D-glucans. *Appl Microbiol Biotechnol.* 2005 Aug;68(2):163-73. Epub 2005 Apr 8. Review.
- Nilsson, L.M, Abrahamsson, A., Sahlin, S., Gustafsson, U., Angelin, B., Parini, P. and Einarsson, C. 2007. Bile acids and lipoprotein metabolism: effects of cholestyramine and chenodeoxycholic acid on human hepatic mRNA expression. *Biochem Biophys Res Commun.*; 357(3):707-11
- Ripsin, C.M., Keenan, J.M., Jacobs, D.R., Elmer, P.J., Welch, R.R. and Vanhorn, L. 1992. Oat products and lipid lowering—a meta-analysis. *Journal of the American Medical Association*; 267(24); 3317–3325.
- Sadiq Butt, M., Tahir-Nadeem, M. and Khan, M.K. 2008. Oat: unique among the cereals. *European Journal of Nutrition*; 47:68–79.