Supplementary materials

Table S1. Comparison of biological activities of oat *β*-D-glucans in relation to M_w.

MW range (kDa)			Source/samples	Isolation/treatment	Administration/assay	Results	Ref.
LMW	**MMW**	**HMW**					
70	100, 133, 199		Milled oat	Extraction with water, γ-ray irradiation	In vitro assays	• Antioxidant activity increases with γ-radiation intensity	96
80, 61, 52	108, 144, 200			Alkaline extraction, γ-ray irradiation		• Proven biocompatibility with human keratinocytes HaCat • Cytotoxic activity against cancer cell lines colo-205 and MCF7	97
83	192	650	Oat *β*-D-glucans	Including in rice breads	Starch digestibility in vitro, PBGR	• LMW *β*-D-glucan reduces free glucose in rice breads • HMW *β*-D-glucan decreased starch digestibility	55
82	325	1996		Enriched dough, ***β***-glucanase		• M_w of oat *β*-D-glucans negatively correlated with digestible starch • Formulations with HMW *β*-D-glucan reduced PBGR effectively	129
	221-225	389-398	Instant oatmeal	Cooking with boiling water Mixing with cold milk	Oral consumption	• Higher satiety of instant oatmeal than same caloric intake due to higher viscosity of *β*-D-glucans	133
59		1700	Plant matrices	Alkaline extraction, removal of proteins Mixing with feed (1% w/w)		• LMW *β*-D-glucans showed benefits in recovery from colitis • HMW *β*-D-glucans ameliorated inflammation in mucosa and submucosa	108
						• LMW *β*-D-glucans reduced pro-inflammatory cytokines • HMW *β*-D-glucans enhanced tissue recovery	109
52, 76	153	393, 841 1980		Partial hydrolysis with β-glucanase Mixing with water (preload)	Oral consumption PBGR	• Oat *β*-D-glucans influence PBGR in healthy humans • Lower M_w of *β*-D-glucans correlated with decreasing of time for blood glucose to peak after preload	134
	370	730, 1450	Oat *β*-D-glucans	Partial hydrolysis Supplementation to high fat meal	Oral consumption by mice	• Hydrolysates reduced the body weight and improve lipid profile effectively than native *β*-D-glucan	89, 121
	Not specified			Mixing with animal feed (AIN-93M)		• LMW *β*-D-glucans improved appetite for colitis mice • Both diets increased number of T cells in lymphocyte population, B cells and NK cells (higher in mice fed with LMW β-D-glucans)	110
						• Both *β*-D-glucans enhanced autophagy related genes expression and reduced of Caspase-3 expression and apoptosis in Crohn`s disease mice	111
				Partial hydrolysis with β-glucanase Homogenized and diluted in water	*In vitro* models of bile acid binding	• Enzymatically degraded *β*-D-glucans slightly affected bile acids binding • Viscous non-degraded *β*-D-glucans caused demobilization of bile acids	119
6	173, 275	1584	Oat flour	Extraction, acidic hydrolysis, oxidation		• Modifications of oat *β*-D-glucans did not improved bile acids binding • Viscosity played significant role in this property	106
	158, 173	1180, 1840	Oat bran concentrate	Acidic and/or enzymatic hydrolysis		• All *β*-D-glucans, especially HMW, decreased bile acid mobility	120
82	524	>1000		Treatment with cell wall degrading enzymes	Oral consumption by humans Exp. diet 3-4 days	• HMW *β*-D-glucans stimulated excretion of bile acids, increased pressure in duodenum and lowered concentration of phenolic comp. in urine • LMW *β*-D-glucans lowered bile acids and pressure in duodenum, but enhanced excretion of phenolic acids in urine • Effect of MMW β-D-glucan was similar to that of HMW β-D-glucan but with lower pressure in duodenum	123
<100	200-500	1000			In vitro models of bile acid binding/retention	• LMW (HMW) *β*-D-glucans had low (high) bile acid binding capacity • MMW *β*-D-glucan showed detectable bile acid reduction, high intestinal viscosity and tolerable fermentation activity without physical discomfort	124
70					In vitro assays	• LMW *β*-D-glucan (50-100 μg/ml) increased viability of HaCaT cells	67

		Not specified				• It showed cytotoxic effect on A431 and Me45 cell lines, but was safe and no toxic for normal cell lines	
						• LMW and HMW β-D-glucans decreased cell viability in A549 and H69AR cell lines; no cytotoxic effect on HaCaT cells • HMW β-D-glucan increased MDA for H69AR and for A549 • LMW β-D-glucan altered nucleus structure in A549 • HMW β-D-glucan caused abnormalities of cytoskeleton in H69AR	155
81, 191	500	1040, 1508, 1800	Oat β-D-glucans			• Oxygen radical uptake by oat β-D-glucans slightly correlated with M_W	138
68, 187	325, 461	5687	Oat bran	Extraction, acid hydrolysis Mixing with food	In vitro model of glucose absorption and diffusion in rat small intestine	• HMW β-D-glucan decreased concentration of available glucose in small intestine; LMW β-D-glucan was less effective • Digestion of starch proceeded slower in presence of both β-D-glucans • Na^+/K^+ ATPase activity was dependent on M_W and concentration of β-D-glucans and decreased with increasing of both values • Concentration of β-D-glucans with defined M_W positively correlated with Na+/K+ ATPase activity due to gastrointestinal motility • β-D-Glucans especially HMW decreased activities of sucrase and maltase	136
70		2180	Oat fibers	Alkali extractions, freeze-milling Exp. diet with 1% oat β-D-glucan	Oral consumption by rats/mice	• HMW β-D-glucans reduced inflammation in colon altering cytokines levels: elevating IL-10 and reducing IL-2 and TNF-α • Diet supplementation with LMW and HMW oat β-D-glucan promoted significant increase in fecal LAB in healthy and enteritis rats	113
						• LMW β-D-glucans reduce lipid hydroperoxidases in rats spleens after LPS injections	139
						• HWM β-D-glucan decreased expression of Granzyme C-like protein reducing inflammation, reduced expression of gene *Serp2* (inhibition of immune response in mice with enteritis), and boosted expression of gene *Nlrp1* (inhibition of inflammation and tumorigenesis) • LMW β-D-glucan increased IL34 and downregulated prostaglandin E receptor 3, both related to inflammatory processed.	114
						• HMW β-D-glucan decreased lipid peroxidases in stomach of enteritis rats • LMW oat β-D-glucan lowered LOOH and TBA in stomach and liver • Both HMW and LMW oak β-D-glucans decreased concentration of toxic 7-ketocholesterol and 25-hydroxicholesterol	140
						• HMW β-D-glucan reduced NK in blood of healthy rats • Both β-D-glucans decreased total and B lymphocytes and granulocytes in enteritis rats with more pronounced effect for HMW β-D-glucan • Monocytes decreased in number in rats fed with HMW β-D-glucan	115
						• LMW and HMW β-D-glucans reduced level of lipid oxidation in stomach, with more pronounced effect for HMW β-D-glucan	116
10, 200	500			Extraction with hot water Labelling with FITC [109]	Solutions of oat β-D-glucans were injected intra-peritoneally Control was PBS or dextran solution	• LMW β-D-glucan (M_W 200 kDa) effectively inhibited primary tumors growth; lowest incidence of lung metastases; IFN-γ, TNF-α, Th-1 chemokines: CXCL9 and CXCL10; IRF1, PDL-1 levels were increased, tumors were infiltrated with T cells, which produced Granzyme B and IFN-γ • CD11 b+ cells, dendritic cells, CD11 c+, T cells and presumably NK cells supported immune control of B16F10 treated with oat β-D-glucan	157
	165	1713	Oat kernels	Enzymatic and hot water extractions Microwave heating, steaming	Fermentation system with fecal microbiota	• Microwave treatment reduces M_W of β-D-glucan and promotes growth of butyrate-producing bacteria Blautia and Dialister	146

				• Fermentation slurries with MMW β-D-glucan yielded more SCFA	
<300	300-1000	>1000	Meta-analysis	• MMW and HMW oat β-D-glucans significantly reduced glucose iAUC, insulin iAUC and glucose and insulin iPeak values	122