

Technical Bulletin

Lectin from *Phaseolus vulgaris* (red kidney bean)

Phytohemagglutinin PHA-P, lyophilized powder

L8754

Product Description

Lectins are proteins or glycoproteins of non-immune origin that agglutinate cells and/or precipitate complex carbohydrates. Lectins can bind glycoproteins even in the presence of various detergents.¹ The agglutination activity of these highly specific carbohydrate-binding molecules is usually inhibited by a simple monosaccharide. However, for some lectins, di-, tri-, and even polysaccharides are required.

Lectins are isolated from a wide variety of natural sources, including seeds, plant roots and bark, fungi, bacteria, seaweed and sponges, mollusks, fish eggs, body fluids of invertebrates and lower vertebrates, and from mammalian cell membranes.² Lectins have proven very valuable in a wide variety of applications *in vitro*, including:

- blood grouping and erythrocyte polyagglutination studies
- mitogenic stimulation of lymphocytes
- lymphocyte subpopulation studies
- fractionation of cells and other particles
- histochemical studies³

A range of lectins suitable for the above applications is available. Most Sigma-Aldrich® lectins are highly purified by affinity chromatography. However, some are offered as purified or partially purified lectins, suitable for specific applications. Many of the lectins are available conjugated to the following moieties, where conjugation does not alter the specificity of the lectin:

- fluorochromes (for detection by fluorimetry)
- enzymes (for enzyme-linked assays)
- insoluble matrices (for use as affinity media)

Please refer to Table 1 for general information on the most common lectins.

Lectin PHA-P is not inhibited easily by monosaccharides, but may be inhibited by oligosaccharides. PHA-P is a mixture of PHA-E (MW = 128 kDa) and PHA-L (MW = 126 kDa).

Several publications,^{4,5} theses^{6,7} and dissertations⁸⁻¹¹ cite use of product L8754 in their research protocols.

Precautions and Disclaimer

For R&D use only. Not for drug, household, or other uses. Please consult the Safety Data Sheet for information regarding hazards and safe handling practices.

Storage/Stability

Aggregation is thought to occur in the presence of high concentrations of 2-mercaptoethanol.

Preparation Instructions

This lectin is soluble in phosphate buffered saline, pH 6.8, at 1 mg/mL.

Procedure

A general agglutination procedure using this lectin with 96-well plates is as follows:

1. Prepare a lectin solution of 1 mg/mL in PBS buffer, pH 6.8.
2. Pipette 50 μ L of fresh PBS into each well and add 50 μ L of the lectin solution into the first well.
3. Serial dilutions are made by pipetting 50 μ L from each successive well into the next well.
4. Blood type A with a 2% hematocrit is used as the substrate.
5. Pipette 50 μ L of blood into each well.
6. Visually determine agglutination.

References

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Table 1. General lectins guide

Lectin	MW (kDa)	Subunits	Specificity		Mitogenic Activity
			Blood Group	Sugar	
<i>Abrus precatorius</i>					+
• Agglutinin	134	4		Gal	
• Abrin A (toxin)	60	2		Gal	
• Abrin B (toxin)	63.8	2($\alpha\beta$)		Gal	
<i>Agarius bisporus</i>	58.5	-	-	β -gal(1 \rightarrow 3)galNAc	+
<i>Anguilla anguilla</i>	40	2	H	α -L-Fuc	
<i>Arachis hypogaea</i>	120	4	T	β -gal(1 \rightarrow 3)galNAc	
<i>Artocarpus integrifolia</i>	42	4	T	α -gal \rightarrow OMe	+
<i>Bandeiraea simplicifolia</i>					
• BS-I	114	4	A, B	α -gal, α -galNAc	
• BS-I-A ₄	114	4	A	α -galNAc	
• BS-I-B ₄	114	4	B	α -gal	
• BS-II	113	4	acq, B, Tk, T	glcNAc	
<i>Bauhinia purpurea</i>	195	4		β -Gal(1 \rightarrow 4)GalNAc	+
<i>Caragana arborescens</i>	60; 120 ^a	2/4	-	GalNAc	
<i>Cicer arietinum</i>	44	2	-	Fetuin	
<i>Codium fragile</i>	60	4	-	GalNAc	
Concanavalin A	102	4	-	α -Man, α -Glc	+
Succinyl-Concanavalin A	51	2	-	α -Man, α -Glc	+ ^b
<i>Cytisus scoparius</i>	-	-	-	GalNAc, Gal	
<i>Datura stramonium</i>	86	2($\alpha\beta$)	-	(GlcNAc) ₂	
<i>Dolichos biflorus</i>	140	4	A ₁	α -GalNAc	
<i>Erythrina corallodendron</i>	60	2	-	β -Gal(1 \rightarrow 4)GlcNAc	+
<i>Erythrina cristagalli</i>	56.8	2($\alpha\beta$)	-	β -Gal(1 \rightarrow 4)GlcNAc	
<i>Euonymus europaeus</i>	166	4($\alpha\beta$)	B,H	α -Gal(1 \rightarrow 3)Gal	+
<i>Galanthus nivalis</i>	52	4	(h)	Non-reduced α -Man	
<i>Glycine max</i>	110	4	-	GalNAc	+ ^c
<i>Helix aspersa</i>	79	-	A	GalNAc	
<i>Helix pomatia</i>	79	6	A	GalNAc	
<i>Lathyrus odoratus</i>	40-43	4($\alpha\beta$)	-	α -Man	+
<i>Lens culinaris</i>	49	2	-	α -Man	+
<i>Limulus polyphemus</i>	400	18	-	NeuNAc	
• Bacterial agglutinin	-	-	-	GalNAc, GlcNAc	
<i>Lycopersicon esculentum</i>	71	-	-	(GlcNAc) ₃	
<i>Maackia amurensis</i>	130	2($\alpha\beta$)	O	Sialic acid	+
<i>Maclura pomifera</i>	40-43	2($\alpha\beta$)		α -Gal, α -GalNAc	
<i>Momordica charantia</i>	115-129	4($\alpha\beta$)	-	Gal, GalNAc	
<i>Naja mocambique mocambique</i>	-	-	-	-	
<i>Naja naja kaouthia</i>	-	-	-	-	

<i>Narcissus pseudonarcissus</i>	26	2	(h)	α -D-Man	
<i>Persea americana</i>	-	-	-	-	
<i>Phaseolus coccineus</i>	112	4	-	-	
<i>Phaseolus limensis</i>	247 (II)	8	A	GalNAc	+
	124 (III)	4			
<i>Phaseolus vulgaris</i>					
PHA-E	128	4	-	Oligosaccharide	+
PHA-L	128	4	-	Oligosaccharide	+
PHA-P					
PHA-M					
<i>Phytolacca americana</i>	32	-	-	(GlcNAc) ₃	+
<i>Pisum sativum</i>	49	4($\alpha\beta$)	-	α -Man	+
<i>Pseudomonas aeruginosa PA-I</i>	13 – 13.7	-	-	Gal	+ ^c
<i>Psophocarpus tetragonolobus</i>	35	1	-	GalNAc, Gal	
<i>Ptilota plumosa</i>	65; 170	-	B	α -Gal	
<i>Ricinus communis</i>					
• Toxin, RCA60	60	2	-	GalNAc, β -Gal	
• Toxin, RCA120	120	4	-	β -Gal	
<i>Sambucus nigra</i>	140	4($\alpha\beta$)	-	α NeuNAC(2→6)Gal, GalNAc	+ ^c
<i>Solanum tuberosum</i>	50, 100 ^a	1,2	-	(GlcNAc) ₃	
<i>Sophora japonica</i>	133	4	A,B	β -GalNAc	
<i>Tetragonolobus purpureas</i>	120 [A]	4	H	α -L-Fuc	
	58 [BA]	2	H	α -L-Fuc	
	117 [C]	4	H	α -L-Fuc	
<i>Triticum vulgare</i>	36	2	-	(GlcNAc) ₂ , NeuNAC	+
<i>Ulex europaeus</i>					
UEA I	68	-	H	α -L-Fuc	
UEA II	68	-		(GlcNAc) ₂	
<i>Vicia faba</i>	50	4($\alpha\beta$)	-	Man, Glc	+
<i>Vicia sativa</i>	40	4($\alpha\beta$)	-	Glc, Man	+
<i>Vicia villosa</i>	139	4	A ₁ +T _n	GalNAc	
• A4	134	4	A ₁	GalNAc	
• B4	143	4	T _n	GalNAc	
<i>Vigna radiata</i>	160	4	-	α -Gal	
<i>Viscum album</i>	115	4($\alpha\beta$)	-	β -Gal	
<i>Wisteria floribunda</i>	68	2	-	GalNAc	

^a Concentration-dependent molecular weight

^c Mitogenic for neuraminidase-treated lymphocyte

^b Non-agglutinating and mitogenic

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