Lectins Used For Coronavirus Research

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Lectins from various sources have been shown to exhibit potent antiviral properties by inhibiting infection of clinically important viral pathogens. The antiviral activity of lectins is largely attributed to direct binding to viral envelope glycans and preventing entry of the virus into cells. Several lectins, particularly plant lectins with affinity toward mannose and N-acetylglucosamine (GlcNAc) sugar moieties, have been identified as potential therapeutic agents in the prevention of viral transmission in human immunodeficiency virus (HIV) and coronaviruses (SARS-CoV and MERS-CoV)[1].

Coronaviruses are enveloped single-stranded RNA viruses that contain at least four structural proteins: the membrane (M), envelope (E), spike (S) and nucleocapsid (N) protein. The heavily glycosylated S protein mediates virus–cell attachment and fusion. Mannose-binding lectins interfere with the coronavirus entry process by binding to the high-mannose type N-glycans of SARS-CoV via the S protein, preventing viral attachment to the host cell[2, 3].

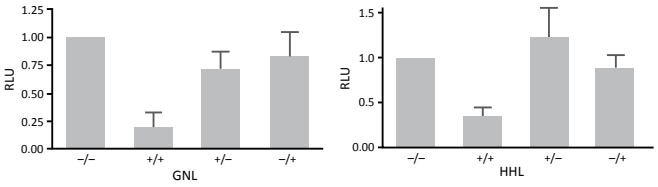
N-glycans on the coronavirus S protein may result in activation of a downstream antiviral innate immune response. N-linked glycosylation plays a critical role in the specific interaction between the mannose-binding lectin and SARS-CoV S protein. This interaction can also negatively affect receptor binding of the coronavirus[4].

Vector Laboratories is an established manufacturer of many plant lectins that are described in the literature as valuable tools in ongoing research to elucidate their potential in suppression of viral activity. Below is a list of mannose-specific and mannose/glucose-specific lectins, available in unconjugated and conjugated formats.

- Galanthus nivalis
- Hippeastrum hybrid
- Narcissus pseudonarcissus
- Concanavalin A
- Lens culinaris
- Musa paradisiaca
- Pisum sativum

Based on prior studies on coronaviruses such as SARS-CoV and MERS-CoV, mannose-specific plant lectins can be used to investigate antiviral properties of the novel coronavirus SARS-CoV-2, the virus that causes COVID-19.

Influence of lectins during receptor binding and viral fusion



Antiviral activity of plant lectins GNL and HHL during separate phases of the infection process of MHV-EFLM on LR7 cells. The experiments were evaluated using the luciferase assay[5].

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Select Lectins for Coronavirus Research

Product	Catalog Number	Unit Size
Galanthus Nivalis Lectin (GNL)		
Unconjugated	L-1240	5 mg
Fluorescein Labeled	FL-1241	2 mg
Agarose Bound (3 mg lectin/ml gel)	AL-1243	2 ml, 5 ml
Biotin Labeled	B-1245	2 mg
Hippeastrum Hybrid (Amaryllis) Lectin (HHL, AL)		
Unconjugated	L-1380	5 mg
Biotin Labeled	B-1385	2 mg
Narcissus Pseudonarcissus (Daffodil) Lectin (NPL, NPA, DL)		
Unconjugated	L-1370	5 mg
Biotin Labeled	B-1375	2 mg
Concanavalin A (Con A)		
Unconjugated	L-1000	500 mg
Fluorescein Labeled	FL-1001	25 mg
Rhodamine Labeled	RL-1002	25 mg
Agarose Bound (6 mg lectin/ml gel)	AL-1003	10 ml, 100 ml
Biotin Labeled	B-1005	5 mg
Lens Culinaris Agglutinin (LCA, LcH)		
Unconjugated	L-1040	10 mg, 25 mg
Fluorescein Labeled	FL-1041	5 mg
DyLight 649 Labeled	DL-1048	1 mg
Rhodamine Labeled	RL-1042	5 mg
Agarose Bound (3 mg lectin/ml gel)	AL-1043	10 ml
Biotin Labeled	B-1045	5 mg
Musa Paradisiaca Lectin (BanLec)		
Unconjugated	L-1410	5 mg
Pisum Sativum Agglutinin (PSA)		
Unconjugated	L-1050	10 mg
Biotin Labeled	B-1055	5 mg

References

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3. Ritchie, G., et al. Identification of N-linked carbohydrates from severe acute respiratory syndrome (SARS) spike glycoprotein. Virology. 2010 Apr 10;399(2): 257-69.
4. Fung, S. and Liu, DX. Post-translational modifications of coronavirus proteins: roles and function. Future Virol. (2018) 13(6), 405–430.)
5. F. J. U. M. van der Meer, et al. The carbohydrate-binding plant lectins and the non-peptidic antibiotic pradimicin A target the glycans of the coronavirus envelope glycoproteins. J Antimicrob Chemother. 2007 Oct; 60(4): 741–749.

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