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Review article

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The role of galectins in immunity and infection

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Supplemental Table 1. Extracellular binding partners identified for galectins*

Galectin	Binding partner
Galectin-1	CD2[1], CD3[1], CD4[2], CD7[2-4], CD11b, CD11a, CD43[2,3], CD44[5], CD45[2,3,6,7], CD69[8], CD107, CD146[9], CD326[5], TCR[10,11], CR3[12], CEA[13], laminin[14,15], fibronectin[14,16], GM1[17], glycoprotein 90/MAC-2BP[18], CA125[19], **pre-B cell receptor[20,21] haptoglobin[22], Vascular Endothelial Growth Factor R2[23], Neuropilin 1[24], α7β1 integrin[25], α4β7 integrin[25], β1 integrin[26], Osteospontin[27], Thrombospondin[27], Thy-1[7], Tissue plasminogen activator[28], Lamp1[13,29] Lamp 2[13]
Galectin-2	CD14[30], β1 integrin[31], MUC5AC[32]
Galectin-3	CD7[33], CD66a[34], CD66b[34], CD29/B1 integrin[33], CD45[35], Mac2[36], IgE, TRAIL[37], EGFR[38], Mac2 BP[39], laminin[40], Tenascin-C[41], Tenascin-R[41], Collagen IV[42], Elastin[43], Hensin[44], Fibronectin[45], NG2[46], CEA[47,48], α2β1 integrin[42], Muc1[49], Lamp 1[50], Lamp 2[50]
Galectin-4	Transferrin receptor[51], ***CD14[52], SB1a[53], SM3[53], SM4s[53], SB2[53], SM2a[53], GM1[53], CEA[53]
Galectin-7	E-cadherin[54,55]
Galectin-8	CD11a/CD18[56], CD44[57], CD45[58], BCR[59], glycoprotein 1b[60]
Galectin-9	CD5[61], CD22[62], CD44[63], CD45[62,64], CD180[61], Tim 3[65,66], PD1[67], V-domain Ig-containing suppressor of T cell activation (VISTA)[68], B cell receptor[61,62], TLR4[61], Lamp 2[69]
Galectin-12	

*Not all binding partners have been tested for every galectin. As a result, a binding partner for one galectin could certainly be engaged by a different galectin family member. However, it should be noted that positive interactions in vitro does not demonstrate that these interactions likewise occur in vivo (see Box 2)

**Extracellular binding partner that interacts with galectins through a carbohydrate-independent processes.

Supplemental Table 2. Impact of common glycan modifications on galectin binding

Galectin	Enhances glycan recognition	Inhibits glycan recognition
Galectin-1	Polylactosamine extension, 3' galactose sulfation[70-76]	α2-6 sialylation, ABO(H) blood group modifications, Lewis^a or Lewis^x modification[70,74]
Galectin-2	Polylactosamine extension, ABO(H) blood group modifications, ABO(H) blood group modifications[74]	α2-3 sialylation, α2-6 sialylation, Lewis^a or Lewis^x modification[70,74]
Galectin-3	Polylactosamine extension, ABO(H) blood group modifications[70-72,74]	α2-6 sialylation, Lewis^a or Lewis^x modification[70,74]
Galectin-4	Polylactosamine extension, ABO(H) blood group modifications, 3' galactose sulfation[53,70,77,78]	α2-3 sialylation, α2-6 sialylation, Lewis^a or Lewis^x modification[70]
Galectin-7	Polylactosamine extension, H blood group modification[70,71,79]	α2-3 sialylation, α2-6 sialylation, Lewis^a or Lewis^x modification[70,79]
Galectin-8**	Polylactosamine extension, 3' galactose sulfation, α2-3 sialylation, ABO(H) blood group modifications[70,72,77,78,80-82]	α2-6 sialylation, Lewis^a or Lewis^x modification[70,80,81]
Galectin-9	Polylactosamine extension, 3' galactose sulfation, ABO(H) blood group modifications[70,77,78,83]	α2-6 sialylation, Lewis^a or Lewis^x modification[70]

*This list is far from comprehensive. Instead, the intention of this list is to provide a general sense of the impact of common glycan modifications on glycan binding by distinct members of the galectin family

**Each domain of galectin-8 has been shown to have distinct glycan binding preferences.

Supplemental Table 3. Intracellular binding partners identified for galectins*

Galectin	Binding partner
Galectin-1	H-ras, actin[84], Gemin4[85], cytochrome oxidase subunit III[85], HBGp82[86], SUMO-3/SMT3B[85], Protocadherin 24[87], Toll-interacting protein (Tollip)[88]
Galectin-2	
Galectin-3	Bcl2[89], K-Ras[90], Akt[91,92], CD95 (cytoplasmic domain)[93], Gemin4[85], Chrp55[94], Axin, CBP70[95], β-catenin[96], TTF-1[97], Synexin[98], Protocadherin 24[87], Cytokeratins[99], Nucling[100], Alix[101,102], NLRP3[103], TRIM16[104]
Galectin-4	APC[105], Axin[105], β-catenin[105], Sp1[106], p27[106]
Galectin-7	Bcl2[107], Toll-interacting protein (Tollip)[88]
Galectin-8	NDP52[108], E3 ligase[109], Regulator-Rag/SLC38A9[110], TAK1[110], AMPK[110], SLC38A9[110]
Galectin-9	TAK1[111], AMPK[110,111], NLRP3[112], USP9X[111]
Galectin-12	VPS13C[113]

*Not all binding partners have been tested for every galectin. As a result, a binding partner for one galectin could certainly be engaged by a different galectin family member. However, it should be noted that positive interactions *in vitro* does not demonstrate that these interactions likewise occur *in vivo* (see Box 2). Glycan-dependent interactions with binding partners exposed to the cytosol can likewise occur and are not outlined here.

Supplemental Table 4. Galectin interactions with microbes

Galectin	Bacteria*	Viruses	Fungus	Parasites
Galectin-1	*Streptococcus pneumoniae*[114]	HIV[115], human T-cell leukemia virus type 1 (HTLV-1)[116], Nipah virus[117], influenza[118]		*Trichomonas vaginalis*[119,120], *Trypanosoma cruzi*[121]
Galectin-2				
Galectin-3	*Klebsiella pneumoniae*[122], *Pseudomonas aeruginosa*[123], *Neisseria gonorrhoeae*[124], *Neisseria meningitidis*[125], *Helciobacter pylori*[126,127], *Salmonella enterica subsp. S. enterica serovar S. minnesota*[122], *Streptococcus pneumoniae*[114,128], *Providencia alcalifaciens*[128]	HSV[129]	*Candida albicans*[130,131], *Cryptococcus neoformans*[132] *Aspergillus fumigatus*[133]	*Trypanosoma cruzi*[121,134], *Trichomonas vaginalis*[120], *Leishmania major*[135], *Schistosoma mansoni*[136], *Toxoplasma gondii*[137]
Galectin-4	*Escherichia coli*[138], *Providencia alcalifaciens*[139], *Klebsiella pneumoniae*[139]			*Trypanosoma cruzi*[121]
Galectin-7	*Escherichia coli*[79], *Providencia alcalifaciens*[79], *Klebsiella pneumoniae*[79], *Streptococcus pneumoniae*[79]			*Trypanosoma cruzi*[121]
Galectin-8	*Escherichia coli*[138], *Providencia alcalifaciens*[139] *alcalifaciens*[139], *Klebsiella pneumoniae*[139]			*Trypanosoma cruzi*[121]
Galectin-9	*Escherichia coli*[83], *Providencia alcalifaciens*[83], *Klebsiella pneumoniae*[83], *Streptococcus pneumoniae*[83]			*Leishmania major*[140], *Trypanosoma cruzi*[121]

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