

The crystal structure of Nematoda galectin LEC-6

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Galectins are known to recognize galactose- β 1,4-*N*-acetyl-D-glucosamine (Gal β 1-4GlcNAc) disaccharide unit of glycoconjugates. LEC-6 is a member of galectins in nematode *Caenorhabditis elegans*. Among the nematode galectins, LEC-6 has been well studied and shown that it prefer to bind with galactose- β 1,4-fucose (Gal β 1-4Fuc) rather than Gal β 1-4GlcNAc. It is interesting finding because galectins are known as Gal β 1-4GlcNAc binding property. To elucidate the molecular mechanism of how the nematode LEC-6 recognizes a carbohydrate which contains Gal β 1-4Fuc, the crystal structure of *C. elegans* galectin LEC-6 with Gal β 1-4Fuc was solved at 1.5 Å resolution. The overall structure and the residues binding to the disaccharide are similar to the other galectins. The structure is composed of six-stranded and five-stranded β -sheets, which together form a β -sandwich arrangement. The disaccharide is bound to concave surface of LEC-6. The multiple sequence alignment and the further structural analysis between LEC-6 and other galectins indicated that the glutamic acid residue located on the surface of LEC-6 is important for the preferential binding between protein and the saccharide. Frontal affinity chromatography analysis of the fluorophore 2-aminopyridine (PA)-sugars was applied for LEC-6 mutants. The association constant (value) of the glutamic acid mutant for E3 (an endogenous oligosaccharide) and Gal β 1-4Fuc were lower than wild-type LEC-6. We concluded that the glutamic acid residue at oligosaccharide-binding site is a key residue for the recognition of fucose (Fuc) moiety in LEC-6 and other galectins.