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Main Page

The CFG Paradigms

The purpose of this section of the CFG database is to document the success of the CFG in achieving its overall goal to 'define paradigms by which protein-carbohydrate interactions mediate cell communication.' Below are the paradigms chosen by the CFG steering committee, subgroup leaders, and other participating investigators to represent each of the major classes of glycan-binding proteins (GBPs). Follow the links to each paradigm for more information and to contribute to a Wiki page describing how the CFG and its PIs have contributed to the understanding of that GBP.

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C-type Lectins

The C-type lectin family consists of proteins with diverse overall organization that contain structurally related carbohydrate-recognition domains. Although they generally share a common mechanism for interacting with sugars through a bound calcium ion, the spectrum of ligands bound by different members of the family is diverse and can include both endogenous mammalian oligosaccharides as well as a sugar-containing structures on pathogenic micro-organisms. The biological functions of the C-type lectins are correspondingly diverse, but many of the best understood examples are membrane receptors found on the surface of cells of the immune system, which mediate interactions of these cells with each other and with viruses, bacteria, fungi and parasites, while other members of the family are soluble mediators of innate immunity. Outside the immune system, members of this group participate in clearance of circulating glycoproteins.

- Paradigm 1: DC-SIGN
- Paradigm 2: Macrophage galactose lectin (MGL)
- Paradigm 3: LSECtin
- Paradigm 4: P-Selectin
- Paradigm 5: Mannose receptor
- Paradigm 6: Ficolins/Mannose-binding protein

Galectins

Galectins are a family of glycan-binding proteins that are expressed in all multicellular organisms, in virtually every cell and tissue, and that vary considerably in function. There are 15 overall genes encoding galectins in different animals and 11 are expressed in humans. All galectins share a consensus sequence of about 130 amino acids and a homologous carbohydrate recognition domain (CRD) that specifically binds many different types of glycans, including those containing b-galactosides and poly-N-acetylglucosamines, but also including blood group antigens, and sialic acid- or sulfate-containing structures found in O- and N-glycans. The jellyroll-like conformation of the CRD, the hallmark of the galectin family, is composed of two anti-parallel b-sheets that establish a b-sandwich. Differences in ligand specificity among this family are determined by specific amino acids in the CRDs, allowing recognition of different modifications of galactose-containing glycans, thus defining the affinity of a particular galectin for specific glycoprotein or glycolipid receptors in a certain tissue or cell type. Galectins are synthesized in the cytoplasm and secreted via a non-classical secretion pathway, so that galectins are found in a variety of intracellular compartments, as well as in the extracellular milieu of almost every cell and tissue type. There are three structural subfamilies of galectins - the prototypic, the chimeric, and the tandem repeat. The three paradigmatic galectins described below represent the three structural

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