

**Direct binding and inhibition assays of fluorinated glucopyranosides
with conA, LCA and PSA lectins: an STD-NMR study**

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Binding events of ligands to receptors are the key for an understanding of biological processes. Carbohydrates act as recognition determinants in a variety of physiological and pathological processes.¹This concept evolved with the realization that carbohydrates have enormous potential for encoding biological information. The messages encoded in the structures of complex carbohydrates are deciphered through interactions with complementary sites on carbohydrate-binding proteins, chiefly lectins.²

A protocol based on saturation transfer difference (STD) NMR³ spectra was used to characterize and evaluate the binding interactions at an atom level. As an example we chose the systems of 2-fluoro-2-deoxy-glucose and 3-fluoro-3-deoxy-glucose binding to the legume lectins proteins *concanavalin A* (conA); *lens culinaris agglutinin* (LCA); and *pisum sativum agglutinin* (PSA). STD-NMR primarily identified which ligands interact with the protein and even discriminate the anomeric configuration preference for binding. Furthermore, it was also possible to develop an epitope mapping and by means of inhibition studies with the natural ligand, α -D-mannose, was possible to extract some thermodynamic information concerning the system.

[1] Sharon, N., Gallagher, J.; *Current Opinion in Structural Biology*, 17, Issue 5, October 2007, 495-497;

[2] Sharon, N., Liss, H.: Lectins-proteins with a sweet tooth: functions in cell recognition. *Essays Biochem.*, 1995; 30: 59-75;

[3] Meyer, B., Peters, T., *Angewandte Chemie International Edition*, 2003, 43, no. 8.

This work has been carried out with financial aid of the European union, project "DYNAMIC INTERACTIVE CHEMICAL BIOLOGY AND BIOMEDICINE" (MRTN-CT-2005-019561)