LECTIN-SUGAR INTERACTIONS DECIPHERED BY SPR-MS AND CREDEX-MS

Carmen Jiménez-Castells[1], Adrian Moise[2], Beatriz G. de la Torre[1], Michael Przybylski[2], Ricardo Gutiérrez-Gallego[1,3], and David Andreu[1]

[1]Department of Experimental and Health Sciences, Pompeu Fabra University
[2]Department of Chemistry, University of Konstanz, 78457 Konstanz, Germany
[3]Bio-analysis group, Neuropsychopharmacology program, IMIM-Hospital del Mar
[1,3]Barcelona Biomedical Research Park, Dr. Aiguader 88, 08003 Barcelona, Spain

Interest in sugar-protein interactions has been rising significantly over the last decades. The role of these interactions in processes such as bacteria-host recognition, viral entry, fertilization and metastasis, justifies the search for powerful, nanosized analytical tools to study the corresponding mechanisms.

Here we report on two complementary analytical techniques that provide both quantitative and qualitative data of the interaction with high sensitivity, low sample consumption and without the requirement of sample labelling. On one hand, with surface plasmon resonance (SPR), kinetic and thermodynamic parameters of the interaction can be determined in real time. In this approach the sugar is immobilized on a chip surface through a tailor-made peptide module[1,2], the protein flown across and the resulting read-out enables both quantitation and kinetic analysis of the interaction. Subsequently, interacted material can be recovered under optimized conditions for mass spectrometric characterization.

On the other hand, a combination of proteolytic excision of protein-carbohydrate complexes and mass spectrometry (CREDEX-MS)[3] allows to identify the peptide motifs at the carbohydrate binding site. Here, the sugar is immobilized to a functionalized Sepharose column and the lectins passed through. After on-column digestion of the complex, sugar-bound peptides are eluted and identified by mass spectrometry[3].

In this presentation we will describe the combination of these two methodologies for sugar-protein interaction studies and demonstrate their applicability with several legume lectins that display different sugar specificities.

1. Vila-Perelló, M., Gutiérrez-Gallego, R., Andreu, D. Chembiochem 6, 1831-1838 (2005)
2. Jiménez-Castells, C., de la Torre, B.G., Gutiérrez-Gallego, R., Andreu, D. Bioorg. Med. Chem. Lett. 17, 5155-5158 (2007)
3. Przybylski M., Moise A., Svobodova E., Siebert H., Gabius H. J Pept. Sci. Supplement to Vol. 14, 40 (2008)