Ana Ardá

Cell surface competing lectin binding by ^{19}F-NMR

Abstract

Galectins constitute a family of evolutionarily conserved, glycan-binding proteins with broad tissue distribution and diverse cellular localizations. They are implicated in a surprisingly wide range of biological processes. In the extracellular space, Galectins interact with glycoconjugates at the cell surface and within the extracellular matrix in a glycan-dependent manner, modulating various cellular activities. Their widespread distribution, along with the ubiquity of their glycan-binding epitopes, raises important questions about how Galectin-mediated biological processes are regulated. Their ability to cross-link glycosylated cell-surface receptors via the so-called 'galectin lattice', is currently proposed as the paradigm for Galectin-mediated functions at the cell surface, including the initiation of intracellular signaling pathways.

Herein we have explored the potential of ^{19}F-NMR as a tool to monitor Galectins binding to the cell surface. The use of fluorinated proteins in ^{19}F-based NMR experiments has emerged as an attractive strategy for simplifying the study of various protein features, such as molecular recognition events. Additionally, it offers the advantage of enabling these studies in mixtures or complex media, as it provides background-free NMR spectra.

Thus, the production of a library of 19F-tagged Galectins has enabled performing competing binding experiments among Galectins with similar glycan binding preferences, as well as monitoring Galectin´s on cell surface binding. These precedents pave the way for conducting on-cell binding experiments, where altering cell surface glycosylation will help us better understand the formation of the `galectin-lattice`.