

19F Labelled Glycosaminoglycan Probes for Solution NMR and Non-linear (CARS) Microscopy

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INTRODUCTION: An understanding of the biological processes that determine cell-cell signalling, hence coordinate cellular responses and maintain healthy growth and development, must encompass a detailed appreciation of interactions between proteins and extracellular matrix (ECM) polysaccharides. Studying polysaccharide-protein interactions under physiological conditions by conventional techniques is challenging. Ideally, macromolecules would need to be followed by both in vitro spectroscopy experiments and in tissues using microscopy, to enable a proper comparison of results. 19F labelling of glycosaminoglycans provides background-free signals with potential in both 19F NMR protein-binding studies and non-linear microscopy. **OBJECTIVES:** With these considerations in mind, we have employed 19F labelling of GAG poly- and oligosaccharides as a route to gaining information concerning protein-polysaccharide interactions. **METHODS:** We used NMR spectroscopy, and as a mean of following events in tissues, employing non-linear (F-CARS) microscopy. **RESULTS:** A synthetic heparin pentasaccharide (AGAIA), corresponding to the active site for antithrombin, has been derivitised with CF3 and its binding to AT studied using 19F NMR and films of the 19F-labeled GAGs were imaged using CARS microscopy. **CONCLUSIONS:** In summary, 19F-labelling of GAGs allow both in vitro spectroscopy experiments as well microscopy-based assays, ultimately allowing data comparison.

Keywords: Glycosaminoglycans, NMR, CARS microscopy

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