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Designing synthetic lectins to investigate metastatic potential in colon and prostate cancers

Tanya Hundal
University of South Carolina, USA

Cancers of colon and prostate, though treatable, require early detection to improve patient outcomes. Current diagnosis methods e.g. visual inspection and biopsies are somewhat subjective, thus decreasing accuracy. Alternatively, blood-based tests measuring specific biomarkers (like CEA and PSA) are associated with high false-positive rates and are more useful for monitoring post-treatment patient health, thus driving efforts to identify better screening and diagnostic techniques. Abnormal glycosylation of integral membrane and secreted glycoproteins is known to take place at the onset of many diseases, including cancer, and presents as the over, under or new occurrence of certain glycans. The aim of this study is to design synthetic lectins (SLs) that recognize cancer associated glycans (CAGs). Each CAG produces a unique response pattern with an array of cross-reactive SLs. Further, the ability of an array of SLs to discriminate cell lines based upon their difference in metastatic potential, demonstrates an alternative approach to detect colon and prostate cancers by looking at global changes in glycosylation. The utility of these SLs was demonstrated using purified glycoproteins, since these glycoproteins expressed similar glycans which are also present in CAGs. Previously, using statistics, an array of 5 SLs could distinguish between 4 human colon cell lines based on their metastatic potential with 89% accuracy. Further SL design modifications have been carried out and correlations between structural modifications and activity have been established. Based on these preliminary examinations, several new SLs have been identified targeting human colon and prostate cell lines. An extended array incorporating these new SLs, can discriminate between normal, cancerous non-metastatic and cancerous metastatic secreted proteins of different tissue types even better. Ongoing work is focused on investigating the binding interaction between SLs and glycans/proteins to enhance our understanding of the system in order to improve upon current SL structures.

Biography

Tanya Hundal is a final year graduate student at Department of Chemistry, University of South Carolina and is working with Dr. John J Lavigne.

hundalt@email.sc.edu

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