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In collaboration with Professor Dipankar Chatterji, MBU, IISc.

The present manuscript describes synthesis and biophysical studies of glycolipids constituted with β-anomeric arabinofuranosides. The desire to study synthetic glycolipids is related to their relevance to mycobacterial cell-wall components. Synthetic glycolipids presented with arabinofuranosides and mannopyranosides were shown previously to affect mycobacterial growth. In the glycolipids studied so far, only α-anomeric arabinofuranosides were involved. Further studies also showed that such synthetic glycolipids interacted with mycobacterial receptor proteins in host cells, namely, surfactant protein A (SP-A), with sub-millimolar binding constants. Having identified binding affinities to α-anomeric arabinofuranoside containing glycolipids previously, it became imperative to identify the binding of SP-A to arabinofuranoside glycolipids with β-anomeric linkages. Accordingly, syntheses of glycolipids were performed with β-arabinofuranoside trisaccharide constituting the glycolipid. Biophysical studies of the interaction of SP-A with two such synthetic glycolipids were conducted and the studies showed two important results, (i) β-arabinofuranoside glycolipids are cognate ligands for SP-A and (ii) SP-A exhibit lesser binding affinities to glycolipids with β-anomeric arabinofuranosides than the α-anomeric arabinofuranoside containing glycolipids. These results are of fundamental significance to our understanding of the role of glycolipids binding to one of the important lung, innate, immune proteins, namely, SP-A. Recognition of synthetic glycolipids to SP-A is unknown so far, even when binding of native lipoarabinomannans to SP-A is being investigated intensely in recent years.