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The work pertains to synthesis of linear and a branched oligoarabinofuranoside containing glycolipids, relevant to mycobacterial cell wall components. Tetra-, hexa- and octa-linear oligoarabinofuransides and a branched hepta-arabinofuranoside were synthesized, initiating from commercially available monomer building blocks. Chemical syntheses were generally high yielding, although judicious choices of protections and deprotections had to be employed. Following syntheses, systematic conformational analyses of glycolipids were conducted through molecular dynamics simulations. Simulations permitted assessing the glycosidic dihedral angles, namely, φ, ψ and ω, leading to derive conformations of the oligosaccharide glycolipids. With the interest to identify the efficacies of synthetic glycolipids to recognize an appropriate cell-surface bound protein, we focused on binding studies involving a pulmonary surfactant protein, namely, surfactant protein A (SP-A), which is the native protein receptor site for the binding of arabinofuranosides decorated bacterial cell wall components with host cells. The surface plasmon resonance (SPR) based method was adopted to identify the associated kinetic constants and the thermodynamic equilibrium constants. We were fortunate to secure SP-A through kind helps of Professor Jo Rae Wright and Dr. Kathy Evans, Duke University, USA. The study was thus made possible, leading to uncover important findings relating to the interaction of glycolipids and SP-A. Kinetic studies and equilibrium constants were derived, thereby providing clue as to the efficacies of synthetic glycolipids. Findings of this study open up opportunities to exploit hitherto un-known oligoarabinofuranoside glycolipids as effective candidates for mycobacterium related disease processes and expanding scope of interventions.