Maiti, K.; Syal, K.; Chatterji, D.; Jayaraman, N. 2017, "Synthetic Arabinomannan Heptasaccharide lycolipids Inhibit Biofilm Growth and Supplements Isoniazid Effects in *Mycobacterium smegmatis*", *ChemBioChem*., 18, 1959 – 1970.

In collaboration with Prof. D. Chatterji, MBU, IISc.

Biofilm formation by a mycobacterium species is a crucial event in the sustenance, survival and pathogenicity of the species under an extremely harsh environmental condition. Genomic and metabolic pathways are altered such that the mycobacterium can survive, even under a nutrient-starvation condition in the biofilm phase. The finer details as to how the mycobacterium survives and exerts pathogenicity in the biofilm phase is hardly clear, for reasons that the mycobacterium exists in the colonized form and is constitutively protected by the formation of biofilm coat. Multi-drug tolerance and resistance are challenges in biofilm formed populations of a mycobacterium. In our sustained work to identify the effect of designed glycolipids, we have demonstrated earlier that tri- to pentasaccharide-containing glycolipids are potent biofilm inhibitors, with studies focused on *M. smegmatis*, which is a putative non-pathogenic model species to the pathogenic *M. tuberculosis* species. In the present work, we expand the scope of glycolipids, with the aid of larger oligosaccharide glycolipids. Effects of larger glycolipids on biofilm forming mycobacterial species are unknown so far. We undertook chemical synthesis of arabinofuranosyl-mannopyranosyl heptasaccharide glycolipids, in different branched fashions, namely, 2,5-branched and 2,3-branched fashions. Following synthesis and characterization, in one part of the studies, we investigated the biofilm inhibition potential of the glycolipids. A systematic quantitation of the inhibition potential show that 2,5-branched oligosaccharide glycolipid inhibits the biofilm most, by more than 85% at a concentration of 100 μg/mL. In another part, we investigated the ability of the synthetic glycolipid to enhance the inhibitory concentrations of an established life-line drug, namely, isoniazid. The drug, in combination with synthetic glycolipid, is able to inhibit the biofilm formation, by more than one third reduction in concentration, with respect to drug alone. A synergistic effect is thus evolved by a combination of these two inhibitors. The results reiterate that arabinofuranosyl-mannopyranoside oligosaccharide glycolipids are newer entry as inhibitors of recalcitrant biofilm phase of a mycobacterium species. A combined chemical and biological investigation aids unraveling such an effect by non-toxic

glycolipids, promising a scope for further developments in the area of inhibitor development to a mycobacterium.