6: CONCLUSIONS AND FUTURE DIRECTIONS

Antimicrobial resistance has urged the discovery of various alternative strategies to overcome the resistance patterns by pathogenic microbes. In this regard, the present study aimed at exploiting Quorum Sensing pathway of *Streptococcus mutans* (a dental pathogen) to discover a potential ligand to attenuate the activity of ComA (an ABC transporter). As discussed in the previous chapters, *in silico* based drug designing indicated 1,3-disubstituted ureas as potential ligands and *in vitro* studies proved the ability of 1,3-disubstituted ureas, in particular, 1,3-di-*m*-toylurea (ComAI), to inhibit the major virulence factors such as biofilm formation (dental plaque) by *S. mutans*. Additionally, we proved that ComAI can reduce the concentration of fluoride to 31.25 ppm instead of 1000 ppm used presently in oral formulations. qRT-PCR data analysis showed downregulation of various genes involved in quorum sensing circuit thus, indicating the target specific action of ComAI. Furthermore, *in vivo* studies using Wistar rat model corroborated with our *in vitro* data showing reduction in the development of caries in treated groups. Reduction in expression of inflammatory markers also showed the ability of ComAI to prevent the progression of dental caries and thus inhibiting the entry of *S. mutans* to the blood stream thus, inhibiting the alleviated chronic immune response. Future studies are warranted to link and explore pathways that link dental caries to systemic diseases and this may provide a guide to further enhance the anti-inflammatory chemotherapeutic anti-caries agents in oral formulations.