Abstract

Fluorine plays an important role in estimating the binding affinity and potency of drugs. This thesis work focuses on the study of fluoroquinolones which are used to treat bacterial infections such as respiratory and urinary tract infections. DNA gyrase is the target site for the quinolones. These fluoroquinolones bind to these enzymes and inhibit their activity. In this work, relaxation and diffusion studies were done for these drugs and similar molecular mass compounds could be differentiated using diffusion study. Here, diffusion study of Pazufloxacin and Prulifloxacin were done inside DPPC lipid bilayer.Their diffusion studies tells us about their interaction with the DPPC lipid bilayer and their motion in the solution. 19 F chemical shift anisotropy (CSA) tensor is a useful tool in NMR to character- ize biomolecules. This work focuses on the characterization of CSA tensor of fluorine in fluoroquinolones using liquid state NMR cross-correlated relaxation experiments and quantum computational methods. The experiments are used to characterize the CSA tensor magnitude and its orientation, through measurement of cross-correlated spin relaxation rates between several different relaxation pathways in these molecules. Chapter 1 deals with a short introduction to NMR, its relaxation phenomenon and basics of computational chemistry. Chapter 2 focusses on relaxation and diffusion studies of drugs Pazufloxacin and Prulifloxacin. It involves experimentally calculated relaxation times and diffusion coefficients for these drugs using DPPC. Chapter 3 involves experimental analysis of Fluoroquinolones using 1-D and 2-D based experiments. Lastly, Chapter-4 includes introduction to CSA tensor and use of quantum chemistry calculations to characterise these CSA tensors. Cross correlated spin relax- ation liquid-state NMR experiments were performed to calculate fluorine CSA tensor.