Abstract

Introduction: The main mechanism of mitoxantrone action is the binding to DNA and inhibition of replication. Calculating mitoxantrone's binding constants can improve clinical interventions. One of the powerful techniques for calculate kinetic parameters is surface plasmon resonance technique (SPR), which provides useful information about association and dissociation constants. SPR is adequately sensitive to changes in dielectric coefficient before and after analyte bonding. Moreover, spectroscopic methods especially fluorescence spectroscopy can also be used as an important technique for the study of DNA-binding events.

Methods: In order to provide carboxylic groups on the surface of the gold chip, a solution of mercapto-andecanoic acid (MUA) was used, which causes the MUA to bind to the gold surface by its thiol. Then, to activate the carboxylic groups, a solution of en-hydroxy succinimide and 1-ethyl-3- (3-dimethylaminopropyl) carbodide was used. Amino DNA (with an amino terminus) was then injected to bind to the surface of the gold chip by forming an amide bond. Different concentrations of mitoxantrone were injected at three different temperatures to obtain binding constants.

Results: The binding constant calculated from SPR and fluorescence spectroscopy showed that at 31 ° C, MTX has a higher affinity for DNA binding.

Conclusion: Analysis of thermodynamic data showed that hydrophobic interactions play an important role in the formation of MTX: DNA complex.

Keywords: Optical Biosensor, SPR, DNA, Mitoxantrone, Fluorescence spectroscopy