



Investigation and Determination the Binding Site of Glycyrrhizin of Liquorice to DNA

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Abstract

Glycyrrhizin (GL), is a triterpenoid saponin found in glycyrrhiza glabra (liquorice). This compound is a frequently used and very effective drug for the treatment of various malignancies. This study was designed to examine the interactions of glycyrrhizin with calf thymus DNA in aqueous solution at physiological conditions. FTIR spectroscopic method was used to determine the ligand binding modes, using constant DNA concentration (6.25 mM) and various drug/DNA (phosphate) ratios of 1/240 to 1/1. UV-Vis spectroscopic method was used to determine the binding constants and the stability of glycyrrhizin-DNA and complexes in aqueous solution, using constant DNA concentration of 5.1×10^{-4} M and various glycyrrhizin concentrations of 5×10^{-6} - 1×10^{-4} M. Spectroscopic evidence showed that the interaction of glycyrrhizin with DNA occurred via G, A-T and PO₂ group with binding constant of $K_{GL-DNA} = 5.7 \times 10^3 \text{ M}^{-1}$ and DNA remains in B-DNA conformation.

Keywords: DNA, Glycyrrhizin, liquorice, FTIR, UV-Visible spectroscopy.

Introduction

The root of liquorice has been used since ancient Egyptian, Greek and Roman times in the West and in ancient China in the East. Liquorice is a common medicinal herb and crude drug in the traditional Chinese medicine used for over 1000 years [1-3]. The main bioactive components of liquorice root is triterpenoid glycoside – glycyrrhizic acid;

3-O-(2-O-β-D-Glucopyranuronosyl-α-D-glucopyranuronosyl)-18β-glycyrrhetic acid. glycyrrhizic acid has been shown to be active against a variety of viruses including herpes simplex type 1 (HSV-1), varicella-zoster virus (VZV), human cytomegalovirus (HCMV), hepatitis A, B and C (HAV, HBV, and HCV) viruses, influenza virus, and human immunodeficiency virus-1 (HIV-1) [4-12]. In

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