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Investigation of interaction and structural changes of insulin in the presence of Lenalidomide

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Abstract

Insulin, a globular peptide hormone (MW 5808 Da), comprises two polypeptide chains: the A-chain (21 amino acids) and the B-chain (30 amino acids), linked by disulfide bonds. Lenalidomide as a potent immunomodulatory drug, is a less toxic analog of thalidomide and was developed to reduce side effects like peripheral neuropathy. Our main aim in the present study is to investigate the interaction and structural alterations in Insulin due to presence of different concentrations of Lenalidomide. For this purpose, we execute two different spectroscopy methods, Fluorescence and UV-Visible, to examine the interactions, structural changes and related parameters.

The intrinsic fluorescence data show systematic quenching of insulin's natural emission spectrum in the presence of various concentrations of lenalidomide at both of the temperatures of 25 and 37 °C. The number of binding sites and binding constants were analyzed by using quenching data. Hill equation analysis identifies that there is one binding site on insulin for binding of lenalidomide at both of the temperatures. Also, according to Stern-Volmer equation and plots which confirm the static quenching mechanism. These results suggest lenalidomide

can interact and bind with insulin protein through static quenching, offering insights into their molecular interactions and potential effects.

Key words: Insulin, Lenalidomide, Hill equation, Stern-Volmer equation