

The study on the effect of non-enzymatic glycation on the interaction of human serum albumin and sodium-fluorescein, via spectroscopic analyses

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The binding of SF to Human Serum Albumin (HSA) has been predicted by molecular docking and investigated by circular dichroism (CD) and fluorescence spectroscopy with or without glycation at temperatures 296K, 301K, and 310K. The binding parameters were calculated by quenching of emission spectrum of a constant concentration of SF (2 μ M) at 513 nm against increasing concentrations of glycated or unmodified HSA as quencher starting from stoichiometry ratio of 1:1. Sodium Fluorescein (SF) is a fluorescent tracer dye used extensively in diagnostic tools in the field of Ophthalmology, particularly in intravenous fluorescein angiography (IVFA). The HSA-SF interaction found to be a static binding. The Stern-Volmer constants (K_{sv}) were in the range of $\sim 104 \text{ M}^{-1}$ and other thermodynamic parameters like enthalpy (ΔH^0), free energy (ΔG^0) and entropy (ΔS^0) are like albumin ligand bindings reported by previous workers. The interactions were found to be spontaneous, irrespective of temperature or glycation. Glycated HSA is clinically used to monitor unstable glycemic controls in diabetic patients. 39% increase in binding affinity

(log K) and free energy (ΔG^0) is reported on glycation at 310 K (room temperature), which may be important in the SF based angiographies. Further, on glycation HSA-SF binding seems to change from an enthalpy-driven to an entropy-driven reaction. SF shows best binding to FA binding site III of HSA, which also overlaps with drug binding site II of sub domain IIIA. Leu-430 seems to play a pivotal role in the interaction. This is the first report of glycated HSA and SF binding and comparison between the thermodynamic parameters of the bindings in the absence and presence of glycation at different temperatures.

Speaker Biography

Priyankar Sen is working in the field of protein folding and protein ligand interactions for the enhanced understanding of the molecular behavior of proteins, specifically albumins. He has done his PhD from Rizwan Khan's Lab in IBU, Aligarh Muslim University, India and Post-doctorate from Salunke's Lab, NII, New Delhi. Out of 5 years' Doctoral and 8 years Post-doctoral research, he has published 21 papers in international peer reviewed journals. He is currently working as Assistant Professor in VIT University. Currently, he is focusing on expression and modification of therapeutically important proteins and further scale up in bioreactors.

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