Influence of Curcumin in Human Serum Albumin at different Temperatures

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Abstract

Curcumin (diferuloylmethane), a polyphenol found in the rhizomes of the plant *Curcuma longa,* has been in the prominence due to its diverse pharmacological activities. Daily consumption of curcumin boosts immune power which is critical to fight against different microbial diseases including Covid-19 and other emerging diseases. Here, we report for the first time a study on the interactions of curcumin with the plasma protein human serum albumin (HSA), exploiting the intrinsic fluorescence emission properties of curcumin as a probe, along with the intrinsic chromophore tryptophan (Trp) of HSA. Moreover, far UV circular dicroism (CD) spectroscopy, combined with molecular modeling computations were performed to study the influence of curcumin on the protein secondary structure and the binding sites respectively. Specific interaction of the curcuminoid with HSA is confirmed from drastic increase and blue shift in curcumin fluorescence with increasing [HSA]. The emission spectra of Trp suggests occurrence of efficient Förster type resonance energy transfer (FRET) from the single tryptophan-214 residue of HSA to the curcumin. With increase in temperature, further blue shift and decrease in emission were observed. Both temperature dependent fluorescence measurements and molecular docking studies reveal that hydrogen bonding, van der Waals interactions, and electrostatic interactions play crucial role in curcumin-HSA interactions.