A spectroscopic study on carbamylated human serum albumin

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Statement of Purpose: Carbamylation is a non-enzymatic attachment of cyanate on the epsilon amino group of lysine residues in proteins. Nonetheless, arginine side chain is also prone to carbamylation. This attachment may cause structural and functional changes in protein and such proteins may be involved in the initiation/progression of various diseases because carbamylation-derived products (CDPs) are bioactive compounds that trigger specific and inappropriate cellular responses. For instance, carbamylation may inactivate hormones and enzymes and alter characteristic biochemical events. Role of carbamylated macromolecules have been shown in atherosclerosis, rheumatoid arthritis and hypoxia.

Methodology: Human serum albumin (3 mg/ml) was incubated with potassium cyanate (0.025M, 0.05M, 0.075M and 0.100M) for 5-6 h at 37°C. Carbamylated-albumin(c-albumin) was characterized by various physico-chemical methods.

Results: Carbamylated-albumin exhibited hypochromicity at 280nm and increase in fluorescence intensity. Carbamylated-albumin also showed shift in amide I and amide II band position indicating changes in secondary structure. A decrease in melting temperature of c-albumin suggests that carbamylation has caused destabilization in albumin’s native structure. Furthermore, enhancement in the emission intensity of ThT-c-albumin complex and altered images under scanning electron microscope and transmission electron microscope suggest that carbamylation has resulted in the aggregation of human serum albumin.

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