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Molecular spectroscopic studies on the interaction of coumarin with calf thymus DNA

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Plant derived polyphenolic compounds are important components of human diet and a number of them such as flavonoids, tannins, curcumin, the stilbene, etc. are considered to possess a wide range of pharmacological properties. Coumarin (1,2-benzopyrone) the parent molecule of coumarin derivatives, is the simplest compound of a large class of naturally occurring phenolic substances made of fused benzene and apyrone rings. Natural as well as synthetic coumarins have recently drawn much attention due to its broad pharmacological activities. Many coumarins and their derivatives exert anti-coagulant, anti-tumor, anti-viral, anti-inflammatory and antioxidant effects, as well as anti-microbial and enzyme inhibition properties, but their mode of interaction with DNA is still not well understood. In this study, we have attempted to ascertain the mode of binding of coumarin with calf thymus DNA (ct-DNA). Coumarin binds to DNA and forms drug-DNA complex. Analysis of absorbance and fluorescence spectra indicates that coumarin is a groove binder of ct-DNA. These observations were further supported by CD spectral analysis and molecular docking study. Competitive fluorimetric studies with Hoechst 33258 shows that coumarin exhibits the ability to displace the DNA-bound Hoechst 33258 indicating that it binds to DNA in strong competition with Hoechst 33258 for the groove binding. The strong dependence on ionic strength or salt in controlling the binding of coumarin with ct-DNA by electrostatic interaction confirms groove binding.

Biography

Tarique Sarwar is pursuing Ph.D. at Department of Biochemistry, AMU, under the supervision of Dr. Mohammad Tabish. He has published a research article in a reputed international journal and co-authored a book chapter. He is presently availing MANFSAF fellowship. He has presented posters in a number of national and international conferences.

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