Interactions of an anticancer drug Formestane with single and double stranded DNA at physiological conditions

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Abstract:

Mode of interactions of anticancer drug Formestane (FMT) with single and double stranded DNA has been investigated at different temperatures and at two physiological pH values i.e. 7.4 (human blood pH) and 4.7 (stomach pH). Fluorescence spectroscopy, UV–Vis spectroscopy, cyclic voltammetry and square wave voltammetry were employed to probe the interaction between FMT and DNA. The observed fluorescence quenching of dsDNA–ethidium bromide system by the anticancer drug FMT confirmed the intercalative mode of binding between the FMT and dsDNA. The absorption spectra and voltammetric results indicate FMT gets intercalated between dsDNA bases and the strength of interaction is independent on the ionic strength. Comparison of the mode of interaction of FMT with dsDNA and ssDNA was discussed. The calculated binding constants for FMT–dsDNA and FMT–ssDNA complexes at pH 7.4 were found to be $1.52 \times 10^5$ $M^{-1}$ and $1.24 \times 10^6$ $M^{-1}$, respectively. Stoichiometric coefficients and thermodynamic parameters of FMT–dsDNA and FMT–ssDNA complexes were evaluated. The association between the anticancer drug FMT with DNA is maximum at pH 7.4 which depicts the most stable complexes are formed at human blood pH. The decrease in peak current of FMT resulting from its interaction with DNA was employed for determination of dsDNA and ssDNA concentration at physiological conditions.

Keywords:

Formestane, DNA, Fluorescence spectroscopy, UV-vis spectroscopy, Voltammetry, Physiological conditions

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