The effect of the caffeine on the binding of haloperidol to human serum albumin

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Introduction

Caffeine belongs to a group of purine alkaloids. Complexes that albumin build with drug molecules represent a depot from which the drug is gradually released. Haloperidol (HPD) belongs to the group of atypical antipsyhotics and it is binding to human serum albumin (HAS) more than 90 %.

Material and methods

Binding of haloperidol and caffeine was investigated by fluorescence spectroscopy. All fluorescent spectra were recorded in the range of 300 to 550 nm at a wavelength of excitation of 295 nm on two temperatures (303 and 310 K). All solutions are freshly prepared by dissolving in phosphate buffer. All the batch solutions were prepared from precision measurements.
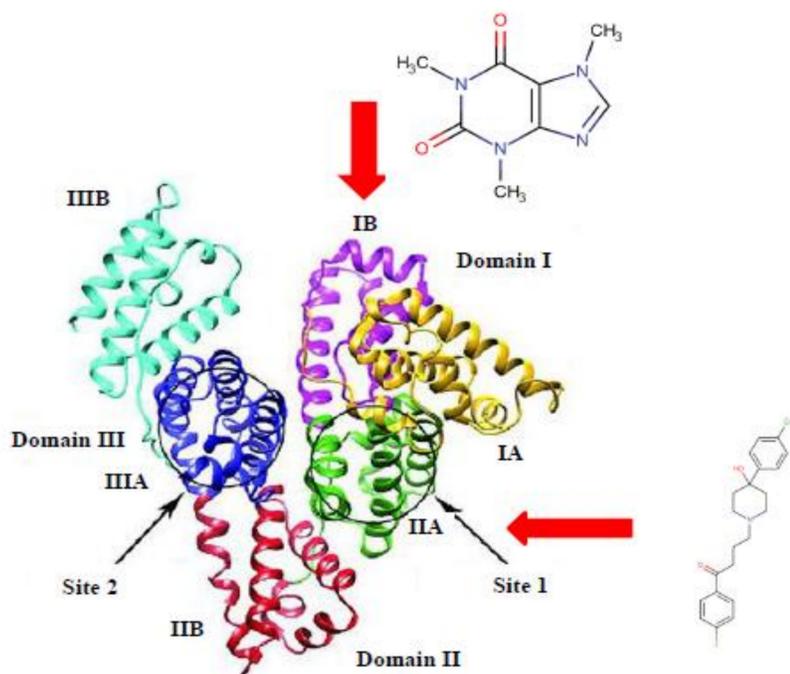
Results

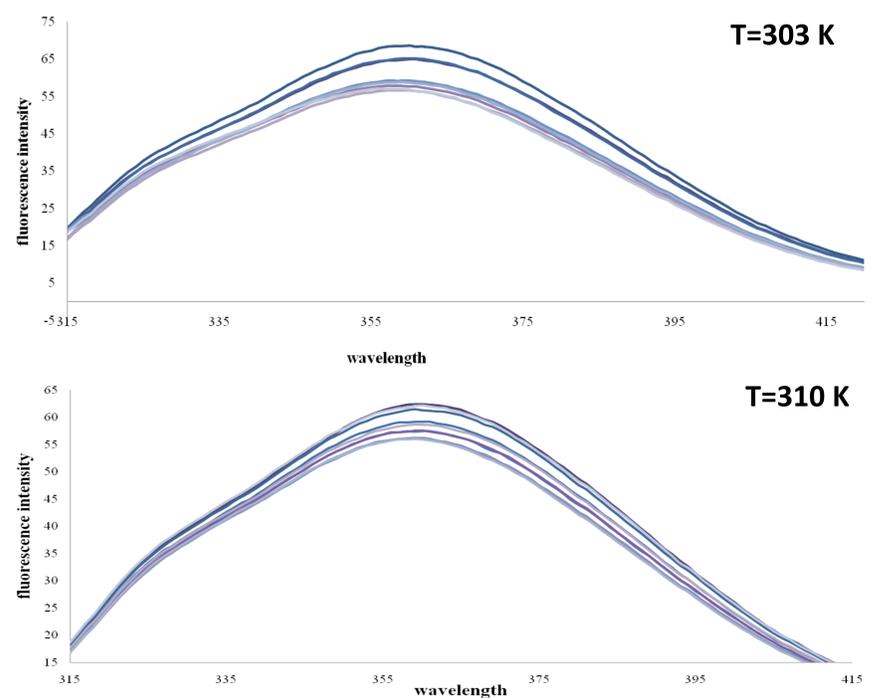Figure 1. Binding sites on the human serum albumin (HSA).

Figure 3. Stern–Volmer plots of the fluorescence quenching of HSA by haloperidol in the presence of caffeine.

Figure 2. The fluorescence quenching spectra of HSA by haloperidol in the presence of Caffeine (T= 303К and T= 310K; λex=295nm; pH=7,4).
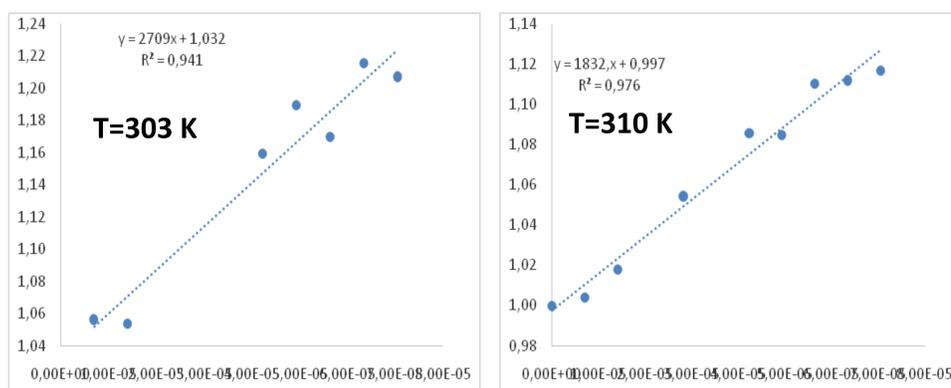
Table 1. Binding constants and the number of binding sites

	Haloperidol-albumin-caffeine complex		Haloperidol-albumin complex	
T(K)	303	310	303	310
Ksv(L/mol)	$2{,}71×10^3$	$1{,}83×10^3$	$3.50 × 10^3$	$3.61 × 10^3$
Ka(L/mol)	$9{,}27 ×10^3$	$9{,}33×10^3$	$4.07 × 10^3$	$1.95 × 10^3$
n	0,869	1,16	1.02	0.93
R^2	0,9665	0,9639	0,9920	0,9900

*Ksv- Stern–Volmer constant; Ka-binding constant; R^2– correlation coefficient; n- number of binding sites

Conclusion

Spectroscopic analyzes on different therapeutic agents indicate that the mechanics of quenching human serum albumin with haloperidol and caffeine are a static process. Caffeine affects the binding of haloperidol to HSA. It leads to a greater stabilization of the HSA-HPD complex. These results indicate the possible impact and significance of the interaction of medicinal products.