Thermodynamics of interaction of interferon α-2b with different forms of oligonucleotides

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Interactions of protein-nucleic acids play a decisive role in many biological processes. RNA-based drugs that can bind and affect the work of epigenetic regulators and transcriptional proteins through interaction, with regulatory domains, can be used as safe analogues.
We studied the ability of yeast oligoribonucleotides (ORN), yeast ORNNa salt (ORNNa), and yeast ORNs-D-mannitol complex (ORNs-D-M) to affect fluorescence quenching and conformational changes of Interferon α2b – a vital protein of the antiviral cell defence mechanism. To determine the energy parameters of protein-ligand interactions, we used isothermal titration nanocalorimetry Nano ITC.
The results of the study of enthalpy changes in the titration of interferon α-2b acid form of ORN and ORN: D-M was −63.28 kJ/mol and −96.61 kJ/mol, respectively, and for the ORNNa and ORNNa: D-M respectively 4,52 and 5,14 kJ/mol. The change in entropy when adding the ORN to interferon α-2b was −38.72 and in the case of the ORN: D-M −63.53 kJ/mol*K, respectively. The change in entropy when adding the ORNNa to interferon α-2b was 17.05 kJ/mol*K, and the ORNNa: D-M, respectively, 17.58 kJ/mol*K. A similar pattern demonstrated when studying the change in Gibbs energy during titration of interferon α-2b with ORNORN and ORN: D-M and it was −24.56 and −33.07 kJ/mol, respectively. And when titrated with ORNNa and its ORNNa: D-M, respectively −12.9 and −12.43 kJ/mol. The obtained curves of titration of INF with ORN indicate that the reaction of the interaction between the protein and acidic ligands occurs exothermally, and with salt endothermically.
These results of studying the effects of thermodynamics of different forms of RNA and their complexes with D-mannitol in the titration of interferon α-2b may indicate different sites of binding of different forms of ORN to protein, as well as other modes of binding and various types of conformational changes in the protein.