Theses of the BioGENext Conference: Shaping the future of medicine through biomedical research and development*

Section 1: Nucleic-acid therapeutics: technologies and applications

http://dx.doi.org/10.7124/bc.000AB9

Interaction of 5'-monoribonucleotides with Interferon α-2b

R.O. Nikolaiev, Z.Yu. Tkachuk

Institute of Molecular Biology and Genetics, NAS of Ukraine
150, Akademika Zabolotnoho Str., Kyiv, Ukraine, 03143
romanfromukrain@gmail.com

Aim: This study aimed to investigate the impact of cytosine 5'-monophosphate (5'-CMP), guanosine 5'-monophosphate (5'-GMP), and uridine 5'-monophosphate (5'-UMP), along with their disodium salts, in combination with D-mannitol (D-M), on the conformation and fluorescence properties of interferon α-2b (IFN), and to determine the energy parameters governing these interactions. **Methods:** Spectroscopic techniques including time-resolved spectroscopy, circular dichroism, and fluorescence spectroscopy, along with isothermal nanocalorimetry, were employed. **Results:** The nucleotide monophosphates (5'-rNMFs) in their acidic form, particularly when complexed with D-mannitol, exhibited stronger binding to interferon α-2b compared to their salt forms. Interaction between IFN α-2b and 5'-rNMFs, especially in the presence of D-mannitol, was found to be exothermic and induced changes in the conformational flexibility of IFN α-2b, increasing the proportion of disordered regions. Conversely, interaction with disodium salts of NMPs was characterized by an endothermic process, potentially enhancing the conformational rigidity of IFN α-2b and improving the efficiency of non-radiative energy transfer to acidic 5'-rNMFs, likely due to the reduced intermolecular distances. **Conclusions:** Overall, the interactions involving 5'-nucleoside monophosphate acids, their salts, and IFN α-2b are influenced by a nucleotide type (purine vs. pyrimidine), the presence of mannitol, and chemical form (acid vs. salt). These interactions significantly affect fluorescence quenching, binding affinity, thermodynamics, energy transfer efficiency, and secondary structure alterations of IFN α-2b.
Grants/Fundings. Simons Support Grant 1290589**.**
K e y w o r d s: kinetics; mononucleotides; interferon α-2b; protein-ligand interactions.

* The materials of the conference were double-blind peer-reviewed according to the rules of the journal Biopolymers and Cell.