Interactions between secondary structures and small molecules

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Oligonucleotide analogues (ODNs) are biomolecules with great scientific potential because of their remarkable properties (higher bioavailability, affinity with the target, stability, and resistance against nuclease degradation). Therefore, they can be used as nanoprobes and biosensors and to develop new materials in the nanotechnology field[1]. ODNs and their analogues can assume several secondary structures which play an important role in Biology, Biotechnology, and Nanotechnology[2]. In particular, ODNs rich in guanines can adopt secondary structures named G-quadruplexes, which are also very interesting from a diagnostic and therapeutic point of view[3]. In the human genome, there are G-quadruplex structures afferent to regions of genes of high regulatory importance (such as enhancers, promoters, and oncogenes). It has been shown that the stabilization and destabilization of these secondary structures can influence the onset of diseases. There is a field of research investigating the interactions between small molecules and DNA secondary structures, including G-quadruplexes. To study the interaction between G-Quadruplexes and ligands, in this paper, we focused our attention on the interactions between G-quadruplexes and modified Porphyrins, a class of macrocyclic compounds that play a significant role in the metabolism of living organisms[4].

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