Design and synthesis of nanoparticles with biomedical applications

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Apart from the canonical double stranded DNA, other alternative nucleic acid structures are well-known. One of them are G-quadruplex (G4), non-canonical secondary structures of DNA identified *in vitro* in more than 700000 guanine-rich sequences in human genome . This DNA topology is formed by the stacking of planar arrays of four guanines (G-tetrad) in which each guanine interacts with two neighbors by Hoogsteen bonding . These G4 structures are specially represented in oncogene promoters, as well as in telomeric regions . Consequently, G4 DNA may affect biological processes, such us replication, transcription and recombination. For this reason, G4 DNA structure is an appealing target for the design of small molecules that stabilize them. The stabilization of these structures in oncogenes may lead to the transcriptional repression of them and the stabilization of the G4 telomere structures would prevent the action of telomerase, an enzyme that plays a fundamental role in maintaining telomere length and tumoral immortality3. Herein, we design a tripodal polyamine containing 1H-pirazol groups as a ligand to target G4 structures through supramolecular interactions, such as π-π stacking, hydrogen bonding and electrostatic interactions. The affinity of this ligand towards G4 has been investigated by fluorometric titrations and Förster Resonance Energy Transfer (FRET) melting assays using both telomeric and proto-oncogene G4 structures (22AG and ckit1, respectively) as a prior study to biological assessment in different tumoral cell lines using liposomes as carriers.