Triplex formation between d-CGCTCT and the self-complementary oligonucleotide d-CAATCTCGCGA-GATTG-spectroscopic investigations

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We report here studies on triple helix formation by mixed purine–pyrimidine strands with a view to explore the general potential of oligomeric triplex formation as a recognition phenomenon of DNA sequences. It is observed that the hexamer d-CGCTCT-3′ with a purine at second position forms a stable triplex with a self-complementary DNA duplex d-CAATCTCGCGA-GATTG-3′ in the pH range 5–7, in the presence of 2M NaCl. ^{1}H NMR spectra in H_2O solution under these conditions show the imino resonances belonging to the Hoogsteen base pairs in the triplex. Thermodynamic parameters for the triplex formation have been determined by UV spectroscopy.

The existence of triplexes in DNA and RNA has been known for over three decades[1]. In the ensuing years a large number of investigators have used pyrimidine oligodeoxynucleotide triple helix formation to recognize extended purine sequences in double helical DNA[2–12]. From X-ray-fibre diffraction studies it has been observed that the third strand in the triplex sits in the major groove of the duplex, formed by the other two strands, is held to it by Hoogsteen base pairs[13–15]. The base triplets T.(AT) and C^+.(GC) thus formed are shown in Figure 1a. It may be noted that the latter requires the protonation of the cytosine residue and hence its formation is pH-dependent[3,9,17]. Formation of the base triplets such as G.(GC) and A.(AT) have also been recently reported[16]. Homopyrimidine oligodeoxynucleotides attached to DNA-cleaving agents have been used to cut duplex DNA[3,5]. Strobel *et al.*[6] established the usefulness of such sequences as probes for chromosome mapping and as antisense DNA for