Primary structure of DNA:

The sequence of nucleotides in the nucleic acid is called the primary structure of DNA. It is written from the 5' to 3' direction, where the 5'-end is on the left end, and the one-letter abbreviation of the nitrogen base represents the nucleotides. It is the sequence of nucleotides that carries the genetic information. Nucleotides are in two types: purine (Adenine and Guanine) and pyrimidine (Cytosine and Thymine). Adenine (**A**) pairs with thymine (**T**) with two hydrogen bonds, Guanine (**G**) pairs with Cytosine (**C**) with three hydrogen bonds.

Secondary Structure of DNA:

Three major forms of DNA:

***B-DNA**

Biologically is the most common, it is a -helix meaning that it has a Right-handed, or clockwise, spiral. Ideal B-DNA has 10 base pair per turn (360° rotation of helix). So, each base is twisted 36° relative to adjacent bases. Base pair are 0.34 nm apart, complete rotation of molecule is 3.4 nm. Axis passes through middle of each base pairs. Minor Groove is Narrow, Shallow, major Groove is Wide, Deep. B-DNA structure is most stable configuration for a random sequence of nucleotides under physiological condition.

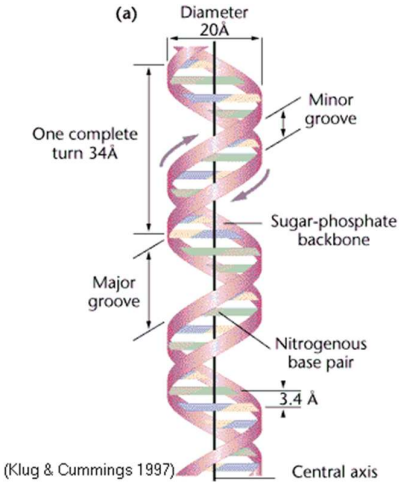

Figure 1: B-DNA secondary structure

***A-DNA**

Right-handed helix, wider and flatter than B-DNA, 11 bp per turn. Its bases are tilted away from main axis of molecule, narrow deep major Groove and broad, Shallow minor Groove. A-DNA has been observed in two context, Active site of DNA polymerase (~3bp) and Gram (+) bacteria undergoing sporulation.

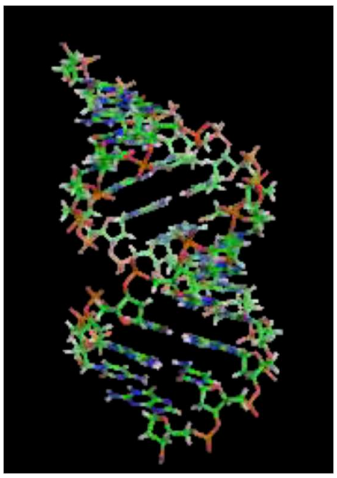

Figure 2: A-DNA secondary structure

*Z-DNA

A left-handed helix seen in condition of high salt concentration. In this form sugar-phosphate backbones zigzag back and forth, giving rise to the name Z-DNA (for zigzag), 12 base pairs per turn. A deep Minor Groove, no Discernible Major Groove. Part of some active genes form Z-DNA, suggesting that Z-DNA may play a role in regulating gene transcription.

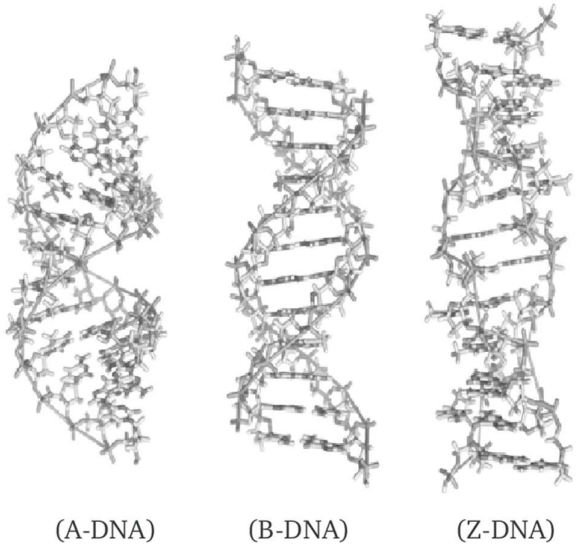

Figure 3: A, B, Z-DNA secondary structure