The pitch is the distance along the helix axis corresponding to one turn-

The *anti* and *syn* conformations of the glycosidic bond are shown in Fig 22.9.

Rotation about the C- N bond swings the base away from (*anti*) or on top of (*syn*) the deoxyribose ring.

The conformation is *syn* for G in Z-DNA and *anti* for all nucleotides in A and B DNA as well as C in Z DNA.

The C-2' *endo* and C-3' *endo* sugar conformations are shown in Fig 24.5.

In the C-2' *endo* conformation carbon atoms 1', 3' and 4' and the ring O are approximately planar while C-2' is out of the plane on the same side of the ring as C-5'.

In the C-3' *endo* conformation carbons 1', 2' and 4' and the ring O are planar while C-3' is out of the plane on the same side of the ring as C-5'.

The most common form of DNA is B-DNA that is shown in Fig 4.15 and 4.12.

One characteristic of the B form of DNA is that the bases lie close to the helix axis, i.e., the center of the helix as shown in Fig 4.12.

Note also that the base pairs are approximately perpendicular to the helix axis as shown in Fig 4.12.

Note also that the phosphate groups are on the surface of the helix and thus will be in contact with the solvent.

In the A form the bases come farther out from the helix axis and the plane of each base pair is more tilted with respect to the helix.

The B form also has major and minor grooves as seen in Fig 31-4.

The grooves result from the fact that the glycosidic bonds between the sugars and the bases in a given base pair are not directly opposite each other as seen in Fig 4.12 and Fig 31-5.

By contrast the A form has grooves of equal depth while the Z form has one deep helical groove.

The major groove in B-DNA is thought to be a region on the surface of which allows interaction with other molecules such as proteins.

The Z-DNA has been found in small synthetic DNA molecules with an alternating GC sequence.

In Z-DNA, the orientation of the guanine with respect to the deoxyribose ring is *syn* rather than *anti* as in A and B DNA.

With alternating G and C bases in the sequence, the base orientation changes from *syn* to *anti* which results in a zig zag pattern of phosphates that lead to the Z designation.

The Z-form may be adopted by some regions of DNA under particular conditions or in the presence of other molecules that bind to the DNA and stabilize this conformation.

Consider supercoiling in closed-circular DNAs.

Many naturally occurring DNA molecules, particularly of bacteria but also DNA found in mitochondria and chloroplasts, are circular, i.e., there is no 5' or 3' end.

We can imagine that such a structure could result from the formation of phosphodiester bonds between the 5' phosphate of one end and the 3' OH of the other end of each strand of a linear DNA molecule-

Closed circular DNA can supercoil, analogous to twisting a rubber band.

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