Toroidal DNA condensates: unraveling the fine structure and the role of nucleation in determining size

Abstract

Toroidal DNA condensates have attracted the attention of biophysicists, biochemists, and polymer physicists for more than thirty years. In the biological community, the quest to understand DNA toroid formation has been motivated by its relevance to gene packing in certain viruses and by the potential use of DNA toroids in artificial gene delivery (e.g., gene therapy). In the physical sciences, DNA toroids are appreciated as a superb model system for studying particle formation by the collapse of a semiflexible, polyelectrolyte polymer. This review focuses on experimental studies from the past few years that have significantly increased our understanding of DNA toroid structure and the mechanism of their formation. Highlights include structural studies that show the DNA strands within toroids to be packed in an ideal hexagonal lattice, and also in regions with a nonhexagonal lattice that are required by the topological constraints associated with winding DNA into a toroid. Recent studies of DNA toroid formation have also revealed that toroid size limits result from a complex interplay between kinetic and thermodynamic factors that govern both toroid nucleation and growth. The work discussed in this review indicates that it will ultimately be possible to obtain substantial control over DNA toroid dimensions.

http://www.ncbi.nlm.nih.gov/pubmed/15869392

DNA Pirates of the Sacred Spiral By Dr. Leonard Horowitz

2 DVD set

http://www.youtube.com/watch?v=u4RCdVdgIac

DNA is a torsion field antenna

The DVD uses the latest of bio science, including genetics, electro genetics, nanotechnology and protein science.

We are an electromagnetic bio-acoustic creation; a bio-holographic projection.

DNA acts as an antenna to the reception and transmission of the EM frequencies and bioacoustics which precipitates us into a physical form in a physical space, which is itself largely a façade when you think about quantum physics.

DNA interacts with the intercellular protein matrix, enzymes are regulated electrically in your body. Chemical reactions are insignificant compared to water and EM reactions. DNA works because it is surrounded by many geometric forms of water.

DNA is a fractal antenna in electromagnetic fields.

CONCLUSIONS:

In 2011, the National Center for Biotechnology Information referenced the fractal nature of DNA antenna.

The wide frequency range of interaction with EMF is the functional characteristic of a fractal antenna, and DNA appears to possess the two structural characteristics of fractal antennas, electronic conduction and self symmetry. These properties contribute to greater reactivity of DNA with EMF in the environment, and the DNA damage could account for increases in cancer epidemiology, as well as variations in the rate of chemical evolution in early geologic history.

http://www.ncbi.nlm.nih.gov/pubmed/21457072

Conditions leading to toroidal conformation of DNA

Addition of multivalent cations spermadine and spermine to a dilute solution of DNA; Other condensing agents: $CoNH_6^{3+}$

Polypeptides and proteins, alcohol or crowding agents such as polyethylene glycol.

http://www.jstor.org/discover/10.2307/40483185?uid=3739960&uid=2129&uid=2&uid=70&uid=4&uid=3739256&sid=21103573279847