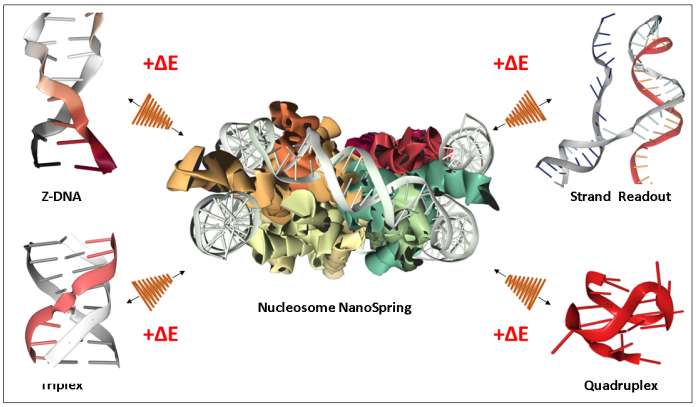
The Nuclear Batteries in Every Cell

Nucleosome Batteries



Nucleosomes store mechanical energy in the DNA wound around them. Nucleosome ejection releases the energy, powering a change in DNA conformation. The altered shape is recognized by proteins that use the energy to nucleate the local assembly of cellular machines.

CHARLESTOWN, MASSACHUSETTS, UNITED STATES, November 1, 2022 /EINPresswire.com/ -- DNA is packed into cells by spooling the double helix around a spheroidal protein structure called a nucleosome. In a paper published online today in BioEssays entitled “Nucleosomes and flipons exchange energy to alter chromatin, conformation, the readout of genomic information, and cell fate”, Alan Herbert suggests that nucleosomes serve a quite different function. The DNA coiled around the nucleosome resembles a mechanical spring that the author refers to as a NanoSpring. Just like a wind-up watch, the energy powers change. In the case of the nucleus, the power can be used to alter DNA conformation from the classical Watson-Crick right-handed B-DNA to a variety of alternative structures that activate different biological pathways.

> “Nucleosomes represent one of smallest mechanical springs known and can power many nuclear events”
>
> *Alan Herbert*

The shape changing sequences, called flipons, are recognized by a number of proteins. The flipon field has advanced rapidly over the last three years. Genetic, biophysical, cellular and genomic evidence now firmly establishes an unequivocal role for the left-handed Z-DNA and Z-RNA conformations in regulating intracellular responses to viruses. Z-flipons also protect against repetitive sequences that cut and paste themselves throughout the genome, an existential threat if left unchecked. The first flipon therapeutic for treating cancers was described earlier this year.

Dr. Herbert proposes that nuclear flipons act as catalyst for many DNA transactions. They accumulate the energy released as nucleosomes are ejected from DNA when active genes are transcribed or replicated. The stored energy can then be used to power the assembly of cellular

machines that alter the way genetic information is readout from the genome. The transactions enable editing of RNA as it is transcribed from the genome, alteration of RNA splicing and the assembly of repair complexes following DNA damage. There are many opportunities to target these processes therapeutically just as there are many ways to enhance the workings of a windup watch.

Dr. Herbert states that “It is very satisfying to see the flipon discoveries coming together. The community is growing and I am sure the field will now receive much better funding. It is amazing how something so central could be so underemphasized for so long”.

InsideOutBio is an early-stage biotech company developing therapeutics for the treatment of cancer The access to the enormous databases created by collaborative international efforts has helped the InsideOutBio scientists make fundamental discoveries such as those reported by Dr. Herbert in the paper. InsideOutBio is privately held. And this research received no external funding

Alan Herbert
InsideOutBio, Inc
+1 617-800-7531
email us here
Visit us on social media:
Twitter
