

Oxidative Charge Transport through DNA in Nucleosome Core Particles

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Abstract

Eukaryotic DNA is packaged into nucleosomes, made up of 146 bp of DNA wrapped around a core of histone proteins. We used photoexcited rhodium intercalators to explore DNA charge transport within these assemblies. Although histone proteins inhibit intercalation of the rhodium complex within the core particle, they do not prevent 5'-GG-3' oxidation, the signature of oxidative charge transport through DNA. Moreover, using rhodium intercalators tethered to the 5' terminus of the DNA, we found that guanine bases within the nucleosome can be oxidized from a distance of 24 bp. Histone binding did not affect the pattern and extent of this oxidation. Therefore, although the structure of the nucleosome core particle generally protects DNA from damage by solution-borne molecules, packaging within the nucleosome does not protect DNA from charge transfer damage through the base pair stack.

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