

# Charge transport in DNA

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Available online 17 July 2002.

## Abstract

The base pair stack within double helical DNA provides an effective medium for charge transport. The DNA  $\pi$ -stack mediates oxidative DNA damage over long molecular distances in a reaction that is exquisitely sensitive to the sequence-dependent conformation and dynamics of DNA. A mixture of tunneling and hopping mechanisms have been proposed to account for this long-range chemistry, which is gated by dynamical variations within the stack. Electrochemical sensors have also been developed, based upon the sensitivity of DNA charge transport to base pair stacking, and these sensors provide a completely new approach to diagnosing single base mismatches in DNA and monitoring protein–DNA interactions electrically. DNA charge transport, furthermore, may play a role within the cell and, indeed, oxidative damage to DNA from a distance has been demonstrated in the cell nucleus. As a result, the biological consequences of and opportunities for DNA-mediated charge transport now require consideration.

Full Text (Subscription May Be Required):

[http://dx.doi.org/10.1016/S0959-440X\(02\)00327-5](http://dx.doi.org/10.1016/S0959-440X(02)00327-5)