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Effects of Silver and Magnesium ions on Bent DNA measured by Fluorescence Resonance Energy Transfer (FRET)[1] KAITLIN BULLARD, YONG WANG, University of Arkansas — Studying DNA interactions is advantageous to developments in the medical field since DNA and its interactions effect our health greatly. Discovering new interactions or a further understanding of existing ones can lead to improved treatment options and preventative care. In addition, it is important to understand how the bendability of DNA depends on metal ions, which are essential for various fundamental processes in cells, including the formation of secondary and higher-order structures of nucleotides, DNA repair, and genomic stability. In this work, we investigated the effects of silver and magnesium ions on bent double-stranded DNA using self-assembled bent DNA molecules and FRET. We measured that the FRET efficiency decreased as the concentration of silver ions increased but increased at higher concentrations of magnesium ions. These observations suggested that silver ions destabilized the bent DNA, while magnesium ions increased the stability of the bent DNA molecules. There also seems to be a peak with the magnesium ions, suggesting an optimal amount of magnesium ions for bent DNA bonding. This peak is unexpected, thus further investigation is in progress. The current hypothesis is that magnesium promotes bonding by helping straighten out the bent DNA to form dimers and trimer but at some point, it makes the DNA too stiff. Compared to our previous work with gel electrophoresis, the FRET measurements were faster and simpler. This work is expected to contribute to a better understanding of the biophysical properties of double-stranded DNA, which will benefit DNA-related medical research and treatment development.

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