Ionic effect on the hybridization strength of PNA/DNA and DNA/DNA duplex

Jae Yang Song, Seong-chun Yim and Hyun Gyu Park
Department of Chemical and Biomolecular Engineering,
Korea Advanced Institute of Science and Technology,
TEL: +82-42-869-3972, FAX: +82-42-869-3910

Peptide nucleic acid(PNA) is a new oligonucleotide mimic in which the sugar-phosphate backbone has been substituted with N-(2-aminoethyl)glycine units.[1,2] Since the spacing between the nucleotides is the same as in DNA, the conventional Watson-Crick base pairing rules apply between mixed base PNA/DNA sequences resulting in the formation of B-like helical formation duplex. PNA backbone is not charged which confers to this polymer a much stronger binding between PNA/DNA strands than between DNA/DNA strands. This is due to the lack of charge repulsion between PNA and DNA strand.[3,4,5]

We studied ionic effect on the hybridization strength of PNA/DNA and DNA/DNA duplexs having the same base sequence. The effect of monovalent salt such as NaCl on hybridization strength was investigated over a range of salt concentration(0 M to 1 M).

References

1. Sebastian T., Munna S., Tommi R., Pernilla W., Peter E. N., Bengt N., Astrid G. (1996), Ionic effects on the stability and conformation of peptide nucleic acid complexes, *J. Am. Chem. Soc.* **118**, 5544-5552.
2. Michael Egholm, Ole Buchardt, Peter E. Nielsen, Rolf H. Berg (1992), Peptide nucleic acids (PNA). Oligonucleotide analogs with an achiral peptide backbone, *J. Am. Chem. Soc.* **114**, 1895-1897.
3. Egholm M., Buchardt O., Christensen L., Behrens C., Freier S. M., Driver D. A., Berg R. H., Kim S. K., Norden B., Nielsen P. E. (1993), PNA Hybridizes to complementary oligonucleotides obeying the Watson-Crick hydrogen bonding rules, *Nature* **365**, 566-568.
4. Nielsen P. E. (1999), Applications of peptide nucleic acids, *Curr. Opin. Biotech.* **10**, 71-75.
5. Demidov, V. V., Potaman, V. N., Frankkamenetskii, M. D., Egholm, M., Buchard, O., Sonnichsen, S. H., & Nielsen, P. E. (1994), Stability of peptide nucleic acid in human serum albumin and cellular extracts, *Biochem. Pharmacol.* **48**, 1310-1313.