

**PNA technology
for diagnosis of
infectious and
genetic diseases**

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We have developed the robust DNA-targeted PNA-based assays which make it possible to detect DNA signature sequences within genomes avoiding global DNA denaturation. Although many natural proteins are capable of targeting duplex DNA (dsDNA) in a sequence-specific manner, our ability to design de novo proteins with desired sequence specificity are very limited, at best. That is why the ability of Peptide Nucleic Acid (PNA) of sequence specific recognizing dsDNA has attracted considerable interest. The basic understanding of the process of dsDNA invasion by pyrimidine bis-PNAs and various applications of the phenomenon have been elucidated during the past two decades. As a result, novel approaches for detecting short (about 20-bp-long) signature sites on genomic DNA under non-denaturing isothermal condition within fixed cells without nucleic acid extraction have been developed. In particular, a PD-loop-based method of pathogen detection has been developed in our laboratory, which makes it possible to distinguish not only different bacterial species but also to discriminate drug sensitive versus drug resistant strains. The next step would be to extend the approach to human cells, which would open the way for even more promising applications. Some encouraging data in this direction will be presented. Featuring both high specificity and high sensitivity as well as amenability to automation PNA-based DNA diagnostics thus being capable of expedient detection of DNA analytes directly in clinical specimens and environment. Progress in this direction may ultimately result in the numerous highly effectual unconventional medical and environmental diagnostic assays.

Biography

Irina Smolina is the Research Assistant Professor at the Department of Biomedical Engineering at Boston University. She received her M.Sc from the Moscow Institute of Physics and Technology (Russia) and completed her Ph.D from Institute of Bioorganic Chemistry (Russian Academy of Science, Moscow). She was a postdoctoral fellow at Boston University and at Harvard Medical School and has published more than 15 papers in reputed journals that span the range from fundamental human genome studies to applied diagnostic analysis, and from analytical chemistry to biotechnology research.