

EXECUTIVE SUMMARY [NON-CONFIDENTIAL, NON-TECHNICAL ABSTRACT FOR PUBLIC INFORMATION OR PROGRAM PROMOTION]: State in layman's terms the application's broad, long-term objectives and specific aims, making reference to the potential public benefits of the project relevant to California. Do not include proprietary or confidential information. This may be distributed before the funding decision has been finalized.

Tethered nucleotide analogs are newly emerging useful tools in biotechnology, largely because they can be incorporated into DNA or RNA strands to "preorganize" their oligomers for enhancing the molecular recognition by native nucleic acids. One well known example is the so-called "LNAs" (Locked Nucleic Acids), which produce DNA capture agents when placed in an oligonucleotide strand.

The new 5'-nucleotide tethering motifs to be developed in this work allow for full and natural Watson-Crick base pairing from within an oligonucleotide strand, and as such they can become new useful tools for many current biotechnology efforts. They cause a well-defined alteration in DNA or RNA backbone trajectory, and some can access the rotational forms found in native A-DNA, B-DNA, and A-RNA, making double-helical Watson-Crick duplex formation possible. Thus, they could be used to generate enhanced, more specific cDNA microarray capture agents. In addition, some of them could be found to be good mimics of local DNA/RNA topological features like hairpin turns, bulges, and flipped residues, making them useful to studies of RNA and DNA topography, catalytic RNA therapeutics, and tRNA codon-anticodon recognitions. There are also potential future antisense applications for these tethered units. The benefit of this work will be to provide new tools for genomic biomedical science.