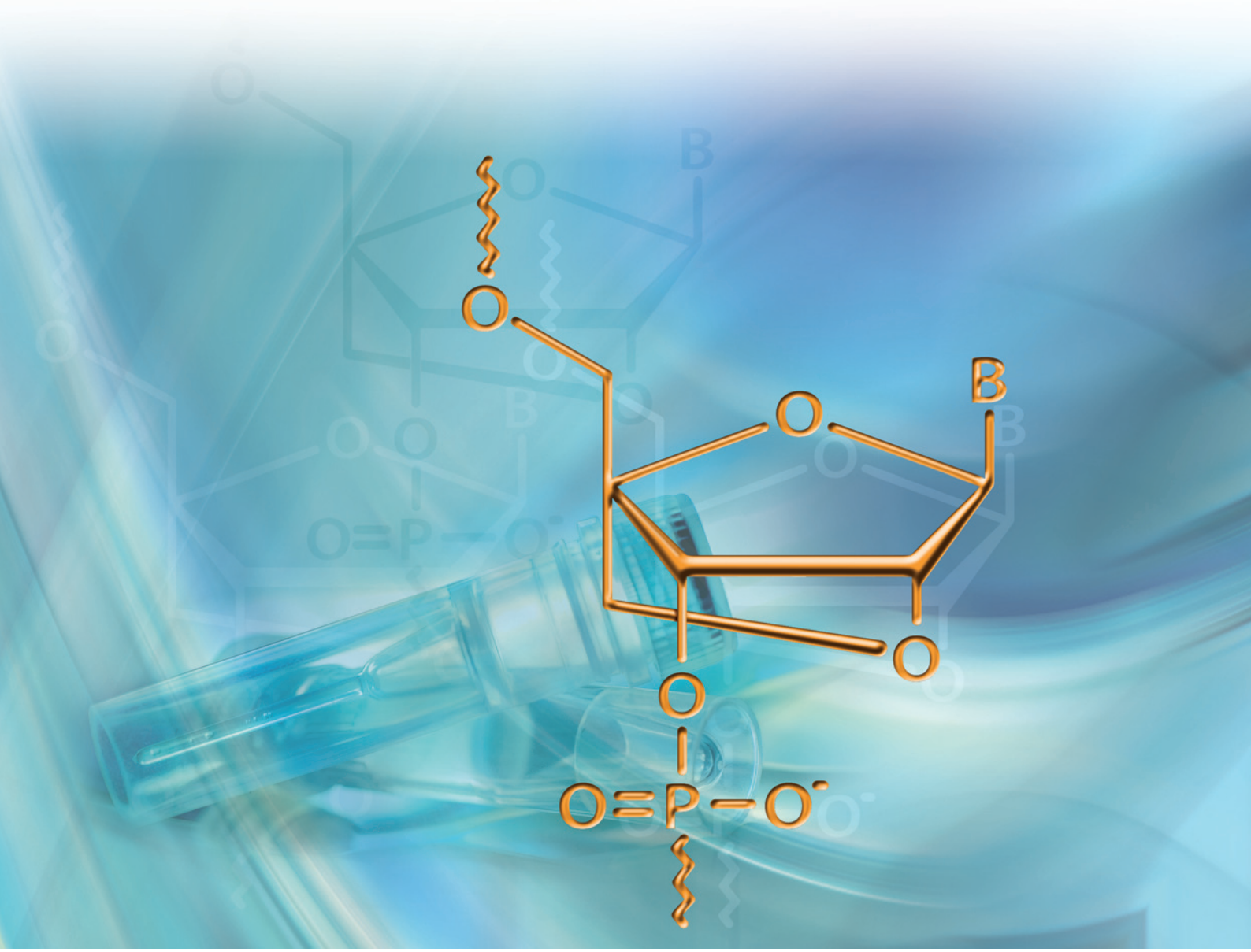
EXIQON

Locked Nucleic Acid - LNA™



Get the highest sensitivity and specificity in your nucleic acid recognition assays

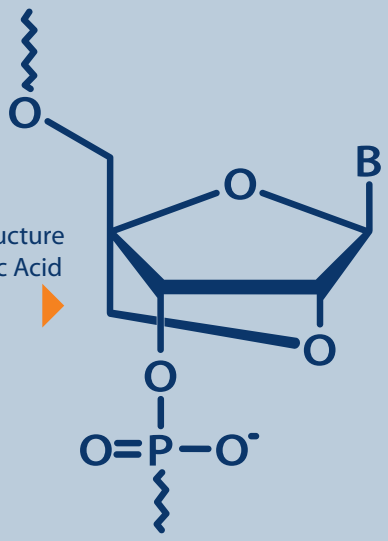
LNA™ : Unique Technology - Unique Applications

What is a Locked Nucleic Acid?

Locked Nucleic Acids (LNA™) are a class of nucleic acid analogues in which the ribose ring is "locked" by a methylene bridge connecting the 2'-O atom with the 4'-C atom (see structure below). LNA™ nucleosides contain the six common nucleobases (T, C, G, A, U and mC) that appear in DNA and RNA and thus are able to form base-pairs according to standard Watson-Crick base pairing rules.
Oligonucleotides incorporating LNA™ have increased thermal stability and improved discriminative power with respect to their nucleic acid targets.
LNA™ can be mixed with DNA, RNA and other nucleic acid analogs using standard phosphoramidite synthesis chemistry. LNA™ oligonucleotides can easily be labeled with standard oligonucleotide tags such as DIG, fluorescent dyes, biotin, amino-linkers, etc. Thus a very high degree of freedom in the design of primers and probes exists.

	LNA™
Tm increase/monomer against DNA	2-6°C
Tm increase/monomer against RNA	3-8°C
ΔTm at single mismatch against DNA	<8°C
Compatible with standard molecular biology	Yes
Water solubility	High

The chemical structure of Locked Nucleic Acid



Why work with LNA™?

Short probes with high Tms
- Perfect for detection of short RNA and DNA targets

Increases the thermal stability of duplexes
- High-affinity binding

Increased discriminatory power
- Single base discrimination capability

Resistant to exo- and endonucleases
- High stability for *in vivo* and *in vitro* application

Increased target specificity
- Fast binding to targets

Strand invasion
- Detect "hard to access" samples

Substrate for standard enzymes, e.g. T4 PNK, T4 ligase & DNA polymerase
- Compatible with standard enzymatic processes

When should I use LNA™ probes?

In any application with a short RNA or DNA target where normal oligonucleotides do not show sufficient affinity or specificity.

Proven applications of LNA™

- microRNA research
- Real-time PCR and ProbeLibrary
- SNP genotyping
- *In situ* hybridisation
- Microarray gene expression profile
- RNAi
- Antisense oligonucleotides
- Allele specific PCR
- Cytogenetics
- DNAzymes
- Gene repair/exon skipping
- mRNA isolation
- Splice variant detection
- Comparative Genome Hybridization (CGH)

LNA™ publications:

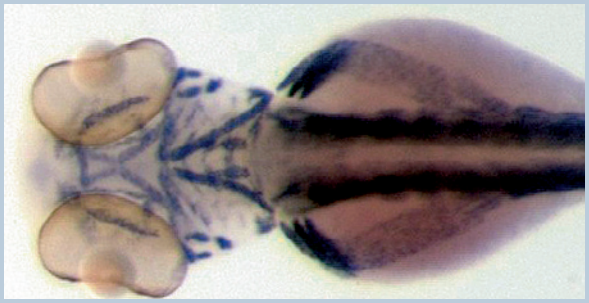
View all LNA™ publications on www.exiqon.com/publications

Selected LNA™ Applications

The best tool for recognition and detection of RNA and DNA targets

microRNA detection by in situ hybridisation

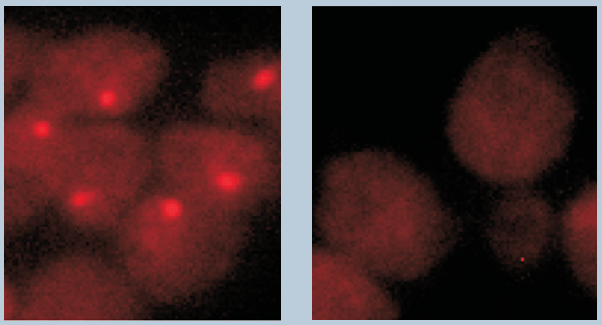
miRCURY™ LNA Detection probes reveal new information about miRNA distribution



Specific detection of miR-206 using miRCURY™ LNA Detection probes in *in situ* hybridisation of whole mount zebrafish embryos.
Image from Wienholds et al., Science 2005 (309), 310-11.

mRNA *in situ* hybridisation

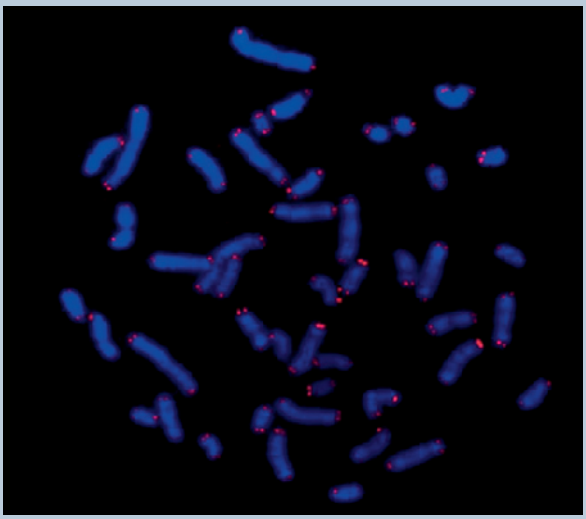
Fast and specific mRNA *in situ* hybridisation with specific LNA™ oligonucleotide in fixed cells



Improved signal and less background using a LNA™ mRNA *in situ* hybridisation probe (left picture) compared to a DNA probe (right picture).
Images from Thomsen et al., RNA 2005, (11), 1745 - 48.

Cytogenetics

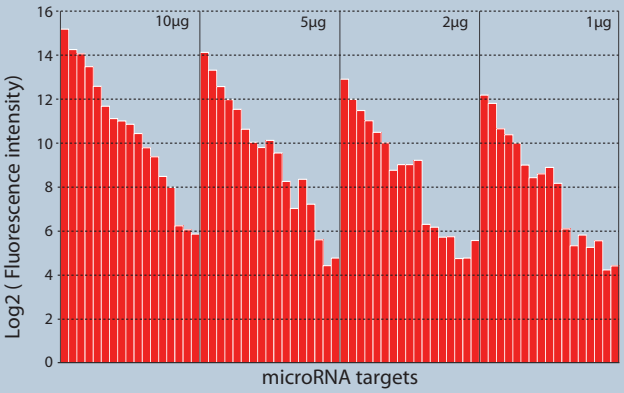
Fast and specific detection of chromosomal sequences directly on intact chromosomes



Specific telomere detection using LNA™ FISH probes.
Image kindly provided by Dr. R. W. Dirks, Leiden University Medical Center, Leiden, The Netherlands.

microRNA expression profiling

miRCURY™ LNA Array capture probes give high sensitivity and specificity for small RNA targets



miRCURY™ LNA Arrays require only 1 µg of total RNA to profile miRNA. Identical miRNA profiles are produced from starting amounts of total RNA that span the range 10µg to 1µg, without miRNA enrichment. 17 different miRNAs detected in human lung total RNA (Ambion) are represented. Numbers in the top righthand of each box show the amount of total RNA used to produce each profile.

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LNA™ products:

microRNA analysis
miRCURY™ LNA Detection, Array, Knockdown, and Real-time PCR

Real-time PCR
ProbeLibrary™ Real-Time PCR Assay System for gene expression analysis

In situ hybridisation
Custom and pre-designed probes for mRNAs, small RNAs, snRNAs, and chromosomes

mRNA isolation
Poly(A)+ RNA isolation using LNA™ oligo-T_{20} capture probe

LNA™ Oligonucleotides
LNA™ Oligonucleotides are available for a variety of different specialty applications and innovative products

Reagents
Exiqon offers a variety of basic research reagents based on our core technologies - LNA™, AQ-Link™ and A-quencher

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