CONTENTS ===

	Prefacexvii
	Part I
	Research Applications
1.	The Many Faces of PNA 3 Peter E. Nielsen 3 Introduction to PNA 3 PNA Chemistry 3 Cellular Uptake of PNA 4 Antisense Applications 5 Antigene Properties 5 Antimicrobial PNAs 9 Genetic Information Carrier 11
	PNA in Diagnostics
2.	Prospects
3.	Targeted Gene Delivery: The Role of Peptide Nucleic Acid
4.	Imaging Gene Expression in the Brainwith Peptide Nucleic Acid (PNA) AntisenseRadiopharmaceuticals and Drug Targeting Technology38Ruben J. Boado and William M. Pardridge40Mechanism of Action of Antisense Drugs40Medical Diagnostic and Therapeutic Applications41Functional Genomics45Overview of Antisense Molecules and Effective Delivery45Brain Drug Targeting Systems47Physiological Brain Efflux of IgG52Imaging of Brain Gene Expression52

5.	Receptor-Specific Targeting with Complementary Peptide Nucleic Acids Conjugated to Peptide Analogs and Radionuclides
6.	Morpholinos and PNAs Compared89James E. Summerton90Classification of Antisense Structural Types91Preparation of Morpholinos and PNAs91Properties of Morpholinos and PNAs93Applications106
7.	Chemistry of Locked Nucleic Acids (LNA):Design, Synthesis and Bio-Physical Properties114Jesper Wengel, Michael Petersen, Miriam Frieden and Troels KochSynthesis of LNA Monomers114Solid Phase Synthesis of LNA Oligonucleotides115Hybridization Characteristics of LNA Oligonucleotides118Hybridization Kinetics of LNA Oligonucleotides119Structure of LNA Oligonucleotides122DNA and RNA Structure122LNA Structure123LNA:RNA Duplexes123LNA:DNA Duplexes125LNA:DNA Duplexes126 α -L-LNA:RNA Duplexes126 α -L-LNA:DNA Duplexes126Implications for RNase H Activity of LNA:RNA126Implications for RNase H Activity of LNA:RNA127Stability of LNA and α -L-LNA Modified Nucleic Acids127LNA Triplexes128
8.	Recent Applications of RNA Interference (RNAi) in Mammalian Systems

Part II Clinical Applications

9.	Peptide Nucleic Acids as Epigenetic Inhibitors of HIV-1
	HIV-1 Life Cycle and Potential Molecular Targets
	Genetic Strategies to Inhibit HIV-1 Replication
	Peptide Nucleic Acids as Epigenetic HIV-1 Inhibitors
	Potential Use of PNA Against Other Infectious Pathogens
	Bio-Delivery of PNA
	Future Perspectives
10.	Therapeutic Uses of Peptide Nucleic Acids (PNA) in Oncology 171 Nadia Zaffaroni, Raffaella Villa and Marco Folini
	Potential of PNAs as Tools for Anticancer
	Therapeutic Interventions
	Perspectives
11.	PNAs as Novel Cancer Therapeutics
	Luca Mologni and Carlo Gambacorti-Passerini
	Biochemistry of Peptide Nucleic Acids
	PNA as a Biomolecular Tool
	Antisense and Anti-Gene Properties of PNA
	Future Directions
12.	Medicinal Chemistry of Plasmid DNA with Peptide Nucleic Acids:
	A New Strategy for Gene Therapy
	Olivier Zelphati, Jiin Felgner, Yan Wang, Xiaowu Liang,
	Xiaodong Wang and Philip Felgner
	Principle of PNA Dependent Gene Chemistry Technology
	Labeling of Plasmid DNA to Study Gene Delivery Mechanism 198
	Transition
	Overcoming the Barriers to Improve Gene Delivery
	and Expression
	PNA-Conjugates for Targeting DNA to Cell Surface Receptors 201
	PNA-Peptide Conjugates to Overcome Cell Membrane Barriers 202
	Other Potential Applications of PNA Conjugate
	for Gene Delivery

13.	Locked Nucleic Acids (LNA) and Medical Applications
	Henrik Ørum, Andreas Wolter and Lars Kongsbak
	Biochemistry of LNA
	LNA in Diagnostics and Genomics Applications
	LNA in Therapeutic Applications
	Future Perspectives on LNA
14.	Peptide Nucleic Acids as Agents to Modify Target
11.	Gene Expression and Function
	Gan Wang and Peter M. Glazer
	PNA Binding Affinity
	PNA Binding Specificity
	Detection of PNA Binding-Induced Transcription
	in Hela Nuclear Extract in Vitro Transcription System
	Determination of the Initiation Sites of PNA
	Binding-Induced Transcription
	PNA Binding-Generated D-Loops Lead to GFP Gene Expression in Mammalian Cells
	Gene Expression in Mammalian Cells
	PNA-Induced Endogenous γ-Globin Gene Expression
	in Human Cells
	The Correlation between PNA Binding-Generated D-Loops
	and the Natural Promoter of the Gene in Target Gene
	Transcription
	The PNA Length Requirement for Inducing Transcription
	from the PNA Binding Sites
	Transcription Components Involved in PNA Binding-Induced
	Transcription
	The Limitation of PNA Binding-Induced Target
	Gene Expression
	PNAs for Targeted Genome Modification
15.	Peptide Nucleic Acids: Cellular Delivery
	and Recognition of DNA and RNA Targets
	David R. Corey
	Hybridization by PNA: Affinity Isn't Everything
	Strand Invasion by PNAs
	Intracellular Delivery of PNAs
	Applications for PNAs Delivered within Cells

16.	The Use of PNAs and Their Derivatives
	in Mitochondrial Gene Therapy243
	Paul M. Smith, Günther F. Ross, Theresa M. Wardell, Robert W. Taylor, Douglass M. Turnbull and Robert N. Lightowlers
	The Antigenomic Hypothesis
	PNA as the Choice of Antigenomic Agent
	Cellular Uptake and the Problem of Mitochondrial Import
	PNAs as Antigenomic Molecules – Do They Work?
	Trouble-Shooting the Antigenomic Approach to mtDNA Disease 248
17.	Gene Silencing through RNA Interference:
-, •	Potential for Therapeutics and Functional Genomics
	David O. Azorsa, Spyro Mousses and Natasha J. Caplen
	RNAi: An Historical Perspective
	RNAi: Summary of Mechanism
	Physiological Role of RNAi and Related Post-Transcriptional
	Gene Silencing Mechanisms
	RNAi in Mammalian Cells
	The Delivery of Triggers of RNAi
	RNAi as a Functional Genomics Tool
	RNAi as a Therapeutic Strategy
	10 1711 as a Therapeutic Strategy
18.	Transcriptional Activation of Human CREB Gene Promoter
	Using Bis-PNA (Peptide Nucleic Acid)265
	Christopher G. Janson, Matthew J. During, Yelena Shifman
	and Paola Leone
	Materials and Methods
	Results
	Future Directions for Trans-Activation in the Brain
	Index