

Applied RNAi

From Fundamental Research to Therapeutic Applications



Edited by: Patrick Arbuthnot and Marc S. Weinberg

Antiviral Gene Therapy Research Unit, School of Pathology, University of the Witwatersrand, WITS 2050, South Africa; Department of Molecular and Experimental Medicine, The Scripps Research Institute, 10550 N Torrey Pines Rd., La Jolla, 92037, USA.

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Since the discovery of RNA interference (RNAi) in 1998, research on the topic has advanced at an impressive pace. Small RNAs, and in particular micro RNAs (miRNAs), play a fundamental role in gene regulation through the activation of RNAi. Detailed insights into the mechanisms of RNAi have led to an improved understanding of gene regulation in normal and disease states, and thereby enabled the exploitation of RNAi for a variety of applications.

In this book an international panel of RNAi experts critically reviews the most interesting advances in basic applied RNAi research, highlighting the applications in RNAi-based therapies and discussing the technical hurdles that remain. Topics covering the fundamental biological aspects of applied RNAi research include: the role of miRNAs in trinucleotide repeat disorders; miRNAs and HIV pathogenesis; miRNAs for epigenetic gene silencing; the role of miRNAs in virus-related cancers; non-canonical miRNA biogenesis. In the area of RNAi-based therapy, topics include: harnessing RNAi for the treatment of viral infections; optimising the design of exogenous RNAi activators; blocking miRNA function with synthetic agents; somatic cell reprogramming; high-content miRNA-based screening tools and the use of miRNA target sites for control of transgene expression.

Essential reading for everyone involved in RNAi research, drug discovery and delivery, biomedical engineering and biomaterials.

Chapter 1. Overview of Biogenesis and Applications of MicroRNA. *Patrick Arbuthnot and Marc S. Weinberg*

Chapter 2. Non-Canonical MicroRNA Biogenesis and Function. *Thomas C. Roberts and Matthew J.A. Wood*

Chapter 3. Non-coding RNAs and the Epigenetic Control of Gene Expression. *Kevin V. Morris*

Chapter 4. From Mice to Men: Towards the Clinical Translation of miRNA Technologies for Somatic Cell Reprogramming. *Elena Senís and Dirk Grimm*

Chapter 5. Systems Biology Tools to Understand the Role of Host miRNAs in Infection: A Closer Look at HIV. *Jerolen Naidoo, Robyn Brackin, Rethabile Khutlang, Anca Savulescu and Musa M. Mhlana*

Chapter 6. Synthetic microRNA Blocking Agents. *Peter Järver, Adrian G. Torres and Michael J. Gait*

Chapter 7. Exploiting microRNAs to Regulate Transgene Expression. *Virginie Pichard, Dejana Ivacic and Nicolas Ferry*

Chapter 8. Use of Artificial microRNAs for Gene Silencing. *Betty Mowa and Abdullah Ely*

Chapter 9. Harnessing RNAi for the Treatment of Viral Infections. *Lorea Blazquez and Puri Fortes*

Chapter 10. Roles of miRNAs in Cancers Associated with Human Tumor Viruses. *Xianzhi Lin, Deguang Liang and Ke Lan*

Chapter 11. MicroRNAs as Cancer Biomarkers. *David Otaegui and Charles H. Lawrie*

Chapter 12. MicroRNA Deregulation in Trinucleotide Repeat Expansion Disorders. *Edyta Koscińska, Emilia Kozłowska, Edyta Jaworska, and Włodzimierz J. Krzyżosiak*

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