

Gene Silencing by RNA Interference

Technology and Application



EDITED BY Muhammad Sohail



CRC PRESS

Table of Contents

Chapter 1

- Gene Silencing by RNA Interference and the Role of Small Interfering RNAs 1
Natasha J. Caplen

Chapter 2

- Basics of siRNA Design and Chemical Synthesis 15
Queta Boese, Angela Reynolds, and William S. Marshall

Chapter 3

- Oligonucleotide Scanning Arrays in the Design of Small Interfering RNAs 37
Valentine M. Macaulay and Muhammad Sohail

Chapter 4

- siRNA Production by *In Vitro* Transcription 59
Olivier Donzé, Peter Dudek, and Didier Picard

Chapter 5

- Production of siRNAs with the Application of Deoxyribozymes 73
Graeme Doran and Muhammad Sohail

Chapter 6

- Production of siRNA *In Vitro* by Enzymatic Digestion
of Double-Stranded RNA 87
Frank Buchholz, David Drechsel, Martine Ruer, and Ralf Kittler

Chapter 7

- Plasmid-Mediated Intracellular Expression of siRNAs 101
Renu Wadhwa, Masayuki Sano, Makoto Miyagishi, and Kazunari Taira

Chapter 8

- Lentiviral Vector-Mediated Delivery of si/shRNA 111
*Dong Sung An, Xiao-Feng Qin, Vincent C. Auyeung, David Baltimore,
and Irvin S.Y. Chen*

Chapter 9

- Exogenous siRNA Delivery: Protocols for Optimizing Delivery to Cells 127
Andrew J. Hollins, Stephen P. Fox, and Saghir Akhtar

Chapter 10

- RNAi in *Drosophila* Cell Cultures 147
Mónica Bettencourt-Dias, Rita Sinka, Lisa Frenz, and David M. Glover

Chapter 11

- RNAi in *Caenorhabditis Elegans* 167
Femke Simmer and Ronald H.A. Plasterk

Chapter 12

- Delivery of RNAi Reagents in *C. elegans* by Microinjection 183
Peter J. Appleford and Alison Woollard

Chapter 13

- RNAi in *Drosophila* Embryos 201
Robert W. Williams

Chapter 14

- RNAi in *Xenopus Laevis* Oocytes 215
Earl Gordon and Geoffrey W. Abbott

Chapter 15

- RNAi in *Xenopus* Embryos 231
Kin Hang Kok and Dong-Yan Jin

Chapter 16

- An RNAi-Based Genomic Library for Forward Genetics
in the African Trypanosome 241

*James C. Morris, Zefeng Wang, Shawn A. Motyka, Mark E. Drew,
and Paul T. Englund*

Chapter 17

- RNAi in the Malaria Parasite *Plasmodium* 259
Anke Brüning-Richardson and Glenn A. McConkey

Chapter 18

- Silencing the Expression of Cysteine Proteases (Falcipains)
in *Plasmodium Falciparum* using RNA Interference Approaches 271
*Palakodeti V.N. Dasaradhi, Asif Mohammed, Manzar J. Hossain,
Virander S. Chauhan, and Pawan Malhotra*

Chapter 19

- RNAi in Transgenic Animal Models 289
Hidetoshi Hasuwa and Masaru Okabe

Chapter 20

- RNA Interference in Mouse Models 299
*Erwei Song, Patrick Stern, Deborah Palliser, Luk Van Parijs,
and Judy Lieberman*

Chapter 21

- Virus-Induced RNA Silencing in Plants 323
*M. Barciszewska-Pacak, B. Grabowska, J. Wojciechowicz, A. Pacak,
and M. Figlerowicz*

Chapter 22

- RNA Silencing in Plants — Biolistic Delivery of RNAi Reagents 343
Ulrich Klahre and Frederick Meins, Jr.

Chapter 23

- Agro-Infiltration: A Versatile Tool for RNAi Studies in Plants 357
Dániel Silhavy

- Index 365