

# **Gene Delivery to Mammalian Cells**

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METHODS IN MOLECULAR BIOLOGY™

# Gene Delivery to Mammalian Cells

*Volume 1: Nonviral Gene Transfer Techniques*

Edited by

**William C. Heiser**

*Bio-Rad Laboratories  
Hercules, CA*

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# Preface

The efficiency of delivering DNA into mammalian cells has increased tremendously since DEAE dextran was first shown to be capable of enhancing transfer of RNA into mammalian cells in culture. Not only have other chemical methods been developed and refined, but also very efficient physical and viral delivery methods have been established. The technique of introducing DNA into cells has developed from transfecting tissue culture cells to delivering DNA to specific cell types and organs in vivo. Moreover, two important areas of biology—assessment of gene function and gene therapy—require successful DNA delivery to cells, driving the practical need to increase the efficiency and efficacy of gene transfer both in vitro and in vivo.

These two volumes of the *Methods in Molecular Biology*<sup>TM</sup> series, *Gene Delivery to Mammalian Cells*, are designed as a compendium of those techniques that have proven most useful in the expanding field of gene transfer in mammalian cells. It is intended that these volumes will provide a thorough background on chemical, physical, and viral methods of gene delivery, a synopsis of the myriad techniques currently available to introduce genes into mammalian cells, as well as a practical guide on how to accomplish this. It is my expectation that it will be useful to the novice in the field as well as to the scientist with expertise in gene delivery.

*Volume 1: Nonviral Gene Transfer Techniques* discusses delivery of DNA into cells by nonviral means, specifically chemical and physical methods. *Volume 2: Viral Gene Transfer Techniques* details procedures for delivering genes into cells using viral vectors. Each volume is divided into sections; each section begins with a chapter that provides an overview of the basis behind the delivery system(s) described in that section. The succeeding chapters provide detailed protocols for using these techniques to deliver genes to cells in vitro and in vivo. Many of these techniques have only been in practice for a few years and are still being refined and updated. Some are being used not only in basic science, but also in gene therapy applications.

I wish to express my thanks to all of the authors who made *Gene Delivery to Mammalian Cells: Volume 1: Nonviral Gene Transfer Techniques* and *Volume 2: Viral Gene Transfer Techniques* possible. I would especially like to thank those who contributed the overview chapter to each section. They provided invaluable discussions, suggestions, and assistance on organizing those sec-

tions. I would particularly like to mention Joanne Douglas, Tom Daly, and Bill Goins for their suggestions on topics and authors, Dexi Liu and Shan Lu for their helpful discussions, and Mark Jaroszeski for his suggestions on organizing the entire editing process.

***William C. Heiser***

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# Contents

|                    |      |
|--------------------|------|
| Preface .....      | v    |
| Contributors ..... | xiii |

## PART I. DELIVERY USING CHEMICAL METHODS

|  |     |
|--|-----|
| 1. Chemical Methods for DNA Delivery: <i>An Overview</i><br><i>Dexi Liu, Evelyn F. Chiao, and Hui Tian</i> .....   | 3   |
| 2. Gene Transfer into Mammalian Cells Using Calcium Phosphate<br>and DEAE-Dextran<br><i>Gregory S. Pari and Yiyang Xu</i> .....                                | 25  |
| 3. DNA Delivery to Cells in Culture Using Peptides<br><i>Lei Zhang, Nicholas Ambulos, and A. James Mixson</i> .....  | 33  |
| 4. DNA Delivery to Cells in Culture Using PNA Clamps<br><i>Todd D. Giorgio and Shelby K. Wyatt</i> .....   | 53  |
| 5. Dendrimer-Mediated Cell Transfection In Vitro<br><i>James R. Baker, Jr., Anna U. Bielinska,<br/>and Jolanta F. Kukowska-Latallo</i> .....                   | 67  |
| 6. DNA Delivery to Cells in Culture Using Cationic Liposomes<br><i>Shelby K. Wyatt and Todd D. Giorgio</i> .....   | 83  |
| 7. Formulation of Synthetic Gene Delivery Vectors<br>for Transduction of the Airway Epithelium<br><i>John Marshall, Nelson S. Yew, and Seng H. Cheng</i> ..... | 95  |
| 8. Cationic Liposome-Mediated DNA Delivery<br>to the Lung Endothelium<br><i>Young K. Song, Guisheng Zhang, and Dexi Liu</i> .....                              | 115 |
| 9. Delivery of DNA to Tumor Cells Using Cationic Liposomes<br><i>Duen-Hwa Yan, Bill Spohn, and Mien-Chie Hung</i> .....  | 125 |
| 10. Delivery of Transposon DNA to Lungs of Mice<br>Using Polyethyleneimine-DNA Complexes<br><i>Lalitha R. Belur and R. Scott McIvor</i> .....                  | 137 |

## PART II. DELIVERY USING PHYSICAL METHODS

|   |     |
|---|-----|
| 11. Gene Delivery Using Physical Methods: <i>An Overview</i><br><i>Te-hui W. Chou, Subhabrata Biswas, and Shan Lu</i> ..... | 147 |
| 12. Gene Delivery to Mammalian Cells by Microinjection<br><i>Robert King</i> .....  | 167 |

|   |     |
|---|-----|
| 13. Delivery of DNA to Cells in Culture Using Particle Bombardment<br><b>William C. Heiser</b> .....  | 175 |
| 14. Delivery of DNA to Skin by Particle Bombardment<br><b>Shixia Wang, Swati Joshi, and Shan Lu</b> .....   | 185 |
| 15. Biolistic Transfection of Cultured Organotypic Brain Slices<br><b>A. Kimberley McAllister</b> .....   | 197 |
| 16. Efficient Electroporation of Mammalian Cells in Culture<br><b>Peter A. Barry</b> .....  | 207 |
| 17. Delivery of DNA to Skin by Electroporation<br><b>Nathalie Dujardin and Véronique Pr  at</b> .....   | 215 |
| 18. In Vivo DNA Electrotransfer in Skeletal Muscle<br><b>Guenha  l Sanz, Saulius   atkauskas, and Llu  s M. Mir</b> .....                                       | 227 |
| 19. Electrically Mediated Plasmid DNA Delivery to Solid Tumors In Vivo<br><b>Mark J. Jaroszeski, Loree C. Heller, Richard Gilbert, and Richard Heller</b> ..... | 237 |
| 20. Hydrodynamic Delivery of DNA<br><b>Joseph E. Knapp and Dexi Liu</b> .....   | 245 |
| 21. Naked DNA Gene Transfer in Mammalian Cells<br><b>Guofeng Zhang, Vladimir G. Budker, James J. Ludtke, and Jon A. Wolff</b> .....                             | 251 |
| 22. Microparticle Delivery of Plasmid DNA to Mammalian Cells<br><b>Mary Lynne Hedley and Shikha P. Barman</b> .....   | 265 |
| 23. DNA Delivery to Cells in Culture Using Ultrasound<br><b>Thomas P. McCreery, Robert H. Sweitzer, and Evan C. Unger</b> .....                                 | 287 |
| 24. DNA Delivery to Cells In Vivo by Ultrasound<br><b>Thomas P. McCreery, Robert H. Sweitzer, Evan C. Unger, and Sean Sullivan</b> .....                        | 293 |
| Index .....   | 299 |



CONTENTS OF THE COMPANION VOLUME  
*Volume 2: Viral Gene Transfer Techniques*

**PART I. DELIVERY USING ADENOVIRUSES**

1. Adenovirus-Mediated Gene Delivery: *An Overview*  
**Joanne T. Douglas**
2. DNA Delivery to Cells in Culture: *Generation of Adenoviral Libraries for High-Throughput Functional Screening*  
**Miroslava Ogorelkova, Seyyed Mehdy Elahi, David Gagnon, and Bernard Massie**
3. Adenovirus-Mediated Gene Delivery to Skeletal Muscle  
**Joanne T. Douglas**
4. Delivery of Adenoviral DNA to Mouse Liver  
**Sheila Connelly and Christine Mech**
5. Delivery of DNA to Lung Airway Epithelium  
**Daniel J. Weiss**
6. Delivery of DNA to Pulmonary Endothelium Using Adenoviral Vectors  
**Paul N. Reynolds**
7. Gene Transfer to Brain and Spinal Cord Using Recombinant Adenoviral Vectors  
**Joseph M. Alisky and Beverly L. Davidson**
8. Adenovirus-Mediated Gene Transfer to Tumor Cells  
**Manel Cascalló and Ramon Alemany**
9. Adenovirus-Mediated Gene Delivery to Dendritic Cells  
**Laura Timares, Joanne T. Douglas, Bryan W. Tillman, Victor Krasnykh, and David T. Curiel**

**PART II. DELIVERY USING ADENO-ASSOCIATED VIRUSES**

10. Overview of Adeno-Associated Viral Vectors  
**Thomas M. Daly**
11. AAV Vector Delivery to Cells in Culture  
**Andrew Smith, Roy Collaco, and James P. Trempe**
12. AAV-Mediated Gene Transfer to Skeletal Muscle  
**Roland W. Herzog**
13. AAV-Mediated Gene Transfer to the Liver  
**Thomas M. Daly**

14. AAV-Mediated Gene Transfer to Mouse Lungs  
***Christine L. Halbert and A. Dusty Miller***
15. Gene Delivery to the Mammalian Heart Using AAV Vectors  
***Danny Chu, Patricia A. Thistlethwaite, Christopher C. Sullivan, Mirta S. Grifman, and Matthew D. Weitzman***
16. Gene Delivery to the Mouse Brain with Adeno-Associated Virus  
***Marco A. Passini, Deborah J. Watson, and John H. Wolfe***
17. Delivery of DNA to Tumor Cells In Vivo Using Adeno-Associated Virus  
***Selvarangan Ponnazhagan and Frank Hoover***
18. Gene Delivery to Human and Murine Primitive Hematopoietic Stem and Progenitor Cells by AAV2 Vectors  
***Arun Srivastava***

### **PART III. DELIVERY USING HERPES SIMPLEX VIRUSES**

19. Delivery Using Herpes Simplex Virus: An Overview  
***William F. Goins, Darren Wolfe, David M. Krisky, Qing Bai, Ed A. Burton, David J. Fink, and Joseph C. Glorioso***
20. Gene Transfer to Skeletal Muscle Using Herpes Simplex Virus-Based Vectors  
***Baohong Cao and Johnny Huard***
21. Delivery of Herpes Simplex Virus-Based Vectors to the Nervous System  
***James R. Goss, Atsushi Natsume, Darren Wolfe, Marina Mata, Joseph C. Glorioso, and David J. Fink***
22. Gene Transfer to Glial Tumors Using Herpes Simplex Virus  
***Ajay Niranjana, Darren Wolfe, Wendy Fellows, William F. Goins, Joseph C. Glorioso, Douglas Kondziolka, and L. Dade Lunsford***
23. Delivery of Herpes Simplex Virus-Based Vectors to Stem Cells  
***Darren Wolfe, James B. Wechuck, David M. Krisky, Julie P. Goff, William F. Goins, Ali Ozuer, Michael E. Epperly, Joel S. Greenberger, David J. Fink, and Joseph C. Glorioso***

### **PART IV. DELIVERY USING BACULOVIRUSES**

24. Baculovirus-Mediated Gene Delivery into Mammalian Cells  
***Raymond V. Merrihew, Thomas A. Kost, and J. Patrick Condreay***

**PART V. DELIVERY USING LENTIVIRUSES**

25. Gene Delivery by Lentivirus Vectors: *An Overview*  
**Tal Kafri**
26. Lentiviral Vectors for the Delivery of DNA into Mammalian Cells  
**Roland Wolkowicz, Garry P. Nolan, and Michael A. Curran**
27. Stable Gene Delivery to CNS Cells Using Lentiviral Vectors  
**Deborah J. Watson, Brian A. Karolewski, and John H. Wolfe**
28. Gene Delivery to Hematopoietic Stem Cells Using  
Lentiviral Vectors  
**Hiroyuki Miyoshi**
29. Delivery of Genes to the Eye Using Lentiviral Vectors  
**Masayo Takahashi**
30. Lentiviral Transduction of Human Dendritic Cells  
**Roland Schroers and Si-Yi Chen**

**PART VI. DELIVERY USING RETROVIRUSES**

31. Gene Transfer by Retroviral Vectors: *An Overview*  
**Nikunj Somia**
32. Gene Delivery to Cells in Culture Using Retroviruses  
**Nikunj Somia**
33. Retrovirus-Mediated Gene Transfer to Tumors: *Utilizing the  
Replicative Power of Viruses to Achieve Highly Efficient  
Tumor Transduction In Vivo*  
**Christopher R. Logg and Noriyuki Kasahara**
34. Delivery of Genes to Hematopoietic Stem Cells  
**Masafumi Onodera**

**PART VII. DELIVERY USING ALPHAVIRUSES**

35. Delivery and Expression of Heterologous Genes in Mammalian Cells  
Using Self-Replicating Alphavirus Vectors  
**Gunilla B. Karlsson and Peter Liljeström**



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