Membrane Transporters in Drug Discovery and Development

Methods and Protocols

Edited by

Qing Yan

PharmTao, Santa Clara, California, USA

Humana Press
# Contents

**Preface** .................................................. p

**Contributors** ........................................... xi

1. Membrane Transporters and Drug Development: Relevance to Pharmacogenomics, Nutrigenomics, Epigenetics, and Systems Biology ........ 1
   *Qing Yan*

2. Bioinformatics for Transporter Pharmacogenomics and Systems Biology: Data Integration and Modeling with UML ...................... 23
   *Qing Yan*

   *Ming Ken Ten, Jonathan S. Chen, Jose L. Marquez, Eric I. Sun, and Milton H. Saier*

4. Targeting Drug Transporters – Combining In Silico and In Vitro Approaches to Predict In Vivo .......................... 65
   *Praveen M. Bahadduri, James E. Polli, Peter W. Swaan, and Sean Ekins*

5. Methods to Evaluate Transporter Activity in Cancer .................. 105
   *Takeo Nakanishi, Douglas D. Ross, and Keisuke Mitsuoka*

6. Analysis of Expression of Drug Resistance-Linked ABC Transporters in Cancer Cells by Quantitative RT-PCR ...................... 121
   *Anna Maria Calcagno and Suresh V. Ambudkar*

7. Fluorescence Studies of Drug Binding and Translocation by Membrane Transporters .................................................. 133
   *Frances J. Sharom, Ronghua Liu, and Balpreet Vinepal*

   *Dennis J. Bobilya*

9. Genetic Variants in the Vesicular Monoamine Transporter 1 (VMAT1/SLC18A1) and Neuropsychiatric Disorders .................. 165
   *Falk W. Loboff*

10. Equilibrium Binding and Transport by Vesicular Acetylcholine Transporter ............................................................. 181
    *Parul Khare, Aubrey R. White, Anuprao Mulakaluri, and Stanley M. Parsons*

11. ABC Transporters in Ophthalmic Disease ............................. 221
    *Corey Westerfeld*
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Author(s)</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Imaging of Protein Translocation In Situ in Skeletal Muscle of Living Mice</td>
<td>Hans P.M.M. Lauritzen</td>
<td>231</td>
</tr>
<tr>
<td>13</td>
<td>Glucose Transporters in Parasitic Protozoa</td>
<td>Scott M. Landfear</td>
<td>245</td>
</tr>
<tr>
<td>14</td>
<td>NMR Studies of Membrane Proteins</td>
<td>Gabriel A. Cook and Stanley J. Opella</td>
<td>263</td>
</tr>
<tr>
<td>15</td>
<td>Site-Directed Mutagenesis in the Study of Membrane Transporters</td>
<td>Audra A. McKinzie, Renae M. Ryan, and Robert J. Vandenberg</td>
<td>277</td>
</tr>
<tr>
<td>16</td>
<td><em>Xenopus laevis</em> Oocytes</td>
<td>Stefan Bröer</td>
<td>295</td>
</tr>
<tr>
<td>17</td>
<td>Measurement of Intracellular pH</td>
<td>Frederick B. Loiselle and Joseph R. Casey</td>
<td>311</td>
</tr>
<tr>
<td>18</td>
<td>Measurement of Plasma Membrane Calcium-Calmodulin-Dependent ATPase (PMCA) Activity</td>
<td>Tamer M. A. Mohamed, Florence M. Baudoin-Stanley, Riham Abou-Leisa, Elizabeth Cartwright, Ludwig Neyses, and Delvac Oceandy</td>
<td>333</td>
</tr>
<tr>
<td>19</td>
<td>Assessment of the Contribution of the Plasma Membrane Calcium ATPase, PMCA, Calcium Transporter to Synapse Function Using Patch Clamp Electrophysiology and Fast Calcium Imaging</td>
<td>Chris J. Roome and Ruth M. Empson</td>
<td>343</td>
</tr>
<tr>
<td></td>
<td>Subject Index</td>
<td></td>
<td>361</td>
</tr>
</tbody>
</table>