

## Cell-Penetrating Peptides. Methods and Protocols

(U. Langel (ed.), in *Methods in Molecular Biology*, Vol. 683, J. M. Walker (ser. ed.),  
Springer Protocols, Humana Press is part of Springer Science+Business Media,  
New York, 2011, 586 p., \$159)

DOI: 10.1134/S000629791112011X

This handbook is divided into five parts including 39 chapters summarizing the most important areas of research on cell-penetrating peptides (CPPs). Part I (chapters 1 and 2) is an introduction and briefly presents the historical background of CPP studies and the classification of available CPPs, and it summarizes the strategies for predicting them. An overview of penetration studies is also included in this part due to the importance of this aspect.

Part II (chapters 3-16) deals with methods for testing mechanisms of cell-penetrating peptides. Among these methods are approaches for testing interactions of CPPs with various membrane model systems, NMR studies of three-dimensional structure and positioning of CPPs in membrane models, kinetic and thermodynamic methods, and CPP stability and uptake mechanisms. The several chapters of this part consider calcium and membrane repair, involvement of proteoglycans in CPP-mediated delivery, and tools for predicting binding and insertion of CPPs into lipid bilayers.

Part III (chapters 17-21) is devoted to functionality of CPPs and highlights methods that attempt to use the unique properties of CPPs to study intracellular biochemical mechanisms of interaction and signal transduction. The first chapter in this part describes the mimicry of proteins by short peptides in their sequences and methods for analysis of this process. The others chapters are devoted to applications of CPPs in intercellular transfer,

pharmacology, tissue-specific protein transduction domains, and selective induction of apoptosis.

Part IV (chapters 22-28) considers applications of CPPs in gene modulation and includes data related to the quickly growing field that applies CPPs to improve the delivery of the oligonucleotides involved in gene modulation, particularly for gene silencing by antisense or siRNA oligonucleotides. As mentioned in the preface of this book by the editor Dr. Ulo Langel, the application of splice correcting oligonucleotides is a modern antisense strategy where several different chemically modified oligonucleotides serve as efficient splice redirectors. This approach may lead to novel gene therapies *in vitro* and *in vivo* as well.

Part V (chapters 29-39) highlights approaches where CPPs can be used as drugs and for drug delivery. There are special chapters with analysis of tumor- and organ-selective targeting with flexible CPPs, intracellular delivery of CPP-nanoparticles, and preclinical and clinical experiences with CPP-based self-assembling peptide systems in topical drug development.

Each chapter contains protocols of experiments and basic bibliography related to covered topics, and there is a subject index at the end of the book.

The book will be useful for researchers in protein chemistry and biochemistry, molecular and cell biologists, and teachers and students of medical schools and universities specialized in proteomics.

*Doctor of Biological Sciences*  
*G. Ya. Wiederschain*