

Springer Series in Biophysics 17

Reinhard Krämer
Christine Ziegler *Editors*

Membrane Transport Mechanism

3D Structure and Beyond

 Springer

Membrane Transport Mechanism 3d Structure And Beyond 17 Springer Series In Biophysics

Arnost Kotyk



Membrane Transport Mechanism 3d Structure And Beyond 17 Springer Series In Biophysics:

Membrane Transport Mechanism Reinhard Krämer, Christine Ziegler, 2014-03-13 This book provides a molecular view of membrane transport by means of numerous biochemical and biophysical techniques The rapidly growing numbers of atomic structures of transporters in different conformations and the constant progress in bioinformatics have recently added deeper insights The unifying mechanism of energized solute transport across membranes is assumed to consist of the conformational cycling of a carrier protein to provide access to substrate binding sites from either side of a cellular membrane Due to the central role of active membrane transport there is considerable interest in deciphering the principles of one of the most fundamental processes in nature the alternating access mechanism This book brings together particularly significant structure function studies on a variety of carrier systems from different transporter families Glutamate symporters LeuT like fold transporters MFS transporters and SMR RND exporters as well as ABC type importers The selected examples impressively demonstrate how the combination of functional analysis crystallography investigation of dynamics and computational studies has made it possible to create a conclusive picture or more precisely a molecular movie Although we are still far from a complete molecular description of the alternating access mechanism remarkable progress has been made from static snapshots towards membrane transport dynamics *Medical and Health Care Books and Serials in Print* ,1986

Directory of Graduate Research American Chemical Society. Committee on Professional Training, 2005 Faculties publications and doctoral theses in departments or divisions of chemistry chemical engineering biochemistry and pharmaceutical and or medicinal chemistry at universities in the United States and Canada **Membrane Biophysics** Hongda Wang, Guohui Li, 2017-11-21 This book highlights recent advances in and diverse techniques for exploring the plasma membrane s structure and function It starts with two chapters reviewing the history of membrane research and listing recent advances regarding membrane structure such as the semi mosaic model for red blood cell membranes and the protein layer lipid protein island model for nucleated tissue cell membranes It subsequently focuses on the localization and interactions of membrane components dynamic processes of membrane transport and transmembrane signal transduction Classic and cutting edge techniques e g high resolution atomic force microscopy and super resolution fluorescence microscopy used in biophysics and chemistry are presented in a very comprehensive manner making them useful and accessible to both researchers in the field and novices studying cell membranes This book provides readers a deeper understanding of the plasma membrane s organization at the single molecule level and opens a new way to reveal the relationship between the membrane s structure and functions making it essential reading for researchers in various fields [The Biophysics of Cell Membranes](#) Richard M. Epand, Jean-Marie Ruysschaert, 2017-09-25 This volume focuses on the modulation of biological membranes by specific biophysical properties The readers are introduced to emerging biophysical approaches that mimic specific states like membrane lipid asymmetry membrane curvature lipid flip flop lipid phase separation that are relevant to

the functioning of biological membranes The first chapter describes innovative methods to mimic the prevailing asymmetry in biological membranes by forming asymmetrical membranes made of monolayers with different compositions One of the chapters illustrates how physical parameters like curvature and elasticity can affect and modulate the interactions between lipids and proteins This volume also describes the sensitivity of certain ion channels to mechanical forces and it presents an analysis of how cell shape is determined by both the cytoskeleton and the lipid domains in the membrane The last chapter provides evidence that liposomes can be used as a minimal cellular model to reconstitute processes related to the origin of life Each topic covered in this volume is presented by leading experts in the field who are able to present clear authoritative and up to date reviews The novelty of the methods proposed and their potential for a deeper molecular description of membrane functioning are particularly relevant experts in the areas of biochemistry biophysics and cell biology while also presenting clear and thorough introductions making the material suitable for students in these fields as well

Biophysics of Membrane Proteins Vincent L. G. Postis, Adrian Goldman, 2021-02-14 This volume provides recent advances in the field of biophysics of membrane proteins Chapters are divided into several parts detailing biochemistry and functional analysis experimental and theoretical structural determinations membrane protein dynamics and conformation studies Written in the highly successful Methods in Molecular Biology series format chapters include introductions to their respective topics lists of the necessary materials and reagents step by step readily reproducible laboratory protocols and tips on troubleshooting and avoiding known pitfalls Authoritative and cutting edge Biophysics of Membrane Proteins Methods and Protocols aims to provide comprehensive protocols with notes to help further the understanding of key membrane protein structure and function for students academics and industrial researchers

Membrane Biophysics Mohammad Ashrafuzzaman, Jack A. Tuszyński, 2012-08-28 Physics mathematics and chemistry all play a vital role in understanding the true nature and functioning of biological membranes key elements of living processes Besides simple spectroscopic observations and electrical measurements of membranes we address in this book the phenomena of coexistence and independent existence of different membrane components using various theoretical approaches This treatment will be helpful for readers who want to understand biological processes by applying both simple observations and fundamental scientific analysis It provides a deep understanding of the causes and effects of processes inside membranes and will thus eventually open new doors for high level pharmaceutical approaches towards fighting membrane and cell related diseases

Physics of Biological Membranes Patricia Bassereau, Pierre Sens, 2018-12-30 This book mainly focuses on key aspects of biomembranes that have emerged over the past 15 years It covers static and dynamic descriptions as well as modeling for membrane organization and shape at the local and global at the cell level scale It also discusses several new developments in non equilibrium aspects that have not yet been covered elsewhere Biological membranes are the seat of interactions between cells and the rest of the world and internally they are at the core of complex dynamic reorganizations and chemical reactions Despite the long

tradition of membrane research in biophysics the physics of cell membranes as well as of biomimetic or synthetic membranes is a rapidly developing field Though successful books have already been published on this topic over the past decades none include the most recent advances Additionally in this domain the traditional distinction between biological and physical approaches tends to blur This book gathers the most recent advances in this area and will benefit biologists and physicists alike

Membrane Transport Arnost Kotyk, 2012-12-06 Not many years ago problems of membranes and transport attracted the attention of but a few dozen enthusiasts mainly physiologists who recognize the significance of membranes for the stabilization of the general steady state of organisms The first symposium organized some fifteen years ago could boast of the attendance of perhaps fifty scientists the remaining fifty were not yet sure that membranes was the topic of their choice ranging in specialization from physical chemistry to bacterial genetics who clairvoyantly decided to study what now has become the number one subject at most congresses of biophysics physiology and even biochemistry and microbiology As is the case with many rapidly developing fields the interest in membranes and transport seems to be growing out of bounds and the whole field of membrane biology interdisciplinary as it is has penetrated into the realms of a number of branches of physics chemistry and biology Its subject is primarily biological and although much has been done in the world to increase the exactness of biology over the past thirty years one cannot strive for a rigorous mathematical description of biological phenomena since as M H

Membrane Organization and Dynamics Amitabha Chattopadhyay, 2017-12-06 This volume brings together information on membrane organization and dynamics from a variety of spectroscopic microscopic and simulation approaches spanning a broad range of time scales The implication of such dynamic information on membrane function in health and disease is a topic of contemporary interest The chapters cover various aspects of membrane lipid and protein dynamics explored using a battery of experimental and theoretical approaches The synthesis of information and knowledge gained by utilizing multiple approaches will provide the reader with a comprehensive understanding of the underlying membrane dynamics and function which will help to develop robust dynamic models for the understanding of membrane function in healthy and diseased states In the last few years crystal structures of an impressive number of membrane proteins have been reported thanks to tremendous advances in membrane protein crystallization techniques Some of these recently solved structures belong to the G protein coupled receptor GPCR family which are particularly difficult to crystallize due to their intrinsic flexibility Nonetheless these static structures do not provide the necessary information to understand the function of membrane proteins in the complex membrane milieu This volume will address the dynamic nature of membrane proteins within the membrane and will provide the reader with an up to date overview of the theory and practical approaches that can be used This volume will be invaluable to researchers working in a wide range of scientific areas from biochemistry and molecular biology to biophysics and protein science Students of these fields will also find this volume very useful This book will also be of great use to those who are interested in the dynamic nature of biological

processes **Membranes, transport** ,1971 **Molecular Biology of Membrane Transport Disorders** Thomas E. Andreoli,A.M. Brown,D.M. Fambrough,Joseph F. Hoffman,Stanley G. Schultz,Michael J. Welsh,2013-11-11 When the six of us gathered to start planning for what was to be the Third Edition of Physiology of Membrane Disorders it was clear that since 1986 when the Second Edition appeared the field had experienced the dawning of a new era dominated by a change in focus from phenomenology to underlying mechanisms propelled by the power of molecular biology In 1985 detailed molecular information was available for only three membrane transporters the lac permease bacterial rhodopsin and the acetylcholine receptor During the decade that has since elapsed almost all of the major ion channels and transport proteins have been cloned sequenced mutagenized and expressed in homologous as well as heterologous cells Few if any of the transporters that were identified during the previous era have escaped the proings of the new molecular technologies and in many instances considerable insight has been gained into their mechanisms of function in health and disease Indeed in some instances novel unexpected transporters have emerged that have yet to have their functions identified The decision to adopt the new title Molecular Biology of Membrane Transport Disorders was a natural outgrowth of these considerations **Membrane Transport** Arnost Kotyk,1977-02-01 Not many years ago problems of membranes and transport attracted the attention of but a few dozen enthusiasts mainly physiolo gists who recognize the significance of membranes for the stabilization of the general steady state of organisms The first symposium organ ized some fifteen years ago could boast of the attendance of perhaps fifty scientists the remaining fifty were not yet sure that membranes was the topic of their choice ranging in specialization from physical chemistry to bacterial genetics who clairvoyantly decided to study what now has become the number one subject at most congresses of biophysics physiology and even biochemistry and microbiology As is the case with many rapidly developing fields the interest in membranes and transport seems to be growing out of bounds and the whole field of membra no logy interdisciplinary as it is has penetrated into the realms of a number of branches of physics chemistry and biology Its subject is primarily biological and although much has been done in the world to increase the exactness of biology over the past thirty years one cannot strive for a rigorous mathematical description of biological phenomena since as M H *Biological Membranes: Structure, Biogenesis and Dynamics* Jos A.F. Op den Kamp,2013-06-29 The Advanced Study Institute on Structure Biogenesis and Dynamics of Biological Membranes held in Cargese from June 14 26 1993 has been dealing with four major topics in membrane biochemistry today lipid dynamics and lipid protein interactions protein translocation and insertion intracellular traffic aud protein structure and folding The lecturers discussed these topics starting from several disciplines including biochemistry cell biology genetics and biophysics This wayan interdisciplinary and very inte sting view on biological membrane systems was obtained At first an extensive overview of mainly biophysical techniques which can be used to study dynamic processes in membranes was presented Sophisticated approaches such as ESR and NMR have been applied succesfully to unravel details of specific lipid protein interactions x ray analysis provides detailed

structural information of several proteins and the possible implications for protein functions. Information obtained this way is complemented by studies on mechanisms and kinetics of protein folding. The latter information is indispensable when discussing protein translocation and insertion processes in which folding and unfolding play essential roles. Extensive insight was offered in the complicated machinery of phospholipid biosynthesis. In particular, the application of sophisticated genetic techniques has allowed a better understanding of the mechanisms regulating the synthetic machinery and detailed studies on a variety of mutants lacking one or more of the essential enzymes have resulted in the beginning of a bL.

The Biophysics of Cell Membranes, 2017. This volume focuses on the modulation of biological membranes by specific biophysical properties. The readers are introduced to emerging biophysical approaches that mimic specific states like membrane lipid asymmetry, membrane curvature, lipid flip-flop, lipid phase separation that are relevant to the functioning of biological membranes. The first chapter describes innovative methods to mimic the prevailing asymmetry in biological membranes by forming asymmetrical membranes made of monolayers with different compositions. One of the chapters illustrates how physical parameters like curvature and elasticity can affect and modulate the interactions between lipids and proteins. This volume also describes the sensitivity of certain ion channels to mechanical forces and it presents an analysis of how cell shape is determined by both the cytoskeleton and the lipid domains in the membrane. The last chapter provides evidence that liposomes can be used as a minimal cellular model to reconstitute processes related to the origin of life. Each topic covered in this volume is presented by leading experts in the field who are able to present clear, authoritative and up-to-date reviews. The novelty of the methods proposed and their potential for a deeper molecular description of membrane functioning are particularly relevant. Experts in the areas of biochemistry, biophysics and cell biology while also presenting clear and thorough introductions making the material suitable for students in these fields as well.

Biochemistry of Membrane Transport : Proceedings Ernesto Carafoli, 1977 **Molecular Mechanisms of Membrane Traffic** D. James Morré, Kathryn E. Howell, John J. M. Bergeron, 1993. The study of membrane traffic in reconstituted cell-free systems has generated an unprecedented amount of new information on the biochemistry, molecular biology and genetics of membrane-based molecular events that underly normal and abnormal cellular function. Many of the individual steps have now been isolated and dissected in simple systems that permit detailed molecular analyses of transport mechanisms and their regulation. Reconstituted events of intercompartment transport include inter-membrane recognition and controlled membrane fusion/fission reactions. Among the many advances is the growing awareness of a remarkable evolutionary conservation of many of the components involved in the many steps of membrane traffic; this realization has accelerated greatly the pace of progress in the field. This book provides a collection of participant contributions from the 1992 Summer Research Conference Molecular Mechanisms of Membrane Traffic jointly sponsored with NATO by the American Society of Cell Biology. The conference was held May 9-13 at the Airlie Conference Center in the Virginia countryside near Warrenton.

The conference was attended by 158 scientists A unique feature was the high proportion of young scientists among the participants Approximately 65% were students postdoctoral fellows and young investigators Each attendee contributed to the conference with either a platform or poster presentation

Biophysics of Membrane Transport ,1994

Membrane Transport in Biology James A. Schafer,Hans H. Ussing,Poul Kristensen,Gerhard H. Giebisch,2011-11-22

Well over one decade has passed since the appearance of the original four volumes of Membrane Transport in Biology Since the publication of the last volume there have been spectacular advances in this field These advances have been in part the result of the application of exciting new methodologies and in part the result of new insights into the regulation and integration of transport processes This volume as well as a sixth volume which is in preparation are intended to cover key areas in which the development has been particularly striking For many years the trend in studies of membrane transport had been that of increasing specialization with regard to the transporter of interest and of the cell or tissue studied This trend was supported by the enormous number of publications directed at understanding the cellular physiology of specific organ systems and tissues and also by the fact that different tissues often seemed to react so differently to the same conditions that mechanisms unique to each appear to be at play One of the happy developments in recent years has been the realization that this apparent disparity of behaviors in different tissues is based on varying combinations of a limited number of transport mechanisms all mediated by the same or similar proteins Some of these transport proteins have already been isolated and analyzed with respect to amino acid sequence whereas others are just entering this phase

Biophysics of Membrane Transport ,1994

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