

cell defense the plasma membrane

cell defense the plasma membrane is a crucial concept in understanding how cells maintain their integrity and protect themselves from external threats. The plasma membrane, often referred to as the cell's security gate, plays a central role in regulating the movement of substances, signaling, and safeguarding cellular components. This article explores the multifaceted functions of the plasma membrane in cell defense, delves into its structure and composition, examines the various mechanisms it employs to shield the cell, and highlights its importance in health and disease. By understanding the defense strategies of the plasma membrane, readers gain insight into how cells interact with their environment, adapt to challenges, and maintain homeostasis. Key topics include the molecular architecture of the plasma membrane, active and passive defense mechanisms, the role of membrane proteins, and how cells respond to pathogens and stress. This comprehensive guide provides essential knowledge for students, researchers, and anyone interested in cell biology, immunology, or biomedical sciences.

- Understanding Cell Defense and the Plasma Membrane
- Structure and Composition of the Plasma Membrane
- Primary Defense Mechanisms of the Plasma Membrane
- Role of Membrane Proteins in Cell Defense
- Cellular Responses to Environmental Threats
- Plasma Membrane Defense in Health and Disease
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Understanding Cell Defense and the Plasma Membrane

The plasma membrane stands at the forefront of cell defense, serving as the boundary between the cell's internal environment and the extracellular space. Its selective permeability ensures that essential nutrients enter while harmful substances and pathogens are kept out. The concept of cell defense the plasma membrane encompasses both passive barriers and active biological mechanisms that protect cells from environmental hazards, toxins, and microbial invaders. This section introduces the pivotal role of the plasma membrane in maintaining cellular integrity and orchestrating defensive strategies.

Cells constantly encounter threats—from chemical agents and physical stress to viruses and bacteria. The plasma membrane not only acts as a physical shield but also facilitates rapid responses to these dangers through specialized proteins and dynamic processes. Its ability to recognize and respond to external signals is vital for survival, adaptation, and communication within multicellular organisms.

Structure and Composition of the Plasma Membrane

The Fluid Mosaic Model

The plasma membrane is best described by the fluid mosaic model, which illustrates its dynamic and heterogeneous nature. It comprises a bilayer of phospholipids interspersed with proteins, cholesterol, and carbohydrates. This mosaic arrangement allows for flexibility, self-healing, and the movement of embedded structures within the membrane.

Key Components of the Plasma Membrane

- **Phospholipids:** Form the basic bilayer structure, providing a semi-permeable barrier.
- **Proteins:** Integral and peripheral proteins facilitate transport, signaling, and defense.
- **Cholesterol:** Modulates membrane fluidity and stability.
- **Carbohydrates:** Attached to lipids and proteins, acting in cell recognition and protection.

Each component contributes uniquely to the membrane's defensive capabilities. Phospholipids repel water-soluble toxins, proteins act as gatekeepers and sensors, cholesterol prevents membrane rupture, and carbohydrates participate in immune recognition.

Primary Defense Mechanisms of the Plasma Membrane

Selective Permeability and Transport

Selective permeability is a fundamental defense strategy of the plasma membrane. By strictly regulating what enters and exits the cell, the membrane prevents the infiltration of harmful substances. Transport proteins, including channels and pumps, enable the controlled movement of ions, nutrients, and waste.

- **Passive transport:** Diffusion and osmosis allow movement without energy expenditure.
- **Active transport:** ATP-powered pumps move essential molecules against concentration gradients.
- **Endocytosis and exocytosis:** Specialized vesicular processes for bulk transport and defense.

Barrier Against Pathogens and Toxins

The plasma membrane provides an effective barrier against microbial invasion and toxic agents. Its hydrophobic core prevents most water-soluble molecules from penetrating, while surface proteins and glycoproteins can recognize and neutralize pathogens. Membrane-bound receptors detect foreign signals, triggering immune responses or apoptosis when necessary.

Role of Membrane Proteins in Cell Defense

Receptor Proteins and Immune Surveillance

Receptor proteins embedded in the plasma membrane are essential for immune surveillance. They detect signals from the environment, bind to antigens, and initiate defensive actions. Examples include toll-like receptors and major histocompatibility complex (MHC) molecules, which play critical roles in pathogen recognition and immune activation.

Transport and Efflux Proteins

Efflux proteins, such as ATP-binding cassette (ABC) transporters, actively expel toxins and drugs from the cell. These proteins help maintain cellular homeostasis and contribute to multidrug resistance in certain cells, such as cancer cells and bacteria. Their action is a vital aspect of cell defense the plasma membrane, ensuring that harmful substances are efficiently removed.

- Channel proteins: Allow selective passage of ions and water.
- Carrier proteins: Facilitate transport of larger molecules.
- Efflux pumps: Expel toxic compounds and metabolic byproducts.

Cellular Responses to Environmental Threats

Signal Transduction Pathways

Upon encountering stress or pathogens, the plasma membrane triggers signal transduction pathways that coordinate cellular defense responses. Binding of external molecules to membrane receptors activates cascades involving kinases, second messengers, and transcription factors, leading to changes in gene expression and defensive action.

Membrane Repair and Remodeling

Damage to the plasma membrane, whether from physical injury or pathogen attack, initiates repair mechanisms. Cells rapidly mobilize lipids and proteins to restore membrane integrity. Membrane remodeling processes, such as endocytosis, exocytosis, and vesicle formation, help remove damaged sections and prevent further invasion.

1. Detection of injury or invasion
2. Activation of repair enzymes
3. Mobilization of membrane components
4. Restoration of barrier function

Plasma Membrane Defense in Health and Disease

Role in Immune System Function

The plasma membrane's involvement in immune system function is pivotal. Surface proteins and glycoproteins facilitate communication between cells and immune molecules, allowing for rapid detection and elimination of pathogens. Defects in membrane defense can lead to impaired immunity and increased susceptibility to infection.

Membrane Dysfunction in Disease

Alterations in plasma membrane composition or function are linked to various diseases, including cancer, neurodegenerative disorders, and autoimmune conditions. Pathogens may exploit membrane vulnerabilities to enter cells, while mutations in membrane proteins can disrupt defense mechanisms. Ongoing research aims to target membrane defense pathways for therapeutic intervention.

Conclusion

cell defense the plasma membrane is a fundamental biological process that underpins cellular survival, adaptation, and health. The plasma membrane acts as both a physical barrier and a sophisticated regulatory interface, employing an array of molecular components and dynamic mechanisms to protect the cell. Understanding these defense strategies is essential for advancing research in cell biology, immunology, and medicine. The plasma membrane's ongoing battle against environmental threats highlights its significance in maintaining life and combating disease.

Q: What is the main function of the plasma membrane in cell defense?

A: The main function of the plasma membrane in cell defense is to act as a selective barrier that regulates the entry and exit of substances, thereby protecting the cell from toxins, pathogens, and harmful environmental conditions.

Q: How does the plasma membrane prevent the entry of pathogens?

A: The plasma membrane prevents the entry of pathogens through its hydrophobic core, selective permeability, and surface proteins that recognize and block foreign invaders. Some membrane proteins can trigger immune responses to neutralize threats.

Q: What role do membrane proteins play in cell defense?

A: Membrane proteins play crucial roles in cell defense by facilitating selective transport, detecting external signals, initiating immune responses, and expelling toxins through efflux pumps.

Q: Why is cholesterol important for plasma membrane defense?

A: Cholesterol stabilizes the plasma membrane, maintains its fluidity, and prevents rupture, all of which are important for the membrane's ability to withstand physical stress and maintain its defensive functions.

Q: How do cells repair damage to the plasma membrane?

A: Cells repair damage to the plasma membrane by activating repair enzymes, mobilizing membrane lipids and proteins, and remodeling the membrane through endocytosis and exocytosis to restore its integrity.

Q: What is selective permeability, and how does it contribute to cell defense?

A: Selective permeability refers to the plasma membrane's ability to allow only certain molecules to pass through while blocking others, thereby safeguarding the cell from harmful agents and maintaining internal balance.

Q: How are plasma membrane defenses related to disease?

A: Plasma membrane defenses are directly related to disease, as dysfunctions or mutations in membrane components can lead to increased vulnerability to infections, autoimmune disorders, and other health conditions.

Q: What is the fluid mosaic model of the plasma membrane?

A: The fluid mosaic model describes the plasma membrane as a flexible, dynamic bilayer composed of lipids, proteins, and carbohydrates, allowing for movement and interaction of embedded molecules essential for cell defense.

Q: How do efflux pumps contribute to cell defense the plasma membrane?

A: Efflux pumps actively transport toxins, drugs, and metabolic wastes out of the cell, helping maintain cellular homeostasis and protect the cell from harmful substances.

Q: Why is the plasma membrane considered the cell's security gate?

A: The plasma membrane is considered the cell's security gate because it controls what enters and leaves the cell, identifies and responds to threats, and acts as the first line of defense against external dangers.

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Cell Defense: The Plasma Membrane - Your Cell's First Line of Defense

The human body is a bustling metropolis of trillions of cells, each a tiny, self-sufficient organism. But these microscopic citizens are constantly under siege – from viruses, bacteria, toxins, and even the internal wear and tear of daily cellular function. Their survival, and ours, depends on a robust defense system. At the forefront of this defense stands the plasma membrane, a dynamic and incredibly sophisticated barrier. This post will delve deep into the fascinating mechanisms by which the plasma membrane acts as the cell's primary defense system, exploring its structure, function, and the crucial role it plays in maintaining cellular homeostasis and overall health. We'll uncover how this seemingly simple structure is, in fact, a complex and finely-tuned security system for every cell in your body.

H2: Understanding the Structure of the Plasma Membrane

The plasma membrane, also known as the cell membrane, isn't just a static wall; it's a fluid mosaic. This means it's composed of a constantly moving assortment of molecules, primarily phospholipids arranged in a bilayer. These phospholipids have hydrophilic (water-loving) heads facing outwards, towards the watery intracellular and extracellular environments, and hydrophobic (water-fearing) tails tucked inwards. Embedded within this bilayer are various proteins, cholesterol molecules, and glycolipids.

H3: The Role of Phospholipids

The phospholipid bilayer itself provides the initial barrier against many substances. Its selective permeability ensures that only certain molecules can pass through freely, while others require specialized transport mechanisms. This selective permeability is fundamental to maintaining the cell's internal environment distinct from its surroundings.

H3: Membrane Proteins: Gatekeepers and Defenders

Membrane proteins play a critical role in cell defense. They perform several key functions:

Receptor Proteins: These proteins bind to specific molecules, such as hormones or neurotransmitters, initiating intracellular signaling cascades. This allows the cell to respond to external stimuli and mount a defense against potential threats.

Transport Proteins: These proteins facilitate the movement of molecules across the membrane, selectively allowing nutrients in and waste products out. They also regulate the passage of ions, maintaining the crucial electrochemical gradient essential for cellular function.

Channel Proteins: These form pores in the membrane, allowing specific ions or small molecules to pass through. These channels are often gated, meaning they can open and close in response to various stimuli, controlling the flow of substances.

Cell Adhesion Molecules (CAMs): These proteins connect cells to each other and to the extracellular matrix, providing structural support and facilitating communication between cells. This contributes to tissue integrity and collective defense against pathogens.

H2: Mechanisms of Cell Defense by the Plasma Membrane

The plasma membrane utilizes several strategies to defend the cell:

H3: Selective Permeability: Keeping the Bad Out

The inherent selective permeability of the phospholipid bilayer acts as a first line of defense against many harmful substances. Large molecules, charged particles, and polar molecules generally cannot readily cross the membrane without assistance from transport proteins.

H3: Receptor-Mediated Endocytosis: Targeted Defense

When harmful substances, like viruses, bind to specific receptor proteins on the plasma membrane, the membrane can engulf them through a process called receptor-mediated endocytosis. This effectively traps the harmful agents within vesicles, preventing them from entering the cell.

H3: Phagocytosis: Engulfing Larger Threats

In certain immune cells, the plasma membrane can actively engulf larger particles, such as bacteria or cellular debris, through phagocytosis. This process is crucial for eliminating pathogens and maintaining tissue homeostasis.

H3: Exocytosis: Removing Waste and Toxins

The plasma membrane also plays a vital role in eliminating waste products and toxins through exocytosis. Waste materials are packaged into vesicles and then fused with the plasma membrane, releasing their contents outside the cell.

H2: The Impact of Membrane Damage on Cell Defense

Damage to the plasma membrane compromises its integrity, rendering the cell vulnerable to attack. Oxidative stress, toxins, and physical damage can all disrupt the membrane's structure, leading to increased permeability and ultimately cell death.

H2: Maintaining Plasma Membrane Integrity: A Crucial Factor in Cell Survival

Maintaining the integrity of the plasma membrane is crucial for cell survival. This involves a complex interplay of various factors, including the proper synthesis and maintenance of membrane components and the efficient repair of any damage.

Conclusion

The plasma membrane isn't just a passive barrier; it's a dynamic, self-regulating defense system crucial for cellular survival. Its sophisticated structure and intricate mechanisms ensure the selective passage of molecules, the targeted elimination of harmful substances, and the maintenance of a stable internal environment. Understanding the complexities of cell defense at the level of the plasma membrane provides invaluable insight into the overall health and well-being of the organism.

FAQs

1. Q: How does cholesterol affect plasma membrane fluidity? A: Cholesterol plays a crucial role in regulating plasma membrane fluidity. At higher temperatures, it reduces fluidity, while at lower temperatures, it prevents the membrane from becoming too rigid.
2. Q: What happens when the plasma membrane is damaged? A: Damage to the plasma membrane compromises its integrity, leading to increased permeability, leakage of cellular contents, and ultimately cell death.
3. Q: Are there any diseases associated with plasma membrane dysfunction? A: Yes, many diseases are linked to defects in the plasma membrane, including cystic fibrosis, muscular dystrophy, and various inherited metabolic disorders.
4. Q: How does the plasma membrane contribute to cell signaling? A: The plasma membrane plays a crucial role in cell signaling via receptor proteins that bind to signaling molecules, triggering intracellular cascades.
5. Q: What are some ways the plasma membrane can be repaired? A: Membrane repair mechanisms involve the patching of damaged regions using membrane-bound vesicles and the activation of repair proteins.

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cell defense the plasma membrane: The Plant Plasma Membrane Angus S. Murphy, Wendy Peer, Burkhard Schulz, 2010-11-11 In plant cells, the plasma membrane is a highly elaborated structure that functions as the point of exchange with adjoining cells, cell walls and the external environment. Transactions at the plasma membrane include uptake of water and essential mineral nutrients, gas exchange, movement of metabolites, transport and perception of signaling molecules, and initial responses to external biota. Selective transporters control the rates and direction of small molecule movement across the membrane barrier and manipulate the turgor that maintains plant form and drives plant cell expansion. The plasma membrane provides an environment in which molecular and macromolecular interactions are enhanced by the clustering of proteins in oligomeric complexes for more efficient retention of biosynthetic intermediates, and by the anchoring of protein complexes to promote regulatory interactions. The coupling of signal perception at the membrane surface with intracellular second messengers also involves transduction across the plasma membrane. Finally, the generation and ordering of the external cell walls involves processes mediated at the plant cell surface by the plasma membrane. This volume is divided into three sections. The first section describes the basic mechanisms that regulate all plasma membrane functions. The second describes plasma membrane transport activity. The final section of the book describes signaling interactions at the plasma membrane. These topics are given a unique treatment

in this volume, as the discussions are restricted to the plasma membrane itself as much as possible. A more complete knowledge of the plasma membrane's structure and function is essential to current efforts to increase the sustainability of agricultural production of food, fiber, and fuel crops.

cell defense the plasma membrane: *Cellular Organelles* Edward Bittar, 1995-12-08 The purpose of this volume is to provide a synopsis of present knowledge of the structure, organisation, and function of cellular organelles with an emphasis on the examination of important but unsolved problems, and the directions in which molecular and cell biology are moving. Though designed primarily to meet the needs of the first-year medical student, particularly in schools where the traditional curriculum has been partly or wholly replaced by a multi-disciplinary core curriculum, the mass of information made available here should prove useful to students of biochemistry, physiology, biology, bioengineering, dentistry, and nursing. It is not yet possible to give a complete account of the relations between the organelles of two compartments and of the mechanisms by which some degree of order is maintained in the cell as a whole. However, a new breed of scientists, known as molecular cell biologists, have already contributed in some measure to our understanding of several biological phenomena notably interorganelle communication. Take, for example, intracellular membrane transport: it can now be expressed in terms of the sorting, targeting, and transport of protein from the endoplasmic reticulum to another compartment. This volume contains the first ten chapters on the subject of organelles. The remaining four are in Volume 3, to which sections on organelle disorders and the extracellular matrix have been added.

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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.

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cell defense the plasma membrane: Abiotic Stress Response in Plants Arun Shanker, B. Venkateswarlu, 2011-08-29 Plants, unlike animals, are sessile. This demands that adverse changes in their environment are quickly recognized, distinguished and responded to with suitable reactions. Drought, heat, cold and salinity are among the major abiotic stresses that adversely affect plant growth and productivity. In general, abiotic stress often causes a series of morphological, physiological, biochemical and molecular changes that unfavorably affect plant growth, development and productivity. Drought, salinity, extreme temperatures (cold and heat) and oxidative stress are often interrelated; these conditions singularly or in combination induce cellular damage. To cope with abiotic stresses, of paramount significance is to understand plant responses to abiotic stresses that disturb the homeostatic equilibrium at cellular and molecular level in order to identify a common mechanism for multiple stress tolerance. This multi authored edited compilation attempts to put forth an all-inclusive biochemical and molecular picture in a systems approach wherein mechanism and adaptation aspects of abiotic stress are dealt with. The chief objective of the book hence is to deliver state of the art information for comprehending the effects of abiotic stress in plants at the cellular level.

cell defense the plasma membrane: Plant Salt Tolerance Sergey Shabala, Tracey Ann Cuin, 2012-08-16 Soil salinity is destroying several hectares of arable land every minute. Because remedial land management cannot completely solve the problem, salt tolerant crops or plant species able to remove excessive salt from the soil could contribute significantly to managing the salinity problem. The key to engineering crops for salt tolerance lies in a thorough understanding of the physiological mechanisms underlying the adaptive responses of plants to salinity. Plant Salt Tolerance: Methods

and Protocols describes recent advances and techniques employed by researchers to understand the molecular and ionic basis of salinity tolerance and to investigate the mechanisms of salt stress perception and signalling in plants. With chapters written by leading international scientists, this book covers nearly 30 different methods, such as microelectrode and molecular methods, imaging techniques, as well as various biochemical assays. Written in the highly successful Methods in Molecular Biology™ series format, chapters contain introductions to their respective topics, lists of the necessary materials and reagents, step-by-step, readily reproducible laboratory protocols, and notes on troubleshooting and avoiding known pitfalls. Authoritative and easily accessible, Plant Salt Tolerance: Methods and Protocols serves as an essential read for every student or researcher tackling various aspects of the salinity problem.

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on the most relevant and established labeling methodologies, and helps researchers to choose the most appropriate labeling method for their biological question.

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cell defense the plasma membrane: Transport And Diffusion Across Cell Membranes Wilfred Stein, 2012-12-02 Transport and Diffusion across Cell Membranes is a comprehensive treatment of the transport and diffusion of molecules and ions across cell membranes. This book shows that the same kinetic equations (with appropriate modification) can describe all the specialized membrane transport systems: the pores, the carriers, and the two classes of pumps. The kinetic formalism is developed step by step and the features that make a system effective in carrying out its biological role are highlighted. This book is organized into six chapters and begins with an introduction to the structure and dynamics of cell membranes, followed by a discussion on how the membrane acts as a barrier to the transmembrane diffusion of molecules and ions. The following chapters focus on the role of the membrane's protein components in facilitating transmembrane diffusion of specific molecules and ions, measurements of diffusion through pores and the kinetics of diffusion, and the structure of such pores and their biological regulation. This book methodically introduces the reader to the carriers of cell membranes, the kinetics of facilitated diffusion, and cotransport systems. The primary active transport systems are considered, emphasizing the pumping of an ion (sodium, potassium, calcium, or proton) against its electrochemical gradient during the coupled progress of a chemical reaction while a conformational change of the pump enzyme takes place. This book is of interest to advanced undergraduate students, as well as to graduate students and researchers in biochemistry, physiology, pharmacology, and biophysics.

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cell defense the plasma membrane: Ultrastructural Pathology Norman F. Cheville, 2009-12-09 Ultrastructural Pathology, Second Edition is a comprehensive reference on electron microscopy of pathologic tissue in animals and humans. Now presented in an atlas format for easier identification of organelles, the text is designed to bridge the gap between what is seen in the

electron microscope at the cellular level and what the pathologist encounters in the postmortem room. New to this edition are sections on diagnostic electron microscopy, providing information on specialized technologies for electron microscopy, and invertebrate pathology. Emphasizing comparative pathology, the book explains and integrates all aspects of cellular changes in lesions occurring from natural or experimental disease.

cell defense the plasma membrane: Cell Volume Regulation Florian Lang, 1998 This volume presents a unique compilation of reviews on cell volume regulation in health and disease, with contributions from leading experts in the field. The topics covered include mechanisms and signaling of cell volume regulation and the effect of cell volume on cell function, with special emphasis on ion channels and transporters, kinases and gene expression. Several chapters elaborate on how cell volume regulatory mechanisms participate in the regulation of epithelial transport, urinary concentration, metabolism, migration, cell proliferation and apoptosis. Last but not least, this publication is an excellent guide to the role of cell volume in the pathophysiology of hypercatabolism, diabetes mellitus, brain edema, hemoglobinopathies, tumor growth and metastasis, to name just a few. Providing deeper insights into an exciting area of research which is also of clinical relevance, this publication is a valuable addition to the library of those interested in cell volume regulation.

cell defense the plasma membrane: The Mycobacterial Cell Envelope Mamadou Daffé, Jean-Marc Reyrat, 2008 Explains the unique characteristics that cause this large group of bacteria responsible for tuberculosis and leprosy to function differently; serves as a valuable reference for those working in the areas of biochemistry, genetics, genomics, and immunology.

cell defense the plasma membrane: Plant Cell Wall Patterning and Cell Shape Hiroo Fukuda, 2014-09-02 Cell walls are defining feature of plant life. The unique and multi-faceted role they play in plant growth and development has long been of interest to students and researchers. Plant Cell Wall Patterning and Cell Shape looks at the diverse function of cell walls in plant development, intercellular communication, and defining cell shape. Plant Cell Wall Patterning and Cell Shape is divided into three sections. The first section looks at role cell walls play in defining cell shape. The second section looks more broadly at plant development. While the third and final section looks at new insights into cell wall patterning.

cell defense the plasma membrane: Plasma Membrane Repair , 2019-10-12 Lysosomes and Membrane Function, Volume 84 in the Current Topics in Membranes series, highlights new advances in the field, with this volume presenting interesting chapters on a variety of topics, including Parasite invasion and PMR, Actin dynamics and myosin contractility during plasma membrane repair: Does one ring really heal them all?, The role of intercellular signaling in cell membrane repair, Role of lipids in plasma membrane repair, Lysosomes and plasma membrane repair, Alveolar epithelial cell membrane integrity: a venerable target in the lung, Conservative evolution of natural versus artificial PEG-induced mechanisms of PMR in eukaryotes, and more. - Provides the authority and expertise of leading contributors from an international board of authors - Presents the latest release in the Current Topics in Membranes series - Updated release includes the latest information on lysosomes and membrane function

cell defense the plasma membrane: Plasma Membrane Oxidoreductases in Control of Animal and Plant Growth Frederick Crane, 2013-04-17 The objective of this workshop was to examine the nature of plasma membrane electron transport and how this electron transport contributes to growth of cells. The workshop came at a time when the study of the plasma membrane oxidoreductase activity was beginning to attract more widespread attention from researchers working with both plants and animals. The rapid response of c fos and c myc Proto-oncogene to stimulation of plasma membrane redox activity by external oxidants under scores a potential role of plasma membrane oxidoreductases in growth control. Other experiments with isolated endosomes indicate emerging roles in endocytosis and lytic processes. Primary attention was focused on trans plasma membrane electron transport which brings about the oxidation of cytosolic, NADH, NADPH or other substrates by electron flow across the plasma membrane to external oxidants including

ferric iron, semide hydroascorbate or oxygen. A major theme in the workshop was the relation of this electron flow to pH changes of the cytoplasm or the transfer of protons to the external medium. The presence and role of other oxidoreductases in the plasma membrane was documented, especially in regard to peroxide production. In plant cells this may contribute to cellular defense against invading para sites. A corresponding function in animals has been long known and extensively discussed but was beyond the scope of this workshop.

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derangements, has been enlarged appreciably.

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