Name _____ Hour _____

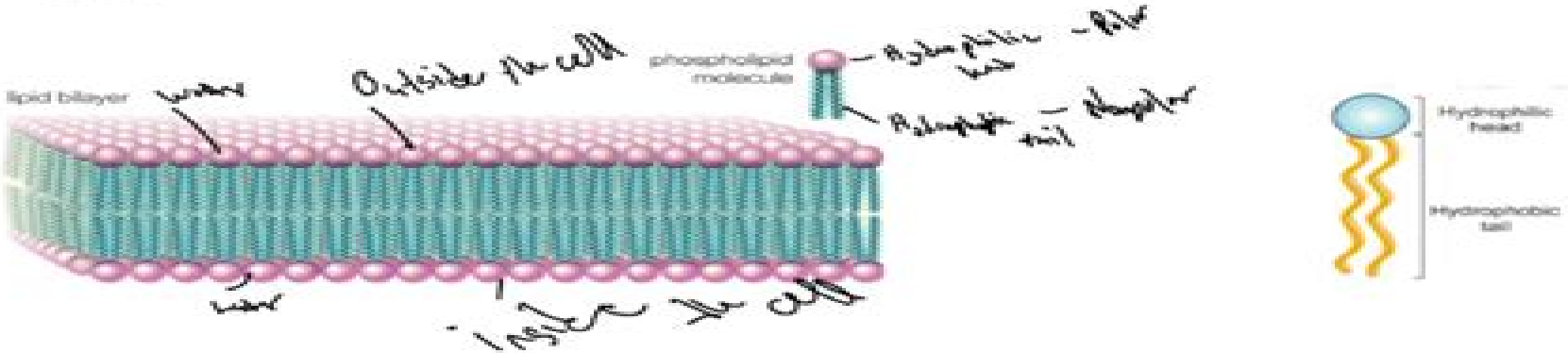
AP Biology – Cell Membrane Structure and Transport POGIL

1) The Phospholipid Bilayer

The Phospholipid Bilayer is the primary component of the cell membrane which encompasses every cell in the body. It also makes up vesicles and the membranes that surround many of the cell's organelles. The bilayer is made up of molecules called Phospholipids which are *Hybrid Molecules* meaning they have two regions which vary significantly in their ability to interact with other substances. Phospholipid construction takes place in the Smooth Endoplasmic Reticulum.

One side of the Phospholipid molecule is Hydrophilic (head region) meaning it is able to interact with water. Since this region is polar, it is also able to interact with any substance which has an electrical charge (+ or -). The other region is made up of two, non-polar, hydrophobic tails composed of fatty acids. These regions are unable to interact with water or any other polar substances or electrical charges.

Since the inside and outside of a cell are aqueous (water-based) environments, the phospholipids will automatically arrange themselves in a manner in which the hydrophilic heads are pointing out, interacting with the water, and the hydrophobic tail regions are pointing in towards each other, preventing the tails from interacting with the water. This arrangement produces a flexible barrier which contains an entirely hydrophobic center. We call this a *Semi-Permeable* barrier due to certain substances being able to cross it and others being blocked.



a) Where do we find Phospholipid Bilayers in cells, and where are they constructed?

Plasma membrane, smooth endoplasmic reticulum

b) On the Phospholipid Bilayer above, label the region above the Bilayer as *Outside of the Cell* and the bottom region as *Inside of the Cell*. Also label a single phospholipid showing where the hydrophilic head and hydrophobic tails are located. Lastly, label the polar and nonpolar regions on the phospholipid.

Membrane Transport Packet Answers Pogil

D.C. Tosteson

Membrane Transport Packet Answers Pogil:

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 Membrane Transport Daniel C. Tosteson,2013-05-27 This is a fascinating collection of personal accounts which is a must read for anyone interested in membrane transport or the history of the development of the current picture of membrane transport physiology This delightful book could serve variously as a history for investigators and historians or as a textbook for advanced students No biology or medical library should be without it *Cell Membrane Transport* Arnošt Kotyk,Dr. Karel Janáček,1972

Cell Membrane Transport Arnost Kotyk,2012-12-06 TO THE SECOND EDITION When preparing the manuscript for the original edition of this book we were only partly aware of the pace at which the field of membrane transport was developing and at which new ideas as well as new techniques would be applied to it The fact is that some of the chapters are now outdated e g the one on the molecular aspects of transport and many others require revision in the light of new information that has appeared in the past five years However it is also true that we overemphasized in the first edition certain points that now appear less important and underestimated the impact of certain others that have since assumed a position among the most forcefully discussed topics of membrane research In making amends it was thus thought useful to include the discussion of these latter problems both in the theoretical and in the comparative sections and on the other hand to omit some of the less topical subjects There was a different reason for rewriting the section on kidney and for dropping the section on mito chondria The help of an expert nephrologist was enlisted for improving chapter 24 while it was decided that mitochondria represent a special field both conceptually being only subcellular particles and methodologically more indirect

estimation techniques being involved than with whole cells or tissues and that more adequate information can be found in treatises specializing in work with mitochondria **An Introduction to Membrane Transport and Bioelectricity** John H. Byrne,Stanley G. Schultz,1994 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 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 **Transport Across Single Biological Membranes** D.C. Tosteson,2012-12-06 This second Volume in the series on Membrane Transport in Biology contains a group of essays on transport across single biological membranes separating the inside and outside of cells or organelles We have not attempted to include material on all types of plasma and intracellular membranes but rather have emphasized structures which have been studied relatively thoroughly Four chapters describe transport of different types of molecules and ions across the plasma membranes of mammalian red cells Two essays concern the excitable membranes of nerve and muscle cells while the remaining four chapters treat transport across several types of intracellular membranes Water makes up more than two thirds of the mass of most living cells The transport of water between the inside and outside of cells and organelles is important for the function of these structures As a result of investigations in many laboratories over the past four decades our picture of the water permea bility of the red cell membranes is rather detailed when compared to the water permeability of other biological membranes In Chapter 1 R I Macey describes this picture and also considers the permeability of red cell membranes to non electrolytes including metabolic substrates such as sugars amino acids purines and nucleosides

Regulation and Development of Membrane Transport Processes James Stephen Graves,1985 This state of the art assessment describes the means by which cell membrane transport systems are regulated in both epithelial and nonepithelial cells Regulation and Development of Membrane Transport Processes leads readers from a physiological description of regulation toward a more mechanistic level of understanding Distinguished researchers in physiology biochemistry genetics and pharmacology offer key insights into the regulatory processes evoked by external stimuli such as hormones or substrate limitation and by the internal stimulus of genetically programmed development Their multidisciplinary efforts define three

forms of regulations 1 gene expression leading to de novo synthesis 2 insertion and removal of cytoplasmic membrane vesicles and 3 in situ modification of the transport system in the membrane Regulation and Development of Membrane Transport Processes reviews a wide spectrum of transport regulatory phenomena in eukaryotic cells and provides the groundwork for future research Transport And Diffusion Across Cell Membranes Wilfred Stein,1986-03-28 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

Membrane Transport in Biology James A. Schafer,Hans H. Ussing,Poul Kristensen,Gerhard H. Giebisch,2013-03-07 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 **Membrane**

Transport ,2000-06-15 Membrane Transport is targeted towards researchers with an interest in the mechanism of solute transport across biological membranes Its scope is broad ranging from the techniques required to study transport itself through the expression purification and reconstitution of transporters to techniques for investigation of their structures As such it not only proves the necessary technical grounding for newcomers to the field but should also be of value to old hands wishing to get up to date with recent developments in these areas While some of the approaches described require sophisticated equipment e g a stopped flow fluorimeter most of the protocols can be implemented in any well found laboratory Preparation of this volume comes at a time when a result of genome sequencing our knowledge of membrane transporter sequences is far outstripping our understanding of their molecular mechanisms Our hope is that this book will help future researchers to redress this imbalance Transport Across Single Biological Membranes D.C. Tosteson,1979-01-01 This second Volume in the series on Membrane Transport in Biology contains a group of essays on transport across single biological membranes separating the inside and outside of cells or organelles We have not attempted to include material on all types of plasma and intracellular membranes but rather have emphasized structures which have been studied relatively thoroughly Four chapters describe transport of different types of molecules and ions across the plasma membranes of mammalian red cells Two essays concern the excitable membranes of nerve and muscle cells while the remaining four chapters treat transport across several types of intracellular membranes Water makes up more than two thirds of the mass of most living cells The transport of water between the inside and outside of cells and organelles is important for the function of these structures As a result of investigations in many laboratories over the past four decades our picture of the water permea bility of the red cell membranes is rather detailed when compared to the water permeability of other biological membranes In Chapter 1 R I Macey describes this picture and also considers the permeability of red cell membranes to non electrolytes including metabolic substrates such as sugars amino acids purines and nucleosides

Membrane transport and metabolism: proceedings... Symposium on Membrane Transport and Metabolism, Prague, 1960, *Basic Principles of Membrane Transport* S. G. Schultz,1980-05-30 *Membrane Transport Processes in Organized Systems* Thomas E. Andreoli,Darrell D. Fanestil,Joseph F. Hoffman,Stanley G. Schultz,2012-12-06 Membrane Transport Processes in Organized Systems is a softcover book containing portions of Physiology of Membrane Disorders Second Edition The parent volume contains six major sections This text encompasses the fourth and fifth sections Transport Events in Single Cells and Transport in Epithelia Vectorial Transport through Parallel Arrays We hope that this smaller volume which deals with transport processes in single cells and in organized epithelia will be helpful to individuals interested in general physiology transport in single cells and epithelia and the methods for studying those transport processes THOMAS E ANDREOLI JOSEPH F HOFFMAN DARRELL D FANESTIL STANLEY G SCHULTZ Vll Preface to the Second Edition The second edition of Physiology of Membrane Disorders represents an extensive revision and a considerable expansion ofthe

first edition Yet the purpose of the second edition is identical to that of its predecessor namely to provide a rational analysis of membrane transport processes in individual membranes cells tissues and organs which in tum serves as a frame of reference for rationalizing disorders in which derangements of membrane transport processes play a cardinal role in the clinical expression of disease As in the first edition this book is divided into a number of individual but closely related sections Part V represents a new section where the problem of transport across epithelia is treated in some detail Finally Part VI which analyzes clinical derangements has been enlarged appreciably **Channels, Carriers, and Pumps** Wilfred D. Stein,2012-12-02 For students as well as researchers this book describes the exciting new advances in the molecular biology of transport proteins and integrates this information with transport kinetics function and regulation Experimental data are linked with theory Provides an introduction to the properties of transport proteins channels carriers and pumps Presents up to date information on the structure of transport proteins and on their function and regulation Includes introductions to transport kinetics and to the cloning of genes that code transport proteins Furnishes a link between the experimental basis of the subject and theoretical model building *Transport Across Single Biological Membranes* ,1979

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 Transport Across Multi-Membrane Systems G. Giebisch,2012-03-09 The contributions of this volume are concerned with transport phenomena in multimembrane systems and in simple epithelia In addition to the very substan tial progress that has been made in the area of transport of fluid and solutes across artifical model membranes in vitro and across simple symmetrical cell membranes much has been learned from studies of transport phenomena in multi membrane systems of higher complexity to be reviewed in this volume It should be recalled that many of the fundamental conceptual and methodological problems of transport physiology have been

successfully approached and defin ed by studying simple epithelia in vitro and that the direction that research has taken has been affected in a major way by the cellular transport models that have evolved from this approach Since then striking progress has been made in several areas Not only have we been witnessing a keen and productive interest in the realtionship between fine structure and transport behavior in multimem brane systems but significant advancements have also been made in defining individual active and passive transport operations in analysing cell ion activities and transport pools and in describing the differences in transport functions that underly the membrane asymmetry and cell polarization of cells subserving di rectional transport *Membrane Transport in Biology* Gerhard H. Giebisch,D. C. Tosteson,Hans H. Ussing,1978

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