CYTOSKELETON IN SPECIALIZED TISSUES AND IN PATHOLOGICAL STATES (THE CYTOSKELETON) pdf

1: The Cytoskeleton | Download eBook PDF/EPUB

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The Cytoskeleton of the Algae provides a comprehensive examination of the structural features of the cytoskeleton in phylogenetic branches of algae. The book also analyzes the possible functions of cytoskeletal components using structural, physiological, genetic, and molecular approaches. Many taxa are described in detail, mirroring the dramatic progress that has been made in recent years in this new research field. Many unique structural elements and motility phenomena are described for the first time, and other features common to all plant cells, such as cell polarity, cytoplasmic streaming, mitosis, cell wall deposition, and contractile events are analyzed using algae as experimental model systems. The Cytoskeleton of the Algae reflects the enormous impact that research on the algal cytoskeleton has on both phycology and plant cell biology, and it will serve as an excellent reference volume for researchers in this area. This monograph begins with a general description of the cytoskeleton in axonal development and pathology and then moves to more detailed descriptions of particular components, including microtubules and associated proteins, neurofilaments and interacting proteins, actin and its binding proteins, and glial fibrillary acidic protein. The later chapters focus on the functional significance of the neuronal cytoskeleton in axonal transport and its regulation in health and disease states. The Cytoskeleton of the Nervous System will encourage further development of unifying principles and stimulate new conceptual and technical approaches toward a better understanding of cytoskeleton functions in health and disease. Annual Plant Reviews, Volume 10 The cytoskeleton is a dynamic filamentous structure composed of at least actin and microtubule networks. Actin and microtubules are no different structurally from their animal and fungal counterparts. However, the strategies of cell differentiation and development in plants require this network to respond appropriately to plant-specific developmental cues and to environmental factors. This book views the cytoskeleton from different perspectives but, on the whole, as a network composed of structural and regulatory proteins controlled by internal and external stimuli that result in different aspects of cell differentiation. This is a volume for researchers and professionals in plant biochemistry, cell biology and genetics. The student of biological science in his final years as an undergraduate and his first years as a graduate is expected to gain some familiarity with current research at the frontiers of his discipline. New research work is published in a perplexing diversity of publications and is inevitably con cerned with the minutiae of the subject. The sheer number of research journals and papers also causes confusion and difficulties of assimilation. Review articles usually presuppose a background knowledge of the field and are inevitably rather restricted in scope. There is thus a need for short but authoritative introductions to those areas of modern biological research which are either not dealt with in standard introductory text books or are not dealt with in sufficient detail to enable the student to go on from them to read scholarly reviews with profit. This series of books is designed to satisfy this need. The authors have been asked to produce a brief outline of their subject assuming that their readers will have read and remembered much of a standard introductory textbook of biology. This outline then sets out to provide by building on this basis, the conceptual framework within which modern research work is progressing and aims to give the reader an indication of the problems, both conceptual and practical, which must be overcome if progress is to be maintained.

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2: Microvillus - Wikipedia

Cytoskeleton in Specialized Tissues and in Pathological States Published: 25th June Editors: J.E. Hesketh I.F. Pryme This volume deals with aspects of the cytoskeleton in different cell types and also describe examples of changes in the cytoskeleton which occur during various pathological states.

Septin Septins are a group of the highly conserved GTP binding proteins found in eukaryotes. Different septins form protein complexes with each other. These can assemble to filaments and rings. Therefore, septins can be considered part of the cytoskeleton. Recent research in human cells suggests that septins build cages around bacterial pathogens, immobilizing the harmful microbes and preventing them from invading other cells. Spectrin Spectrin is a cytoskeletal protein that lines the intracellular side of the plasma membrane in eukaryotic cells. Spectrin forms pentagonal or hexagonal arrangements, forming a scaffolding and playing an important role in maintenance of plasma membrane integrity and cytoskeletal structure. Yeast In budding yeast an important model organism , actin forms cortical patches, actin cables, and a cytokinetic ring and the cap. Cortical patches are discrete actin bodies on the membrane and are vital for endocytosis , especially the recycling of glucan synthase which is important for cell wall synthesis. Actin cables are bundles of actin filaments and are involved in the transport of vesicles towards the cap which contains a number of different proteins to polarize cell growth and in the positioning of mitochondria. The cytokinetic ring forms and constricts around the site of cell division. Prokaryotic cytoskeleton Prior to the work of Jones et al. When studied, many misshapen bacteria were found to have mutations linked to development of a cell envelope. Like tubulin, FtsZ forms filaments in the presence of guanosine triphosphate GTP , but these filaments do not group into tubules. During cell division , FtsZ is the first protein to move to the division site, and is essential for recruiting other proteins that synthesize the new cell wall between the dividing cells. All non-spherical bacteria have genes encoding actin-like proteins, and these proteins form a helical network beneath the cell membrane that guides the proteins involved in cell wall biosynthesis. Filaments of ParM exhibit dynamic instability , and may partition plasmid DNA into the dividing daughter cells by a mechanism analogous to that used by microtubules during eukaryotic mitosis. Crescentin is also involved in maintaining cell shape, such as helical and vibrioid forms of bacteria, but the mechanism by which it does this is currently unclear. These filament forming proteins have been classified into 4 classes. Actin-like proteins are actin in eukaryotes and MreB , FtsA in prokaryotes. Examples for intermediate filaments, which have almost exclusively been found in animals i. The same holds true for the actin-like proteins and their structure and ATP binding domain. Which proteins fulfill which task is very different. For example, DNA segregation in all eukaryotes happens through use of tubulin, but in prokaryotes either WACA proteins, actin-like or tubulin-like proteins can be used. Cell division is mediated in eukaryotes by actin, but in prokaryotes usually by tubulin-like often FtsZ-ring proteins and sometimes Crenarchaeota ESCRT-III, which in eukaryotes still has a role in the last step of division. While mainly seen in plants, all cell types use this process for transportation of waste, nutrients, and organelles to other parts of the cell.

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3: The cytoskeleton of nerve cells | Anthony Brown Lab - The Ohio State University

Cytoskeleton in Specialized Tissues and in Pathological States. Defects in muscle-cytoskeleton interaction in diseased states Review article Pages

Structure[edit] Microvilli are covered in plasma membrane, which encloses cytoplasm and microfilaments. Though these are cellular extensions, there are little or no cellular organelles present in the microvilli. Each microvillus has a dense bundle of cross-linked actin filaments, which serves as its structural core. Myosin 1a functions through a binding site for filamentous actin on one end and a lipid binding domain on the other. The plus ends of the actin filaments are located at the tip of the microvillus and are capped, possibly by capZ proteins, [2] while the minus ends are anchored in the terminal web composed of a complicated set of proteins including spectrin and myosin II. Intermicrovillous space increases with contractile activity of myosin II and tropomyosin , and decreases when contraction ceases. Locations[edit] Thousands of microvilli form a structure called the brush border that is found on the apical surface of some epithelial cells , such as the small intestines. Microvilli should not be confused with intestinal villi , which are made of many cells. Each of these cells has many microvilli. Microvilli are observed on the plasma surface of eggs, aiding in the anchoring of sperm cells that have penetrated the extracellular coat of egg cells. Clustering of elongated microtubules around a sperm allows for it to be drawn closer and held firmly so fusion can occur. They are large objects that increase surface area for absorption. Microvilli are also of importance on the cell surface of white blood cells , as they aid in the migration of white blood cells. Relationship to cell[edit] As mentioned, microvilli are formed as cell extensions from the plasma membrane surface. Actin filaments, present in the cytosol , are most abundant near the cell surface. These filaments are thought to determine the shape and movement of the plasma membrane. The nucleation of actin fibers occurs as a response to external stimuli, allowing a cell to alter its shape to suit a particular situation. This could account for the uniformity of the microvilli, which are observed to be of equal length and diameter. This nucleation process occurs from the minus end, allowing rapid growth from the plus end. Though the length and composition of microvilli is consistent within a certain group of homogenous cells, it can differ slightly in a different part of the same organism. For example, the microvilli in the small and large intestines in mice are slightly different in length and amount of surface coat covering. Because of this vital function, the microvillar membrane is packed with enzymes that aid in the breakdown of complex nutrients into simpler compounds that are more easily absorbed. For example, enzymes that digest carbohydrates called glycosidases are present at high concentrations on the surface of enterocyte microvilli. Thus, microvilli not only increase the cellular surface area for absorption, they also increase the number of digestive enzymes that can be present on the cell surface. Glycocalyx[edit] The microvilli are covered with glycocalyx , consisting of peripheral glycoproteins that can attach themselves to a plasma membrane via transmembrane proteins. This layer may be used to aid binding of substances needed for uptake, to adhere nutrients or as protection against harmful elements. It can be another location for functional enzymes to be localized. Destruction[edit] The destruction of microvilli can occur in certain diseases because of the rearrangement of cytoskeleton in host cells. This can lead to malabsorption of nutrients and persistent osmotic diarrhea, often accompanied by fever. This is seen in infections caused by EPEC subgroup Escherichia coli , in celiac disease, and microvillus inclusion disease [4] an inherited disease characterized by defective microvilli and presence of cytoplasmic inclusions of the cell membrane other than the apical surface. The destruction of microvilli can actually be beneficial sometimes, as in the case of elimination of microvilli on white blood cells which can be used to combat auto immune diseases.

4: Cytoskeleton | Download eBook PDF/EPUB

This volume deals with aspects of the cytoskeleton in different cell types and also describe examples of changes in the

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cytoskeleton which occur during various pathological states. These studies bring the exciting area of cytoskeleton research into the domain of medical science.

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This volume deals with aspects of the cytoskeleton in different cell types and also describe examples of changes in the cytoskeleton which occur during various pathological states.

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