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Sensory hair cells are the specialized mechanosensory receptors found in vertebrate auditory, vestibular, and lateral line organs that transduce vibratory and acoustic stimuli into the sensations of hearing and balance. Hair cells can be damaged due to such factors as aging, ototoxic chemicals, acoustic trauma, infection, or genetic factors. Loss of these hair cells lead to deficits in hearing and balance, and in mammals, such deficits are permanent. In contrast, non-mammalian vertebrates exhibit the capability to regenerate missing hair cells. Researchers have been examining the process of hair cell death and regeneration in animal models in an attempt to find ways of either preventing hair cell loss or stimulating the production of new hair cells in mammals, with the ultimate goal of finding new therapeutics for human sensorineural hearing and balance deficits. This has led to a wide array of research on sensory hair cells- such as understanding the factors that cause hair cell loss and finding agents that protect them from damage, elucidating the cell signaling pathways activated during hair cell death, examining the genes and cellular pathways that are regulated during the process of hair cell death and regeneration, and characterizing the functional sensory loss and recovery following acoustic or ototoxic insults to the inner ear. This research has involved cell and developmental biologists, physiologists, geneticists, bioinformaticians, and otolaryngologists. In this Research Topic, we have collated reviews of the past

progress of hair cell death and regeneration studies and original research articles advancing sensory hair cell death and regeneration research into the future.

This book is geared to every student in biology, pharmacy and medicine who needs to become familiar with receptor mediated signaling. The text starts with explaining some basics in membrane biochemistry, hormone biology and the concept of receptor based signaling as the main form of communication between cells and of cells with the environment. It goes on covering each receptor superfamily in detail including their structure and evolutionary context. The last part focusses exclusively on examples where thorough knowledge of receptors is critical: pharmaceutical research, developmental biology, neurobiology and evolutionary biology. Richly illustrated, the book is perfectly suited for all courses covering receptor based signaling, regardless whether they are part of the biology, medicine or pharmacology program.

In this contribution, several specialists describe the current knowledge on the molecular networks that regulate cell cycle progression, with an emphasis on the G1 phase of the cell cycle. The first part of Regulation of G1 Phase Progression is concerned with the individual molecules that form the network, including cyclins, cyclin-dependent kinases, inhibitors of these kinases and retinoblastoma and p53. The second section describes the signaling cascades by which external factors influence the cell cycle network, including mitogens, the extracellular matrix, nutrients and oxygen radicals. The last section describes the effects of specific external conditions on cell cycle progression

and are presented such as serum starvation and subsequent re-addition and stress conditions (heat, osmolarity). The final two chapters describe the relation between cell cycle progression with cell differentiation and with apoptosis.

Advances in Cancer ResearchAcademic Press

"Cancer is one of the major causes of death worldwide. Despite hundreds of clinical trials currently in progress for cancer patients, the success rate is still very low. Understanding the molecular aspects of cancer development, the discovery of new molecu"

Initiation, development, and establishment of a functional ectomycorrhiza involve a series of biochemical events mediated by a number of genes from the fungus as well as the host plant. We have identified a heat shock protein gene from Laccaria bicolor (Lbhsp) that appears to play a role in these events. The size and characteristics of Lbhsp suggest that it belongs to the family of small heat-shock proteins described in the literature. Nucleotide sequencing of an almost full length cDNA indicated that the Lbhsp mRNA is about 611 nucleotides long and codes for a single protein of ~ 17 kDa. Isolation and characterization of the Lbhsp gene showed that it was made up of three exons separated by two small introns. Southern analysis suggested that the L. bicolor genome contains at least two copies of the Lbhsp gene. Temporal expression analyses revealed that the gene is expressed within 4 to 12 hours after interaction with red pine roots. The yeast two-hybrid studies showed that the Lbhsp was closely associated with

the ras gene (Lbras) described earlier. The data suggest that Lbhsp may play a supporting role in ras-mediated mycorrhizal signaling pathways during various stages of ectomycorrhizal development.

Amebiasis, a parasitic disease transmitted by the unicellular protozoan parasite Entamoeba histolytica, is the cause of at least 100,000 deaths each year. The disease is mostly prevalent in developing countries and is one of the three common causes of death from parasitic diseases. The parasite has two stages in its life cycle in the host: the infective cyst and the invasive trophozoite. In the large intestine, the parasite feeds on bacteria and on cellular debris. No vaccine against amebiasis currently exists. Although metronidazole is the drug of choice for treating amebiasis, adverse effects in patients and potential resistance to metronidazole in other protozoa exist. About nine out of 10 people who are infected with E. histolytica are asymptomatic and in those individuals who develop symptoms, bloody diarrhea (amebic colitis) and liver abscess are the most common symptoms. One possible explanation for this observation is the difference in the gut microbiota between individuals that may significantly influence the host’s immune response in amebiasis and E. histolytica's virulence. Amebiasis is characterized by acute inflammation of the intestine with release of pro-inflammatory cytokines, reactive oxygen species and reactive nitrogen species from activated cells of the host's immune system. In recent years, significant advances on the cell biology of Entamoeba infection have been achieved through the development of new genetic tools

to manipulate gene expression in the parasite and through the application of Omics tools. In this Research Topic, we welcome high quality original research articles, as well as review, opinion or method articles, on amebiasis including but not limited to the regulation of gene expression, cell biology and signaling, adaptation and resistance to environmental stresses, metabolism, pathogenesis and immunity, pathogenesis and microbiome, drug discovery and drug resistance.

Agrobacterium is a plant pathogen which causes the “crown-gall” disease, a neoplastic growth that results from the transfer of a well-defined DNA segment (“transferred DNA”, or “T-DNA”) from the bacterial Ti (tumor-inducing) plasmid to the host cell, its integration into the host genome, and the expression of oncogenes contained on the T-DNA. The molecular machinery, needed for T-DNA generation and transport into the host cell and encoded by a series of chromosomal (chv) and Ti-plasmid virulence (vir) genes, has been the subject of numerous studies over the past several decades. Today, Agrobacterium is the tool of choice for plant genetic engineering with an ever expanding host range that includes many commercially important crops, flowers, and tree species. Furthermore, its recent application for the genetic transformation of non-plant species, from yeast to cultivated mushrooms and even to human cells, promises this bacterium a unique place in the future of biotechnological applications. The book is a comprehensive volume describing Agrobacterium's biology, interactions with host species, and uses for genetic engineering.

The HEP issue on Metabolic Control provides a state-of the art overview over both classical concepts and emerging areas in metabolism and associated disorders. In this context, metabolic control is highlighted at various levels of complexity ranging from transcriptional mechanisms in metabolic pathway control over metabolic communication routes in physiology and pathophysiology to current treatment modalities and options in metabolic disorders, including type 2 diabetes and obesity. Dedicated chapters by leading experts in their fields provide a concise overview over important areas in metabolic research at a molecular level, including the role of the central nervous system in metabolism, inflammation and metabolism, pancreatic hormone signaling, brown adipose tissue, and therapeutic concepts.

Naïve T cells get activated upon encounter with their cognate antigen and differentiate into a specific subset of effector cells. These T cells are themselves plastic and are able to re-differentiate into another subset, changing both phenotype and function. Differentiation into a specific subset depends on the nature of the antigen and of the environmental milieu. Notably, certain nutrients, such as vitamins A and D, sodium chloride, have been shown to modulate T cell responses and influence T cell differentiation. Parasite infection can also skew Th differentiation. Similarly, the gut microbiota regulates the development of immune responses. Lastly, the key role of metabolism on T cells has also been demonstrated. This series of articles highlights some of the multiple links existing between environmental factors and T cell responses.

Enzymes—Advances in Research and Application: 2013 Edition is a ScholarlyEditions™ book that delivers timely, authoritative, and comprehensive information about Transferases. The editors have built Enzymes—Advances in Research and Application: 2013 Edition on the vast information databases of ScholarlyNews.™ You can expect the information about Transferases in this book to be deeper than what you can access anywhere else, as well as consistently reliable, authoritative, informed, and relevant. The content of Enzymes—Advances in Research and Application: 2013 Edition has been produced by the world's leading scientists, engineers, analysts, research institutions, and companies. All of the content is from peer-reviewed sources, and all of it is written, assembled, and edited by the editors at ScholarlyEditions™ and available exclusively from us. You now have a source you can cite with authority, confidence, and credibility. More information is available at http://www.ScholarlyEditions.com/. Since the discovery of the first examples of 2-oxoglutarate-dependent oxygenase-catalysed reactions in the 1960s, a remarkably broad diversity of alternate reactions and substrates has been revealed, and extensive advances have been achieved in our understanding of the structures and catalytic mechanisms. These enzymes are important agrochemical targets and are being pursued as therapeutic targets for a wide range of diseases including cancer and anemia. This book provides a central source of information that summarizes the key features of the essential group of 2-oxoglutarate-dependent dioxygenases and related enzymes. Given the numerous recent advances

and biomedical interest in the field, this book aims to unite the latest research for those already working in the field as well as to provide an introduction for those newly approaching the topic, and for those interested in translating the basic science into medicinal and agricultural benefits. The book begins with four broad chapters that highlight critical aspects, including an overview of possible catalytic reactions, structures and mechanisms. The following seventeen chapters focus on carefully selected topics, each written by leading experts in the area. Readers will find explanations of rapidly evolving research, from the chemistry of isopenicillin N synthase to the oxidation mechanism of 5-methylcytosine in DNA by ten-eleven-translocase oxygenases.

This volume of Advances in Cancer Research begins with a "Foundations in Cancer Research" articles by Harold Varmus. He focuses on Andrew Lwoff who influenced a generation of scientists and how Dr. Lwoff's influence on Howard Temlin, in particular, led to the identification of the cause of AIDS. Hiroto Okayama and colleagues discuss the conserved control mechanisms of the G1 and G2 phases in fission yeasts and mammals, and the newly identified control genes. Nilis Mandahl presents the cytogenetic findings in bone and soft tissue tumors and introduces the major molecular genetic findings. Hannel Tapiovaara dn co-workers review plasmin generation at restricted areas of the cell surface and hypothesize that it may be a catalyst for tumor cells to metastasize. Noël Bouck et al. review the evidence suggesting that certain

types of stimulations of inducers by activated oncogenes, and decreased production of inhibitors of angiogenesis, may be instrumental in enabling developing tumour cells to attract new cells and continue the malignant growth. Peter L. Stern reviews the role of immunity and the prospects for immune intervention in cervical neoplasia. Lastly, Denis J. Moss and his associates discuss the Epstein-Barr virus (EBV) host-virus relationship and the immune control of EBV infections and examine development of vaccines and immunotherapy.

This book provides a compact history of gears, by summarizing the main stages of their development and the corresponding gradual acquisition of engineering expertise, from the antiquity to the Renaissance and the twentieth century. This brief history makes no claim to be exhaustive, since the topic is so extensive, complex and fascinating that it deserves an entire encyclopedia. Despite its brevity, the book debunks a number of popular misconceptions, such as the belief that the first literary description of a gear was supplied by Aristotle. It disproves not only this myth, but also other peremptory statements and/or axiomatic assumptions that have no basis in written documents, archaeological findings or other factual evidence. The book is chiefly intended for students and lecturers, historians of science and scientists, and all those who want to learn about the genesis and evolution of this topic.

Issues in Life Sciences—Molecular Biology / 2013 Edition is a ScholarlyEditions™ book that delivers timely, authoritative, and comprehensive information about

Macromolecular Bioscience. The editors have built Issues in Life Sciences—Molecular Biology: 2013 Edition on the vast information databases of ScholarlyNews.™ You can expect the information about Macromolecular Bioscience in this book to be deeper than what you can access anywhere else, as well as consistently reliable, authoritative, informed, and relevant. The content of Issues in Life Sciences—Molecular Biology: 2013 Edition has been produced by the world's leading scientists, engineers, analysts, research institutions, and companies. All of the content is from peer-reviewed sources, and all of it is written, assembled, and edited by the editors at ScholarlyEditions™ and available exclusively from us. You now have a source you can cite with authority, confidence, and credibility. More information is available at http://www.ScholarlyEditions.com/.

The phosphatidylinositol 3-kinase (PI3K)/mTOR pathway integrates signals from growth factors with nutrient signals and other conditions and controls multiple cell responses, including proliferation, survival and metabolism. Deregulation of the PI3K pathway has been extensively investigated in connection to cancer. Somatic or inherited mutations frequently occur in tumor suppressor genes (PTEN, TSC1/2, LKB1) and oncogenes (PIK3CA, PIK3R1, AKT) in the PI3K/mTOR pathway. The fact that the PI3K/mTOR pathway is deregulated in a large number of human malignancies, and its importance for different cellular responses, makes it an attractive drug target. Pharmacological PI3K inhibitors have played a very important role in studying cellular responses involving these enzymes. Currently, a wide range of selective PI3K inhibitors have been tested in preclinical studies and some have entered clinical trials in

oncology. Rapamycin and its analogs targeting mTOR are effective in many preclinical cancer models. Although rapalogs are approved for the treatment of some cancers, their efficacy in clinical trials remains the subject of debate. Due to the complexity of the PI3K/mTOR signaling pathway, developing an effective anti-cancer therapy remains a challenge. The biggest challenge in curing cancer patients with various signaling pathway abnormalities is to target multiple components of different signal transduction pathways with mechanism-based combinatorial treatments.

Structure and Function of Membrane Proteins documents the proceedings of the International Symposium on Structure and Function of Membrane Proteins held in Selva di Fasano on May 23-26, 1983. This compilation makes it possible to obtain more information on the structure of membrane proteins, determining the structure in order to understand the function, and mechanism of action that is only understood by knowledge of the atomic structure. The gathering of data on the function of membrane proteins prior to knowledge of their structure is valuable for characterizing and defining the proteins. Once the structure is known, another stage of research will penetrate to the functional assignments of the structure. Other topics covered include the physical methods for the structure-function relationship; identification and mapping of sites in membrane proteins; and primary structure of transport proteins. Tertiary structure and molecular shape of membrane proteins and structure-function relationship in membrane proteins are also examined. This book is a good source of information for students and individuals conducting research on biochemistry, specifically on membrane proteins.

Programmed cell death (PCD) is central in maintaining the life of multicellular organisms, during development as well as in healthy adulthood or in the context of disease. The best

understood form of PCD is apoptosis, a caspase mediated, immunologically silent cell death that can be initiated in probably all cell types upon aging, lack of growth support, critical damage or infection. One of the key pathways of apoptosis involves mitochondrial outer membrane permeabilization (MOMP), a process tightly regulated by members of the BCL-2 family. Whereas PCD and apoptosis were used synonymously in the past, other forms of PCD have been discovered more recently, including RIPK1/3- and MLKL-dependent necroptosis, resulting in a necrotic phenotype, and pyroptosis. Interestingly, key components of the necroptotic pathway are actively suppressed by apoptotic caspases, and this interconnection allows a switch in cell death modalities with greatly impact on the host's immune response. Recent findings link mitochondria and/or MOMP to non-apoptotic forms of PCD, including ferroptosis and necroptosis, putting this organelle even more in the center of cellular death. This article collection highlights the exciting potential and as yet undiscovered regulation of programmed cell death that can impact the immune system and its response.

This volume of Methods in Enzymology aims to provide a reference for the diverse, powerful tools used to analyze RNA helicases. The contributions in this volume cover the broad scope of methods in the research on these enzymes. Several chapters describe quantitative biophysical and biochemical approaches to study molecular mechanisms and conformational changes of RNA helicases. Further chapters cover structural analysis, examination of co-factor effects on several representative examples, and the analysis of cellular functions of select enzymes. Two chapters outline approaches to the analysis of inhibitors that target RNA helicases. This volume of Methods in Enzymology aims to provide a reference for the diverse, powerful tools used to analyze RNA helicases The contributions in this volume cover the broad

scope of methods in the research on these enzymes

This report presents the recommendations of a WHO Expert Committee commissioned to coordinate activities leading to the adoption of international recommendations for the production and control of vaccines and other biological substances, and the establishment of international biological reference materials. Following a brief introduction, the report summarizes a number of general issues brought to the attention of the Committee. The next part of the report, of particular relevance to manufacturers and national regulatory authorities, outlines the discussions held on the development and adoption of new and revised WHO Recommendations, Guidelines and guidance documents. Following these discussions, a WHO guidance document on Regulatory assessment of approved rDNA-derived biotherapeutics was adopted along with WHO Guidelines on the stability evaluation of vaccines for use under extended controlled temperature conditions and on WHO good manufacturing practices for biological products. In addition, revised WHO Recommendations to assure the quality, safety and efficacy of recombinant human papillomavirus virus-like particle vaccines were also adopted by the Committee. Subsequent sections of the report provide information on the current status and proposed development of international reference materials in the areas of antibiotics; biotherapeutics other than blood products; blood products and related substances; in vitro diagnostic device reagents; and vaccines and related substances. A series of annexes are then presented which include an updated list of all WHO Recommendations, Guidelines and other documents on biological substances used in medicine (Annex 1). The above four WHO documents adopted on the advice of the Committee are then published as part of this report (Annexes 2-5). Finally, all additions and discontinuations made during the 2015 meeting

to the list of International Standards, Reference Reagents and Reference Panels for biological substances maintained by WHO are summarized in Annex 6. The updated full catalog of WHO International Reference Preparations is available at: http://www.who.int/bloodproducts/catalogue/en/.

A unique, encyclopaedic reference work covering the whole field of pure and applied microbiology and microbial molecular biology. This latest edition contains a vast amount of new and updated material - often to research level, and well beyond the coverage of current textbooks - making the dictionary even more valuable to lecturers, students, researchers and others in the biosciences and medicine. Updates and extends current textbooks 18 000 entries, from concise definitions to review-length articles Extensive cross-referencing between topics Thousands of references from mainstream journals and other specialist sources Over 5000 taxa: algae, archaeans, bacteria, fungi, protozoa and viruses; prions A 30-page Appendix of detailed metabolic pathways A classic book with a lifetime's use! Reviews of the Second Edition ' very informative and extensive valuable reference tool.' FEBS Letters 'The material is well cross-referenced ... Students should find it particularly useful.' Society for General Microbiology ' the uniqueness is in its concise and clear description of terms extremely comprehensive and easy to use.' ARBA

This volume covers the mechanisms of pRb inactivation detailing repressive mechanisms commonly associated to cancer, and representative of the experimentally relevant tests used in the establishment of cancer diagnosis and prognosis. Chapters contain protocols and in-depth discussions for commonly used experimental approaches to assess the status and function of components of the pRb pathway, including pRb itself, in cell lines and biological samples.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 practical, The Retinoblastoma Protein aims to serve as a guide to assist molecular cancer biologists in their search for understanding of the molecular functions of this preeminent tumor suppressor.