Download File Platelets And Megakaryocytes Volume 2 Perspectives And Techniques Methods In Molecular Biology Free Download Pdf

Protein NMR Techniques Aug 22 2019 When I was asked to edit the second edition of Protein NMR Techniques, my first thought was that the time was ripe for a new edition. The past several years have seen a surge in the development of novel methods that are truly revolutionizing our ability to characterize biological macromolecules in terms of speed, accuracy, and size limitations. I was particularly excited at the prospect of making these techniques accessible to all NMR labs and for the opportunity to ask the experts to divulge their hints and tips and to write, practically, about the methods. I commissioned 19 chapters with wide scope for Protein NMR Techniques, and the volume has been organized with numerous themes in mind. Chapters 1 and 2 deal with recombinant protein expression using two organisms, E. coli and P. pastoris, that can produce high yields of isotopically labeled protein at a reasonable cost. Staying with the idea of isotopic labeling, Chapter 3 describes methods for perdeuteration and site-specific protonation and is the first of several chapters in the book that is relevant to studies of higher molecular weight systems. A different, but equally powerful, method that uses molecular biology to “edit” the spectrum of a large molecule using segmental labeling is presented in Chapter 4. Having successfully produced a high molecular weight target for study, the next logical step is data acquisition. Hence, the final chapter on this theme, Chapter 5, describes TROSY methods for stru- ural studies.
Bioconjugation Protocols Dec 07 2020 There are a number of outstanding volumes that provide a comprehensive overview of bioconjugation techniques. However, many of the conventional approaches to the synthesis of chemically modified protein conjugates lack efficient means to control the stoichiometry of conjugation, as well as the s- cific site of attachment of the conjugated moiety. Moreover, the recent dev- opments in microarray technologies as well as in nanobiotechnology—a novel field of research rapidly evolving at the crossroads of physics, chemistry, b- technology, and materials science—call for a summary of modern bioconjugation strategies to overcome the limitations of the classical approaches. Bioconjugation Protocols: Methods and Strategies is intended to provide an update of many of the classic techniques and also to introduce and summarize newer approaches that go beyond the pure biomedical applications of bioconjugation. The purpose of Bioconjugation Protocols: Methods and Str- egies is therefore to provide instruction and inspiration for all those scientists confronting the challenges of semisynthesizing functional biomolecular reagents for a wide variety of applications ranging from novel biomedical diagnostics, to therapeutics, to biomaterials. Part I contains seven protocols for the preparation of protein conjugates.
Chemoinformatics Aug 27 2022 Well-recognized pioneers and investigators from diverse professional environments survey the key concepts in the field, describe cutting-edge methods, and provide exemplary pharmaceutical applications. The authors explain the theory behind the crucial concepts of molecular similarity and diversity, describe the challenging efforts to use chemoinformatics approaches to virtual and high-throughput screening, and illuminate the latest developments in multidimensional QSAR analysis. Other topics of interest include the use of partitioning algorithms and classification methods for analyzing large compound databases, screening sets, and virtual screening for active molecules; different approaches to target class-specific library design; and the generation of a novel class of molecular surface properties

descriptors that can be readily calculated from 2D representations of molecular structures. Chemoinformatics: Concepts, Methods, and Tools for Drug Discovery illuminates the conceptual and methodological diversity of this rapidly evolving field and offers instructive examples of cutting-edge applications in the drug discovery process. Understand the key concepts and novel methods behind chemoinformatics See cutting-edge chemoinformatic methods applied to the drug discovery process Appreciate the conceptual and methodological diversity of chemoinformatics Master the basics of machine learning, library design, and ADME modeling.

HPLC of Peptides and Proteins Feb 18 2022 The introduction of high-performance liquid chromatography (HPLC) to the analysis of peptides and proteins some 25 years ago revolutionized the biological sciences by enabling the rapid and sensitive analysis of peptide and protein structure through the exquisite speed, sensitivity, and resolution that can be easily obtained. Today, HPLC in its various modes has become the pivotal technique in the characterization of peptides and proteins and currently plays a critical role in both our understanding of biological processes and in the development of peptide- and protein-based pharmaceuticals. The number of applications of HPLC in peptide and protein purification continues to expand at an extremely rapid rate. Solid-phase peptide synthesis and recombinant DNA techniques have allowed the production of large quantities of peptides and proteins that need to be highly purified. HPLC techniques are also used extensively in the isolation and characterization of novel proteins that will become increasingly important in the postgenomic age. The design of multidimensional purification schemes to achieve high levels of product purity further demonstrates the power of HPLC techniques not only in the characterization of cellular events, but also in the production of pepti- and protein-based therapeutics. HPLC continues to be at the heart of the analytical techniques with which scientists in both academia and in industry must arm themselves to be able to fully characterize the identity, purity, and potency of peptides and proteins.

RNA Interference, Editing, and Modification May 12 2021 This volume presents a comprehensive collection of cuttingedge methods for elucidating the function of new genes and altering gene expression. These readily reproducible techniques can be used either in transient and stable gene splicing applied to worms, flies, trypanosomes, mammals, and plants, or in studying RNA editing mechanisms in a wide range of organisms, including systems that involve the conversion of one base to another and insertion/deletion editing. Topics of interest include stable and transient RNA interference, gene silencing, RNA editing, bioinformatics, small noncoding RNAs, and RNomics. Special attention is given to methods for the identification and characterization of small RNAs involved in RNA interference or modification. Readily reproducible protocols for discovering new genes or altering gene expression.

Photosynthesis Research Protocols Dec 27 2019 Photosynthesis is one of the most important biological phenomena on earth. The conversion of sunlight by photosynthetic organisms supplies most of the energy required to develop and sustain life on the planet. Photosynthesis is not only at the heart of plant bioenergetics, it is also fundamental to plant prod- tivity and biomass. Photosynthetic carbon fixation and oxygen evolution - rectly intervene in many environmental, including the global atmospheric CO 2 level and global climate. Therefore, it is not surprising that a large effort is devoted to photosynthesis research. Several biochemical methods of isolation, treatment, and analysis have been developed to fulfill the needs of photosynthesis research. Photosynthesis Research Protocols contains a broad range of general and fundamental me- ods that are commonly used by plant biochemists, physiologists, and mole- lar biologists. This book is thus intended as a source of information for scientists working on any of the multiple aspects of photosynthesis, and should be of great interest to a multidisciplinary field of research involving agric- ture, biochemistry, biotechnology, botany, cell biology, environmental s- ences, forestry, plant genetics, plant molecular biology, photobiology, photophysics, photoprotection, plant physiology, plant stress, etc.

Gene Expression Profiling Jan 20 2022 The transcription of messenger RNA from a DNA template is a key process in a wide variety of biological systems. In this book, leaders in gene expression

methodology and bioinformatics data analysis share their best methods for measuring RNA levels in cells and tissues. Each proven protocol is described in step-by-step detail and contains an introduction outlining the principle behind the technique, lists of equipment and reagents, and tips on troubleshooting and avoiding known pitfalls.

Nitric Oxide Protocols Sep 03 2020 Carrying on the high standards of the much-praised first edition of Nitric Oxide Protocols, Aviv Hassid has brought together a panel of expert researchers and clinician scientists to describe in step-by-step detail the latest methodologies for the measurement of nitric oxide--and the enzyme that produces it-in biological tissues and fluids. The authors take advantage of the latest methodologies for the quantitation of biological fluids and tissues, including capillary electrophoresis, microcoaxial electrodes, in vivo measurement of nitric oxide in exhaled air, confocal microscopy, gas chromatography, in situ hybridization, and real-time polymerase chain reaction. Chapters on the measurement of the novel products of nitric oxide, such as nitrated proteins, S-nitrosylated proteins, and dioxygen-dependent NO metabolism, are also included. Additional chapters address the expression of nitric oxide synthase via the use of viral vectors in gene therapy for erectile dysfunction and cancer, as well as in retrovirus, adenovirus, or adenoassociated virus-mediated expression of nitric oxide synthase in vivo. The protocols follow the successful Methods in Molecular Biology"!series format, each one offering step-by-step laboratory instructions, an introduction outlining the principle behind the technique, lists of equipment and reagents, and tips on troubleshooting and avoiding known pitfalls. State-of-the-art and highly practical, Nitric Oxide Protocols, 2nd ed., offers investigators and clinican/scientists a gold-standard collection of readily reproducible analytical techniques for measuring levels of nitric oxide and determining its manifold functions and effects

Platelets and Megakaryocytes Sep 27 2022 The main aim of this fourth volume is to complement the first three volumes published in 2004 and 2012 by adding advanced methodologies and perspectives. Chapters guide readers through new techniques into the study of platelets and megakaryocytes, including new imaging approaches, new methods for platelet production in vitro, and systems biology approaches. Written in the highly successful Methods in Molecular Biology series format, methods chapters include introductions to their respective topics, lists of the necessary materials and reagents, step-by-step, readily reproducible laboratory protocols, and vital tips on troubleshooting or avoiding known pitfalls. Authoritative and up-to-date, Platelets and Megakaryocytes: Volume 4, Additional Protocols and Perspectives adds a wealth of new expertise for the labs of scientists working in this key biological area of study.

Oligonucleotide Synthesis Jan 26 2020 A collection of powerful new techniques for oligonucleotide synthesis and for the use of modified oligonucleotides in biotechnology. Among the protocol highlights are a novel two-step process that yields a high purity, less costly, DNA, the synthesis of phosphorothioates using new sulfur transfer agents, the synthesis of LNA, peptide conjugation methods to improve cellular delivery and cell-specific targeting, and triple helix formation. The applications include using molecular beacons to monitor the PCR amplification process, nuclease footprinting to study the sequence-selective binding of small molecules of DNA, nucleic acid libraries, and the use of small interference RNA (siRNA) as an inhibitor of gene expression.

Parasite Genomics Protocols Apr 10 2021 Parasitic diseases remain a major health problem throughout the world, for both humans and animals. For many of us, our technologically advanced lifestyle has decreased the prevalence and transmission of parasitic diseases, but for the majority of the world’s population, they are ever present in homes, domestic animals, food, or the environment. The study of parasites and parasitic disease has a long and distinguished history. In some cases, it has been driven by the great importance of the presence of the parasite to the community, for example, those that affect our livestock. In other cases, it is clear that applied research has suffered for lack of funding because the parasite affects people with few resources, such as the rural poor in resource-poor countries. These instances include the so-called “neglected diseases,” as defined by the World Health Organization (WHO). Parasites have complicated life cycles, and a thorough

understanding of the unique characteristics of a particular parasite species is vital in attempts to avoid, prevent, or cure infection or to alleviate symptoms. Of course, the biological characteristics that each parasite has developed to aid survival and transmission, to avoid destruction by the immune system, and to adapt to a changing environment are of lasting fascination to basic biologists as well. The elegance of these biological systems has ensured that the study of protozoan and metazoan parasites also remains an active field of research in countries where the diseases are not a threat to the population.

Flow Cytometry Protocols Mar 29 2020 This thoroughly revised and updated edition of a widely used practical guide to flow cytometry describes in step-by-step detail an array of time proven and cutting-edge techniques much needed in today's advanced laboratories. These readily reproducible methods deploy emerging flow cytometry technologies in many new applications, especially in the field of stem cells, functional genomics and proteomics, and microbiology. Here, the aspiring investigator will find methods for the characterization of stem/progenitor cells by monitoring the efflux of fluorescent dyes and the elucidation of signal transduction pathways using phospho-specific antibodies. There are also techniques for monitoring gene transfer and expression using fluorescent protein technology, high throughput screening for discovery of novel protein interactions, phenotypic and functional characterization of T cell subsets and precursors, and microbial flow cytometry, to highlight but some of the many useful procedures.

Chiral Separations Nov 17 2021 Prominent experts from around the world detail the chromatographic and electroseparation techniques they have developed for chiral separations on an analytical scale. Described in step-by-step detail to ensure successful experimental results, the procedures are presented as either general methods or as specific applications to substance classes and special compounds, with emphasis on high performance liquid chromatography and capillary electrophoresis techniques, but also including thin layer chromotographic, gas chromatographic, supercritical fluid chromatographic as well as recent electrochromotographic techniques.

Public Health Microbiology Nov 05 2020 Public Health Microbiology: Methods and Protocols is focused on microorganisms that can present a hazard to human health in the course of everyday life. There are chapters dealing with organisms that are directly pathogenic to humans, including bacteria, viruses, and fungi; on organisms that produce toxins during growth in their natural habitats; on the use of bacteriocins produced by such organisms as lactobacilli and bifidobacteria; as well as several chapters on hazard analysis, the use of disinfectants, microbiological analysis of cosmetics, and microbiological tests for sanitation equipment in food factories. Additional chapters look at the use of animals (mice) in the study of the various characteristics of milk and their relationships with lactic acid bacteria in particular. Other chapters focus on special methods for determining particular components of milk. In particular, in Parts I and II, on bacterial and viral pathogens, special attention is given to methods for PCR detection of genes with resistance to tetracycline, as well as to Salmonella enterica; for identification and typing of Campylobacter coli; for detection of the abundance of enteric viruses, hepatitis A virus, and rotaviruses in sewage, and of bacteriophages infecting the O157:H7 strain of Escherichia coli. Part III offers methods for computerized analysis and typing of fungal isolates, for isolation and enumeration of fungi in foods, and for the determination of aflatoxin and zearalenone.

Receptor Signal Transduction Protocols Sep 15 2021 This second edition of Receptor Signal Transduction Protocols not only has a new editor, but also a greater focus on G-protein-coupled receptors, their properties per se, and their coupling to immediate downstream binding partners—principally, although not exclusively, the heterotrimeric G-proteins. The new edition combines updates of key chapters from the first edition, as well as a large number of new contributions covering key methodologies that have emerged, or been extended to receptor/G-protein research, in the past 5–6 years. In common with many fields, the range of methods used to assess the first steps in signal transduction are continually expanding and methods that might have been considered too specialized five years ago are now sufficiently routine to be included here. Unlike many research areas, where off-the-shelf kits have made research basically foolproof, signal

transduction research still requires considerable expertise, and the methods included here are provided by internationally recognized experts in their fields who have many years of experience using the methods they describe. This not only allows each chapter to impart a clear description of the method, but also to furnish invaluable troubleshooting advice for when things do not go entirely according to plan. Once again we would like to thank the Series Editor, John Walker, for the invitation to compile this second edition, and to express our gratitude to all of the authors who have enthusiastically agreed to provide the uniformly excellent contributions.

Capillary Electrophoresis of Proteins and Peptides Feb 27 2020 Throughout the more than 20 years that have followed the beginnings of capillary electrophoresis (CE), its application to the analysis of proteins and peptides has continued to be reliable, versatile, and productive. Over time, CE has matured to become a superb complement to HLPC, and in many cases has also evolved as an automated and quantitative replacement for conventional slab gel electrophoresis methods such as SDS-PAGE and isoelectric focusing. Within Capillary Electrophoresis of Proteins and Peptides, we have assembled contributions from researchers who are applying state-of-the-art CE for protein and peptide analysis, including topics that we believe are of great potential both in the present and for the future. In comparison to traditional separation methods, CE represents a miniaturized analysis technique (especially in its microchip-based format) that is highly dependent upon the basic fundamentals of effective sample recovery and high sensitivity detection. With these issues in mind, Chapters 1–4 describe recently developed approaches for both capillary coatings and analyte detection via laser-induced fluorescence. Since the discipline of biotechnology has established itself as a primary platform for the application of CE to the analysis of proteins and peptides, Chapters 5–7 demonstrate a variety of examples of the specific techniques that have been applied for the development of biopharmaceuticals and their commercialization. The methods covered here include also the analysis of oligosaccharides from glycoproteins.

Platelets and Megakaryocytes Oct 29 2022 12 The average human body has in the order of 10 circulating platelets. They are crucial for hemostasis, and yet excessive platelet activation is a major cause of m- bidity and mortality in western societies. It is therefore not surprising that platelets have become one of the most extensively investigated biological cell types. We are, however, far from understanding precisely how platelets become activated under physiological and pathophysiological conditions. In addition, there are large gaps in our knowledge of platelet production from their giant precursor cell, the megakar- cyte. Understanding megakaryocyte biology will be crucial for the development of platelet gene targeting. The aim of Platelets and Megakaryocytes is therefore to bring together established and recently developed techniques to provide a comprehensive guide to the study of both the platelet and the megakaryocyte. It consists of five s- tions split between two volumes. The more functional assays appear in Volume 1, whereas Volume 2 includes signaling techniques, postgenomic methods, and a n- ber of key perspectives chapters. Part I of Volume 1, Platelets and Megakaryocytes: Functional Assays, describes many well established approaches to the study of platelet function, including aggregometry, secretion, arachidonic acid metabolism, procoagulant responses, pla- let adhesion under static or flow conditions, flow cytometry, and production of microparticles. Although one would ideally wish to perform experiments with human platelets, studies within the circulation using intravital microscopy require the use of animal models, which are described in Chapter 16, vol. 1.

Patch-Clamp Methods and Protocols Apr 30 2020 Patch Clamp Methods and Protocols surveys the typical patch clamp applications and advises scientists on identifying problems and selecting the best technique in each instance. The experiments described require a basic level of electrophysiological training and aid the researcher in pursuing new areas of electrophysiology and using the patch clamp technique effectively. Patch Clamp Methods and Protocols is divided into three sections that cover the major areas of patch clamp application: Pharmacology, Physiology, and Biophysics. The first section provides examples and step by step instructions on how to use whole-cell and single-channel patch clamp methods for testing drugs in industrial settings. The second section provides a wide selection of patch clamp applications in physiological studies. The last part

focuses on the biophysical applications of the patch clamp method using single channel recordings or statistical analysis of whole-cell currents in order to obtain parameters that describe ion channel properties or transmitter release. Individual techniques are explored within the area that they are applied most often. Researchers will find Patch Clamp Methods and Protocols to be an invaluable aid in the design and execution of a wide variety of patch clamp experiments, both on their own and in conjunction with other state-of-the-art methodologies.

Genomics, Proteomics, and Clinical Bacteriology May 31 2020 This review of the application of proteomic and genomic advances in clinical biology covers principles such as the application of genomics to diagnostic bacteriology and protocols for interrogating bacterial genomes. It also provides updates on all the significant advances of genome sequencing.

Platelets and Megakaryocytes Nov 29 2022 12 The average human body has in the order of 10 circulating platelets. They are crucial for hemostasis, and yet excessive platelet activation is a major cause of m- bidity and mortality in western societies. It is therefore not surprising that platelets have become one of the most extensively investigated biological cell types. We are, however, far from understanding precisely how platelets become activated under physiological and pathophysiological conditions. In addition, there are large gaps in our knowledge of platelet production from their giant precursor cell, the megakar- cyte. Understanding megakaryocyte biology will be crucial for the development of platelet gene targeting. The aim of Platelets and Megakaryocytes is therefore to bring together established and recently developed techniques to provide a comprehensive guide to the study of both the platelet and the megakaryocyte. It consists of five s- tions split between two volumes. The more functional assays appear in Volume 1, whereas Volume 2 includes signaling techniques, postgenomic methods, and a n- ber of key perspectives chapters. Part I of Volume 1, Platelets and Megakaryocytes: Functional Assays, describes many well established approaches to the study of platelet function, including aggregometry, secretion, arachidonic acid metabolism, procoagulant responses, pla- let adhesion under static or flow conditions, flow cytometry, and production of microparticles. Although one would ideally wish to perform experiments with human platelets, studies within the circulation using intravital microscopy require the use of animal models, which are described in Chapter 16, vol. 1.

mRNA Processing and Metabolism Aug 15 2021 Cells possess a wealth of posttranscriptional control mechanisms that impact on every conceivable aspect of the life of an mRNA. These processes are intimately intertwined in an almost baroque manner, where promoter context influences the recruitment of splicing factors, where the majority of pre-mRNAs undergo alternative splicing, and where proteins deposited during nuclear processing impact distal cytoplasmic processing, translation, and decay. If there is a unifying theme to mRNA Processing and Metabolism: Methods and Protocols, it is that mRNA processing and metabolism are integrated processes. Many of the techniques used to study mRNA have been described in a previous volume of this series (RNA–Protein Interaction Protocols, Susan Haynes, ed.) and specialized methods journals. In selecting topics for mRNA Processing and Metabolism: Methods and Protocols, I sought input on new and novel techniques and approaches that build on this foundation using technological advances in microscopy, whole genome sequencing, microarrays, mass spectrometry, fluorescent detection methodologies, and RNA interference. I have tried not to bias this book toward any single model organism, and approaches described in the various chapters use yeast, Drosophila, Xenopus, mice, plants, and cultured mammalian cells.

Platelets and Megakaryocytes Dec 31 2022 12 The average human body has on the order of 10 circulating platelets. They are crucial for hemostasis, and yet excessive platelet activation is a major cause of m- bidity and mortality in Western societies. It is therefore not surprising that platelets have become one of the most extensively investigated biological cell types. We are, however, far from understanding precisely how platelets become activated under physiological and pathophysiological conditions. In addition, there are large gaps in our knowledge of platelet production from their giant precursor cell, the megakar- cyte. Understanding megakaryocyte biology will be crucial for the development of platelet gene targeting. The aim of Platelets and

Megakaryocytes is therefore to bring together established and recently developed techniques to provide a comprehensive guide to the study of both the platelet and the megakaryocyte. It consists of five s- tions split between two volumes. The more functional assays appear in Volume 1, whereas Volume 2 includes signaling techniques, postgenomic methods, and a n- ber of key perspectives chapters. Part I of Volume 1, Platelets and Megakaryocytes: Functional Assays, describes many well-established approaches to the study of platelet function, including aggregometry, secretion, arachidonic acid metabolism, procoagulant responses, pla- let adhesion under static or flow conditions, flow cytometry, and production of microparticles. Although one would ideally wish to perform experiments with human platelets, studies within the circulation using intravital microscopy require the use of animal models, which are described in Chapter 16, vol. 1.

B Cell Protocols Jan 08 2021 B-lymphocyte development and function remains an exciting area of research for those interested in the physiology and pathology of the immune system in higher animals. While recent advances in genetics and cellular and molecular biology have provided a large spectrum of powerful new experimental tools in this field, it is both time consuming and often very difficult for a student or just any bench-side worker to identify a reliable experimental protocol in the ocean of the literature. The aim of B Cell Protocols is to provide a collection of diverse protocols ranging from the latest inventions and applications to some classic, but still frequently used methods in B-cell biology. The authors of the various chapters are all highly qualified scientists who are either the inventors or expert users of these methods. Their extensive experience in mastering a particular method provides not only the step-by-step details of a reproducible protocol, but also useful troubleshooting tips that readers will appreciate in their daily work. We hope that this book will be helpful for both beginning and experienced researchers in the field in designing or modifying an experimental approach, and exploring a biological question from multiple angles.

Protein'Protein Interactions Mar 10 2021 As the mysteries stored in our DNA have been more completely revealed, scientists have begun to face the extraordinary challenge of unraveling the int- cate network of protein–protein interactions established by that DNA fra- work. It is increasingly clear that proteins continuously interact with one another in a highly regulated fashion to determine cell fate, such as proliferation, diff- entiation, or death. These protein–protein interactions enable and exert str- gent control over DNA replication, RNA transcription, protein translation, macromolecular assembly and degradation, and signal transduction; essentially all cellular functions involve protein–protein interactions. Thus, protein–p- tein interactions are fundamental for normal physiology in all organisms. Alt- ation of critical protein–protein interactions is thought to be involved in the development of many diseases, such as neurodegenerative disorders, cancers, and infectious diseases. Therefore, examination of when and how protein–p- tein interactions occur and how they are controlled is essential for understa- ing diverse biological processes as well as for elucidating the molecular basis of diseases and identifying potential targets for therapeutic interventions. Over the years, many innovative biochemical, biophysical, genetic, and computational approaches have been developed to detect and analyze p- tein–protein interactions. This multitude of techniques is mandated by the diversity of physical and chemical properties of proteins and the sensitivity of protein–protein interactions to cellular conditions.

MAP Kinase Signaling Protocols Mar 22 2022 Mitogen-activated protein kinase (MAPK) signaling cascades are a group of protein kinases that play a central role in the intracellular transmission of extracellular signals. These cascades operate as major lines of communication within a complicated signaling network that regulates many cellular processes, including proliferation, differentiation, development, stress response, and apoptosis. More than 15,000 papers on MAPKs have been published over the past few years, with the number of publications increasing each year. More and more laboratories embark on the study of MAPK cascades in many d- tinct cellular systems and in particular their role in disease. Future challenges in the study of MAPK cascades remain in understa- ing the role of the various components and isoforms of the cascades in the multiple critical functions that they regulate in the whole organism, as well as the diseases caused by their malfunction. Data from gene-disrupted mice s- gest that inhibition of the MAPK cascades may have

serious consequences on the development and growth of the animals. For example, targeted deletion of MEK1 is lethal, owing to developmental problems of placental vasculature and abnormal fibroblast migration. This lethality occurs in spite of the normal expression of MEK2, indicating that although the two MEK isoforms are apparently similar, they do have distinct functions, at least during embryog- esis. The ERK cascade was also shown to play a central role in brain function and in learning and memory.

Apoptosis Methods and Protocols Aug 03 2020 The most fundamental question facing each and every cell within an org- ism is to survive or to die. Cell death is required for normal function; some estimates suggest that as many as one million cells undergo cell death every second in the adult human body. Almost all cells undergoing physiological, or programmed, cell death, independent of cell type, manifest a stereotypic p- tern of morphological changes termed apoptosis. Typically, apoptotic cells d- play shrinkage, membrane blebbing, chromatin condensation, and nuclear fragmentation. The integrity of the cell membrane is not lost during apoptosis and so avoids eliciting the inflammatory response that would have been caused by the spillage of the cell's contents. This is quite in contrast to the loss of cell contents typical of necrosis. The caspases, the family of intracellular cysteine proteases associated with apoptosis, are responsible for the stereotypical m- phological changes. Caspases cleave various substrate proteins that act on DNA fragmentation, nuclear envelope integrity, the cytoskeleton, and cell volume regulation. Apoptotic cells are cleared in vivo by the process of phagocytosis, in which specific "phagocytes" move to the site of apoptosis, engulf the dying cells and digest them. Apoptosis has a central role in many physiological processes, for example, in the immune system. Autoreactive cells are deleted via apoptosis to prevent autoimmunity. At the end of an immune response, activated lymphocytes are removed to maintain homeostasis within the immune system.

Protein Arrays Jul 14 2021 Protein Arrays: Methods and Protocols is an introduction to protein array technology and its application to the multiplexed detection of proteins. Although protein array technology has some roots in gene array technology, it can only be described as a distant relative. Unlike DNA, with its established rules of base pairing, and therefore predictable biochemical behavior, proteins are rich with diversity. Proteins can be large or small, compact or extended, basic or acidic, hydrophobic or hydrophilic, and so on. Just as importantly, their behavior is determined by the environment in which they reside, and so the composition of the buffer in which experiments are performed has a dramatic impact on the outcome of the experiment. Thus, if the goal is to simultaneously measure the expression of a large number of proteins, these variables must be addressed. Not to be deterred, scientists have created a variety of solutions to successfully detect and ch- acterize multiple proteins simultaneously. It is the intent of this volume to introduce to the reader a set of technological solutions to the diversity problem as well as to provide the reader with some examples of practical applications of these technologies.

Ribozymes and siRNA protocols May 24 2022 In this completely updated and expanded edition of a classic bench manual, hands-on experts take advantage of the latest advances in ribozyme, DNAzyme, and RNA interference technologies to describe in detail the exciting and successful methods now available for gene inactivation in vitro and in vivo. Their optimized techniques employ hairpain ribozymes, DNAzymes, hammerhead ribozymes and derivatives, group I intron ribozymes, Rnase P ribozymes, and siRNAs, as well as general methods for RNA structure analysis, delivery of oligonucleotides, and gene therapy. Also provided are novel methods for identifying accessible cellular mRNA sites; group I intron and RNAse P ribozymes protocols for effective design, selection, and therapeutic applications; and the latest RNAi methods for sequencing-specific gene silencing in a wide variety of organisms. Comprehensive and up-to-date, Ribozymes and siRNA Protocols synthesizes for experienced and novice investigators alike the exciting advances in understanding nucleic acid enzymes and demonstrates how they may be used to analyze gene function and target validation, and to productively develop new therapeutics for human diseases.

Checkpoint Controls and Cancer Jun 12 2021 Intracellular checkpoint controls constitute a network of signal transd- tion pathways that protect cells from external stresses and internal errors.

Ext- nal stresses can be generated by the continuous assault of DNA-damaging agents, such as environmental mutagens, ultraviolet (UV) light, ionizing radiation, or the reactive oxygen species that can arise during normal cellular metabolism. In response to any of these assaults on the integrity of the genome, the activation of the network of checkpoint control pathways can lead to diverse cellular responses, such as cell cycle arrest, DNA repair, or elimination of the cell by cell death (apoptosis) if the damage cannot be repaired. Moreover, internal errors can occur during the highly orchestrated replication of the cellular genome and its distribution into daughter cells. Here, the temporal order of these cell cycle events must be strictly enforced—for example, to ensure that DNA replication is c- plete and occurs only once before cell division, or to monitor mitotic spindle assembly, and to prevent exit from mitosis until chromosome segregation has been completed. Thus, well functioning checkpoint mechanisms are central to the maintenance of genomic integrity and the basic viability of cells and, the- fore, are essential for proper development and survival. The importance of proper functioning of checkpoints becomes plainly obvious under conditions in which this control network malfunctions and fails. Depending on the severity and timing, failure of this machinery can lead to embryonic lethality, genetic diseases, and cancer.

Vaccinia Virus and Poxvirology Jul 02 2020 The Right Book at the Right Time The poxviruses comprise a family of complex DNA viruses that replicate in the cytoplasm of vertebrate or invertebrate cells. Of the eight recognized g- era of vertebrate poxviruses, those belonging to the orthopoxvirus genus have been most intensively studied. This group includes variola virus, the agent of smallpox, as well as cowpox virus and vaccinia virus. Jenner's original sma- pox vaccine, described in 1798, consisted of live cowpox virus, but vaccinia virus later replaced it (1). There has been speculation as to the origin of v- cinia virus; the most likely idea is that it is a separate species, possibly ori- nally isolated from a horse, and is now extinct or rare in nature (2). Recent genome sequencing studies confirm the distinctness of variola virus, cowpox virus, and vaccinia virus and also their very close genetic relationship, which accounts for the cross protection of smallpox vaccines. The novelty of the smallpox vaccine can be readily appreciated by the time it took, about 80 years, before the next live vaccine against rabies was developed, and another 50 years for the yellow fever vaccine. Moreover, the eradication of smallpox in 1977 stands as a unique medical achievement. Because of its historical role, sma- pox vaccination contributed greatly to present concepts of infectious disease, immunity, and pathogenesis. Less well known, however, are the many other "firsts" for vaccinia virus.

Genetic Recombination Apr 22 2022 Genetic recombination, in the broadest sense, can be defined as any process in which DNA sequences interact and undergo a transfer of information, producing new "recombinant" sequences that contain information from each of the original molecules. All organisms have the ability to carry out recombination, and this striking universality speaks to the essential role recombination plays in a variety of biological processes fundamentally important to the maintenance of life. Such processes include DNA repair, regulation of gene expression, disease etiology, meiotic chromosome segregation, and evolution. One important aspect of recombination is that it typically occurs only between sequences that display a high degree of sequence identity. The stringent requirement for homology helps to ensure that, under normal circumstances, a cell is protected from deleterious rearrangements since a swap of genetic information between two nearly identical sequences is not expected to dramatically alter a genome. Recombination between dissimilar sequences, which does happen on occasion, may have such harmful consequences as chromosomal translocations, deletions, or inversions. For many organisms, it is also important that recombination rates are not too high lest the genome become destabilized. Curiously, certain organisms, such as the trypanosome parasite, actually use a high rate of recombination at a particular locus in order to switch antigen expression continually and evade the host immune system effectively.

Recombinant Gene Expression Oct 24 2019 Since newly created beings are often perceived as either wholly good or bad, the genetic alteration of living cells impacts directly on a symbolic meaning deeply imbedded in every culture. During the earlier years of gene expression research, te- nological

applications were confined mainly to academic and industrial laboratories, and were perceived as highly beneficial since molecules that were previously unable to be separated or synthesized became accessible as therapeutic agents. Such were the success stories of hormones, antibodies, and vaccines produced in the bacterium Escherichia coli. Originally this bacterium gained fame among humans for being an unwanted host in the intestine, or worse yet, for being occasionally dangerous and pathogenic. H- ever, it was easily identified in contaminated waters during the 19th century, thus becoming a clear indicator of water pollution by human feces. Tamed, cultivated, and easily maintained in laboratories, its fast growth rate and metabolic capacity to adjust to changing environments fascinated the minds of scientists who studied and modeled such complex phenomena as growth, evolution, genetic exchange, infection, survival, adaptation, and further on—gene expression. Although at the lower end of the complexity scale, this microbe became a very successful model system and a key player in the fantastic revolution kindled by the birth of recombinant DNA technology.

Neuroprotection Methods and Protocols Oct 17 2021 Neuroprotection is a topic of great importance in current neuroscience, both basic and clinical. The incidence of age-related neurodegenerative diseases could be expected to rise dramatically in the future owing to an aging population. Consequently, finding the means of retarding or preventing the progression of such diseases becomes increasingly important. This book focuses on basic perspective on neuroprotective approaches and scientists well recognized for their work have contributed chapters to this volume. Although findings on neuroprotection in the different pathologies become more and more frequent and detailed, it can be difficult for researchers to orient themselves in such a complicate field. For this reason, this book describes basic science discovery and the application of such research within different laboratories leading to the development of neuroprotective protocols. The main aim of this volume is thus to give an overview of methods used to study neuronal death and neuroprotection and to offer a really comprehensive step-by-step method in order to make clear not just the procedure but also the principles behind the use of it. At this purpose, the “Notes” section of each chapter represents a useful tool to solve technical problems and to help in reproducing the described methods.

Thrombopoiesis and Thrombopoietins Feb 06 2021 David Kuter and a host of leading international researchers summarize in one volume all the knowledge of thrombopoietins (TPO) available today. The distinguished experts review the history of the search to discover TPO, describe the molecular and biological characteristics of this new molecule, and present the results of the preclinical animal experiments that will guide clinical use of this new hormone. Along the way they provide the most recent and comprehensive guide to the biology of megakaryocytes and platelets.

Bacterial Artificial Chromosomes Jun 24 2022 Several developmental and historical threads are woven and displayed in these two volumes of Bacterial Artificial Chromosomes, the first on Library Construction, Physical Mapping, and Sequencing, and the second on Fu- tional Studies. The use of large-insert clone libraries is the unifying feature, with many diverse contributions. The editors have had quite distinct roles. Shaying Zhao has managed several BAC end-sequencing projects. Marvin Stodolsky during 1970–1980 contributed to the elucidation of the natural b- teriophage/prophage P1 vector system. Later, he became a member of the Genome Task Group of the Department of Energy (DOE), through which s- port flowed for most clone library resources of the Human Genome Program (HGP). Some important historical contributions are not represented in this volume. This preface in part serves to mention these contributions and also briefly surveys historical developments. Leon Rosner (deceased) contributed substantially in developing a PAC library for drosophila that utilized a PI virion-based encapsidation and tra- fection process. This library served prominently in the Drosophila Genome Project collaboration. PACs proved easy to purify so that they substantially replaced the YACs used earlier. Much of the early automation for massive clone picking and processing was developed at the collaborating Lawrence Berkeley National Laboratory. However, the P1 virion encapsidation system itself was too fastidious, and P1 virion-based methods did not gain popularity in other genome projects.

Epidermal Cells Oct 05 2020 Helps the reader to learn about the derivation, characterization, and utility of epidermal stem cells; follow step-by-step instructions that ensure successful results; understand the utility of epidermal cells in regenerative medicine applications; and apply reproducible methods to study epidermal precursors and mature epidermal cells.

Germ Cell Protocols Jul 26 2022 The study of germ cells has undergone enormous advances in recent years and has entered into an explosive phase of new discoveries with the introd- tion of transgenic technologies and nuclear cloning. Basic knowledge and te- niques developed for lower vertebrate and invertebrate systems have facilitated the study of higher vertebrates, including humans. Many experiments that have first been performed on lower vertebrates provided the tools and strategies that could later be applied to other less readily available mammalian systems. The discovery of centrosomes in ascidians and sea urchin eggs now benefits st- ies of fertility and infertility in mammals including humans. External in vitro fertilization, now a common technique in assisted fertilization has only been possible as a result of numerous studies in lower systems in which external fertilization is natural. Egg activation, first explored in sea urchin and asc- ian eggs, now benefits cloning efficiency in farm and domestic animals. Gene manipulations and molecular methods have added to the possibilities of p- ducing live offspring with enormous biomedical, ecological, and economic implications. All sexually reproducing organisms produce primordial germ cells, a small population of cells that differentiate into gametes of either sex that carry to- potency, an ability to develop into an entire new organism. The two volumes on germ cells combine techniques in a variety of different systems and have selected those systems that have provided landmarks in advancing our kno- edge on germ cells.

Epigenetics Protocols Sep 23 2019 The field of epigenetics has grown exponentially in the past decade, and a steady flow of exciting discoveries in this area has served to move it to the forefront of molecular biology. Although epigenetics may previously have been considered a peripheral science, recent advances have shown considerable progress in unraveling the many mysteries of nontraditional genetic processes. Given the fast pace of epigenetic discoveries and the groundbreaking nature of these developments, a thorough treatment of the methods in the area seems timely and appropriate and is the goal of Epigenetics Protocols. The scope of epigenetics is vast, and an exhaustive analysis of all of the techniques employed by investigators would be unrealistic. However, this TM volume of Methods in Molecular Biology covers three main areas that should be of greatest interest to epigenetics investigators: (1) techniques related to analysis of chromatin remodeling, such as histone acetylation and methylation; (2) methods in newly developed and especially promising areas of epigenetics such as telomere position effects, quantitative epigenetics, and ADP ribosylation; and (3) an updated analysis of techniques involving DNA methylation and its role in the modification, as well as the maintenance, of chromatin structure.

Mobile Genetic Elements Dec 19 2021 Transposable elements (TEs)-DNA sequences that are capable of moving from one chromosome location to another-are found in all living organisms. They have been increasingly investigated in a wide spectrum of species, including bacteria, plants, fungi, and animals. In Mobile Genetic Elements: Protocols and Genomic Applications, leading experts describe in step-by-step detail their most productive transposon-based methods and strategies for studying genome structure, function, and evolution. These readily reproducible techniques cover a broad range, including mutagenesis, transgenesis, gene silencing, and molecular systematics. Among the highlights are a series of DNA hybridization methods for analyzing the distribution and dynamics of mobile DNA at the hosts' genomic level, techniques for studying LTR retrotransposons in heterologous host systems, and mutagenesis protocols for investigating gene functions in a broad range of organisms. Additional methods deal with highly informative sets of polymorphic markers, RNAi technology in gene silencing, and applications during transgenesis. The protocols presented follow the successful Methods in Molecular Biology"!series format, each one offering step-by-step laboratory instructions, an introduction outlining the principle behind the technique, lists of equipment and reagents, and tips on troubleshooting and avoiding known pitfalls. State-of-the-art and highly practical, Mobile Genetic Elements: Protocols and Genomic Applications offers

investigators powerful genetic tools for dissecting the function of a specific gene, elaborating on the mechanisms leading to genetic change and diversity, and studying the evolutionary impact of mobile DNA on the biology and evolution of organisms
Signal Transduction Protocols Nov 25 2019 Carrying on the high standards of the much-acclaimed first edition, highly experienced investigators have extensively updated the first edition with many of the new approaches that have been transforming the field. Included in this new edition are readily reproducible immunoassays, fluorescence-based assays, high-throughput methods, protein modification assays, lipid second messenger assays, and chromatin immunoprecipitation techniques.