

# Cancer Cell Culture

## *Methods and Protocols*

Edited by

Simon P. Langdon



# Cancer Cell Culture Methods And Protocols Methods In Molecular Medicine

**Toni Lindl, Rosemarie Steubing**



## **Cancer Cell Culture Methods And Protocols Methods In Molecular Medicine:**

**Cancer Cell Culture** Simon P. Langdon, 2008-02-01 The culture of cancer cells is routinely practiced in many academic research centers biotechnology companies and hospital laboratories *Cancer Cell Culture Methods and Protocols* describes easy to follow methods to guide both novice and more experienced researchers seeking to use new techniques in their laboratories Our present understanding of the cell and molecular biology of cancer has been derived mainly from the use of cultured cancer cells and we cover a number of the most widely used assays to study function in current use Part I introduces the basic concept of cancer cell culture and this is followed by a description of the general techniques used in many cell culture facilities The importance of cell line characterization is now widely recognized and methods to characterize and authenticate cell lines are described in Part II Part III covers the isolation and development of specific cancer cell types and provides valuable tips for those wishing to derive new cell line models A wide range of procedures encompassing many of the key functional features of cancer cells are described in Part IV including assays to evaluate clonogenicity cell proliferation apoptosis adhesion migration invasion senescence angiogenesis and cell cycle parameters Methods to modify cancer cells are described in Part V including protocols for transfection development of drug resistance immortalization and transfer in vivo In Part VI methods of coculture of different cell types and contamination of cell lines are covered *Human Cell Culture Protocols* Joanna Picot, 2008-02-02 A thoroughly revised and updated collection readily reproducible techniques for culturing human cells This new edition includes a wide range of human cell types relevant to human disease and new chapters on fibroblasts Schwann cells gastric and colonic epithelial cells and parathyroid cells The protocols follow the successful *Methods in Molecular Medicine*™ series format each offering step by step laboratory instructions an introduction outlining the principle behind the technique lists of the necessary equipment and reagents and tips on troubleshooting and avoiding known pitfalls *Prostate Cancer Methods and Protocols* Pamela J. Russell, Paul Jackson, Elizabeth A. Kingsley, 2008-02-01 Prostate cancer is the second leading cancer in men in Western society A major concern and an area of intensive research involves understanding why certain prostate cancers remain localized or indolent whereas others become aggressive and metastasize The differences between these cancer types have profound implications for patients and physicians Indolent disease which grows very slowly generally does not cause any problems to the patient whereas aggressive disease requires immediate treatment the earlier the better At present there are no markers that discriminate between these two entities thus causing a dilemma for the management of patients who have recently been diagnosed The aim of *Prostate Cancer Methods and Protocols* is to explore cutting edge molecular methods that may have the potential to reveal markers of disease for use in more accurate diagnoses of prostate cancer and consequently to lead to new treatment strategies This book provides a comprehensive collection of both in vitro and in vivo step by step protocols currently used by leaders in prostate cancer research advice on approaches that can be used in the study of prostate cancer as well as reviews covering areas less

amenable to laboratory research such as environmental factors in prostate cancer to provide the reader with an overview of the prostate cancer research field as it currently stands      Novel Anticancer Drug Protocols John K. Buolamwini,Alex A. Adjei,2008-02-01 We are in an exciting era in the war against cancer with real prospects for novel anticancer drugs that are cancer cell specific without the toxicities that have been the hallmark of conventional cytotoxic cancer chemotherapy Advances in cancer cell biology fueled by the molecular biology revolution have resulted in the uncovering of many novel potential molecular targets for cancer therapy New anticancer drug discovery and development is now largely focused on exploiting these new molecular targets which encompass oncogenes tumor suppressor genes and their gene products as well as targets involved in tumor angiogenesis metastasis survival and longevity mechanisms Exploitation of some of these targets has already yielded fruits and introduced new paradigms of molecularly targeted cancer therapy into the clinic namely protein kinase inhibition by antibodies or small molecules exemplified by Herceptin trastuzumab a humanized antibody targeted against the HER 2 growth factor receptor tyrosine kinase for the treatment of metastatic breast cancer and Gleevec a small molecule bcr abl kinase inhibitor for the treatment of chronic myelogenous leukemia      Laboratory Techniques in Cellular and Molecular Medicine Hajdúch, Marián,Drábek, Jiří, The methodological book Laboratory techniques in cellular and molecular medicine is intended for students of bachelor master and doctoral study programmes at faculties of science medicine and veterinary medicine as well as for laboratory technicians interested in methodological approaches of contemporary cellular and molecular medicine The book does not aim to provide a comprehensive overview of the current state of the art in cellular and molecular medicine that would be a superhuman task The aim of the 56 member author team is to provide readers with an overview of the methods established and tested at the Institute of Molecular and Translational Medicine of the Faculty of Medicine of Palack University Olomouc to describe the methodological principles and their practical application It focuses both on basic methods whose principles are used by the most modern methods and on special methods reflecting the laboratory experience and specialisation of individual authors The 52 chapters describe the work with cells and microorganisms bioengineering manipulations of nucleic acids the search for biomarkers detection at the level of DNA RNA protein organelle and whole cell and the use of fluorescent and radioactive labeling To aid comprehension the description of the methods is illustrated by figures and diagrams Each chapter is followed by troubleshooting tips The book promotes the best laboratory practice to increase the reproducibility of results in biomedicine      **Atlas of Living Cell Cultures** Toni Lindl,Rosemarie Steubing,2013-03-25 The first atlas in many years giving researchers a good visual reference of the status of their cell lines Given the increasing importance of well defined cellular models in particular in biomedical research this is a sorely needed resource for everyone performing cell culture      Opioid Research Zhizhong Z. Pan,2008-02-01 Opioid research is one of the multidisciplinary research areas that involve advanced techniques ranging from molecular genetics to neuropharmacology and from behavioral neuroscience to clinical medicine In current opioid research it

has become increasingly important to use multiple approaches at molecular cellular and system levels for investigations on a specific opio related target system That often requires understanding and applying cro field techniques and methods for the success of one s research projects Through its broad spectrum of coverage Opioid Research Methods and Protocols provides a comprehensive collection of major laboratory methods and protocols in current opioid research covering topics from molecular and genetic techniques to behavioral analyses of animal models and then to clinical practice It will serve as a convenient reference book from which those involved in opioid research will learn or perfect the necessary cross field techniques The detailed methods and protocols described in Opioid Research Methods and Protocols have each been successfully applied in current opioid research Part I provides molecular techniques for the cloning and expression of opioid receptors and for the quantitative characterization of their signaling pathways Part II includes primary techniques for mapping the distributions and detecting the expression levels of opioid receptors opioid peptides and their messages in brain tissues and in individual cells Part III deals with methods for creating in vitro receptor models and in vivo animal models to study opioid functions Part IV describes practical applications of opioids in clinical medicine for the treatment of pain and opioid addiction

*Blood'Brain Barrier* Sukriti Nag,2008-02-01 Blood brain barrier BBB breakdown leading to cerebral edema occurs in many brain diseases such as trauma stroke inflammation infection and tumors and is an important factor in the mortality arising from these con tions Despite the importance of the BBB in the pathogenesis of these diseases the molecular mechanisms occurring at the BBB are not completely und stood In the last decade a number of molecules have been identified not only in endothelial cells but also in astrocytes pericytes and the perivascular cells that interact with endothelium to maintain cerebral homeostasis However the precise cellular interactions at a molecular level in steady states and d eases have still to be determined The introduction of new research techniques during the last decade or so provide an opportunity to study the molecular mec nisms occurring at the BBB in diseases The Blood Brain Barrier Biology and Research Protocols provides the reader with details of selected morphologic permeability transport in vitro and molecular techniques for BBB studies all written by experts in the field Each part is preceded by a review that emphasizes the advantages and pitfalls of particular techniques as well as offering much relevant current information The techniques provided will be helpful to both beginners in BBB research and those more experienced investigators who wish to add a specific technique to those already available in their laboratories

**The Thirteenth Annual Conference YUCOMAT 2011: Programme and the Book of Abstracts** Uskokovic, Dragan P., Adoptive Immunotherapy Burkhard Ludewig,Matthias W.

Hoffmann,2008-02-02 An authoritative collection of optimal techniques for producing and characterizing the immunologically active cells and effector molecules now gaining wide use in the clinical treatment of patients Taking advantage of the latest technologies the authors present readily reproducible experimental protocols for the study of dendritic cells T cells monoclonal antibodies and bone marrow transplantation The emphasis is on preclinical and clinical applications and on the

progress of selected approaches in clinical trials Additional chapters cover the molecular definition of target antigens mathematical modeling approaches to immunotherapy and the utilization of regulatory T cells The protocols make it possible to study the adoptive transfer of tailored antigen specific immune cells and to improve the clinical application of adoptive immunotherapy

**Hemoglobin Disorders** Ronald L. Nagel, 2008-02-01 Hemoglobin and Hemoglobinologists This volume Hemoglobin Disorders Molecular Methods and Protocols will be introduced with a review of the great milestones in the field and the scientists responsible for those achievements The history of hemoglobin can be divided into three periods the Classical period the Modern period and the Post Modern period I am inclined to include as the four major members of the classical period Francis Roughton Quentin Gibson Jeffries Wyman and Linus Pauling not only because of their achievements but also because of the superb scientists they trained and or influenced Francis John Worsely Roughton 1899 1972 Fig 1 in his laboratory at Trinity College in Cambridge England made the first measurements of the rapid reaction of oxygen with hemoglobin at the millisecond scale at first by flow mixing methods and later by flash photolysis He not only opened an era of molecular research of hemoglobin but also invented the methodology for fast reactions through the use of laser technology which was later improved by others so that even faster reactions could be detected Another contribution of Roughton was the education of Quentin H Gibson Fig 2 his favorite student who in his laboratory in Sheffield continued to expand the horizon of ligand binding to hemoglobin defining the oxygen binding constants for each of the hemes of hemoglobin Though this did not as expected solve the underlying mechanism of ligand cooperativity as discussed below it was nonetheless an important milestone

Regenerative Medicine Technology Sean V. Murphy, Anthony Atala, 2016-11-30 Miniaturization in the fields of chemistry and molecular biology has resulted in the lab on a chip Such systems are micro fabricated devices capable of handling extremely small fluid volumes facilitating the scaling of single or multiple lab processes down to a microchip sized format The convergence of lab on a chip technology with the field of cell biology facilitated the development of organ on a chip systems Such systems simulate the function of tissues and organs having the potential to bypass some cell and animal testing methods These technologies have generated high interest as applications for disease modeling and drug discovery This book edited by Drs Sean Murphy and Anthony Atala provides a comprehensive coverage of the technologies that have been used to develop organ on a chip systems Known leaders cover the basics to the most relevant and novel topics in the field including micro fabrication 3D bio printing 3D cell culture techniques biosensor design and microelectronics micro fluidics data collection and predictive analysis The book describes specific tissue types amenable for disease modeling and drug discovery applications Lung liver heart skin and kidney on a chip technologies are included as well as a progress report on designing an entire body on a chip system Additionally the book covers applications of various systems for modeling tissue specific cancers metastasis and tumor microenvironments and provides an overview of current and potential applications of these systems to disease modeling toxicity testing and individualized medicine

**Cytogenetic Laboratory Management**

Susan Mahler Zneimer, 2017-01-27 Cytogenetic Laboratory Management Chromosomal FISH and Microarray Based Best Practices and Procedures Cytogenetic Laboratory Management Chromosomal FISH and Microarray Based Best Practices and Procedures is a practical guide that describes how to develop and implement best practice processes and procedures in the genetic laboratory setting The text first describes good laboratory practices including quality management design control of tests and FDA guidelines for laboratory developed tests and preclinical validation study designs The second focus of the book is on best practices for staffing and training including cost of testing staffing requirements process improvement using Six Sigma techniques training and competency guidelines and complete training programs for cytogenetic and molecular genetic technologists The third part of the text provides stepwise standard operating procedures for chromosomal FISH and microarray based tests including preanalytic analytic and postanalytic steps in testing which are divided into categories by specimen type and test type All three sections of the book include example worksheets procedures and other illustrative examples that can be downloaded from the Wiley website to be used directly without having to develop prototypes in your laboratory Providing a wealth of information on both laboratory management and molecular and cytogenetic testing Cytogenetic Laboratory Management will be an essential tool for laboratorians worldwide in the field of laboratory testing and genetic testing in particular This book gives the essentials of Developing and implementing good quality management programs in laboratories Understanding design control of tests and preclinical validation studies and reports FDA guidelines for laboratory developed tests Use of reagents instruments and equipment Cost of testing assessment and process improvement using Six Sigma methodology Staffing training and competency objectives Complete training programs for molecular and cytogenetic technologists Standard operating procedures for all components of chromosomal analysis FISH and microarray testing of different specimen types This volume is a companion to Cytogenetic Abnormalities Chromosomal FISH and Microarray Based Clinical Reporting The combined volumes give an expansive approach to performing reporting and interpreting cytogenetic laboratory testing and the necessary management practices staff and testing requirements

**Cardiovascular Disease, Volume 2** Qing Wang, 2007-10-26 Cardiovascular disease is the leading cause of death in developed countries but is quickly becoming an epidemic in such well populated countries as China India and other developing nations Cardiovascular research is the key to the prevention diagnosis and management of cardiovascular disease Vigorous and cross disciplinary approaches are required for successful cardiovascular research As the boundaries between different scientific disciplines particularly in the life sciences are weakening and disappearing a successful investigator needs to be competent in many different areas including genetics cell biology biochemistry physiology and structural biology The newly developed field of molecular medicine is a cross disciplinary science that seeks to comprehend disease causes and mechanisms at the molecular level and to apply this basic research to the prevention diagnosis and treatment of diseases and disorders This volume in the Methods in Molecular Medicine series Cardiovascular



Disease provides comprehensive coverage of both basic and the most advanced approaches to the study and characterization of cardiovascular disease. These methods will advance knowledge of the mechanisms, diagnoses and treatments of cardiovascular disease. Cardiovascular Disease is a timely volume in which the theory and principles of each method are described in the Introduction section followed by a detailed description of the materials and equipment needed and step by step protocols for successful execution of the method. A notes section provides advice for potential problems, any modifications and alternative methods.

**Cardiovascular Disease, Volume 1** Qing Wang, 2007-10-26 Cardiovascular disease is the leading cause of death in developed countries but is quickly becoming an epidemic in such well populated countries as China, India and other developing nations. Cardiovascular research is the key to the prevention, diagnosis and management of cardiovascular disease. Vigorous and cross disciplinary approaches are required for successful cardiovascular research. As the boundaries between different scientific disciplines, particularly in the life sciences, are weakening and disappearing, a successful investigator needs to be competent in many different areas including genetics, cell biology, biochemistry, physiology and structural biology. The newly developed field of molecular medicine is a cross disciplinary science that seeks to comprehend disease causes and mechanisms at the molecular level and to apply this basic research to the prevention, diagnosis and treatment of diseases and disorders. This volume in the Methods in Molecular Medicine series Cardiovascular Disease provides comprehensive coverage of both basic and the most advanced approaches to the study and characterization of cardiovascular disease. These methods will advance knowledge of the mechanisms, diagnoses and treatments of cardiovascular disease. Cardiovascular Disease is a timely volume in which the theory and principles of each method are described in the Introduction section followed by a detailed description of the materials and equipment needed and step by step protocols for successful execution of the method. A notes section provides advice for potential problems, any modifications and alternative methods.

**Diabetes Mellitus** Sabire Özcan, 2008-02-01 Diabetes mellitus is the collective name for a group of diseases associated with hyperglycemia, high levels of blood glucose caused by defects in insulin production, insulin action or both. About 6.2% of the US population, 17 million people, have diabetes mellitus. It is the leading cause of kidney failure, blindness and amputations. It is also a major risk factor for heart diseases, stroke and birth defects. Diabetes Mellitus: Methods and Protocols provides a state of the art account of the experimental methodology for studying the molecular defects leading to diabetes mellitus, both at the molecular and biochemical levels. The chapters cover a wide range of topics written by experts in their respective fields and are organized in two sections: Insulin Production and Insulin Action. The detailed experimental protocols presented, including the notes of interest, provide a very useful tool for basic researchers and clinicians for investigating and treating this disease. Each chapter starts with an introduction to a specific technique and explains its application in the field of diabetes research. Following the list of materials, a detailed description of the technique is presented in the methods section in a way that enables the successful execution of the protocol. The Notes



section at the end discusses the pitfalls of the technique and alternative approaches I am grateful to the numerous scientists who have contributed to this volume by writing both highly detailed and understandable chapters

Molecular Diagnosis of Genetic Diseases Rob Elles, 2008-02-01 This completely revised and updated second edition integrates the many new technologies and insights now available for the diagnosis of genetic diseases The authors use such methodologies as PCR optimization dosage analysis mutation scanning and quantitative fluorescent PCR for aneuploidy analysis Neurofibromatosis type 1 and Duchenne muscular dystrophy These largely generic methodologies may be adapted to most genetic conditions for which a molecular diagnosis is relevant no matter how frequent or rare their incidence Molecular Diagnosis of Genetic Diseases Second Edition offers diagnostic molecular geneticists a unique opportunity to sharpen their scientific skills in the design of assays their execution and their interpretation

*Tissue Engineering* Hansjörg Hauser, Martin M. Fussenegger, 2007-07-27 Features Leading experts present their own most recent advances Includes a wide spectrum of methods representing tissue engineering in many diverse disciplines Supplies an understanding of diverse technologies and methods

**Bone Marrow and Stem Cell Transplantation** Meral Beksac, 2007-05-03 This volume is a compendium of cutting edge molecular methods for the successful transplantation of hematopoietic stem cells The contributors are world renown leaders in the field They describe promising tools for stem cell transplant research models such as in vivo bioluminescence imaging They discuss HLA typing PCR SSP typing and HLA antigens This volume is an invaluable source for biochemists molecular biologists and clinicians

*DNA Vaccines* Mark W. Saltzman, Hong Shen, Janet L. Brandsma, 2008-02-02 In the early 1990s almost 200 yr after Edward Jenner demonstrated the effectiveness of the smallpox vaccine a new paradigm for vaccination emerged The conventional method of vaccination required delivery of whole pathogens or structural subunits but in this new approach DNA or genetic information was administered to elicit an immunological response Once it was observed that plasmid DNA delivered in vivo led to production of an encoded transgene 1 two ground breaking studies demonstrated that immunological responses could be generated against antigenic transgenes via plasmid DNA delivered by DNA vaccination as this approach is called 2 3 The appearance of this new vaccination strategy coincided with advances in molecular biology which provided new tools to study and manipulate the basic elements of an organism's genome and also could also be applied to the design and production of DNA vaccines DNA Vaccines is a major updated and enhancement of the first edition It reviews state of the art methods in DNA vaccine technology with chapters describing DNA vaccine design delivery systems adjuvants current applications methods of production and quality control Consistent with the approach of the Methods in Molecular Medicine series these chapters contain detailed practical procedures on the latest DNA vaccine technology The enthusiasm for DNA vaccine technology is made clear by the number of research studies published on this topic since the mid 1990s

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