

Methods in
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Vladimir V. Didenko *Editor*

Fast Detection of DNA Damage

Methods and Protocols



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In Situ Detection of DNA Damage Vladimir V. Didenko, 2008-02-05 Detection and analysis of DNA damage is of critical importance in a variety of biological disciplines studying apoptosis cell cycle and cell division carcinogenesis tumor growth embryogenesis and aging neurodegenerative and heart diseases anticancer drug development environmental and radiobiological research and others Individual cells within the same tissue or in cell culture may vary in the extent of their DNA damage and consequently can display different reactions to it These differences between individual cells in the same cell population are detected using in situ approaches In situ is a Latin term meaning on site or in place It is used to denote the processes occurring or detected in their place of origin In molecular and cell biology this usually refers to undisrupted mounted cells or tissue sections In that meaning in situ is used as part of the terms in situ PCR in situ transcription in situ hybridization in situ end labeling and in situ ligation Sometimes the in situ term is applied at the subcellular level to cells disrupted in the process of analysis for example in the detection of specific sequences in chromosomes using fluorescent in situ hybridization FISH Historically the term was used primarily in methods dealing with nucleic acids

DNA Damage Detection Takamitsu A. Kato, *Fast Detection of DNA Damage* Vladimir V. Didenko, 2017-07-14 This volume presents a comprehensive collection of quick assays for the detection of nuclear and mitochondrial DNA damage and its effects in live and fixed cells and tissues and in bacterial genomes Although such rapid techniques are in demand in the research trenches they are not covered well in the literature This volume is the first such compendium of the time saving techniques for detection of DNA damage and its direct physiological outcomes including apoptosis necrosis and phagocytic clearance The volume demonstrates all levels of detection starting from the molecular level up to the level of the entire live organism 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 cutting edge *Fast Detection of DNA Damage Methods and Protocols* aims to provide easily reproducible techniques requiring only few steps to perform

Methods in Molecular Biology: In situ detection of DNA damage: methods and protocols John M. Walker, 1984 *DNA Damage Detection In Situ, Ex Vivo, and In Vivo* Vladimir V. Didenko, 2010-11-08 Recent advances in organic chemistry fluorescent microscopy and materials science have created an entirely new range of techniques and probes for imaging DNA damage in molecular and cellular biology In *DNA Damage Detection In Situ Ex Vivo and In Vivo Methods and Protocols* expert researchers explore the latest advances in the area covering both recent and established techniques to detect and quantify DNA damage at scales ranging from subcellular to the level of a whole live organism Chapters present all major assays used in molecular and cellular biology for the labeling of DNA damage in situ ex vivo and in vivo Composed in the highly successful Methods in Molecular Biology™ series format each chapter contains a brief introduction step by step methods a list of necessary

materials and a Notes section which shares tips on troubleshooting and avoiding known pitfalls Comprehensive and current DNA Damage Detection In Situ Ex Vivo and In Vivo Methods and Protocols is an essential handbook for novice and experienced researchers in a variety of fields including molecular and cellular biology experimental and clinical pathology toxicology radiobiology oncology embryology experimental pharmacology drug design and environmental science

Capillary Electrophoresis of Carbohydrates Pierre Thibault, Susumu Honda, 2008-02-03 A collection of cutting edge techniques for using capillary electrophoresis CE to analyze complex carbohydrates These readily reproducible protocols provide methods for sample preparation analysis of mono and oligosaccharides glycoproteins and glycoconjugates A useful appendix describes the structures of the most commonly encountered carbohydrate residues and oligosaccharides from mammalian and bacterial origins Each protocol contains detailed information on reagents apparatus notes comments and tips on procedures

Posttranslational Modification of Proteins Christoph Kannicht, 2008-02-04 Christoph Kannicht and a panel of highly experienced researchers describe readily reproducible methods for detecting and analyzing the posttranslational modifications of protein particularly with regard to protein function proteome research and the characterization of pharmaceutical proteins

Cardiac Cell and Gene Transfer Joseph M. Metzger, 2008-02-03 Heart disease is the leading cause of death in developed countries Recent experimental advances featuring cellular molecular and genetic tools and technologies offer the potential for new therapeutic strategies directed toward remediation of inherited and acquired heart diseases Whether these recent basic science advances will ultimately translate to clinical efficacy for patients with heart disease is unknown and is important to ascertain Cardiac Cell and Gene Transfer Principles Protocols and Applications is designed to provide the reader with up to date coverage of a myriad of specific methodologies and protocols for gene and cell transfer to the myocardium Each chapter features a Notes section that provides useful how to problem solving insights that are often left unstated in standard published protocols Cardiac Cell and Gene Transfer Principles Protocols and Applications addresses principles and applications of cell and gene transfer to the heart including protocols for vector production and purification Detailed step by step methods and applications for first second generation adenoviral vectors adeno associated vectors gutted adenoviral vectors and lentiviral vectors are included Additionally detailed methods for cardiac cell grafting and transplantation are provided and these chapters highlight the prospects of cell based therapies for cardiac repair The book also covers specific in vivo techniques for cardiac gene transfer and specifies subsequent cellular and organ level physiological assessment techniques and protocols Accordingly this book is designed for basic science and clinical researchers in the academic pharmaceutical and biotechnology sectors of the cardiovascular community

Tumor Suppressor Genes Wafik S. El-Deiry, 2008-02-03 It has become clear that tumors result from excessive cell proliferation and a corresponding reduction in cell death caused by the successive accumulation of mutations in key regulatory target genes over time During the 1980s a number of oncogenes were characterized whereas from the 1990s to the present the emphasis

has shifted to tumor suppressor genes TSGs It has become clear that oncogenes and TSGs function in the same pathways providing positive and negative growth regulatory activities The signaling pathways controlled by these genes involve virtually every process in cell biology including nuclear events cell cycle cell death cytoskeletal cell membrane angiogenesis and cell adhesion effects Mutations in tumor suppressor genes have been identified in familial cancer syndromes and the same genes in many cases have been found to be mutationally inactivated in sporadically occurring cancers In their normal state TSGs control cancer development and progression as well as contribute to the sensitivity of cancers to a variety of therapeutics Understanding the classes of TSGs the biochemical pathways they function in and how they are regulated provides an essential lesson in cancer biology We cannot hope to advance our current knowledge and to develop new and more effective therapies without understanding the relevant pathways and how they influence the present approaches to therapy Moreover it is important to be able to access not only the powerful tools now available to discover these genes but also their links to cell biology and growth control

Molecular Toxicology Protocols Phouthone Keohavong, Stephen G. Grant, 2008-02-03 A collection of cutting edge techniques for analyzing genotoxic exposure and detecting the resulting biological effects including endogenous metabolites up to and including the development of cancer The authors emphasize analytical methods that can be specifically applied to human populations and patients Among the applications detailed are the analysis of interactions between such cellular macromolecules as DNA and proteins and chemical and physical agents the assessment of medically relevant toxicity and the characterization of genetic alterations induced in transgenic animals by in vivo systems There are also methods for the analysis of genotoxic exposure during gene expression of cytotoxicity caused by the induction of apoptosis of genetic alterations in reporter genes and oncogenes early premalignant detection of altered oncogenes and of individual variation in biotransformation and DNA repair capacity

In Situ Detection of DNA Damage Vladimir V. Didenko, 2002-04-30 Detection and analysis of DNA damage is of critical importance in a variety of biological disciplines studying apoptosis cell cycle and cell division carcinogenesis tumor growth embryogenesis and aging neurodegenerative and heart diseases anticancer drug development environmental and radiobiological research and others Individual cells within the same tissue or in cell culture may vary in the extent of their DNA damage and consequently can display different reactions to it These differences between individual cells in the same cell population are detected using in situ approaches In situ is a Latin term meaning on site or in place It is used to denote the processes occurring or detected in their place of origin In molecular and cell biology this usually refers to undisrupted mounted cells or tissue sections In that meaning in situ is used as part of the terms in situ PCR in situ transcription in situ hybridization in situ end labeling and in situ ligation Sometimes the in situ term is applied at the subcellular level to cells disrupted in the process of analysis for example in the detection of specific sequences in chromosomes using fluorescent in situ hybridization FISH Historically the term was used primarily in methods dealing with nucleic acids

Base Excision Repair Pathway Kishor K. Bhakat, Tapas K.

Hazra,2023-09-14 This detailed volume provides a comprehensive set of experimental protocols and useful strategies to examine the repair of damaged bases via the Base Excision Repair BER pathway in vitro and in cells Beginning with multiple molecular and cellular techniques to examine the excision of damaged bases from double stranded DNA or DNA wrapped in a nucleosome the book continues with sections covering procedures to detect and quantify the damaged bases protein DNA crosslinks and double strand breaks experimental procedures to identify DNA repair protein interactome by conventional tandem affinity purification followed by mass spectroscopy analysis as well as the analysis of genome wide binding of DNA repair proteins and copy number variations of the DNA damage response gene in tumors Written for the highly successful Methods in Molecular Biology series chapters include introductions to their respective topics lists of the necessary materials and reagents step by step and readily reproducible laboratory protocols and tips on troubleshooting and avoiding known pitfalls Authoritative and practical Base Excision Repair Pathway Methods and Protocols serves as a valuable resource for novices and experts trying to examine the repair of various types of DNA lesions in vitro and in cell by the distinct set of proteins in the BER pathway

DNA Repair Lata Balakrishnan,Jason A. Stewart,2019-05-25 The volume outlines techniques used to study the primary mechanisms of important DNA repair pathways The chapters in this book are organized into five sections each discussing a specific aspect of repair biology Part I reviews the role of post translational modifications of HDR and DNA damage caused by defective telomere replication Part II describes methods to detect and measure DNA breaks and proteins involved in DNA damage response Part III talks about methods designed to measure DNA repair efficiency and characterize factors involved in the repair process Part IV discusses various in vitro assays used to purify recombinant proteins that are used to study DNA repair enzyme mechanisms Lastly Part V focuses on methods to study the damage arising during DNA replication 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 Cutting edge and authoritative DNA Repair Methods and Protocols is an essential resource for novice and experienced researchers and provides easily adaptable techniques to help them advance in their specific protein or repair pathway of interest

Epigenetics and DNA Damage Miriam Galvonas Jasiulionis,2022-08-14 Although scientists recognize the role of epigenetic mechanisms in DNA damage response the complex mechanistic interplay between chromatin regulation and DNA repair is still poorly understood Comprehending how these processes are connected in time and space and play out in developmental processes may reveal novel directions for new research and disease treatment Epigenetics and DNA Damage a new volume in the Translational Epigenetics series offers a thorough grounding in the relationship between DNA Damage epigenetic modifications and chromatin regulation Early chapters address the basic science of DNA damage and its association with various epigenetic mechanisms including DNA methylation post translational histone modifications histone variants chromatin remodeling

miRNAs and lncRNAs This is followed by a close discussion of DNA damage and epigenetics in metabolism aging cellular differentiation immune function stem cell biology and cancer tying recent research to translational application in disease understanding Later chapters examine possible epigenetic therapies combining DNA damage induction and epigenetic alteration as well as instructive chapters on how to analyze DNA damage and epigenetic alterations in new research Offers a thorough foundation in epigenetics and DNA damage research as well as informed discussion of evolving research trends disease findings and early therapeutics Features chapter contributions from leading international contributors Empowers scientists to apply protocols in DNA damage and epigenetic alteration analysis and experimentation in their own research

In Vivo ,2004 DNA Repair Protocols Daryl S. Henderson,2008-02-03 The first edition of this book published in 1999 and called DNA Repair Protocols Eukaryotic Systems brought together laboratory based methods for studying DNA damage and repair in diverse eukaryotes namely two kinds of yeast a nematode a fruit fly a toad three different plants and human and murine cells This second edition of DNA Repair Protocols covers mammalian cells only and hence its new subtitle Mammalian Systems There are two reasons for this fresh emphasis both of them pragmatic to cater to the interests of what is now a largely mammalocentric DNA repair field and to expedite editing and production of this volume Although DNA Repair Protocols Mammalian Systems is a smaller book than its predecessor it actually contains a greater variety of methods Fourteen of the book's thirty two chapters are entirely new and areas of redundancy present in the first edition have been eliminated here for example now just two chapters describe assays for nucleotide excision repair NER rather than seven All eighteen returning chapters have been revised many of them extensively In order to maintain a coherent arrangement of topics the four part partitioning seen in the first edition was dispensed with and chapters concerned with ionizing radiation damage and DNA strand breakage and repair were relocated to near the front of the book Finally an abstract now heads each chapter *Hamilton and Hardy's Industrial Toxicology* Raymond D. Harbison,Marie M. Bourgeois,Giffie T. Johnson,2015-04-13 Providing a concise yet comprehensive reference on all aspects of industrial exposures and toxicants this book aids toxicologists industrial hygienists and occupational physicians to investigate workplace health problems Updates and expands coverage with new chapters covering regulatory toxicology toxicity testing physical hazards high production volume HPV chemicals and workplace drug use Includes information on occupational and environmental sources of exposure mammalian toxicology industrial hygiene medical management and ecotoxicology Retains a succinct chapter format that has become the hallmark for the previous editions Distills a vast amount of information into one resource for both academics and professionals Detection of DNA Damage Caused by Folate Deficiency and Chronic Inflammation Benjamin Carl Blount,1994 *Technologies for Detection of DNA Damage and Mutations* G.P. Pfeifer,2013-11-11 Man made carcinogens natural genotoxic agents in the environment as well as ionizing and ultraviolet radiation can damage DNA and are a constant threat to genome integrity Throughout the evolution of life complex DNA repair systems have developed in all living organisms to cope with this damage Unrepaired

DNA lesions can promote genetic alterations mutations that may be linked to an altered phenotype and if growth controlling genes are involved these mutations can lead to cell transformation and the development of malignant tumors Proto oncogenes and tumor suppressor genes may be critical targets for DNA damaging agents In a number of animal model systems correlations between exposure to a carcinogen tumor develop ment and genetic changes in tumor DNA have been established To understand mutagenesis processes in more detail at the molecular level we need to know the type and frequency of DNA adducts within cells their distribution along genes and specific DNA sequences as well as the rates at which they are repaired We also need to know what types of mutations are produced and which gene positions are most prone to mutagenesis This book provides a collection of techniques that are useful in mutagenesis research The book is divided into three parts In Part I methods for DNA damage and repair analysis are provided

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Regents University of Michigan. Board of Regents,2002-12

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