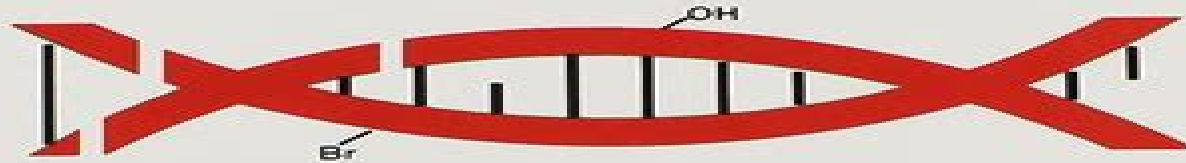


# Radiation Damage in DNA



## Structure/Function Relationships at Early Times

Edited by

**Alfred F. Fuciarelli**  
and  
**John D. Zimbrick**

# Radiation Damage In Dna Structurefunction Relationships At Early Times

**Zbigniew Darzynkiewicz, Harry A.  
Crissman, J. Paul Robinson, American  
Society for Cell Biology**

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**Radiation Damage in DNA** Alfred F. Fuciarelli, John D. Zimbrick, 1995      *Radiation Damage in Biomolecular Systems* Gustavo García Gómez-Tejedor, Martina Christina Fuss, 2012-01-04 Since the discovery of X rays and radioactivity ionizing radiations have been widely applied in medicine both for diagnostic and therapeutic purposes The risks associated with radiation exposure and handling led to the parallel development of the field of radiation protection Pioneering experiments done by Sanche and co workers in 2000 showed that low energy secondary electrons which are abundantly generated along radiation tracks are primarily responsible for radiation damage through successive interactions with the molecular constituents of the medium Apart from ionizing processes which are usually related to radiation damage below the ionization level low energy electrons can induce molecular fragmentation via dissociative processes such as internal excitation and electron attachment This prompted collaborative projects between different research groups from European countries together with other specialists from Canada the USA and Australia This book summarizes the advances achieved by these research groups after more than ten years of studies on radiation damage in biomolecular systems An extensive Part I deals with recent experimental and theoretical findings on radiation induced damage at the molecular level It includes many contributions on electron and positron collisions with biologically relevant molecules X ray and ion interactions are also covered Part II addresses different approaches to radiation damage modelling In Part III biomedical aspects of radiation effects are treated on different scales After the physics oriented focus of the previous parts there is a gradual transition to biology and medicine with the increasing size of the object studied Finally Part IV is dedicated to current trends and novel techniques in radiation reserach and the applications hence arising It includes new developments in radiotherapy and related cancer therapies as well as technical optimizations of accelerators andtotally new equipment designs giving a glimpse of the near future of radiation based medical treatments      *Electron Paramagnetic Resonance* Bruce C Gilbert, N M Atherton, M J Davies, 2007-10-31 Specialist Periodical Reports provide systematic and detailed review coverage of progress in the major areas of chemical research Written by experts in their specialist fields the series creates a unique service for the active research chemist supplying regular critical in depth accounts of progress in particular areas of chemistry For over 80 years the Royal Society of Chemistry and its predecessor the Chemical Society have been publishing reports charting developments in chemistry which originally took the form of Annual Reports However by 1967 the whole spectrum of chemistry could no longer be contained within one volume and the series Specialist Periodical Reports was born The Annual Reports themselves still existed but were divided into two and subsequently three volumes covering Inorganic Organic and Physical Chemistry For more general coverage of the highlights in chemistry they remain a must Since that time the SPR series has altered according to the fluctuating degree of activity in various fields of chemistry Some titles have remained unchanged while others have altered their emphasis along with their titles some have been combined under a new name whereas others have

had to be discontinued The current list of Specialist Periodical Reports can be seen on the inside flap of this volume

**Recent Trends in Radiation Chemistry** James F. Wishart, 2010 This volume is a review of the trends in the field of radiation chemistry research It covers a broad spectrum of topics ranging from the historical perspective instrumentation of accelerators in the nanosecond to femtosecond region through the use of radiation chemical methods in the study of antioxidants and nanomaterials radiation induced DNA damage by ionizing radiation involving both direct and indirect effects to ultrafast events in free electron transfer radiation induced processes at solid liquid interfaces and the recent work on infrared spectroscopy and radiation chemistry The book is unique in that it covers a wide spectrum of topics that will be of great interest to beginners as well as experts Recent data on ultrafast phenomena from the recently established world class laser driven accelerators facilities in the US France and Japan are reviewed

**Radiation Induced Molecular Phenomena in Nucleic Acids** Manoj Shukla, Jerzy Leszczynski, 2008-05-08 Comprehensive theoretical and experimental analysis of UV radiation and low energy electron induced phenomena in nucleic acid bases NABs and base assemblies are presented in this book NABs are highly photostable the absorbed energy is dissipated in the form of ultrafast nonradiative decay This book highlights the possible mechanisms of these phenomena which is important for all living species and discusses technical challenges in exploration of these processes

**Advances in Quantum Chemistry**, 2006-12-22 Advances in Quantum Chemistry presents surveys of current developments in this rapidly developing field that falls between the historically established areas of mathematics physics chemistry and biology With invited reviews written by leading international researchers each presenting new results it provides a single vehicle for following progress in this interdisciplinary area Publishes articles invited reviews and proceedings of major international conferences and workshops Written by leading international researchers in quantum and theoretical chemistry Highlights important interdisciplinary developments

*DNA Damage and Repair* Jac A. Nickoloff, Merl F. Hoekstra, 1998-08-12 Cutting edge reviews by leading researchers illuminate key aspects of DNA repair in mammalian systems and its relationship to human genetic disease and cancer Major topics include UV and X Ray repair repair of chemical damage recombinational repair mismatch repair transcription repair coupling and the role of DNA repair in disease prevention Extensive up to date references and rigorous peer review of each chapter make this volume definitive and bring it to the active frontiers of research

Radiation Protection in Medical Physics Yves Lemoigne, Alessandra Caner, 2011-04-14 This book introduces the fundamental aspects of Radiation Protection in Medical Physics and covers three main themes General Radiation Protection Principles Radiobiology Principles Radiation Protection in Hospital Medical Physics Each of these topics is developed by analysing the underlying physics principles and their implementation quality and safety aspects clinical performance and recent advances in the field Some issues specific to the individual techniques are also treated e g calculation of patient dose as well as that of workers in hospital optimisation of equipment used shielding design of radiation facilities radiation in oncology such as use of

brachytherapy in gynecology or interventional procedures All topics are presented with didactical language and style making this book an appropriate reference for students and professionals seeking a comprehensive introduction to the field as well as a reliable overview of the most recent developments

*Multiscale Modeling of Complex Molecular Structure and Dynamics with MBN Explorer* Ilia A. Solov'yov, Andrey V. Korol, Andrey V. Solov'yov, 2017-05-16 This book introduces readers to MesoBioNano MBN Explorer a multi purpose software package designed to model molecular systems at various levels of size and complexity In addition it presents a specially designed multi task toolkit and interface the MBN Studio which enables the set up of input files controls the simulations and supports the subsequent visualization and analysis of the results obtained The book subsequently provides a systematic description of the capabilities of this universal and powerful software package within the framework of computational molecular science and guides readers through its applications in numerous areas of research in bio and chemical physics and material science ranging from the nano to the mesoscale MBN Explorer is particularly suited to computing the system s energy to optimizing molecular structure and to exploring the various facets of molecular and random walk dynamics The package allows the use of a broad variety of interatomic potentials and can e g be configured to select any subset of a molecular system as rigid fragments whenever a significant reduction in the number of dynamical degrees of freedom is required for computational practicalities MBN Studio enables users to easily construct initial geometries for the molecular liquid crystalline gaseous and hybrid systems that serve as input for the subsequent simulations of their physical and chemical properties using MBN Explorer Despite its universality the computational efficiency of MBN Explorer is comparable to that of other more specialized software packages making it a viable multi purpose alternative for the computational modeling of complex molecular systems A number of detailed case studies presented in the second part of this book demonstrate MBN Explorer s usefulness and efficiency in the fields of atomic clusters and nanoparticles biomolecular systems nanostructured materials composite materials and hybrid systems crystals liquids and gases as well as in providing modeling support for novel and emerging technologies Last but not least with the release of the 3rd edition of MBN Explorer in spring 2017 a free trial version will be available from the MBN Research Center website [mbnresearch.com](http://mbnresearch.com)

**Radical and Radical Ion Reactivity in Nucleic Acid Chemistry** Michael D. Greenberg, 2009-09-22 Comprehensive coverage of radical reactive intermediates in nucleic acid chemistry and biochemistry The Wiley Series on Reactive Intermediates in Chemistry and Biology investigates reactive intermediates from the broadest possible range of disciplines The contributions in each volume offer readers fresh insights into the latest findings emerging applications and ongoing research in the field from a diverse perspective The chemistry and biochemistry of reactive intermediates is central to organic chemistry and biochemistry and underlies a significant portion of modern synthetic chemistry Radical and Radical Ion Reactivity in Nucleic Acid Chemistry provides the only comprehensive review of the chemistry and biochemistry of nucleic acid radical intermediates With contributions by world leaders in the field the text

covers a broad range of topics including A discussion of the relevant theory Ionization of DNA Nucleic acid sugar radicals Halopyrimidines Oxidative reductive and low energy electron transfer Electron affinity sensitizers Photochemical generative of reactive oxygen species Reactive nitrogen species Ene-diyne rearrangements Phenoxyl radicals A unique compilation on the cutting edge of our understanding Radical and Radical Ion Reactivity in Nucleic Acid Chemistry provides an unparalleled resource to student and professional researchers in such fields as organic chemistry biochemistry molecular biology and physical chemistry as well as the industries associated with these disciplines **Cytometry** Zbigniew Darzynkiewicz, Harry A. Crissman, J. Paul Robinson, American Society for Cell Biology, 2001 Each chapter presents a detailed background of the described method its theoretical foundations and its applicability to different biomedical material Updated chapters describe either the most popular methods or those processes that have evolved the most since the past edition Additionally a large portion of the volume is devoted to clinical cytometry Particular attention is paid to applications of cytometry in oncology the most rapidly growing area Charged Particle and Photon Interactions with Matter A. Mozumder, Yoshihiko

Hatano, 2003-11-14 Charged Particle and Photon Interactions with Matter offers in depth perspectives on phenomena of ionization and excitation induced by charged particle and photon interactions with matter in vivo and in vitro This reference probes concepts not only in radiation and photochemistry but also in radiation physics radiation biochemistry and radiatio

*Toxicological profile for iodine*, 2004 **Advances in DNA Damage and Repair** Miral Dizdaroglu, Ali Esat Karakaya, 2012-12-06 Damage to DNA by both exogenous and endogenous sources is increasingly regarded as highly important in the initiation and progression of cancer and in the occurrence of other pathological events DNA damage caused by reactive oxygen derived species also called oxidative DNA damage is most the frequent type encountered by aerobic cells Mechanistic studies of carcinogenesis indicate an important role of this type of damage to DNA There is also strong evidence to support the role of oxidative DNA damage in the aging process DNA damage is opposed in vivo by repair systems If not repaired DNA damage may lead to detrimental biological consequences Therefore the repair of DNA damage is regarded as one of the essential events in all life forms In recent years the field of DNA repair has flourished due to new findings on DNA repair mechanisms and the molecular basis of cancer A detailed knowledge of mechanisms of DNA damage and repair and how individual repair enzymes function may lead to manipulation of DNA repair in cells and ultimately to an increase of the resistance of human cells to DNA damaging agents This volume covers the most recent developments in this research field and contains contributions from scientists working in the fields of biochemistry molecular biology enzymology biomedical science and radiation biology International Journal of Radiation Biology, 2007 Radioprotectors Edward A. Bump, Kamal Malaker, 2021-12-24 It is essential to minimize damage to normal tissues during radiation therapy and many strategies have been employed in finding the best methods for radioprotection This book integrates chemical biological and clinical perspectives on these strategies and developments providing a comprehensive treatise It emphasizes new concepts in

radioprotection aiming to inspire further basic science and clinical progress in radioprotector research Radioprotectors Chemical Biological and Clinical Perspectives includes the following topics Early research on radioprotectors WR 2721 an aminothiols prodrug as a radioprotector New results with naturally occurring thiols Nitroxides as effective radioprotectors in vitro and in vivo Radioprotection observed with radical scavengers or antioxidants Bone marrow radioprotection with cytokines and biological modifiers Multiple mechanisms of altering radiation response by eicosanoids Vascular response to radiation and the importance of vascular damage to normal tissue Modifiers of radiation induced apoptosis Survey of clinical trials with radioprotectors Radiation biologists and oncologists cancer researchers and toxicologists will benefit from the findings discussed and strategies for future research

*Effects of X-ray and Computed Tomography Exposure on the Amplification of DNA from Bone* Britta May Grieshaber, 2003

Consequences of the Chernobyl Catastrophe on Human Health Elena Borisovna Burlakova, 1999 This important book delineates experimental studies of effects of low dose irradiation on biological objects organisms cells and biomolecules and presents theoretical concepts related to this issue The problem of low dose irradiation has many aspects theoretical what is truth populist political and bureaucratic low doses versus the atomic industry The book contains important works dealing with the serious effects of low dose irradiation an adaptive response It is known that a subsequent high dose irradiation of cells and organisms irradiated earlier with low doses causes lesser damages than after irradiation with a high dose Some of the authors consider a dependence of an adaptive response on the radiation dose and dose rate and on the time span between the first exposure to an adaptive dose and the second one Scientists who believe in a radiobiological dogma that the higher dose and the dose rate the stronger the effect cannot explain the observed changes in the state of health by the irradiation effects and try to discover other factors responsible for these changes It is concluded that low doses of radiation are indeed dangerous because low doses above all affect our sensitivity to the action of other damaging factors of the endogenic and exogenic nature A number of these environmental factors is considerable Their effect is evidently not fatal and we can be protected from them by making efforts to study the specific effects of low doses instead of verbal discussion about whether low doses affect the organism cells and population or not

BOOK COVER Environmental Health Perspectives, 1993

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