
Proceedings of the Fifth International
Congress of Radiation Research

RADIATION RESEARCH

**Biomedical, Chemical, and Physical
Perspectives**

EDITED BY

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Radiation Research

Biomedical, Chemical, and Physical Perspectives

Proceedings of the
Fifth International Congress of Radiation Research
Held at Seattle, Washington, U.S.A.
July 14-20, 1974

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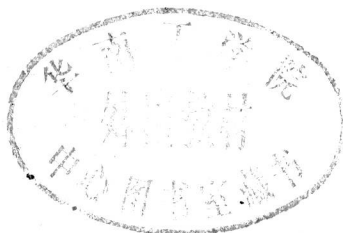
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RADIATION RESEARCH

*Biomedical, Chemical, and Physical
Perspectives*



The Fifth International Congress of Radiation Research

*Under the Patronage of
The President of the United States of America*

The Fifth International Congress of Radiation Research was organized by a corporation, the Fifth International Congress of Radiation Research, Inc., with Officers appointed by the Radiation Research Society (of the United States) and approved by the International Association for Radiation Research.

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PREFACE

The basic aspects of radiation effects on living systems include not only examination of these effects at all levels in such systems—molecular, cellular, organ, and whole animal—but also consideration of the processes by which radiation interacts with matter and generates chemical species capable of subsequent interaction with biologically important molecules. Recognition of the need to consider these fundamental aspects lies at the root of radiation research as a field. Consequently, meetings and discussions among physicists, chemists, and biomedical scientists have played a special role in the development of this area of research. Initially such meetings were small, and took place at Oberlin, Ohio (1948), and subsequently in London, Aarhus, Liege, Stockholm, Cambridge, and Venice. The interdisciplinary character of the subject was emphasized, as well as the necessity for physicists, chemists, and biologists to meet and to discuss their different approaches to the common problems confronting them. At the same time concern was felt about the uncertainties associated with long-term exposure to radiation delivered even at very low dose rates, and the need to understand fundamental processes in order to evaluate the potential hazards.

During this same period a number of societies devoted to radiation research were founded in different countries, including the United States, Great Britain and other European countries, and Japan. Additional societies are still being formed as interest in this challenging field continues to grow.

This national and international activity resulted in the First International Congress of Radiation Research, which was held at Burlington, Vermont, in 1958. This congress was an important development, as not only did it open the eyes of many to the broad implications of research in radiation chemistry, physics, and biology, as well as in medicine, but also it provided a base for the development of international cooperation. This base was firmly established at the Second International Congress of Radiation Research; held at Harrogate, England, in 1962, where it was decided to form the International Association of Radiation Research (IARR). A principal responsibility of the IARR is to act as sponsor for these international congresses. In addition, the Association provides for their continuity, decides upon appropriate hosts and locations, fosters the development of international cooperation in the field, and encourages smaller meetings. Under IARR sponsorship, the Third Congress was held in Cortina, Italy, in 1966; the Fourth in Evian, France, in 1970; and the present Fifth Congress in Seattle, Washington, USA, July 14-20, 1974.

The development of modern biology and the explosive increase of information on basic structures in the nucleus and cytoplasm, the discovery of the structure of nucleic acids and of the mechanisms of transcription and translation of information within cells have opened many new avenues to the biologists. This accumulation of basic information has been paralleled by many significant new developments in mammalian radiobiology, basic biochemistry, radiation chemistry, and physics.

RADIATION RESEARCH

Radiation genetics and radiation cytology have provided some of the keys for the development of modern molecular biology. At the same time theories of radiation action, models of possible low-level effects in populations, and comparisons of radiation with other hazards have been generated.

A number of Symposia and many contributed papers at the Seattle Congress emphasized the significance of the above mentioned areas of radiation research. Public awareness of the importance of the uses and effects of radiation had increased appreciably. While the focus of the present Congress was on fundamental research, there were several well-attended sessions on the practical aspects of radiation research as it relates to radiotherapy, central station power generation by both nuclear fission and fusion, and the environment.

The scientific sessions and other activities of the congress were held at the Seattle Center, a large parklike area in the heart of Seattle. Leading scientists, many of whom were from fields not directly involved with radiation research, accepted invitations as speakers in the Plenary Sessions and Symposia. The fresh points of view and the range of experiences which these speakers provided were important factors in the overall success of the Congress.

The recent transformation in the United States of the former Atomic Energy Commission into the broader framework of a new agency, the Energy Research and Development Administration, provides the investigator with new challenges. Those disciplines which have contributed so much to radiation research are now facing the additional challenge of considering other environmental insults and especially those resulting from the various aspects of energy generation. These new hazards must be evaluated, modified, and reduced, or perhaps even eliminated. Some of the Plenary Sessions, Symposia and sessions for contributed papers which were convened at this Congress addressed themselves to such questions, and we can confidently expect more attention to be devoted to these subjects in the future.

This was a full and busy congress, attendance was excellent, and no less than 36 countries were represented. Especially important to this congress was the presence of so many young investigators, both from within the USA and abroad, many of whom were assisted by travel grants from the Congress and its sponsors.

The enormous number of developments that have taken place in radiation research in recent years were reflected best at Seattle, not so much in the fundamental discoveries that have accumulated in recent times, but rather by the greatly broadened scope of the subject, and the evidence of the role it must play in the general area of science as well as in the public arena. An air of excitement and expectancy prevailed throughout and a common remark was "There is so much going on that is interesting, I cannot possibly take it all in." But this was said with a feeling of challenge rather than chagrin, as if the truly broad dimensions of the field were just being fully realized. To the Congress organizers and their sponsors, the IARR and the Radiation Research Society, this feeling was especially encouraging as it demonstrated the healthy state of radiation research and the central role it has played, and is playing, in advancing knowledge in certain areas of basic biology, chemistry, physics, and medicine.

RADIATION RESEARCH

We hope that these proceedings will capture the optimistic feeling of challenge for the future which we think pervaded the Seattle Congress.

V.P. Bond, *President*
W.K. Sinclair, *Secretary-General*

5th International Congress of
Radiation Research

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The editorial tasks involved in the preparation of this volume were greatly facilitated by the dedicated assistance of Mary Jane Loop who handled much of the logistics and did the major share of proofreading; the Editors are deeply grateful to her for her invaluable contribution to the publication of these Proceedings.

We further wish to express our appreciation to Mrs. Paulette Snowden for editorial assistance, and to the staff of the Health Center Library, Case Western Reserve University, for its tireless help in verifying and completing a great many of the references.

This volume will serve as a record of the Plenary Sessions and Symposia of the Seattle Congress. The Editors regret that it was not possible to publish the Contributed Papers as well. However, abstracts of all papers, including those reproduced in this volume, are available as a permanent record in the July, 1974 issue of the periodical *Radiation Research* (Vol. 59, pp. 1-315).

A separate list of contributors to the volume has not been provided since full addresses of the authors appears with their contributions.

O. F. Nygaard
H. I. Adler
W. K. Sinclair

**The Officers and Organizing Committee
of the Fifth International Congress
of Radiation Research**

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7960933

CONTENTS

<i>Preface</i>	xv
<i>Editors' Note</i>	xix
<i>Officers and Organizing Committee</i>	xxi

Special Addresses

Speech at Opening Ceremonies of the Fifth International Congress of Radiation Research <i>D.L. Ray</i>	3
The Time Scale in Radiobiology (Failla Memorial Lecture) <i>J. W. Boag</i>	9

Plenary Sessions

Energy Needs, Nuclear Power and the Environment Energy Needs, Nuclear Power, and the Environment <i>A.M. Weinberg</i>	32
Prospects for Fusion Power Status and Future Prospects for Fusion Power <i>R.L. Hirsch and William L. Rice</i>	42
Fusion Research in Japan <i>S. Yoshikawa</i>	56
Technological Applications of Radiation Technological Applications of Radiation—An Introduction <i>L. B. Sztanyik</i>	62
Applied Industrial Radiation Chemistry of Monomers and Polymers <i>A.S. Hoffman</i>	65
Mutations in Plant Breeding—A Glance Back and a Look Forward <i>A. Gustafsson</i>	81
The Use of Ionizing Radiation for Preservation of Food and Feed Products <i>E.S. Josephson, A. Brynjolfsson and E. Wierbicki</i>	96
Radiation Sterilization—An Industrial Process <i>F.J. Ley</i>	118
Human Radiobiology The Late Effects of Acute External Exposure to Ionizing Radiation in Man <i>S. Jablon</i>	132
The Risk of Malignancy from Internally-Deposited Radioisotopes <i>R.E. Rowland</i>	146

Reevaluation of Hazards of Radiation Exposure Relative to Other Environmental Agents

Chemical and Radiation Carcinogenesis in Man and Experimental Animals

J.A. Miller and E.C. Miller

158

Problems in the Reevaluation of Genetic Risks from Radiation and Other Environmental Hazards

P. Oftedal

169

Symposia

The Basic Physics of the Interactions of Radiation with Matter

Introduction to the Symposium on the Basic Physics of the Interactions of Radiation with Matter

M. Inokuti

184

Photoionization

J. Berkowitz

188

Electron Energy Deposition in Matter at the Molecular Level

M.J. van der Wiel

205

Secondary Electron Spectra

Y-K. Kim

219

Ionization by Energy Transfer from Excited Species

A. Niehaus

227

Ionization by Interpenetration of Electron Shells

F.T. Smith and A. Salop

242

Spontaneous Break-up of Gaseous Ions

Ch. Ottinger

255

Ion-Molecule Reactions

P. Kebarle

276

Particle Penetration Phenomena

Energy Loss and Ranges of Charged Particles in Matter

P. Sigmund

278

Channeling: A Tool for the Study of the Interactions of Energetic Particles Penetrating Solids

S. Datz

287

Transmission of Fast Molecules through Solids

J. Remillieux

302

Primary Processes and Track Effects in Irradiated Media

R.H. Ritchie and W. Brandt

315

Electrons in Liquids

The Optical Absorption Spectrum of the Solvated Electron in Polar Liquids and in Binary Solutions

L.M. Dorfman and J.F. Gavlas

326

RADIATION RESEARCH

Theory of Optical Spectra of Solvated Electrons <i>N.R. Kestner</i>	333
Electron Yields and Reaction Kinetics in Polar Liquids <i>J.W. Hunt, K.Y. Lam and W.J. Chase</i>	345
Reaction Rates of Electrons at Short Times <i>G. Czapski and E. Peled</i>	356
Measured Mobilities of Electrons <i>G.R. Freeman</i>	367
Energies of Conduction Bands in Dielectric Liquids <i>R. Holroyd</i>	378
Excess Electrons and Energy Fluctuations in the Non-Polar Liquids <i>R. Schiller</i>	388
Mobilities of Slow Electrons in Low- and High-Pressure Gases and Liquids <i>L.G. Christophorou</i>	397
Radiation Effects in Frozen Media	
Ground State Structure of Trapped Electrons in Glassy Matrices <i>L. Kevan</i>	406
Some Aspects of Electron Dynamics in Solid Alkanes <i>I-y. Cheng and K. Funabashi</i>	415
Deferred Luminescence in Organic Matrices at Low and Very Low Temperatures <i>P. Cordier, F. Kieffer, C. Lapersonne-Meyer, and J. Rigaut</i>	426
Trapped Electrons and Anions in Rigid Organic Glasses at 4° K <i>A. Namiki, M. Noda, and T. Higashimura</i>	436
Reactions of Electrons in 3-Methylhexane Glass <i>H.A. Gillis, N.V. Klassen and G.C. Teather</i>	443
Formation and Decay of Trapped Electrons in Frozen Media <i>J. Moan</i>	450
Electron Tunneling in Rigid Media <i>J. Kroh and Cz. Stradowski</i>	462
Fast Response Techniques in Chemistry and Biology	
Rapid-Mixing Studies on the Time-Scale of Radiation Damage in Cells <i>G.E. Adams, B.D. Michael, J.C. Asquith, M.A. Shenoy, M.E. Watts and D.W. Whillans</i>	478
Application of Fast Polarography in Pulse Radiolysis <i>M. Grätzel, K.M. Bansal, and A. Henglein</i>	493
Catalysis of Electron and Electron Transfer Reactions in Micellar and Protein Systems <i>M. Grätzel, M. Cooper, and J.K. Thomas</i>	511
The Picosecond Reactions of Electrons with Biologically Important Molecules <i>K.Y. Lam and J.W. Hunt</i>	524

Current Topics in Dosimetry

International Intercomparison of Neutron Dosimetry <i>R.S. Caswell, L.J. Goodma, P.D. Colvett</i>	532
Dosimetric Parameters and Their Relevance to Radiology <i>R. Oliver</i>	547
Microdosimetry of Auger Electrons <i>Y. Feige and A. Gavron</i>	557
Particle Dosimetry by Track Etching with Applications to Apollo Astronauts and to Heavy Radionuclide Mapping in Biological Systems <i>R.L. Fleischer</i>	570

Photodynamic Inactivation of Macromolecules and Cells

Psoralen Cross-Links in DNA: Biological Consequences and Cellular Repair <i>R.S. Cole and R.R. Sinden</i>	582
Chemical Aspects of Photodynamic Action in the Presence of Molecular Oxygen <i>K. Gollnick</i>	590
The Effects of Photodynamic Action Involving Oxygen upon Biological Systems <i>A. Knowles</i>	612

The Effects of UV Light on Genetic Functions

Dissipation of UV Energy in Nucleic Acids and Nucleoproteins <i>J.W. Longworth</i>	624
Genetic Effects of UV on <i>Escherichia coli</i> —A Model for Prokaryotes <i>B.A. Bridges</i>	626
The Present Status of DNA Repair Mechanisms in UV Irradiated Yeast Taken as a Model Eukaryotic System <i>E. Moustacchi, R. Waters, M. Heude, and R. Chanet</i>	632
Radiology Applied: Mapping Transcriptional Organization in Pro- and Eukaryotes <i>W. Sauerbier</i>	651

The Eukaryotic Chromosome

The Replication of <i>Drosophila</i> DNA: The Periodic Distribution of Replication Origins <i>A.B. Blumenthal</i>	664
Mammalian Chromosome Structure: Ultrastructural Aspects of Specialized Regions and Chromosome Aberrations <i>B.R. Brinkley, M. McGill and M.L. Mace</i>	673
Structure and Replication of the Yeast Chromosome <i>W.L. Fangman</i>	692

RADIATION RESEARCH

Repair Processes in Eukaryotes

Repair Studies at the Molecular, Chromosomal, and Cellular Levels: A Review of Current Work in Japan	694
<i>S. Okada</i>	
DNA Damage and Its Repair in Hyperthermic Mammalian Cells: Relation to Enhanced Cell Killing	703
<i>E. Ben-Hur and M.M. Elkind</i>	
Use of a Purified Lesion-Recognizing Enzyme to Assay DNA Repair in Cultured Animal Cells	718
<i>M.C. Paterson</i>	
Carcinogens and DNA Repair	727
<i>H.F. Stich and B. Laishes</i>	
Chemical Changes Induced in DNA by Ionizing Radiation and the Relationship of their Repair to Survival of Mammalian Cells	735
<i>R.B. Painter</i>	

Chemical Radiosensitization of Mammalian Cells

Mammalian Cell Sensitization, Repair and the Cell Cycle	742
<i>W.K. Sinclair</i>	
Chemical Radiosensitization Studies with Mammalian Cells Growing <i>in Vitro</i>	752
<i>J.D. Chapman, D.L. Dugle, A.P. Reuvers, C.J. Gillespie, and J. Borsa</i>	
<i>In Vivo</i> Testing of Hypoxic Cell Radiosensitizers	761
<i>A.M. Rauth, K. Kaufman, and J.E. Thomson</i>	
Chairman's Comments on the Discussion of Effects <i>in Vivo</i>	773
<i>G.E. Adams</i>	

Response of Stem Cells to Single Repeated and Continuous Irradiation

Concept of Human Stem Cell Kinetics	780
<i>E.P. Cronkite</i>	
Response of Stem Cell Systems to Whole Body and Partial Body Irradiation	788
<i>J. Gidáli</i>	
Characteristics of the Stem Cell Population Surviving a Sublethal Exposure to Ionizing Radiation	797
<i>J.F. Duplan</i>	

Cell Proliferation Changes in Tumor and Normal Tissue as a Result of Irradiation

Changes in the Rate of Proliferation in Normal Tissue after Irradiation	810
<i>J. Denekamp</i>	

RADIATION RESEARCH

Cell Proliferation Changes in Hemopoietic Tissue as a Result of Irradiation or Drug Administration: The Control of Cell Proliferation in Hemopoietic Tissue	
<i>B.I. Lord</i>	826
The Importance of Proliferation Kinetics and Clonogenicity of Tumor Cells for Volume Responses of Experimental Tumors after Irradiation	
<i>A.F. Hermens and G.W. Barendsen</i>	834
Cell Proliferation Kinetics and Growth Rate of the Irradiated Human Tumors	
<i>E.P. Malaise, N. Chavaudra, F. Pène, J.M. Richard, and M. Tubiana</i>	850
Carcinogenesis: Radiation and Other Agents	
Carcinogenesis by Ionizing Radiation and Lessons for Other Pollutants	
<i>R.H. Mole</i>	860
Mechanisms of Carcinogenesis	
<i>G. Klein</i>	869
Direct Evidence that Damaged DNA Results in Neoplastic Transformation—A Fish Story	
<i>R.B. Setlow and R.W. Hart</i>	879
Immunology of Carcinogenesis and Its Relation to Radiation	
Mechanisms of Radiation Carcinogenesis	
<i>D.W. van Bekkum</i>	886
The Interplay of Viruses and Radiation in Carcinogenesis	
<i>A.C. Upton</i>	895
Roles of Cellular and Humoral Immunity in Malignancy	
<i>T.J. Linna and C-p. Hu</i>	909
Macrophage Functions in Immune Responses to Tumors	
<i>H. Cottier, H. Bürki, M.W. Hess, H.U. Keller, and B. Roos</i>	917
New Ways of Estimating Genetic Risks in Man	
The Use of Chromosome Aberrations for Predicting Genetic Hazards to Man	
<i>J.G. Brewen and R.J. Preston</i>	926
Mutation and the Amount of Human Ill Health	
<i>H.B. Newcombe</i>	937
Use of the Mouse to Fill Gaps in Our Risk Assessments	
<i>A.G. Searle</i>	947
Comparison of the Mutagenic Effects of Chemicals and Ionizing Radiation	
A Comparison of the Mutagenic Effects of Chemicals and Ionizing Radiation (Chairman's Remarks)	
<i>F.H. Sobels</i>	958

RADIATION RESEARCH

Determinants of the Mutagenic Specificity of Chemical and Physical Agents in Microorganisms <i>B.J. Kilbey</i>	966
Comparison of the Mutagenic Effects of Chemicals and Ionizing Radiation Using <i>Drosophila melanogaster</i> Test Systems <i>W.R. Lee</i>	976
Comparison of the Mutagenic Effects of Chemicals and Ionizing Radiation in the Spermatogenic Cells of the Mouse <i>B.M. Cattanaach</i>	984
Theoretical Approaches to Radiation Biology	
Biophysical Implications of Radiation Quality <i>H.H. Rossi</i>	994
Analysis of Radiation-Induced Chromosome Aberrations <i>J.M. Brenot and N. Parmentier</i>	998
Cell Cycle Kinetics and Radiation Therapy <i>M.L. Mendelsohn</i>	1009
Theoretical Aspects and Implications of the Oxygen Effect <i>J. Kiefer</i>	1025
The Significance of LET in Radiobiology	
Fundamental Aspects of LET in Radiobiology <i>J.F. Fowler</i>	1040
Energy Deposition in Small Volumes in Relation to Linear Energy Transfer (LET) <i>D. Srdoč</i>	1053
The Dependence on LET of Various Types of Damage in Phage DNA in Relation to the Inactivation Efficiency <i>R.C. Christensen</i>	1060
The Dependence of RBE and OER on Neutron Energy for Damage to Mammalian Cells and Plant Systems <i>E.J. Hall</i>	1066
RBE Values of Fast Neutrons for Damage to Organized Tissues in Experimental Animals <i>J. J. Broerse</i>	1073
The Use of Heavy Particles in Radiotherapy	
Biological Basis of Heavy Particle and Fast Neutron Radiotherapy <i>G.W. Barendsen</i>	1084
The Middle Atlantic Neutron Therapy Trial <i>C. Rogers</i>	1092
A Preliminary Report of the MDAH-TAMVEC Neutron Therapy Pilot Study <i>D.H. Hussey, G.H. Fletcher, and J.B. Caderao</i>	1106