Biological Effects Of Electric And Magnetic Fields Volume 1 Sources And Mechanisms

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Radioprotectors

Modeling and Simulation for Electric Vehicle Applications

During the last 35 years, there has been considerable develop ment and increase in the number of devices that emit nonionizing radiant energies. These energies such as radiofrequency including microwaves are used in all sectors of our society for military, industrial. telecommunications, medical, and consumer applications. This increase in sources of nonionizing radiant energies has resulted in growing interest on the part of government regulatory agencies, industrial and military physicians, research workers, clinicians, and environmentalists. Although there is information on biologic effects and potential hazards to man from exposure to microwave/radiofrequency energies, considerable confusion and misinformation has permeated not only the public press but also some scientific and technical publications. Because of the complexity of the interactions of nonionizing radiation in biological systems, an inter-disciplinary approach is necessary to assess and elucidate the problems that evolve as this field advances and as the use of these

energies expands. It is important to maintain a proper perspective and assess realistically the biomedical effects of these radiant energies so that the worker or general public will not be unduly exposed nor will research, development and beneficial utilization of these energies be hampered or restricted by an undue concern for effects which may be nonexis tent or minimal in comparison to other environmental hazards.

Biological Effects of Metal Nanoparticles

This reference describes the role of various intermolecular and interparticle forces in determining the properties of simple systems such as gases, liquids and solids, with a special focus on more complex colloidal, polymeric and biological systems. The book provides a thorough foundation in theories and concepts of intermolecular forces, allowing researchers and students to recognize which forces are important in any particular system, as well as how to control these forces. This third edition is expanded into three sections and contains five new chapters over the previous edition. · starts from the basics and builds up to more complex systems · covers all aspects of intermolecular and interparticle forces both at the fundamental and applied levels · multidisciplinary approach: bringing together and unifying phenomena from different fields · This new edition has an expanded Part III and new chapters on non-equilibrium (dynamic) interactions, and tribology (friction forces)

Integrative Biophysics

Recent advances in technology have led to the unprecedented accuracy in measurements of endogenous electric fields around sites of tissue disruption. State-of-the-art molecular approaches demonstrate the role of bioelectricity in the directionality and speed of cell migration, proliferation, apoptosis, differentiation, and orientation. New information indicates that electric fields play a role in initiating and coordinating complex regenerative responses in development and wound repair and that they may also have a part in cancer progression and metastasis. Compiling current research in this rapidly expanding field, Physiology of Bioelectricity in Development, Tissue Regeneration, and Cancer highlights relevant, cutting-edge topics poised to drive the next generation of medical breakthroughs. Chapters consider methods for detecting endogenous electric field gradients and studying applied electric fields in the lab. The book addresses bioelectricity’s roles in guiding cell behavior during morphogenesis and orchestrating higher order patterning. It also covers the response of stem cells to applied electric fields, which reveals bioelectricity as an exciting new player in tissue engineering and regenerative medicine. This book provides an in-depth exploration of how electric signals control corneal wound repair and skin re-epithelialization, angiogenesis, and inflammation. It also delves into the bioelectric responses of cells derived from the musculoskeletal system, bioelectrical guidance of neurons, and the beneficial application of voltage gradients to promote regeneration in the spinal cord. It concludes with a discussion of bioelectricity and cancer progression and the potential for novel cancer biomarkers, new methods for early detection, and bioelectricity-based therapies to target both the tumor and metastatic cancer cells. This multidisciplinary compilation will benefit biologists, biochemists, biomedical scientists, engineers, dermatologists, and clinicians, or

anyone else interested in development, regeneration, cancer, and tissue engineering. It can also serve as an ideal textbook for students in biology, medicine, medical physiology, biophysics, and biomedical engineering.

Biological Effects from Electric and Magnetic Fields, Air Ions and Ion Currents Associated with High Voltage Transmission Lines

Bioengineering and Biophysical Aspects of Electromagnetic Fields primarily contains discussions on the physics, engineering, and chemical aspects of electromagnetic (EM) fields at both the molecular level and larger scales, and investigates their interactions with biological systems. The first volume of the bestselling and newly updated Handbook of Biological Effects of Electromagnetic Fields, Third Edition, this book adds material describing recent theoretical developments, as well as new data on material properties and interactions with weak and strong static magnetic fields. Newly separated and expanded chapters describe the external and internal electromagnetic environments of organisms and recent developments in the use of RF fields for imaging. Bioengineering and Biophysical Aspects of Electromagnetic Fields provides an accessible overview of the current understanding on the scientific underpinnings of these interactions, as well as a partial introduction to experiments on the interactions themselves.

Electromagnetic Fields in Biology and Medicine

Biology and Physiology of Freshwater Neotropical Fish is the all-inclusive guide to fish species prevalent in the neotropical realm. It provides the most updated systematics, classification, anatomical, behavioral, genetic, and functioning systems information on freshwater neotropical fish species. This book begins by analyzing the differences in phylogeny, anatomy, and behaviour of neotropical fish. Systems such as cardiovascular, respiratory, renal, digestive, reproductive, muscular, and endocrine are described in detail. This book also looks at the effects of stress on fish immune systems, and how color and pigmentation play into physiology and species differentiation. Biology and Physiology of Freshwater Neotropical Fish is a must-have for fish biologists and zoologists. Students in zoology, ichthyology, and fish farming will also find this book useful for its coverage of some of the world’s rarest and least-known fish species. Features chapters written by top neotropical fish researchers and specialists Discusses environmental effects on neotropical fishes, including climate change and pollution Details the phylogenetic occurrence of electroreceptors and electric organs in fish

Bioengineering and Biophysical Aspects of Electromagnetic Fields

Biological Effects of Electric and Magnetic Fields

The success, growth, and virtually limitless applications of nanotechnology depend upon our ability to manipulate nanoscale objects, which in turn depends upon developing new insights into the interactions of electric fields, nanoparticles, and

the molecules that surround them. In the first book to unite and directly address particle electrokinetics and nanotechnology, Nanoelectromechanics in Engineering and Biology provides a thorough grounding in the phenomena associated with nanoscale particle manipulation. The author delivers a wealth of application and background knowledge, from using electric fields for particle sorting in lab-on-a-chip devices to electrode fabrication, electric field simulation, and computer analysis. It also explores how electromechanics can be applied to sorting DNA molecules, examining viruses, constructing electronic devices with carbon nanotubes, and actuating nanoscale electric motors. The field of nanotechnology is inherently multidisciplinary-in its principles, in its techniques, and in its applications-and meeting its current and future challenges will require the kind of approach reflected in this book. Unmatched in its scope, Nanoelectromechanics in Engineering and Biology offers an outstanding opportunity for people in all areas of research and technology to explore the use and precise manipulation of nanoscale structures.

Magnetobiology

When Thomas Edison began wiring New York City with a direct current electricity distribution system in the 1880s, he gave humankind the magic of electric light, heat, and power; in the process, though, he inadvertently opened a Pandora’s Box of unimaginable illness and death. Dirty Electricity tells the story of Dr. Samuel Milham, the scientist who first alerted the world about the frightening link between occupational exposure to electromagnetic fields and human disease. Milham takes readers through his early years and education, following the twisting path that led to his discovery that most of the twentieth century diseases of civilization, including cancer, cardiovascular disease, diabetes, and suicide, are caused by electromagnetic field exposure. In the second edition, he explains how electrical exposure does its damage, and how electricity is causing our current epidemics of asthma, diabetes and obesity. Dr. Milham warns that because of the recent proliferation of radio frequency radiation from cell phones and towers, terrestrial antennas, Wi-Fi and Wi-max systems, broadband internet over power lines, and personal electronic equipment, we may be facing a looming epidemic of morbidity and mortality. In Dirty Electricity, he reveals the steps we must take, personally and as a society, to coexist with this marvelous but dangerous technology.

Biological Effects of Power Frequency Electric and Magnetic Fields

This book is dedicated to the field of conductive polymers, focusing on electrical interactions with biological systems. It addresses the use of conductive polymers as the conducting interface for electrical communications with the biological system, both in vitro and in vivo. It provides an overview on the chemistry and physics of conductive polymers, their useful characteristics as well as limitations, and technologies that apply conductive polymers for medical purposes. This groundbreaking resource addresses cytotoxicity and tissue compatibility of conductive polymers, the basics on electromagnetic fields, and commonly used experimental methods. Readers will also learn how cells are cultured in vitro with conductive polymers, and how conductive polymers and living tissues interact

electrically. Throughout the contents, chapter authors emphasize the importance of conductive polymers in biomedical engineering and their potential applications in medicine.

Biological Effects of Transmission Line Fields

The new edition will discuss recent advances in computer modeling, including how fields generated outside the body are distributed inside and how various frequencies may interact differently with natural biological or biochemical cycles. It covers the basic biological, medical, physical, and electrical engineering principles and experimental results concerning how electric and magnetic fields affect biological systems--both as potential hazards to health and as potential tools for medical treatment and scientific research. It also briefly includes material on the relationship between the science and the regulatory processes concerning human exposure to the fields.

Dirty Electricity

This book, a selection of the papers presented at the 2nd World Congress for Electricity and Magnetism, provides state-of-the-art information on applications of electricity and electromagnetic fields on living organisms, especially man.

Electricity and Magnetism in Biology and Medicine

Through a biophysical approach, Electromagnetic Fields in Biology and Medicine provides state-of-the-art knowledge on both the biological and therapeutic effects of Electromagnetic Fields (EMFs). The reader is guided through explanations of general problems related to the benefits and hazards of EMFs, step-by-step engineering processes, and basic results obtained from laboratory and clinical trials. Basic biological mechanisms reviewed by several authors lead to an understanding of the effects of EMFs on microcirculation as well as on immune and anti-inflammatory responses. Based upon investigational mechanisms for achieving potential health benefits, various EMF medical applications used around the world are presented. These include the frequent use of EMFs in wound healing and cartilage/bone repair as well as use of EMFs in pain control and inhibition of cancer growth. Final chapters cover the potential of using the novel biophysical methods of electroporation and nanoelectroporation in electrochemotherapy, gene therapy, and nonthermal ablation. Also covered is the treatment of tendon injuries in animals and humans. This book is an invaluable tool for scientists, clinicians, and medical and engineering students.

Biological Effects of Magnetic and Electromagnetic Fields

The editors are pleased to present these Proceedings of the V Course of the "International School of Radiation Damage and Pro tection" of the "E. Majorana Centre", held in Erice (Italy) in No vember 1983. The lectures and discussions among leading scientists in various disciplines of physics, engineering, biophysics, cellular biology, physiology and medicine from 11 countries are included in this compilation. In this volume we have attempted to explore all aspects of the

interaction of static and Extremely Low Frequency (ELF: 0-300 Hz) electric and magnetic fields with biological tissue, systems and whole organisms; we considered dosimetry and what is known or pre sumed concerning basic interactions, responses from the cellular and molecular level to the whole organism. Discussions of medical appli cations as well as epidemiologic investigations related to high volt age transmission were held with critiques of methodologies used and recommendations for future approaches. Consideration was also given to the necessity and principles of setting protection standards for man and the environment. We believe this is the first attempt to put all this informa tion together into one volume to provide perspective for understand ing the influence of static and ELF electric and magnetic fields on biological systems. We hope our attempts were successful. Martino Grandolfo Sol M. Michaelson Alessandro Rindi v ACKNOWLEDGEMENTS This is the Fifth Course of the International School of Radia tion Damage and Protection of the "Ettore Majorana" Centre for Sci entific Culture directed by Professor A. Zichichi.

Electric Field

The book summarizes the emerging topic about the effects of SMF on biological samples ranging from single molecules, subcellular compartments, and cells to whole organisms, as well as the potential application of SMF in clinical treatment of cancer and other diseases. With the development and growing popularity of modern appliances, including MRI in the hospitals, the potential impact of magnetic fields on human health is invoking increasing concerns. At the same time, SMF has been used in the clinical treatment of tumors and other diseases for decades. However, there are still some reservations and uncertainties about these treatments, which are largely due to the differential biological effects reported in the literature. These experimental inconsistencies are mainly caused by variations such as different magnetic field types, intensities, treatment time as well as biological samples examined. This volume will help clarify some dilemmas in this field and encourage further investigations in order to achieve a better understanding of the biological effects of SMF, aiming for a rational application of SMF in clinical therapy in the near future. The book is useful for scientists doctors, and students who are interested in magnetic fields and life sciences.

Biological Effects of Static Magnetic Fields

The International Symposium on Biological Effects of Magnetic and Electrom- netic Fields was held from September 3-4, 1993 at Kyushu University in Fukuoka . Japan . Originally, it was only intended to be an informal gathering of many scientists who had accepted my invitation to visit Kyushu University after the XXIVth General Assembly of the International Union of Radio Science (URSI), held in Kyoto prior to our symposium . However, since so many distinguished scientists were able to come, it was decided that a more formal symposium would be possible . It was a very productive symposium and, as a result, many of the guests consented that it would be a good idea to gather all the information put forth at the meeting and have it published. In addition, although they were unfortunately unable to attend the symposium . many other distinguished scientists had also expressed their wish to contribute to this effort and, in so doing. help to increase understanding in this, as yet, relatively immature field of science . The question of both positive and

negative effects of magnetic and electromagnetic fields on biological systems has become more and more important in our world today as they .

Biological Effects of Electromagnetic Fields

Recent concerns over the possible hazards of electrical and magnetic fields in the home and workplace are comprehensively addressed within this book. The chapters contain detailed research on the biological effects of electric and magnetic fields, and evidence for and against any interaction of electromagnetic fields (EMFs) and the biological systems. The relative risk of exposure to EMFs Putative behavioral and neural effects of EMFs EMF effects on cells

Conductive Polymers

The book presents interesting topics from the area of modeling and simulation of electric vehicles application. The results presented by the authors of the book chapters are very interesting and inspiring. The book will familiarize the readers with the solutions and enable the readers to enlarge them by their own research. It will be useful for students of Electrical Engineering; it helps them solve practical problems.

Assessment of the Possible Health Effects of Ground Wave Emergency Network

Biological and Health Effects from Exposure to Power-line Frequency Electromagnetic Fields

CRC Handbook of Biological Effects of Electromagnetic Fields

Electrical and Biological Effects of Transmission Lines

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Intermolecular and Surface Forces

Everyone, whether they like it or not, is exposed to electromagnetic fields, most of the time, at very low levels. In this case, they are inconsequential, but they can cause adverse health effects when they become intense enough. This topic is complex and sensitive. Covering frequencies from 0 Hz to 300 GHz, Human Exposure to Electromagnetic Fields provides an overview of this vast topic. After a reminder of the concepts of electromagnetic fields, the author presents some examples of sources of radiation in daily life and in the industrial or medical sectors. The biophysical and biological effects of these fields on the human body are detailed and the exposure limits are recalled. The exposure assessment and the implementation of the appropriate regulation within companies are also covered. Technically and practically, this book is aimed at people with a scientific background, risk prevention actors, health physicians, especially occupational doctors, and equipment designers.

Handbook of Biological Effects of Electromagnetic Fields, Fourth Edition - Two Volume Set

Recent concerns over the possible hazards of electrical and magnetic fields in the home and workplace are comprehensively addressed within this book. The chapters contain detailed research on the biological effects of electric and magnetic fields, and evidence for and against any interaction of electromagnetic fields (EMFs) and the biological systems. The relative risk of exposure to EMFs Putative behavioral and neural effects of EMFs EMF effects on cells

Biological Effects of Microwaves

Radio Frequency and Microwave Effects on Biological Tissues

This book is designed to provide an overview of the different genotoxicants and their effects on living organisms, including humans. The contributions made by the specialists in this field of research are gratefully acknowledged. We hope that the information presented in this book will meet the expectations and needs of all those interested in the different aspects of the genotoxicity field. The publication of this book is of great importance to those scientists, pharmacologists, physicians and veterinarians, as well as engineers, teachers, graduate students and administrators of environmental programmes, who make use of these investigations to understand both the basic and applied genotoxic aspects of known and new xenobiotics, and to guide them in their future investigations.

Biological effects of power frequency electric and magnetic fields

Written at the request of the U.S. Air Force and Congress, this book evaluates the potential health effects associated with deployment of the Ground Wave Emergency Network (GWEN), a communications system to be used in case of a high-altitude detonation of a nuclear device. The committee, composed of experts

in biophysics, physics, risk assessment, epidemiology, and cancer, examines data from laboratory and epidemiologic studies of effects from electromagnetic fields to determine the likelihood of health effects being caused by the operation of a fully implemented GWEN system.

Biological Effects and Dosimetry of Static and ELF Electromagnetic Fields

People are immersed in electromagnetic fields from such sources as power lines, domestic appliances, mobile phones, and even electrical storms. All living beings sense electric fields, but the physical origins of the phenomenon are still unclear. Magnetobiology considers the effects of electromagnetic fields on living organisms. It provides a comprehensive review of relevant experimental data and theoretical concepts, and discusses all major modern hypotheses on the physical nature of magnetobiological effects. It also highlights some problems that have yet to be solved and points out new avenues for research. Why do some people feel unwell during a lightning storm? Why is there a correlation between the level of electromagnetic background and the incidence of cancer? Why do so many medical centers use electromagnetic exposures to treat a wide variety of disorders in humans? The international scientific community is extremely interested in a theory of magnetobiology and the answers to these and other questions, as evidenced by the growing number of research associations in the United States, Europe, and other parts of the world. The World Health Organization (WHO) has named electromagnetic contamination in occupational and residential areas as a stress factor for human beings. This book stands out among recent texts on magnetobiology because it draws on a strong foundation of empirical and theoretical evidence to explain the various effects of magnetic fields on the human body. It contains the first comprehensive collection of experimental data bearing physical information, frequency and amplitude/power spectra, and original research data on how electromagnetic fields interfere with ions and molecules inside the proteins of living organisms. Introduction is written so that it will be understandable to a wide scientific community regardless of their specialisation First comprehensive collection of experimental data bearing physical information, frequency and amplitude/power spectra Original theoretical research data on the interference of ions and molecules inside proteins Appendix covers physical questions most relevant for magnetobiology. In particular there is an original exposition of the magnetic resonance basic principles

Nanoelectromechanics in Engineering and Biology

Focussing on engineering aspects of RF/Microwave interaction with biological tissues This book discusses the advancement in bio-electromagnetics pertaining to this important issue of electromagentic field-bio interaction vis-a-vis the emission of electromagnetic radiations from mobile phones and their biological fallout. Divided into six chapters, it discusses basic issues in Electromagnetic Field-Biointeraction, dosimetery, instrumentation, and methods of measurement of specific absorption rate, criteria and magnitude of safe exposure and measurements of field in an open (unobstructed) environment.

Genotoxicity

Reporting new results, this book covers the subject of biological effects of EMF in its entirety. Experimental verification of the theoretical results is given when at all possible, and the book is expected to open new areas of research, providing material for university course creation.

Human Exposure to Electromagnetic Fields

The first edition of this book has been recognized as the standard reference on biological effects of electric and magnetic fields from DC to microwaves. But much has changed in this science since the book's original publication in 1986. With contributions from eighteen leading researchers, this latest edition includes authoritative discussions of many new developments and will quickly become the new, must-have resource handbook. Dielectric properties of biological tissue are thoroughly examined, followed by chapters on physical mechanisms and biological effects of static and extremely low frequency magnetic fields. New chapters on topics that were treated very briefly in the first edition now receive extensive treatment. These topics include electric and magnetic fields for bone and soft tissue repair, electroporation, and epidemiology of ELF health effects. The chapter on computer methods for predicting field intensity has been substantially revised to describe new numerical techniques developed within the last few years and includes calculations of power absorbed in the human head from cellular telephones. The chapter discussing experimental results on RF interaction with living matter now contains information on effects of very high power, very short duration pulses. A new appendix on safety standards is based on the latest publications of governmental, as well as quasi-governmental organizations (such as the U.S. Council on Radiation Protection) in the United States, Europe, and Australia. With all its revisions, this updated version of the CRC Handbook of Biological Effects of Electromagnetic Fields provides the most comprehensive overview available of this rapidly changing science.

Biological Effects of Electric and Magnetic Fields

This book offers a comprehensive overview of recent studies conducted on the biological effects of metal nanoparticles. It also provides a solid theoretical foundation and various metal nanoparticle synthesis methods. Part I reviews the main chemical methods used for synthesizing metal nanoparticles in a solution and describes original method of biochemical synthesis, as well as some special procedures developed specifically for studying the biological activity of nanoparticles. Part II analyzes current literature on the effects of metal nanoparticles observed in microorganisms and addresses the influence of silver nanoparticles obtained by biochemical synthesis on biological objects on various organization levels, namely on microorganisms, acellular slim mold, unicellular alga, plant seeds and mammalian cells. The last section explains the central problems common in studies on the biological effects of metal nanoparticles and outlines potential uses of this trend in bio-nanotechnologies. This book is aimed at specialists, professors and students aspiring to expand their knowledge about the biological activities of metal nanoparticles and nanoparticle-containing materials.

Biology and Physiology of Freshwater Neotropical Fish

Biophotonics is a rapidly increasing field of current scientific research and applications, based on the discovery of biophotons, a permanent, weak photon current emanating from all living systems. The biophoton emission reflects some, if not all, of the essential biological and physiological activities in biological systems. Biophotonics provides a powerful tool for investigating these electromagnetic interactions. The theoretical approach requires holistic models of living systems, rather than local analytical models. Consequently, these new insights into living matter create a new basis of "integrative biophysics" that is concerned with the questions of regulation, communication and organization of biological systems. Most of the specialists working in this interdisciplinary field of physics, biology, biophysics and medicine are associated with "The International Institute of Biophysics" (IIB), in Neuss, Germany, where basic research and possibilities for applications are coordinated. The growth in this field is indicated by the increase in financial support, interest from the scientific community and frequency of publications. Audience: The scientists of IIB have presented the most essential background and applications of biophotonics in these lecture notes in biophysics, based on the summer school lectures by this group. This book is devoted to questions of elementary biophysics, as well as current developments and applications. It will be of interest to graduate and postgraduate students, life scientists, and the responsible officials of industries and governments looking for non-invasive methods of investigating biological tissues.

Biological Effects and Dosimetry of Nonionizing Radiation

In the present book, various applications of electric field are introduced in health and biology like treating cancer and cell sorting and in engineering and technological applications like enhancing the heat transfer, colloidal hydrodynamics and stability, and lithography. Electric field is defined as a force field arising from the electric charges. Depending on the nature of the material (the ability to polarize) and the inherent or attained surface charges, the response of the electric field varies.

Handbook of Biological Effects of Electromagnetic Fields, Third Edition - 2 Volume Set

Proceedings of the NATO Advanced Research Workshop on The Mechanisms of the Biological Effect on Extra High Power Pulses (EHPP), Yerevan, Armenia 3 - 5 March 2005

Electromagnetic Fields in Biological Systems

The possible health effects of electro-magnetic (EMF) from high-voltage electric power lines have been discussed sine the 1970s. The concern was triggered by epidemilogical studies in the United States and Europe that suggested a slightly increased incidence of leukaemia's and brain tumours occured among those living and working near high-voltage power lines. Although studies can indicate an associate between factor and effect, the studies themselves cannot confirm a

cause-effect relationship. Whether EMF is producing these ill effects must be confirmed by experimental studies.

The Pineal Gland

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 aminothiol 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.

The Physiology of Bioelectricity in Development, Tissue Regeneration and Cancer

This report was prepared by the Office of Technology Assessment of the United States Congress to review the health effects of high-voltage transmission lines. For about two decades, there has been some concern about the health effects of electric and magnetic fields produced by transmission lines. Recent studies have heightened this concern. Health effects research is still preliminary and inconclusive, but a growing number of studies suggest that under certain circumstances even relatively weak electric and magnetic fields can produce biologic changes.This report discusses the present state of knowledge on the health effects of low-frequency electric and magnetic fields and describes current U. S. funding levels and research programs. Also, the report provides information on regulatory activity, including existing and proposed field exposure standards.

Biological Effects of Magnetic and Electromagnetic Fields

The objective of this book is to present in a concise manner what is actually known at the present time about biological effects of time invariant, low frequency and radio frequency (including microwave) electric and magnetic fields. In reviewing the vast amount of experimental data which have been obtained in recent years, the authors tried to select those results that are, in their opinion, of major importance and of lasting value. In discussing mechanisms of interaction of electromagnetic fields with living matter they have tried to differentiate between what is clearly established, what is suggested by available evidence without being convincingly proven, and what is conjecture at the present time.

Bioelectromagnetics Current Concepts

Spanning static fields to terahertz waves, this volume explores the range of consequences electromagnetic fields have on the human body. Topics discussed include essential interactions and field coupling phenomena; electric field interactions in cells, focusing on ultrashort, pulsed high-intensity fields; dosimetry or coupling of ELF fields into biological systems; and the historical developments and recent trends in numerical dosimetry. It also discusses mobile communication devices and the dosimetry of RF radiation into the human body, exposure and dosimetry associated with MRI and spectroscopy, and available data on the interaction of terahertz radiation with biological tissues, cells, organelles, and molecules.