

# Preface and Acknowledgements

*Perspectives in Environmental Toxicology* is a comprehensive textbook deciphers the phenomena and highlights the latest developments in environmental toxicology. The fundamental information on the effect of environmental toxicants or pollutants focuses on the multidisciplinary field of science by applying the principles of biology, physics, and chemistry. The *biological* (bacteria, viruses, parasites, fungi, enzymes, biological toxicants) and *chemical* contaminations (metal contamination, pesticides, toxic chemicals, compounds, tobacco smoke, nanoparticles), and *physical* exposures (high power tension wire, electromagnetic field (EMF), electronic gadgets, medical devices) have been discussed in this book. This chemical, physical, and biological contaminants are all around us and pose a problem in the onset of various diseases or physiological disorders to human beings due to man-made substances and compounds. There are a number of different ways to affect the human health by toxic substances such as air, water, soil, and noise. Man-made EMF has been considered as an “electro-pollution” or “electrosmog” in the list of air, water, or soil pollution. The overall objectives of this book are to cover the effects of environmental toxicants in animals, plants and humans. Complementary chapters examine the environmental causes of cancer, classification of carcinogens, metabolism of chemical carcinogens, and DNA damage and repair system. This highlights the latest developments in agriculture solid waste management and ecotoxicological effects. This book has value-added collections of 10 different papers (chapters) and links to multidisciplinary approaches of environmental toxicology with a focus on the following aspects.

Chapter “[Neurophysiological and Behavioral Dysfunctions After Electromagnetic Field Exposure: A Dose Response Relationship](#)” represents the introduction of radiofrequency EMF effects on neurophysiology, brain behavior, and dose response relationship. Interestingly, this chapter not only is limited to theoretical or mechanistic view but also explores the experimental examinations. This chapter shows evidence of the effect of EMF on Alzheimer disease and neurodegeneration. Chapter “[Induction of LPO and ROS Production in Rat Brain Exposed to Microwaves: Computational Elucidation of Melatonin in Repair System](#)”

investigates the effect of microwave radiations on brain antioxidative levels. The administration of melatonin against microwave radiations and computational elucidation of melatonin in repair system are the main observations. Therefore, Chapters “[Neurophysiological and Behavioral Dysfunctions After Electromagnetic Field Exposure: A Dose Response Relationship](#)” and “[Induction of LPO and ROS Production in Rat Brain Exposed to Microwaves: Computational Elucidation of Melatonin in Repair System](#)” mainly focus to explore the dose response relationship between EMF exposure and the effect on brain, and also in repair system by introducing melatonin. Chapter “[Nanoparticles: Applications, Toxicology and Safety Aspects](#)” discusses good and bad science of nanoparticles. Twenty-first century is known for both technological prosperity and environmental toxicity. This chapter mainly focuses on the applications of nanoparticle in the environmental and biomedical sciences. Also the causative factors come through environmental contaminations and recommended safety aspects have been discussed. Chapter “[Cadmium Toxicity Showing Organ Specific Signature of Responsiveness](#)” is in continuation of Chapter “[Nanoparticles: Applications, Toxicology and Safety Aspects](#)”. The environmental exposures are of several types such as nanoparticle dust, metals or chemical toxicity. Toxic heavy metals like cadmium are found to be more hazardous for the biological system. This chapter mainly explores the toxic effect of cadmium, source of exposure and possible mechanism of health effects. The environmental toxicants that cause severe neurodegenerative diseases are also discussed in Chapter “[Toxicity of Protein and DNA-AGEs in Neurodegenerative Diseases \(NDDs\) with Decisive Approaches to Stop the Deadly Consequences](#)”. This chapter’s focus is to measure the toxicity of protein and DNA-AGEs in neurodegenerative diseases and to discuss approaches to stop the deadly or severe consequences, which has been associated with toxicity of glycation intermediate (dicarbonyl compounds and ketoamine moieties) and their end products. The measurement and the interaction of enzymes, proteins, and DNA repair pathways suggested to introduce by applying computational approach. Somehow, it is a problem-solving tool of experimental research. Therefore, Chapter “[Carcinogenic Toxicity of Cigarette Smoke: A Computational Enzymatic Interaction and DNA Repair Pathways](#)” first time introduces *in silico* approach to find molecular interaction of cigarette smoke carcinogens with enzymes involved in DNA repair pathways. In this continuation, Chapter “[Determination of \*murG\* Transferase as a Potential Drug Target in \*Neisseria meningitides\* by Spectral Graph Theory Approach](#)” deciphering the fundamentals for the determination of *murG* transferase as a potential drug target in *Neisseria meningitides* by spectral graph theory. Interestingly 3D structure of *murG* transferase has been suggested for further use in *in silico* drug designing by docking methods with suitable inhibitors. This is growing area of research, which has fruitful and novel use in wet laboratory and cancer research. Cancer or associated health concerns are becoming severe nowadays due to an increasing environmental exposure or toxicity. This exposure has a big source of agricultural solid wastes. Chapter “[Review processing, Properties and Applications of Agricultural Solid Waste: Effect of an Open Burning in Environmental Toxicology](#)” shows the pros and

cons of solid wastes. The wastes such as rice straw, husk, sugarcane bagasse, leaves or other biomass found good source of bioenergy or biofuel in this chapter, where as the open burning of these agricultural wastes has reported hazardous effect on human health and the environment. This article provides the pathway of mechanism and future recommendations for the use of agriculture wastes as a bioresource for the production of biofuel or bioenergy. Some of the waste has also use in biomedical science like silica nanoparticles, which could be synthesized from rice husk. Concerning medical sciences, Chapter “[Antibiotic Resistance Genes: An Emerging Environmental Pollutant](#)” gives an overview on the impact of antibiotics resistance bacteria (ARB) and antibiotic resistance genes (ARGs) as an environmental pollutant into different form of the environment. ARB and ARGs have been extensively detected in wastewater, agricultural soil, animal manure and hospital waste. This type of environmental pollution found more dangerous and causative for human health and need to be exploring by providing the experimental data. Now from Chapter “[Neurophysiological and Behavioral Dysfunctions After Electromagnetic Field Exposure: A Dose Response Relationship](#)”–“[Antibiotic Resistance Genes: An Emerging Environmental Pollutant](#)” it is very clear that day by day, our environment is getting highly polluted due to man-made sources. The above-reported types of environmental toxicants or pollutants are very dangerous for climate change and ecosystem, insects, soil organisms, and human beings. Chapter “[Biomarkers of Ecotoxicological Effects in Social Insects](#)” explores the biomarkers of ecotoxicological effects in social insects. For the ecotoxicity testing, biochemical, morphological, or behavioral parameters of living organisms have been set to biomarkers of exposure, effect or susceptibility or biomarkers of defense and damage. Social insects such as ants, drosophila are well indicators of the lifespan and healthy environment.

This is the first book ever providing comprehensive evidence on multidisciplinary approach of total environmental toxicity for students, research scholars, academicians, scientists, and layman. This book is fundamentally, theoretically, and principally strong to present the mechanisms of interaction of environmental toxicity and human health by flow diagrams. This book analyzes the carcinogenic, mutagenic, genotoxic, and neurotoxic effects of both anthropogenic and natural toxins present in water, soil, air, and our surroundings in the form of electro-pollution or electrosmog. All Chapters “[Neurophysiological and Behavioral Dysfunctions After Electromagnetic Field Exposure: A Dose Response Relationship](#)”–“[Toxicity of Protein and DNA-AGEs in Neurodegenerative Diseases \(NDDs\) with Decisive Approaches to Stop the Deadly Consequences](#)” have followup links from each other, and conclude that reactive oxygen species (ROS) is the responsible factor for all types of induced environmental toxicity and human health. I hope this book will serve as both an excellent review and a valuable reference for formulating suitable measures against environmental toxicology and for promoting the science involved in this area of research.

Finally, I would like to dedicate this book to my mother, late Parwati Devi. She passed away on 31 January 2016, and left her infinite blessings for all my success. I would like to thank my father, Dr. Arjundas Kesari, who has given me much encouragement and support. I would like to thank all authors who have contributed to this book. Last but not least, my special thanks go to series editor, publisher, and entire Springer team for their sincere assistance and support.

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