Preface

In the last few decades, our understanding of functional foods has increased greatly and people around the world are aware of the concept of functional foods. To them it is more than just a source of simple nutrition. People are starting to realize not only the physiological and nutritional value of these foods, but their health benefits as well. We now have a revolution in the way we understand nutrition and health.

Functional foods are an important part to the diet and play a vital role in health and nutrition. We may have different ways of defining “functional food”. However, it is any fresh or processed food which is supposed to have a health-promoting and/or disease-preventing property apart from providing only the basic nutritional function of supplying nutrients. In the general category we have processed food made from functional food ingredients, or fortified with health-promoting additives, like “vitamin-enriched” products, and also fresh foods (e.g., vegetables) that have specific health claims attached to them. Fermented foods with live cultures are often also considered to be functional foods with probiotic benefits. The most noteworthy aspects of functional foods are their biological functions that augment several health benefits to consumers due to the functional properties linked with them.

During the past few decades or so, consumption of functional foods has developed as a major health trend among conscious people who want to have a greater control over their health and well being. It is apparent that this life style trend will continue and gain momentum, so there is a continuous need for scientific information on all aspects of functional foods in this evolving sector. Being a part of a regular diet, functional foods are understood to provide a wide range of physiological benefits and potential health benefits. This book on functional foods discusses these and other functional properties of foods available and consumed by people. The book also reviews functional foods for the prevention and treatment of diseases from a multidisciplinary perspective and covers a wide range of topics. Although many topics have been included in this book, we do not claim the coverage to be comprehensive.

The necessity to provide a better understanding together with the need to disseminate the latest developments in this rapidly expanding field, this book, covers a wide range of functional foods, including the source of the functional foods, their history, functionality, chemical, physical and physiological properties, health benefits, mechanisms of antioxidant action, anticancer, antidiabetic properties, as well as clinical and epidemiological evidence. This book discusses the theoretical and practical aspects of functional foods, from the fundamental concepts of biochemistry, nutrition, and physiology to the technologies involved in food processing.

In recent years, the health-promoting effects of foods have evolved into an area of intense research and there is now a wealth of scientific evidence that supports the role of various foods and their components in promoting human health. Recently, a great deal of consideration has been made to anti-carcinogenicity, anti-mutagenicity, anti-oxidative and anti-aging properties of certain foods and such studies have revealed
their potential health significance. These studies have also provided an understanding of the relationship between diet and optimal health, particularly with respect to age-related degenerative disease risk reduction such as cancer, heart disease, osteoporosis, diabetes, and stroke. This book offers an assortment of important information on functional foods and provides scientific evidence on therapeutic applications of foods.

Due to potential health benefits of functional foods, consumers around the world have intensified their interest in food selection and preparation as a means of maintaining good health and also for protection against diseases and age related conditions. Such interest and changes in the approach of consumers, together with the continuous advances made in food science and technology, have provided food companies with substantial incentives to produce health-promoting foods and diets with advanced formulations that take into consideration the needs of the increasingly health conscious consumers who are interested in self-administered health care.

Today more and more people have the firm belief that traditional functional foods can reduce disease risk, maintain health, and thus make their dreams of having a long and healthy life come true. The history of traditional functional foods is based on herbal products which are in use as traditional medicines from time immemorial. This together with health care which is based on natural products has given new worldwide meaning to functional foods.

This book provides food scientists and technologists, food process engineers, biochemists, nutritionists, medical doctors, public health professionals, entrepreneurs as well as students and researchers interested in functional foods with comprehensive information on selected functional foods in terms of the physiological effects of foods and food components able to promote good health and prevent or alleviate diseases. Individuals who believe in the need for real foods that combine nutritional and medical benefits and who believe that such foods can be produced, will find this book to be immensely helpful. The information provided in the book would be of enormous help to those who are keen in preserving health through prevention of diseases. Augmented understanding of the role of functional foods will open new possibilities of producing new elements for nutritionally optimized foods that care of both the health and nutrition of a consumer.

This book will also be an invaluable source of information for a detailed understanding of the impact of functional food nutrients on human metabolic pathways. Therefore, researchers and policy makers in life sciences will find this information greatly resourceful for them. We believe a contemporary reference and source book such as this, which describes, distils, and disseminates important and relevant scientific information and advances in this field, is valuable for the flow of such information.

This book consists of a series of chapters focusing on the current state of functional properties of foods in relation to health and diseases. It examines health-promoting and therapeutic properties of functional foods and the resulting benefits to nutritional value and long-term health.

 Chapters 1 and 2 describe the contribution of functional foods to the prevention of cardiovascular health of humans and attempts to identify the role of dietary factors while bearing in mind the impact of physiologically active components. The chapter also covers the role of functional foods in the treatment of cardiovascular disorders. The chapters provide a better understanding of the current knowledge on the potential health benefits of different functional foods and bioactive compounds such as dietary fiber, omega-3 fatty acids, antioxidants, photochemical as well as probiotics, prebiotics and synbiotics and its relation to the health of heart and blood vessels.
Chapter 3 provides information on the abilities of functional foods to prevent and manage hypertension by virtue of their capability to influence bio-macromolecules in the cells. The chapter also describes the etiology and pathophysiology of hypertension and the role of functional components of foods such as long chain fatty acids, glucosinolate and polyphenols in the wellbeing of humans in relation to hypertension.

Chapters 4 and 5 focus on the potential health benefits of tea which contains a wide range of antioxidants. These chapters also summarize the history behind the consumption of tea and describe the current research on the mode of operation of the antioxidants as well as epidemiological evidence of health benefits of tea. The functionality and physiological properties of conventional and medicinal herbal tea in terms of their role in anti-aging and chronic diseases such as cancer has also been discussed.

Topics of Chapter 6 cover the functional benefits and risks of consumption of rice on human health. Heath benefits of rice are described in terms of antioxidant properties of rice and the presence of phytochemical such as flavonoids, tocopherol, tocotrienol, anthocyanins and steryl fevulate.

Chapter 7 describes the current research on kimchi, a traditional fermented Korean dish (made from vegetables using an assortment of seasonings and its health benefits) as a vegetable probiotic food. Health promoting effects of kimchi such as lipid lowering, antiatherosclerosis, antithrombotic, antihypertensive, antioxidant, anti-aging, anticancer, antiviral, anti-asthma, obesity preventing, skin care, etc. has been discussed.

Topics of Chapter 8 focus on the nutritional composition, presence of antioxidants and other bioactive substances in relation to the health rendering benefits of lentils. This chapter provides information on the presence of nutrients and bioactive phytochemicals that have prophylactic and therapeutic functional properties in lentils. It also describes the role of lentils in the management and prevention of several human chronic illnesses due to their anti-carcinogenic, hypo-glycemic, hypo-cholesterolemic properties together with their blood-pressure lowering activities.

Chapter 9 focuses on the potential health benefits of camel milk in relation to different bioactive components present in the milk. The presence of bioactive components such as oligosaccharide, conjugated linoleic acid, D and L amino acid have been particularly mentioned and the functional role of the constituents of camel milk on antidiabetic, antimicroiral, antioxidant, anticancer, hypoallergenicity and Angiotension Converting Enzyme (ACE) inhibitory activity has been described. The proposed mechanisms behind the activity of these bioactive components and potential health claims are also described.

In Chapter 10, the role of pomegranate (*Punica granatum* L.) and its extract in the treatment of various ailments is discussed, focusing particularly on antioxidants, phytochemicals and dietary fiber. Since ancient times pomegranates have been turned to for their immense medical benefits responsible for protection against a range of mild infections to several life threatening degenerative disorders. Pomegranate and its extracts as source of bioactive healthy components responsible for averting cardiovascular diseases, inflammatory and non-inflammatory disorders, type 2 diabetes, gastric ulcers, various types of cancers and neurodegenerative disorders have also been described.

Chapter 11 discusses the beneficial health effects of soy and soy products in addition to their nutritive value. The chapter focuses on the relationship between functional bioactive components of soybean, such as isoflavones and equol, and their health benefits. The mode of action and the role of isoflavones on menopause symptoms, bone health, cardiovascular and central nervous system and hormone-dependent cancers have been illustrated in this chapter.

Chapter 12 covers the functional benefits of plant food, Yerba Mate. This chapter is devoted to different functional properties of this plant food. Some of the yerba health benefits are less widely known, at least for those who do not live in a yerba-drinking part of the world. It is used as an antioxidant and
antimicrobial agent. It is also used for the improvement of oral health. This chapter elaborates the role yerba mate has in cancer prevention, as a hypo-cholesterolemic agent and as a source of photochemicals. Relationship between bioactive food components and their health benefits has also been discussed.

Chapter 13 discusses some of the important functional foods of the Indian subcontinent. It describes the presence of various chemical and biological functional components and their role in improving human health. The functional constituents of various food commodities consumed by the people of the Indian Subcontinent e.g., cereals, legumes, oilseeds, milk and milk products, herbs and condiments and exotic fruits such as Ber (*Ziziphus*), Jamun (*Syzgium cumini*) has been described in this chapter. Consumption of such food on the corrective and preventive potential of gastrointestinal health, bone health, cardiovascular diseases, various types of cancers, neurodegenerative diseases, ill-effects of obesity, and metabolic syndrome has also been illustrated.

Chapter 14 discusses the unique nutritional and health-promoting bioactive compounds present in traditional African foods that contribute to human health and influence various physiological pathways involved in health promotion. The chapter also outlines the abilities of functional components of traditional African foods to prevent and manage chronic diseases, such as diabetes, hypertension, obesity, cardiovascular diseases, cancer, and others. The chapter also includes the health benefits of traditional African fermented foods.

Chapter 15 mainly focuses on the antioxidant functional components of different foods and identifies the role of antioxidant/pro-oxidant substances present in different foods on health benefits. The chapter also describes the association of health improvement and prevention of disease in relation to consumption of natural foods containing various antioxidant molecules.

Chapter 16 reviews the current literature on the history, composition, classification and functional properties of edible film coating, with regard to controlling microbiological growth and extension of shelf-life of various foods. The chapter also presents the action of microbial films and coatings on food, uses of antimicrobial food agents and additives in edible films with respect to food sensory quality and nutrition. The impact and advantages of edible film coating in terms of food safety and consumer acceptability and health benefits has also been discussed.

Finally, Chapter 17 deals with sulfur supplementation to pigs and its impact on growth performance and meat quality, and ways to enhance nutritional and functional values, extend shelf-life; improve sensory quality characteristics and health benefits etc. This chapter further discusses the current status, consumer acceptance, and market for functional foods from a global viewpoint. Future prospects for functional meat and meat products are also discussed.

Functional foods in nutrition and health benefit is a rapidly advancing area of research and this book discusses the science behind these foods and offers a great deal of information on how they can be used to fight disease and improve overall health. This book will serve as a useful source book in understanding what functional food is, its impact, potential, and how it relates to the well-being of human. The chapters are clear, easy to read, and interesting for anyone who wishes to become more knowledgeable about functional foods. This book is a compilation of various aspects of functionality and health benefits of selected functional foods of the world.
Preface

1. Food and Cardiac Health: Protective effects of food on cardiovascular system by Aditi Jain and Vibha Rani
2. Functional foods and cardiac health by Santosh Jain Passi
3. Functional Food in hypertension by Anil Kumar Gupta
4. Health benefits of tea by Sumonto Mitra and Shashi Khandelwal
5. Herbal benefits of tea by Eteter Roland Eshiet and Ernest E. Smith
6. Health benefits and Risks of Rice by Zakir Hossain Howlader and Hussain Uddin Shekhar
7. Health promoting effects of kimchi by Kim Hyun Ju and Han Eung-Soo
9. Functional properties of camel milk by Omar Amin Alhaj
10. Pomegranate peel and fruit extracts - a novel approach to avert degenerative disorders by Saeed Akhtar, Tariq Ismail and Muhammad Riaz
11. Soy and soy products, isoflavones, equol and health by Baltasar Mayo, Lucia Guadamuro, Ana Belen Florez and Susana Delgado
12. Yerba Mate: Chemistry, technology and biological properties by Roberto Buffo
13. Functional foods of Indian subcontinent by Jiwant S. Sidhu and Tasleem A. Zafar
14. Traditional African foods and their potential to contribute to health and nutrition by John H. Mayonga, Sophie Nansereko, Ilona Steenkamp, Marena Manley and Judith Kanensi Okoth
15. Food in Health Preservation and Promotion - A Special Focus on the Interplay between Oxidative Stress and Pro-oxidant / Antioxidant by Saikat Sen and Raja Chakraborty
16. Antimicrobial edible films and coatings for fruits and vegetables by Amrita Poonia
17. Application of the dietary processed Sulphur supplementation for enhancing nutritional and functional properties of meat products by Chi Ho Lee

There are several professional books on this subject matter and the choice for any particular one depends on the needs of the users. The 17 chapters in this book represent collections of selected reviews on the role of functional foods in nutrition and health benefits from a multidisciplinary perspective. It not only introduces functional foods, but also shows the investigations and research that led to their creation with modern approaches in the prevention and treatment of chronic diseases such as cardiovascular disease. As functional foods continue to become popular worldwide, a concrete understanding of these functional foods will help food scientists take advantage of them to better maintain and promote health.

Each chapter has been contributed by dedicated professionals from across the globe representing academia, government institutes, and industry. We hope this book would be a valuable information source and reference book for scientists of diverse backgrounds including biologists, biochemists, chemists, dieticians, food scientist, and nutritionists, medical doctors and pharmacologists from universities, research institutes, and food industries. We sincerely hope this book addresses the needs of its readers and advances their understanding and knowledge of functional food. We believe that this book will lead to further stimulation of research and development in this emerging field, and will provide consumers with up-dated information about products that could reduce disease risk and assist them in maintaining a healthy lifestyle. It is a joint effort of many individuals who worked hard to make this book a comprehensive one. This effort signifies significant cooperation and outstanding teamwork.
We express our gratitude to all the contributing authors who accepted our invitation to give their time and effort and share the expertise they have achieved through their hard work and extensive research. We also thank the reviewers for giving their valuable comments leading to improvements in the contents of each chapter. We acknowledge and thank the members of the production team at IGI for their time, effort, advice, and expertise, especially, Ms. Erin O’Dea and Ms. Courtney Tychinski for their guidance and support to this project. They are the ones who made this book possible. It has been a pleasure to work with IGI publisher and the co-operation of the editorial and production staff is highly appreciated. We are grateful to our families and the institution we work for. It would not have been possible for us to publish this book without their endless encouragement and their faith in us.

Yearul Kabir  
On behalf of the Editors