



Bharat B. Aggarwal • Ajaikumar B. Kunnumakkara
Editors



Molecular Targets and Therapeutic Uses of *Spices*

Modern Uses for
Ancient Medicine



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Dedicated to

**Our Sages, Rishis, Saints, Acharyas,
Scientists, Gurus and Parents whose wisdom
continues to inspire and guide us!**

***“Gururbrahma Gururvishnu Gururdevo Maheshwrah,
Guru Sakshat Parm Brahma Tasme Srigurve Namaha”***

***Yatkaromi Yatashnami Yajjuhomi Dadami Yat
Yatpsyami Kountiya Tatkromi Tavarpanam
(modified from Srimad Bhagwad Gita 9-27)***

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PREFACE

It is believed that Spices is the reason that brought Romans, Jews and Arabs to India. The search for spices was also the impetus for Christopher Columbus's discovery of America and for Vasco de Gama's voyage from Portugal to India, in the 15th century, along what is now called the "Spice Route". The Indonesian island where the nutmeg, cloves, cinnamon, ginger, turmeric and mace were grown is now called "Spice Island". Here, wealthy ladies kept spices in lockets around their necks so they could freshen their breaths, and gentlemen added nutmeg to food and drink. Spices were also used for medicinal purposes, especially in the relief of colic, gout, wounds, and rheumatism. Because of the great demand for spices, their prices soared, and so expeditions were launched to find their source and secure them for Europe. This struggle led to fights between Arabs, Portuguese, Spanish, French, British, and Dutch governments during the 17th and 18th centuries.

This monograph focuses on the medicinal aspects of these spices. Where is the evidence that these spices have medicinal value? Hippocrates remarked almost 25 centuries ago "*Let food be thy medicine and medicine be thy food*". This aphorism parallels the common American saying "you are what you eat" and the current recommendation from the United States National Institutes of Health to consume as many as "12 servings of fruits and vegetables a day" to prevent common diseases. How spices and their components affect disease and what are their molecular targets, is the collective focus of this book. We intend to demonstrate that, like modern medicine, ancient medicine, including its pharmacopeia, was evidence-based but based on technology different from that of today. We are fortunate that this is so, because products that are safe and yet efficacious

are needed today more than ever before. Overall, we hope that the information provided in this book is useful to scientists, clinicians, herbalogists, naturopaths, and above all the people who use such products. We would like to thank all the contributors who made this book possible and Divya Danda for the cover design. We hope that this book will justify “*Adding Spice to Your Life*”.

Bharat B. Aggarwal, Ph.D.
Ajaikumar B. Kunnumakkara, Ph. D.

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ABOUT THE EDITORS

Dr. Bharat B. Aggarwal is a Professor of Medicine, Immunology, Biochemistry, Experimental Therapeutics, and Chief of the Cytokine Research Laboratory at the University of Texas M.D. Anderson Cancer Center, Houston. He currently holds the Ransom Horne, Jr., Endowed Professorship in Cancer Research. He earned his PhD in biochemistry from the University of California, Berkeley, did his postdoctoral fellowship at the University of California Medical Center, San Francisco and then worked for almost ten years with Genentech before moving to Texas. Dr. Aggarwal was the first to isolate TNF- α and TNF- β and identify their receptors.

He has published more than 500 original articles in peer-reviewed journals, currently serving on the editorial boards of more than a dozen journals, edited 12 books and granted 35 patents. He has delivered more than 300 lectures, both nationally and internationally, and has been listed as one of the “World’s Most Highly Cited Scientists”. He has received numerous awards, most recently the Ranbaxy Award, an Outstanding Scientist Award from the American Association of Indian Scientists in Cancer Research, and a McCormick Science Institute Research Award from the American Society of Nutrition. The primary focus of Dr. Aggarwal’s research is the role of inflammatory pathways in tumorigenesis and other diseases and their modulation by natural products including dietary agents, spices, Ayurvedic medicine, and traditional Chinese medicine.

Dr. Ajaikumar B. Kunnumakkara is currently working at the Signal Transduction Section of the Medical Oncology Branch, National Cancer Institute, National Institute of Health, Bethesda in USA. He obtained his PhD in biochemistry from University of Calicut, Kerala (the land of spices where Vasco De Gama first landed), India; did his postdoctoral work at the University of Texas M.D. Anderson Cancer Center in Houston, Texas. Dr. Kunnumakkara has published more than 40 original articles and review papers in peer-reviewed journals, and has authored seven book chapters. The primary focus of his research is to identify safe, efficacious and affordable anti-inflammatory, antitumor and antimetastatic compounds from natural sources and to develop different *in vivo* models for biomedical research.