

Preface

The fine-tuning of cellular signaling pathways is pivotal for maintaining homeostasis in the living organism. Therefore, disruption of any of the signal transduction pathways can lead to severe cellular dysfunction. Current research continues to increase its attention on the role of nutrition and diet in modifying oxidative and inflammatory damage in the progression of disease. *Dietary Modulation of Cell Signaling Pathways* reviews some of the latest research findings, focusing on nutrient–gene interactions with particular emphasis on the intracellular signaling network.

Dietary modulation of specific gene expression systems highlights underlying molecular and cellular mechanisms. Numerous reports have demonstrated the effects on health and disease of nutrition and specific dietary components, organic and mineral micronutrients, and other food-based and natural-source ingredients. Hence, dietary substances influence and modulate many vital aspects of cell regulation, such as the cell cycle, pathway of biosynthesis and degradation, metabolism, and apoptosis.

Much evidence shows that consumption of natural source substances confers chemopreventive and cytoprotectant activities. A now legendary report by Paul Talalay and colleagues (*Proceedings of the National Academy of Science USA*, vol. 77, pp. 5216–5220, 1980) demonstrated the induction of phase 2 enzymes like NAD(P)H:quinone reductase by dietary antioxidants.

Dietary ingredients that affect signaling are usually small molecules of plant origin with a broad range of molecular structures, including those having the properties of Michael acceptors (e.g., olefins or acetylenes conjugated to electron withdrawing groups). Some of these molecules like those with phenolic hydroxyl groups are also potent antioxidants, that is, are bifunctional cytoprotective substances. There is also direct evidence that sulfhydryl groups of enzymes (e.g., phosphatases) and proteins (e.g., Keap 1) are critical targets modulated by oxidative and inflammatory conditions as well as dietary substances. Several chapters in this book describe nutrient actions on activation of antioxidant (Nrf2) and inflammatory (NF- κ B) transcription factors, and induction of their target gene expression.

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on state-of-the-art research of their own specialty. We hope this volume will contribute to the developments in this rapidly expanding and highly important area of biomedical research.

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