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Introduction to the Special Issue: Dietary Natural Compounds

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Preface

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Natural bioactive ingredients from either plant-based medicine or diets rich in fruits, vegetables, and grains have different biological benefits in body systems. Since ancient times, natural compounds are constantly being discovered to have health-promoting effects and reduce the risk of developing chronic diseases. Despite their abundance in nature and perception as safe, natural compounds (flavonoids and non-flavonoids) present poor absorption, inefficient systemic delivery, and poor oral bioavailability that could reduce their bioefficacy. Thus, selecting suitable techniques, methods, and models to enhance their bioactivity as well as developing new bioactive components for the food system are valued.

This Special Issue, Dietary Natural Compounds, consists of 19 review articles that focus on the potential biological benefits and molecular effects of various herbal extracts/phytocompounds. The first three reviews broadly delineate various types of emulsion systems and extraction methods for enhancing the bioavailability, while the other 15 reviews focus on the functional properties and their underlying mechanisms of various dietary natural compounds. Of the 15 reviews, two summarize the production, bioactivity, and application of black garlic and classification of dietary fiber (DF), and the remaining 14 reveal potentially useful chemopreventive effects and positive health benefits.

The healthful properties of bioactive phenolics depend on their bioavailability for intestinal absorption, metabolism, and subsequent interaction with target tissues. Therefore, enhancing their solubility, preventing their degradation in the intestinal environment, elevating the permeation in small intestine, and even increasing their contents in the bloodstream are key methods for exerting their biological effects. In the first review, Dr. Hu classifies food polyphenols and illustrates the methods on improving bioavailability. Dr. Hu and his co-workers also believe that food macromolecules based nanodelivery systems are the most suitable option for applications in functional foods and medicine. The second review by Dr. Hu et al. provides the current available analytical methods and techniques to ensure the successful development of delivery systems and efficiently characterize these quality parameters of emulsion systems. In addition to delivery systems, extraction methods are related with bioavailability. In the third review, Dr. Lu et al. discussed various extraction methods for major capsaicinoids from fresh pepper fruits and dried samples in addition to a review of their stability, bioaccesbility, bioavailability, pharmacological effects, and underlying mechanisms. In the fourth review, Dr. Dai and Dr. Chau discuss the history and evolution of the state of dietary fiber (DF) in terms of refinements of extraction methods and legal definitions subsequent to the launch of DF hypothesis. In the fifth review, Dr. Xiao et al. summarized the extraction, isolation, and characterization of volatiles and bioactive molecules in *G. jasminoides*.

Although chemical compositions and analytical methods play an important role in the definition of bioactive compounds, manufacturing processes have also been taken into consideration. In the sixth review, Dr. Kimura and co-workers summarize the changes in garlic components and reported that black garlic (BG) exhibits several advantages compared to fresh garlic. Among them, controlling the amount of active components might be difficult due to influential factors during the aging process, which include temperature, humidity, and fermentation. Furanocoumarins are a specific group of secondary metabolites that also are commonly affected by several environmental conditions, such as processing techniques, storage, temperature, and packing materials. In the seventh review, Dr. Hung et al. investigated the biosynthetic pathway, analytical methods, distribution, and molecular mechanisms of grapefruit furanocoumarins. In the course of food processing, heating, and storage, the Maillard reaction has been demonstrated to produce excessive advanced glycation end products (AGEs) and cause many chronic diseases in organisms, including diabetes mellitus (DM). In the eighth review, Dr. Yeh et al. collect recent literature concerning the antiglycation mechanisms of polyphenols on the generation of AGEs and methylglyoxal (MG).

Until now, dietary phytochemicals from food and herbs have health benefits, mainly due to their antioxidant and anti-inflammatory characteristics. Recent investigations have revealed that oxidative stress is an important element in metabolic diseases and carcinogenesis. Based on this reason, more and more models have been established for evaluation and identification of the bioactivity of active components. The Intestinal functions with gut microbiota have received great attention . It is well known that the intestines play crucial

roles in health maintenance and disease prevention. In the ninth review, Dr. Shimizu discuss the multi-funcions of dietary polyphenols in the regulation of intestinal inflammation. In the 10th review, Dr. Tung et al. introduced differentiation models of murine preadipocyte (3T3-L1) cell line and describe the possible antiobesity mechanism of selected phytochemicals from food and herbs. In the 11th review, Dr. Castaneda et al. proposed the mechanistic roles and multiple targets of nutraceuticals in the activated macrophage models. In the 12th review, Dr. Tu et al. update and discuss key findings from *in vitro* and *in vivo* studies on apples and their biocompounds, with a special focus on their anticancer role. In the 13th and 14th reviews, Dr. Chen and Dr. Tsai et al. describe the most popular stilbenoids, including pterostilbene, resveratrol, and 3′-hydroxypterostilbene, on the therapeutic/preventive actions and molecular targets for the management and treatment of chronic disorders, such as skin diseases, heart disease, stroke, cancer, diabetes, and obesity. In the 15th review, Dr. Idehen et al. reviewed available information regarding barley phytochemicals and their potential to combat common nutrition-related diseases. In the 16th review, Dr. Lou et al. report the quantitative and qualitative data as well as biological activity of kumquats and calamondins for their potential applications. The 17th review summarizes the natural dietary compounds derived from common dietary foods and plants and their possible mechanisms of action in the prevention/suppression of contaminant-induced toxicity.

In this special issue, 2 reviews focused on the medicinal application and biopharmaceutical potential of *Prosopis* spp. and *Cordyceps sinensis* (CS). In the 18th review, Dr. Henciya et al. reveal the origins, distribution, folk uses, chemical components, biological functions, and applications of different representatives of *Prosopis*. In the 19th review, Dr. Chen et al. briefly described the *in vitro* and *in vivo* effects of *C. sinensis* and cordycepin on mouse Leydig cell steroidogenesis, proposing their functional enhancement in male reproduction.

Firstly the editor kindly thanks the authors for their contributions of their manuscripts in this special issue. We hope this issue will stimulate the readers to conduct further researches in the field of dietary natural compounds, which can be applied as functional food products in the future. The editor also thanks Dr. Lucy Sun Hwang, Editor-in-Chief of the Journal of Food and Drug Analysis (JFDA), for inviting me to serve as Guest Editor of this Special Issue, and Ms. Hsiang-Pin Chiu JFDA for technical assistance.

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