
Advances *in* Food *and* Nutrition Research

Application of polyphenols in foods
and food models

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Volume Editor
Daniel Granato





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and Food Models

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ADVANCES IN FOOD AND NUTRITION RESEARCH

Application of Polyphenols in Foods
and Food Models

Edited by

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Preface

This volume of *Advances in Food and Nutrition Research* comprises eight chapters written by an international board of authors and reports the latest developments in relevant and interesting topics about the technological applications of phenolic compounds in food models. Topics of the book chapters are related to the classification, methods of identification, and general beneficial effects of phenolic compounds in human health, application of polyphenols in food preservation, for the development of nondairy foods and beverages, meat-based foods, baked products, and conjugates (phenolic compounds—proteins). In addition, one chapter is dedicated to the cell-based evaluation of the bioactivity (cellular antioxidant activity) and some initial toxicological evaluation (i.e., cytotoxicity) of phenolic compounds.

Chapter 1 reviews published articles and database of dietary polyphenols to draw a profile for the classification, structural identification, quantification methods, and biological activities mainly based on enzymes, cell bioassay, and animal models, as well as the population-based investigation about the alleged health effects of polyphenols. **Chapter 2** describes the use of phenolic compounds in different food preservation (i.e., extension of shelf life) applications and the mechanisms of action. As some phenolic compounds have antioxidant and antimicrobial activities, plant-derived polyphenols can be a suitable alternative to synthetic additives used in the food industry. **Chapter 3** is an integration between food chemistry, food technologies with a glimpse of biochemistry, and pharmacology to produce phenolic-rich extracts. The application of these extracts in the development of nondairy foods and beverages is described together with practical guidance on the toxicological safety and bioactivity of polyphenol-rich extracts in different foods and beverages. **Chapter 4** presents the properties of by-products from the industrial processing of different berry fruits and the environmentally friendly technologies for the pretreatment of the raw materials and includes the description of new green-based extraction procedures to obtain new ingredients rich in phenolic compounds. In addition, a focus is given on the modification and recovery of the polyphenols, as well as the formulation and stabilization of the ingredients. **Chapter 5** is focused on two main streams: meat products added with phenolic-rich extracts and active and edible packaging materials. Authors put emphasis on the use of encapsulation

techniques to deliver and protect compounds from chemical degradation and the combined use of polyphenols and nonthermal technologies to improve the shelf life of meat products. [Chapter 6](#) focuses on the use of extracts rich in different phenolic compounds to manufacture bakery foods, including breads, cakes, cookies, muffins, rolls, buns, crumpets, pancakes, doughnuts, waffles, and bagels. The role of these extracts in mitigating reactive carbonyl species and the subsequent formation of advanced glycation end products, antioxidant, and antimicrobial activities are also discussed.

[Chapter 7](#) describes the interconnection between oxidative stress, cancer, phenolic compounds, and antiproliferative activity as a way to increase the use of cell-based protocols to screen the bioactivity and toxicological safety of phenolic-rich extracts and foods. In vitro techniques and their biological applications, such as in the evaluation of cell viability and intracellular measure of reactive oxygen assays, are also debated. Finally, [Chapter 8](#) focuses on the methodology for the production and characteristics of protein-phenolic compounds conjugates and their applications in various food systems and nutraceutical field, such as emulsions, edible films, hydrogels, controlled-release nutraceuticals, and nanoparticles.

In summary, this volume presents the combined efforts of 24 professionals developing their research in 6 countries (USA, Brazil, Finland, China, Thailand, Spain) with a variety of background and expertise. The Editor personally thanks the production staff and all the contributors for sharing their experience and for making this book possible.

DANIEL GRANATO
Editor