

PROBIOTICS AND PREBIOTICS



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# BIOACTIVE FOODS IN PROMOTING HEALTH: PROBIOTICS AND PREBIOTICS

Edited by

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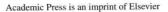
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Academic Press is an imprint of Elsevier

32 Jamestown Road, London NW1 7BY, UK 30 Corporate Drive, Suite 400, Burlington, MA 01803, USA 525 B Street, Suite 1900, San Diego, CA 92101-4495, USA

First edition 2010

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### British Library Cataloguing-in-Publication Data

A catalogue record for this book is available from the British Library

### Library of Congress Cataloging-in-Publication Data

A catalog record for this book is available from the Library of Congress

ISBN: 978-0-12-374938-3

For information on all Academic Press publications visit our website at www.elsevierdirect.com

Typeset by Macmillan Publishing Solutions www.macmillansolutions.com

Printed and bound in United States of America 10 11 12 13 14 10 9 8 7 6 5 4 3 2 1

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# BIOACTIVE FOODS IN PROMOTING HEALTH: PROBIOTICS AND PREBIOTICS

# Preface

By use of probiotics people can dramatically expand their exposure to protective chemicals and thus readily reduce their risk of multiple diseases. Specific foods, individual fruits or vegetables and their by-products are biomedicines with expanded understanding and use. However, which bacteria and their metabolism of bio-molecules in the diet are best to prevent with disease or promote health? How can their growth be stimulated? What dietary supplements will help the bacteria proper and provide health benefits? This book focuses on probiotics and their role in bio-modulation of natural products to produce active agents from inactive molecules in dietary fruits and vegetables.

This book brings together experts working on the different aspects of supplementation, foods, and bacterial preparations, in health promotion and disease prevention. Their expertise and experience provide the most current knowledge to promote future research. Dietary habits need to be altered, for most people. Therefore, the conclusions and recommendations from the various chapters will provide a basis for change.

Probiotics and prebiotics are dietary supplements. They are now a multi-billion-dollar business which is built upon limited but growing research data. For example the U.S. Food and Drug Administration is pushing the whole dietary supplement industry, with the support of Congress, to base its claims and products on scientific research. Since common dietary bacterial preparations are over-the-counter and readily available, this book will be useful to laymen who apply it to modify their lifestyles, as well as to the growing nutrition, food science, and natural product community. This book focuses on the growing body of knowledge on the role of various bacteria in reducing disease.

Expert reviews define and support the actions of bacteria; materials that promote gastrointestinal organisms, bacteria modified biomolecules they make as well as modified from other materials that are part of the diet. As such probiotic bacteria with health-promoting activities may have biological activity. Therefore, their role is a major emphasis, along with discussions of which agents may be the active components.

The overall goal is the most current, concise, scientific appraisal of the efficacy of key foods and constituent bacteria and their growth promoting food sources, in preventing disease and improving the quality of life. This book reviews and often presents new hypotheses and conclusions on the effects of different bioactive components of probiotics to prevent disease and improve the health of various populations.

# Acknowledgments

The work of editorial assistant, Bethany L. Stevens, in communicating with authors, working with the manuscripts and the publisher was critical to the successful completion of the book and is much appreciated. Her daily responses to queries and collection of manuscripts and documents were extremely helpful. Support for her work was graciously provided by the National Health Research Institute as part of its mission to communicate to scientists about

bioactive foods and dietary supplements was vital (http://www.naturalhealthresearch.org). This was part of their efforts to educate scientists and the lay public on the health and economic benefits of nutrients in the diet as well as supplements. Finally Nguyen T. Nga and Mari Stoddard of the Arizona Health Sciences library was instrumental in finding the authors and their addresses in the early stages of the book's preparation.

# **Abbreviations**

3', 5'-cyclic adenosine monophosphate cAMP AOS Acidic oligosaccharides **AHCC** Active hexose correlated compound Alginates containing high percentages of mannuronic acid polymers High-M alginates (IBS-A) Alternating IBS Antibiotic-associated diarrhea AAD AE Atopic eczema BT Bacterial translocation Bifidobacterium Mixed Species **BSM BBB** Blood-brain barrier BMI Body mass index Branched-chains fatty acids **BCFA** Clostridium difficile-associated diarrhea CDAD Center of Disease Control (in China), The CDC **CSF** Cerebrospinal fluid **CrEDTA** Chromium-labeled ethylenediaminetetraacetic acid Clostridium difficile-associated diarrhea CDAD Colitis ulcerosa (ulcerative colitis) UC **CFU** Colony-forming units CP Conditional pathogens CS Conditional susceptibility Confederation of the Food and Drink Industries of the EU (in French) CIAA Constipation-predominant IBS (IBS-C) **CMA** Cow milk allergy Crohn's disease CD Denaturing gradient gel electrophoresis DGGE Derjaguin, Landau, Verwey and Overbeek Theory DLVO theory Dextran sulfate sodium DSS Diarrhea-predominant IBS (IBS-D) Dietary fibers DF Dinitrobenzene sulfonic acid DNBS Double-blind, placebo-controlled, randomized intervention trial **DBRCT** Enterohemorrhagic Escherichia coli **EHEC** Enteroinvasive Escherichia coli EIEC **EPEC** Enteropathogenic Escherichia coli Enterotoxigenic Escherichia coli **ETEC** 

European Food Safety Authority

**EFSA** 

Fluorescence <i>in situ</i> hybridization Food for Specified Health Uses (in Japan) Food with Health Claims (in Japan) Food with Nutrient Function Claims (in Japan) Fructo-oligosaccharides	FISH FOSHU FHC FNFC FOS
Gastrointestinal tract Gastrointestinal Generally Recognised As Safe Genetically modified organisms Germinated barley foodstuff Global symptom scores Glutathione peroxidase Group B Streptococcus Gut-associated lymphoid tissue	GIT GI GRAS GMOs GBF GSS GPO GBS GALT
Human intestinal epithelial cell line from colorectal adenocarcinoma Human intestinal epithelial cell line from colorectal carcinoma Human milk oligosaccharides	Caco-2 T84 HMOS
Immunoglobulin M Inducible nitric oxide synthase Infant milk formula Inflammatory bowel diseases Inhibitory protein kB Interleukin International Life Science Institutes Irritable bowel syndrome	IgM iNOS IMF IBD IkB IL ILSI IBS
Joint Health Claims Initiative (in UK)	JHCI
Lactic acid bacteria Lactobacillus rhamnosus strain GG Lipopolysaccharide	LAB LLG LPS
Mesenteric lymph nodes Microentrapment Minimal inhibitory concentration Ministry of Health, Labor and Welfare (in Japan) Mitogen-activated protein kinase Mucin Myeloperoxidase	MLN ME MIC MHLW MAPK MUC MPO
National Health Surveillance Agency (in Brazil) Necrotizing enterocolitis Neonatal sepsis and meningitis Non-digestible oligosaccharides Non-pathogenic microbiota Non-susceptibility	ANVISA NEC NSM NDOs NP NS

No-observed-adverse-effect level Nuclear factor κB Nucleotide oligomerization domain Nutrition and Health Claim Oligofructose Oligosaccharides Oral rehydration solution	NOAEL NFkB NOD NHC OF OS ORS
Peptidoglycan Phosphatidylinositol 3-kinase Phosphoenolpyruvate transport system Phosphotransferase system Polydextrose Polydextrose Polyethylene glycol Protein kinase C	PGN PI3K PTS PTS PDX PEG PKC
Qualified Perception of Safety Qualified Presumption of Safety Randomized control trial Raw potato starch Reactive oxygen species Resistant starches	QPS QPS RCT RPS ROS RS
Scientific Committee on Animal Nutrition Scientific Committee on Food Scoring index for atopic dermatitis Senescence-accelerated mouse Severe combined immunodeficiency Sexually transmitted diseases Short-chain fructo-oligosaccharides Short circuit current Short-chain fatty acids Small intestinal bacterial overgrowth Soluble dietary fiber Spontaneous bacterial peritonitis Spray coating State Food and Drug Administration (in China), The Superoxide dismutases Systemic inflammatory response syndrome	SCAN SCF SCORAD SAM SCID STD SC-FOS I <sub>sc</sub> SCFAs SIBO SDF SBP SC SFDA SODs SIRS
Technical Scientific Commission on Functional Foods and Novel Foods (in Brazil) Tight junction Toll-like receptors (trans-)galacto-oligosaccharides Transgalactosylated oligosaccharides	TJ TLRs TOS or GOS TOS

Transepithelial electrical resistance Trinitrobenzene sulfonic acid Tumor necrosis factor	TEER TNBS TNF
Unconditional pathogens Unconditional susceptibility	UP US
Very low birth weight	VLBW
Water availability Widespread antibiotic use	a <sub>w</sub> WAU
Xylo-oligosaccharides	XOS
Zonula occludens proteins 1, 2, 3	ZO-1, -2, -3

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