

Contents

List of Contributors	xii
Preface	xv
Acknowledgments.....	xvii
I	
NON-NUTRITIONAL COMPONENTS IN DIET AND SUPPLEMENTS, NUTRACEUTICALS AND THEIR ROLE IN HEALTH PROMOTION IN THE MATURE ADULT	
1. A Traditional Elder's Anti-Aging Cornucopia of North American Plants	
MARIA PONTES FERREIRA, JACLYN PALMER, ELDER BETTY MCKENNA AND FIDJI GENDRON	
1.1 Introduction	3
1.2 Indian Breadroot (<i>Pediomelum esculentum</i> (Pursh) Rydb. formerly <i>Psoralea esculenta</i> Pursh)	4
1.3 Gumweed (<i>Grindelia squarrosa</i> (Pursh) Dunal)	5
1.4 Labrador Tea (<i>Ledum</i> spp.)	7
1.5 Blueberry (<i>Vaccinium</i> spp.).....	8
1.6 Conclusion	9
References.....	9
2. Alzheimer's Disease: Current Perspectives – Animal Models, Drugs Under Development, and Potential Nutritional Intervention	
JHANSI RANI VANGAVARAGU, PRABHAKAR VISSAVAJJHALA AND C. DAMODAR REDDY	
2.1 Introduction	13
2.2 Incidence and Prevalence: Global and US Statistics	14
2.3 Economic Impact and Healthcare Costs.....	15
2.4 Molecular Basis.....	16
2.5 Medication	17
2.6 Experimental Animal Models and Therapeutic Approaches.....	18
2.7 Recent Drug Development Efforts.....	21
2.8 Scope of Nutritional Intervention.....	23
2.9 Insights and the Future	23
References.....	25
xi	3. Amla in the Prevention of Aging: Scientific Validation of the Ethnomedicinal Claims
RASHMI TERESA MATHAI, RAEES TONSE, FAIZAN KALEKHAN, MARSHALL DAVID COLIN, HALADI SUDHIR PRABHU, SAHANA RAO AND MANJESHWAR SHRINATH BALIGA	
3.1 Introduction	29
3.2 Traditional and Validated Uses.....	29
3.3 Conclusion	34
References.....	34
4. Sarcopenia – Potential Beneficial Effects of Creatine Supplementation	
SCOTT C. FORBES, DARREN G. CANDOW AND KATHERINE MCLEOD	
4.1 Introduction	37
4.2 Creatine and Aging.....	38
4.3 Timing of Creatine Supplementation.....	38
4.4 Safety of Creatine for Older Adults	38
4.5 Summary.....	39
References.....	39
5. Dietary Spices in the Prevention of Rheumatoid Arthritis: Past, Present, and Future	
MANJESHWAR SHRINATH BALIGA, PRAJWAL PRABHudev MANE, JOZY TIMOTHY NALLEMGERA, KARADKA RAMDAS THILAKCHAND AND FAIZAN KALEKHAN	
5.1 Introduction	41
5.2 Use of Complementary and Alternative Medicines in the Treatment of Arthritis.....	42
5.3 Conclusions	46
References.....	46
6. Medicinal Benefits of Ginger in Various Gastrointestinal Ailments: Use in Geriatric Conditions	
KAMALJEET KAUR, ARPIT SAXENA, RAGHAVENDRA HANIAOKA, ELROY SALDANHA, PRAJNYA D'SILVA, VENKATESH PONEMONE, RAJA FAYAD AND MANJESHWAR SHRINATH BALIGA	
6.1 Introduction	51
6.2 Ginger in Traditional Medicine.....	52
6.3 Chemistry of Ginger	52
6.4 Ginger in Gastrointestinal Ailments.....	52
6.5 Conclusions	57
References.....	58

7. Foods and Dietary Supplements in the Prevention and Treatment of Neurodegenerative Diseases in Older Adults

SEYED ALI MOSTAFAVI AND SAEED HOSSEINI

7.1 Introduction	63
7.2 Dementia and Alzheimer's Disease.....	63
7.3 Multiple Sclerosis.....	64
7.4 Parkinson's Disease.....	65
7.5 Dysphagia in Neurodegenerative Diseases	66
7.6 Conclusion	66
References.....	66
Further Reading.....	67

II

NUTRACEUTICALS IN CHRONIC DISEASE AND CANCER THERAPY IN SENIORS

8. Targeting Mitochondria for Healthy Brain Aging

HEATHER M. YONUTAS, ELIZABETH HEAD AND PATRICK G. SULLIVAN

8.1 Introduction	71
8.2 Mitochondria Bioenergetics.....	71
8.3 Changes that Occur in the Brain with Age.....	73
8.4 Age-Related Cellular Dysfunction and Association with Alzheimer's Disease.....	74
8.5 Dietary Supplementation Targeting Mitochondrial Function to Improve Age-Related Cognitive Deficits.....	75
8.6 The Importance of Canine Studies in Age-Related Cognitive Deficits.....	77
8.7 Summary.....	78
Acknowledgments	78
References	78

9. The Progression of Non-alcoholic Fatty Liver Disease and Lifestyle Intervention in Older Adults

XIAOFANG JIA, HISAO NAITO, KAZUYA KITAMORI, HUSNA YETTI AND TAMIE NAKAJIMA

9.1 Introduction	85
9.2 Prevalence of NAFLD and NASH.....	85
9.3 Risk Factors Associated with NAFLD and NASH.....	86
9.4 Pathogenesis of NAFLD and NASH	89
9.5 Animal Models.....	90
9.6 NAFLD and NASH in the Elderly	91
9.7 Management of NAFLD/NASH	93
9.8 Conclusions	93
References	93

10. Use of Tea (*Camellia sinensis* [L.] Kuntze) as a Hepatoprotective Agent in Geriatric Conditions

ARNADI RAMACHANDRAYYA SHIVASHANKARA, ASHISH KUMAR, RITHIN RAVI, PAUL SIMON, PRAJWITI RAI, ATHUL FRANCIS AND MANJESHWAR SHRINATH BALIGA

10.1 Introduction	99
10.2 Phytochemistry of Tea	100
10.3 Tea Protects Against Alcohol-induced Hepatotoxicity.....	100
10.4 Tea Protects Against Carbon Tetrachloride-induced Hepatotoxicity.....	101
10.5 Tea is Effective in Viral Hepatitis	101
10.6 Effect of Tea on Ischemia Reperfusion Injury.....	101
10.7 Effect of Tea Phytochemicals on Hepatotoxicity of Lead	101
10.8 Conclusions.....	103
References	103

11. Fruits in the Prevention of Cataractogenesis by Targeting the Aldose Reductase: Promise from Preclinical Observations

V. SOWMYA, FAIZAN KALEKHAN, KRATIKA KAMATH AND MANJESHWAR SHRINATH BALIGA

11.1 Introduction	105
11.2 Beneficial Effects of Dietary Agents.....	107
11.3 Conclusions.....	108
References	108

12. Ginger (*Zingiber officinale* Roscoe) in the Treatment of Osteoarthritis: Clinical Observations and Mechanistic Insights

MANJESHWAR SHRINATH BALIGA, LATHEESH LATHEEF, RAGHAVENDRA HANIADKA, FARHAN FAZAL, PRAJWAL PRABHUDEV MANE, FAIZAN KALEKHAN AND JACOB CHACKO

12.1 Introduction	111
12.2 Use of Complementary and Alternative Medicines in the Treatment of Arthritis	112
12.3 Phytochemistry of Ginger.....	112
12.4 Traditional Uses of Ginger	112
12.5 Scientific Studies Validating the Antiarthritic Effects of Ginger	114
12.6 Mechanistic Studies.....	114
12.7 Conclusions.....	116
References	116

13. Natural Polyphenols Target the Tumor Necrosis Factor-related Apoptosis-inducing Ligand (TRAIL) Signaling Pathway for Cancer Chemoprevention

EWELINA SZLISZKA AND WOJCIECH KROL

13.1 Introduction	119
13.2 Characteristic of Death Ligand Trail and Trail-Mediated Apoptotic Pathway.....	119

13.3 Polyphenols Enhance TRAIL-Induced Apoptosis in Cancer Cells	121
References.....	131
14. Use of the Ayurvedic Drug Triphala in Medical Conditions Afflicting Older Adults	
MANJESHWAR SHRINATH BALIGA, SHARAKE MEERA, MANOJ P. RAI, EROY SALDANHA, SAIRA PAIS, DIPIKA JAYACHANDER AND PRINCY LOUIS PALATTY	
14.1 Introduction	135
14.2 Rasayana Drugs in Ayurveda	136
14.3 Traditional Uses of Triphala	138
14.4 Conclusion	141
References.....	141
15. Use of Ayurvedic Medicinal Plants as Immunomodulators in Geriatrics: Preclinical Studies	
HARSHITH P. BHAT, RAMAKRISHNA PAI JAKRIBETTU, REKHA BOLOOR, RAJA FAYAD AND MANJESHWAR SHRINATH BALIGA	
15.1 Introduction	143
15.2 Plants as Immunomodulators.....	144
15.3 Conclusions.....	148
References.....	148
16. The Health Benefits of Indian Traditional Ayurvedic Rasayana (Anti-aging) Drugs: A Review	
MANJESHWAR SHRINATH BALIGA, SHARAKE MEERA, ARNADI RAMACHANDRAYYA SHIVASHANKARA, PRINCY LOUIS PALATTY AND RAGHAVENDRA HANIADKA	
16.1 Introduction	151
16.2 Hypothesis of Aging	151
16.3 Ayurveda and Aging	152
16.4 Types of Rasayana Drugs and Some Compositions	153
16.5 Mechanisms Responsible for the Beneficial Effects	157
16.6 Conclusions.....	159
References.....	160
17. Can Phytochemicals be Effective in Preventing Ethanol-Induced Hepatotoxicity in the Geriatric Population? An Evidence-Based Revisit	
ARNADI RAMACHANDRAYYA SHIVASHANKARA, SUNITHA VENKATESH, HARSHITH P. BHAT, PRINCY LOUIS PALATTY AND MANJESHWAR SHRINATH BALIGA	
17.1 Introduction	163
17.2 Phytochemicals in Protection Against Alcohol-induced Hepatotoxicity	164
17.3 Mechanisms.....	168
17.4 Conclusions.....	168
References.....	169
18. Chamomile: A Herbal Agent for Treatment of Diseases of the Elderly	
JANMEIJI K. SRIVASTAVA AND SANJAY GUPTA	
18.1 Introduction	171
18.2 The Plant – Chamomile	171
18.3 Phytochemicals in Chamomile.....	172
18.4 Use of Chamomile Based on Traditional Practice...172	
18.5 Use of Chamomile Based on Scientific Evidence....172	
18.6 Adverse Effects, Allergic Reactions, and Safety Issues with Chamomile.....	179
18.7 Conclusions.....	180
Acknowledgments	180
References.....	180
III	
NUTRITIONAL APPROACHES TO THERAPY IN CLINICAL MEDICINE IN OLD AGE	
19. Effects of Omega-3 on Neurodegenerative Diseases and Stroke	
ANA MÁRCIA DELATTRE, PEDRO VINÍCIUS STAZIAKI AND ANETE CURTE FERRAZ	
19.1 Omega-3 PUFA as a Diet Supplement	187
19.2 The Aging Brain and its Relation to Omega-3 PUFA.....	190
19.3 Omega-3 PUFA, Neurodegenerative Diseases, and Stroke	191
19.4 Conclusions	197
References	197
20. Selenium Binding Protein 1: A Moonlighting Protein	
CHANGHUI ZHAO AND THOMAS W. CASTONGUAY	
20.1 Introduction	203
20.2 Selenium Binding Protein 1	203
20.3 Other SBPs.....	206
20.4 Conclusions	207
References	208
21. Selenium and Senescence: Centering on Genome Maintenance	
RYAN T.Y. WU AND WEN-HSING CHENG	
21.1 Introduction	211
21.2 Selenium and Selenoproteins	211
21.3 Senescence	214
21.4 ATM Activation in DNA Damage Response.....218	
21.5 Roles of p53 in DNA Damage and Senescence Responses.....218	

21.6 Pathway Crosstalk in Senescence	218	25. Micronutrients and Ginseng for Immune Support in Older Adults	25																																																																												
21.7 Selenium and Cellular Senescence	221	SILVIA MAGGINI, KARL WISHART AND EVA SABINE WINTERGERST																																																																													
21.8 Future Perspectives.....	221																																																																														
Disclaimer	222																																																																														
References	222																																																																														
22. Nutritional Strategies Against Sarcopenia of Aging: Current Evidence and Future Directions																																																																															
RICCARDO CALVANI, FRANCESCO LANDI, AGNESE COLLAMATI, ELISABETTA SERAFINI, ROBERTO BERNABELI AND EMANUELE MARZETTI																																																																															
22.1 Introduction	231	25.1 Introduction	265																																																																												
22.2 Age-Related Changes in Eating Habits	231	25.2 Aging and Immune Function	266																																																																												
22.3 Current Nutritional Recommendations Against Sarcopenia	231	25.3 Micronutrients and Immune Function.....	266																																																																												
22.4 New Dietary Candidates for the Management of Sarcopenia.....	233	25.4 Ginseng and Immune Function.....	270																																																																												
22.5 Nutritional Strategies to Counteract Muscle Aging	234	25.5 Conclusions.....	272																																																																												
22.6 Are Nutritional Supplements Always Beneficial for Muscle? The Case of Antioxidants.....	235	References	272																																																																												
22.7 A New Way to Look at the Nutritional Regulation of Muscle Physiology: The “Pachinko Model”	235																																																																														
22.8 Conclusion	236																																																																														
References.....	236																																																																														
23. Minerals and Older Adults																																																																															
JENNIFER DOLEY																																																																															
23.1 Introduction	239	26.1 Introduction	277																																																																												
23.2 Calcium	239	26.2 Micronutrients.....	277																																																																												
23.3 Iron	242	26.3 Micronutrients and Immune Function.....	278																																																																												
23.4 Magnesium	243	26.4 Effect of Micronutrient Supplements on the Aging Immune System	278																																																																												
23.5 Zinc.....	245	26.5 Effects of Micronutrient Supplements on the Frequency and Severity of Infections.....	279																																																																												
23.6 Selenium.....	248	26.6 Problems with Micronutrient Supplements	280																																																																												
23.7 Conclusion	249	26.7 Conclusion	280																																																																												
References.....	249	References	281																																																																												
24. Vitamin D and Immunity																																																																															
KARL WISHART, SILVIA MAGGINI AND EVA SABINE WINTERGERST																																																																															
24.1 Introduction	253	IV																																																																													
24.2 Overview of the Immune System.....	253	FOOD AND SUPPLEMENTS IN CHRONIC HEART DISEASES, OBESITY, AND STROKE																																																																													
24.3 Vitamin D – Overview of its Biological Functions.....	255	24.4 Vitamin D and its Importance in Immunity.....	256	27. Dietary Protein and the Risk of Stroke		24.5 Vitamin D Deficiency: A Global Problem.....	259	JULI ROBINE AND ADAM BERNSTEIN		24.6 Human Studies Investigating the Effects of Vitamin D on Immunity.....	259	27.1 Introduction	285			24.7 Conclusion	260	27.2 Sources of Dietary Protein and Daily Requirements	285	References.....	261	27.3 Total, Animal, and Vegetable Protein	286					27.4 Red and Processed Meat.....	287			27.5 Fish and Poultry	288			27.6 Dairy and Eggs	289			27.7 Legumes, Nuts, and Grains	290			27.8 Dietary Patterns	291			27.9 Protein Supplementation Post-stroke	291			27.10 Conclusion	292			Appendices	293			References	294			28. Care for Stroke Patients with Eating Difficulties				EVA CARLSSON AND MARY HÄGG				28.1 Introduction	297			28.2 Eating Difficulties.....	298		
24.4 Vitamin D and its Importance in Immunity.....	256	27. Dietary Protein and the Risk of Stroke																																																																													
24.5 Vitamin D Deficiency: A Global Problem.....	259	JULI ROBINE AND ADAM BERNSTEIN																																																																													
24.6 Human Studies Investigating the Effects of Vitamin D on Immunity.....	259	27.1 Introduction	285			24.7 Conclusion	260	27.2 Sources of Dietary Protein and Daily Requirements	285	References.....	261	27.3 Total, Animal, and Vegetable Protein	286					27.4 Red and Processed Meat.....	287			27.5 Fish and Poultry	288			27.6 Dairy and Eggs	289			27.7 Legumes, Nuts, and Grains	290			27.8 Dietary Patterns	291			27.9 Protein Supplementation Post-stroke	291			27.10 Conclusion	292			Appendices	293			References	294			28. Care for Stroke Patients with Eating Difficulties				EVA CARLSSON AND MARY HÄGG				28.1 Introduction	297			28.2 Eating Difficulties.....	298												
27.1 Introduction	285																																																																														
24.7 Conclusion	260	27.2 Sources of Dietary Protein and Daily Requirements	285																																																																												
References.....	261	27.3 Total, Animal, and Vegetable Protein	286					27.4 Red and Processed Meat.....	287			27.5 Fish and Poultry	288			27.6 Dairy and Eggs	289			27.7 Legumes, Nuts, and Grains	290			27.8 Dietary Patterns	291			27.9 Protein Supplementation Post-stroke	291			27.10 Conclusion	292			Appendices	293			References	294			28. Care for Stroke Patients with Eating Difficulties				EVA CARLSSON AND MARY HÄGG				28.1 Introduction	297			28.2 Eating Difficulties.....	298																						
27.3 Total, Animal, and Vegetable Protein	286																																																																														
		27.4 Red and Processed Meat.....	287																																																																												
		27.5 Fish and Poultry	288																																																																												
		27.6 Dairy and Eggs	289																																																																												
		27.7 Legumes, Nuts, and Grains	290																																																																												
		27.8 Dietary Patterns	291																																																																												
		27.9 Protein Supplementation Post-stroke	291																																																																												
		27.10 Conclusion	292																																																																												
		Appendices	293																																																																												
		References	294																																																																												
		28. Care for Stroke Patients with Eating Difficulties																																																																													
		EVA CARLSSON AND MARY HÄGG																																																																													
		28.1 Introduction	297			28.2 Eating Difficulties.....	298																																																																								
28.1 Introduction	297																																																																														
28.2 Eating Difficulties.....	298																																																																														

28.3 Dysphagia	298
28.4 General Care and Nursing Interventions for Patients with Eating Difficulties.....	300
References.....	306
29. Homocysteine, B Vitamins, and Cardiovascular Risk	
GEORGE NTAIOS	
29.1 Homocysteine Metabolism	309
29.2 Vitamins B6, B9, and B12	309
29.3 Causes of Hyperhomocysteinemia.....	311
29.4 Atherothrombotic Effect of Homocysteine	311
29.5 Association of Homocysteine with Increased Cardiovascular Risk	311
29.6 Vitamin B Supplementation to Decrease Hyperhomocysteinemia	312
29.7 Safety of Vitamin B Supplementation	312
29.8 Effect of Vitamin B Supplementation on Cardiovascular Surrogate Markers	313
29.9 Effect of Vitamin B Supplementation on Cardiovascular Clinical Outcomes.....	313
29.10 Meta-Analyses of Large Randomized Clinical Trials of Vitamin B Supplementation	315
29.11 Vitamin B Supplementation and Cardiovascular Risk: What Went Wrong?.....	315
29.12 Screening for Hyperhomocysteinemia: Is it Necessary?	315
29.13 Current Status.....	315
References.....	316
30. Changes in Postprandial Blood Pressure in the Elderly	
SEBASTIÃO RODRIGUES FERREIRA-FILHO	
30.1 Introduction	319
30.2 Gastrointestinal Hormones Could be Contributing to PPH	319
30.3 Modifications in Autonomic Nervous System.....	320
30.4 Types of Food and PPH	321
30.5 Treatment Options.....	322
References	322
31. Diet Modification After Acute Coronary Events	
LAURA DE KEIZER AND CLARA K. CHOW	
31.1 Introduction	323
31.2 Dietary Recommendations for Patients Following Acute Coronary Syndromes	323
31.3 What is the Evidence that Diet Modification Improves Outcomes?	325
31.4 Enriching Diets with Specific Nutrients	328
31.5 Barriers to Change	332
31.6 Final Thoughts.....	332
References	332
32. The Effects of Vitamin B12 and Folic Acid Deficiencies on Stroke, and Vitamin B12 and Folic Acid Supplements	
AYSİN T. RAYIR	
32.1 Introduction	335
32.2 Vitamin B12 and Folic Acid Metabolism	335
32.3 Homocysteine and Cerebrovascular Diseases	336
32.4 Vitamin B12 and Folic Acid Deficiency in the Elderly.....	336
32.5 Low Vitamin B12 and Folic Acid Levels in Stroke in the Elderly, and Vitamin B12 and Folic Acid Supplementation.....	336
References	339
33. Nutritional Data in the Prevention and Therapy of Peripheral Arterial Disease	
MELINA VEGA DE CÉNIGA, ESTHER BRAVO, MAITE IZAGIRRE AND CLAUDIA ARAMENDI	
33.1 Peripheral Arterial Disease	341
33.2 Nutritional Assessment.....	341
33.3 Nutritional Data in Peripheral Arterial Disease.....	343
33.4 Current Recommendations.....	346
References	347
34. Vitamin D Deficiency and Anemia in Heart Failure	
ARMIN ZITTERMANN AND JANA BARBARA ERNST	
34.1 Introduction	349
34.2 Vitamin D.....	349
34.3 Heart Failure	351
34.4 Heart Failure and Anemia.....	353
34.5 Vitamin D and Anemia	355
Conclusions.....	357
References	357
35. Immunoprotective Effects of Probiotics in the Elderly	
TENNILLE MARX	
35.1 Introduction	363
35.2 The Human Gut Microbiota	363
35.3 Aging and the Gut Microbiota	364
35.4 Aging and Inflammation.....	366
35.5 The Gut Microbiota and Immunosenescence	366
35.6 Probiotics in the Elderly	367
35.7 Elderly Gut Care	367
35.8 Conclusion	370
References	370
Index	373