

Contents

1 Fruits and Vegetables	1
Disease Prevention	1
Cardiovascular Disease.....	1
Type 2 Diabetes Mellitus.....	2
Cancer.....	2
Osteoporosis.....	3
Age-Related Eye Diseases.....	3
Chronic Obstructive Pulmonary Disease...4	
Neurodegenerative Disease.....	4
Intake Recommendations	4
Summary	4
2 Cruciferous Vegetables	8
Disease Prevention	8
Cancer.....	8
Nutrient Interactions	10
Iodine and Thyroid Function.....	10
Intake Recommendations	10
Summary	11
3 Legumes	14
Disease Prevention	14
Type 2 Diabetes Mellitus.....	14
Cardiovascular Disease.....	14
Cancer.....	15
Intake Recommendations	16
Summary	16
4 Nuts	19
Disease Prevention	19
Cardiovascular Disease.....	19
Type 2 Diabetes Mellitus.....	20
Body Weight.....	21
Safety	21
Nut Allergies.....	21
Adverse Effects.....	21
Intake Recommendations	21
Summary	21
5 Whole Grains	24
Disease Prevention	24
Type 2 Diabetes Mellitus.....	24
Cardiovascular Disease.....	25
Cancer.....	25
Intestinal Health.....	26
Intake Recommendations	26
Increasing Whole-Grain Intake.....	27
Summary	27
6 Coffee	30
Some Bioactive Compounds in Coffee	30
Chlorogenic Acid.....	30
Caffeine.....	30
Diterpenes.....	31
Disease Prevention	32
Type 2 Diabetes Mellitus.....	32
Parkinson Disease.....	32
Colorectal Cancer.....	33
Cirrhosis and Liver Cancer.....	33
Mortality.....	34
Safety	34
Health Risks Associated with Coffee	
Consumption.....	34
Adverse Effects.....	36
Drug Interactions.....	36
Nutrient Interactions.....	37
Summary	37
7 Tea	42
Definitions	42
Types of Tea.....	42
Cup Sizes.....	43
Bioactive Compounds in Tea	44
Flavonoids.....	44
Caffeine.....	44
Fluoride.....	44
Disease Prevention	44
Cardiovascular Disease.....	44
Cancer.....	45
Osteoporosis.....	46
Dental Caries.....	46
Kidney Stones.....	47
Weight Loss.....	47
Safety	47
Adverse Effects.....	47
Pregnancy and Lactation.....	48
Drug Interactions.....	48
Nutrient Interactions.....	48
Summary	48
8 Carotenoids	52
Bioavailability and Metabolism	52
Biological Activities	53
Vitamin A Activity.....	53
Antioxidant Activity.....	53
Light Filtering.....	53

Intercellular Communication.....	54	Disease Prevention	76
Immune System Function	54	Cancer.....	76
Deficiency	54	Disease Treatment	77
Disease Prevention	54	Cancer.....	77
Lung Cancer	54	Inflammatory Diseases	77
Prostate Cancer.....	55	Cystic Fibrosis.....	77
Cardiovascular Disease	56	Alzheimer Disease	78
Age-Related Macular Degeneration	56	Sources	78
Cataracts.....	57	Food Sources.....	78
Sources	57	Supplements.....	78
Food Sources.....	57	Safety	78
Supplements.....	59	Adverse Effects.....	78
Safety	60	Pregnancy and Lactation.....	79
Toxicity.....	60	Drug Interactions	79
Adverse Effects.....	60	Summary	79
Safety in Pregnancy and Lactation	60		
Drug Interactions	61	11 Flavonoids	83
Interactions with Foods	61	Bioavailability and Metabolism	84
Interactions Among Carotenoids	62	Absorption and Metabolism	84
Summary	62	Biological Activities	84
9 Chlorophyll and Chlorophyllin	67	Direct Antioxidant Activity	84
Bioavailability and Metabolism	67	Metal Chelation.....	84
Biological Activities	67	Effects on Cell-Signaling Pathways.....	84
Complex Formation with Other		Biological Activities Related to Cancer	
Molecules.....	67	Prevention.....	85
Antioxidant Effects	68	Biological Activities Related to	
Modification of the Metabolism and		Cardiovascular Disease Prevention	85
Detoxification of Carcinogens	68	Disease Prevention	86
Therapeutic Effects	68	Cardiovascular Disease	86
Disease Prevention	68	Cancer.....	87
Aflatoxin-Associated Liver Cancer.....	68	Neurodegenerative Disease	87
Disease Treatment	69	Sources	88
Internal Deodorant.....	69	Food Sources.....	88
Wound Healing	69	Supplements.....	88
Sources	70	Safety	89
Food Sources.....	70	Adverse Effects.....	89
Supplements.....	70	Drug Interactions	90
Safety	70	Nutrient Interactions.....	91
Summary	70	Summary	91
10 Curcumin	73		
Bioavailability and Metabolism	73	12 Soy Isoflavones	96
Biological Activities	75	Bioavailability and Metabolism	96
Antioxidant Activity.....	75	Biological Activities	97
Anti-inflammatory Activity	75	Estrogenic and Antiestrogenic Activities	97
Glutathione Synthesis	75	Estrogen-Receptor-Independent	
Effects on Biotransformation Enzymes		Activities	97
Involved in Carcinogen Metabolism	75	Disease Prevention	97
Induction of Cell-Cycle Arrest and		Cardiovascular Disease	97
Apoptosis	76	Hormone-Associated Cancers	98
Inhibition of Tumor Invasion and		Osteoporosis.....	99
Angiogenesis.....	76	Cognitive Decline	100
		Disease Treatment	100
		Menopausal Symptoms.....	100

Sources	101	Sources	120
Food Sources.....	101	Food Sources.....	120
Supplements.....	101	Supplements.....	121
Infant Formulas.....	102	Safety	121
Safety	102	Adverse Effects.....	121
Adverse Effects.....	102	Pregnancy and Lactation.....	121
Drug Interactions.....	103	Drug Interactions.....	121
Summary	103	Summary	121
13 Isothiocyanates	109	15 Lignans	126
Bioavailability and Metabolism	109	Bioavailability and Metabolism	126
Biological Activities	110	Biological Activities	127
Effects on Biotransformation Enzymes		Estrogenic and Antiestrogenic	
Involved in Carcinogen Metabolism.....	110	Activities.....	127
Preservation of Normal Cell-Cycle		Estrogen-Receptor-Independent	
Regulation.....	110	Activities.....	127
Inhibition of Proliferation and Induction		Disease Prevention	128
of Apoptosis.....	110	Cardiovascular Disease.....	128
Inhibition of Histone Deacetylation.....	110	Hormone-Associated Cancers.....	128
Anti-inflammatory Activity.....	111	Osteoporosis.....	129
Antibacterial Activity.....	111	Sources	129
Disease Prevention	111	Food Sources.....	129
Cancer.....	111	Supplements.....	130
Genetic Variation in Isothiocyanate		Safety	130
Metabolism and Cancer Risk.....	112	Adverse Effects.....	130
Sources	112	Summary	130
Food Sources.....	112	16 Fiber	133
Supplements.....	113	Definitions of Fiber	133
Safety	113	US Institute of Medicine Classification	
Adverse Effects.....	113	System.....	134
Pregnancy and Lactation.....	113	Other Classification Systems.....	135
Drug Interactions.....	113	Biological Activities	135
Summary	113	Lowering Serum Cholesterol.....	135
14 Indole-3-Carbinol	116	Decreasing Postprandial Glycemia.....	135
Bioavailability and Metabolism	116	Softening Stool.....	136
Biological Activities	117	Disease Prevention	136
Effects on Biotransformation Enzymes		Cardiovascular Disease.....	136
Involved in Carcinogen Metabolism.....	117	Type 2 Diabetes Mellitus.....	137
Alterations in Estrogen Activity and		Cancer.....	137
Metabolism.....	118	Diverticular Disease.....	138
Induction of Cell-Cycle Arrest.....	118	Weight Control.....	138
Induction of Apoptosis.....	119	All-Cause Mortality.....	139
Inhibition of Tumor Invasion and		Disease Treatment	139
Angiogenesis.....	119	Diabetes Mellitus.....	139
Disease Prevention	119	Irritable Bowel Syndrome.....	139
Cancer.....	119	Sources	140
Disease Treatment	119	Food Sources.....	140
Diseases Related to Human Papilloma		Isolated Fibers and Supplements.....	140
Virus Infection.....	119	Safety	141
Systemic Lupus Erythematosus.....	120	Adverse Effects.....	141
		Drug Interactions.....	142
		Nutrient Interactions.....	142

Intake Recommendations	142	Drug Interactions	168
Adequate Intake	142	Nutrient Interactions	168
Summary	143	Summary	169
17 Organosulfur Compounds from Garlic	149	19 Resveratrol	173
Bioavailability and Metabolism	149	Bioavailability and Metabolism	173
Allicin-Derived Compounds	149	Biological Activities	174
γ-Glutamylcysteines and		Direct Antioxidant Activity	174
S-Allylcysteine	149	Estrogenic and Antiestrogenic	
Biological Activities	151	Activities	174
Related to Cardiovascular Disease		Biological Activities Related to Cancer	
Prevention	151	Prevention	174
Biological Activities Related to Cancer ..	151	Biological Activities Related to	
Antimicrobial Activity	152	Cardiovascular Disease Prevention	176
Disease Prevention	152	Disease Prevention	176
Cardiovascular Disease	152	Cardiovascular Disease	176
Cancer	154	Cancer	177
Sources	155	Longevity	177
Food Sources	155	Sources	177
Supplements	155	Food Sources	177
Safety	156	Supplements	178
Adverse Effects	156	Safety	178
Pregnancy and Lactation	156	Adverse Effects	178
Drug Interactions	157	Pregnancy and Lactation	178
Summary	157	Estrogen-Sensitive Cancers	178
18 Phytosterols	162	Drug Interactions	178
Definitions	163	Summary	179
Bioavailability and Metabolism	163	20 Essential Fatty Acids	
Absorption and Metabolism of Dietary		(Omega-3 and Omega-6)	183
Cholesterol	163	Bioavailability and Metabolism	183
Absorption and Metabolism of Dietary		Biological Activities	184
Phytosterols	163	Membrane Structure and Function	184
Biological Activities	163	Vision	184
Effects on Cholesterol Absorption and		Nervous System	185
Lipoprotein Metabolism	163	Eicosanoid Synthesis	185
Other Biological Activities	164	Regulation of Gene Expression	186
Disease Prevention	164	Deficiency	186
Cardiovascular Disease	164	Essential Fatty Acid Deficiency	186
Cancer	165	Omega-3 Fatty Acid Deficiency	186
Disease Treatment	166	Disease Prevention	187
Benign Prostatic Hyperplasia	166	Visual and Neurological Development ..	187
Sources	166	Pregnancy and Lactation	187
Food Sources	166	Cardiovascular Disease	188
Foods Enriched with Plant Sterols and		Alzheimer Disease and Dementia	191
Plant Stanols	166	Disease Treatment	191
Supplements	167	Coronary Heart Disease	191
Safety	167	Diabetes Mellitus	192
Adverse Effects	167	Inflammatory Diseases	193
Sitosterolemia (Phytosterolemia)	167	Major Depression and Bipolar Disorder	194
Pregnancy and Lactation	168	Schizophrenia	195
		Alzheimer Disease and Dementia	195

Sources	196	Disease Prevention	217
Food Sources.....	196	Aging	217
Biosynthesis	196	Cardiovascular Disease	217
Supplements.....	196	Disease Treatment	218
Infant Formula.....	197	Mitochondrial Encephalomyopathies	218
Safety	197	Cardiovascular Diseases	218
Adverse Effects.....	197	Diabetes Mellitus.....	220
Infant Formula.....	198	Neurodegenerative Diseases	220
Pregnancy and Lactation.....	198	Cancer.....	222
Contaminants in Fish.....	198	Performance	222
Contaminants in Supplements	199	Athletic Performance	222
Drug Interactions	199	Sources	222
Nutrient Interactions.....	199	Biosynthesis	222
Intake Recommendations	199	Food Sources.....	223
US Institute of Medicine	199	Supplements.....	223
International Recommendations	199	Safety	224
American Heart Association	200	Toxicity.....	224
Summary	200	Drug Interactions	224
21 Choline	209	Summary	224
Function	209	23 L-Carnitine	229
Structural Integrity of Cell Membranes.....	209	Bioavailability and Metabolism	229
Cell Signaling.....	209	Endogenous Biosynthesis.....	229
Nerve Impulse Transmission.....	209	Absorption of Exogenous L-Carnitine.....	230
Lipid Transport and Metabolism.....	209	Elimination and Reabsorption	230
Major Source of Methyl Groups	209	Biological Activities	230
Deficiency	209	Mitochondrial Oxidation of	
Symptoms.....	209	Long-Chain Fatty Acids.....	230
Nutrient Interactions.....	210	Regulation of Energy Metabolism	
Adequate Intake	210	through Modulation of Acyl CoA:	
Disease Prevention	211	CoA Ratio	230
Cardiovascular Diseases	211	Deficiency	231
Cancer.....	211	Primary Systemic Carnitine Deficiency	231
Pregnancy Complications.....	211	Myopathic Carnitine Deficiency.....	232
Disease Treatment	212	Secondary Carnitine Deficiency or	
Alzheimer Disease	212	Depletion	232
Sources	212	Nutrient Interactions.....	232
Biosynthesis	212	Disease Prevention	232
Food Sources.....	212	Aging	232
Supplements.....	212	Disease Treatment	233
Safety	213	Cardiovascular Disease	233
Toxicity.....	213	End-Stage Renal Disease/	
Drug Interactions	213	Hemodialysis.....	235
Summary	213	Alzheimer Disease (Dementia)	235
22 Coenzyme Q₁₀	215	HIV/AIDS	235
Function	215	Decreased Sperm Motility	236
Mitochondrial ATP Synthesis	215	Performance	237
Lysosomal Function.....	215	Physical Performance	237
Antioxidant Functions	215	Sources	237
Nutrient Interactions.....	215	Biosynthesis	237
Deficiency	216	Food Sources.....	237
		Supplements.....	237

Safety	238	Appendix 1 Glycemic Index and Glycemic Load	253
Adverse Effects	238	Glycemic Index	253
Drug Interactions	238	Measuring the Glycemic Index of Foods	253
Summary	238	Physiological Responses to High-Glycemic-Index Values	253
24 Lipoic Acid	242	Glycemic Load	253
Bioavailability and Metabolism	242	Disease Prevention	254
Endogenous Biosynthesis	242	Type 2 Diabetes Mellitus	254
Dietary and Supplemental α -Lipoic Acid	242	Cardiovascular Disease	255
Biological Activities	243	Obesity	255
Protein-Bound α -Lipoic Acid	243	Cancer	256
Free α -Lipoic Acid	243	Gallbladder Disease	256
Deficiency	244	Disease Treatment	256
Disease Treatment	244	Diabetes Mellitus	256
Diabetes Mellitus	244	Lowering Dietary Glycemic Load	256
Multiple Sclerosis	247	Appendix 2 Quick Reference to Diseases	259
Cognitive Decline and Dementia	247	Appendix 3 Drug Interactions	264
Sources	247	Appendix 4 Nutrient Interactions	269
Endogenous Biosynthesis	247	Appendix 5 Quick Reference to Foods Rich in Phytochemicals or Other Dietary Factors	270
Food Sources	247	Appendix 6 Glossary	272
Supplements	248	Index	293
Safety	248		
Adverse Effects	248		
Pregnancy and Lactation	248		
Drug Interactions	248		
Nutrient Interactions	249		
Summary	249		