

SECOND EDITION

Edited by

ANN M. COULSTON

CAROL J. BOUSHEY



Contents

List of Contributors Preface to the First Edition	xv xix	CHAPTER 3 Physical Assessment of Nutritional Status Edward Saltzman and Megan A. McCrory	
Preface to the Second Edition	xxi	I. Introduction	57
		II. Components of Clinical Assessment	57
		III. Anthropometric Assessment	58
december of the Control of the Contr		IV. Body Composition Assessment	62
SECTION I:		V. Physical Manifestations of Malnutrition	63
Research Methodology		VI. Functional Assessment	68
<u></u>		VII. Multicomponent Assessment Tools	69
A. Assessment Methods for Research		VIII. Summary	70
and Practice		References	70
CHAPTER 1		CHAPTER 4	
Dietary Assessment Methodology		Energy Requirement Methodology	
Frances E. Thompson and Amy F. Subar		Debra Coward-McKenzie and Rachel K. Johnson	
I. Introduction	3	I. Introduction	75
II. Dietary Assessment Methods	3	II. Components of Energy Expenditure	75 75
III. Dietary Assessment in Specific Situations	12	III. Total Energy Expenditure	81
IV. Dietary Assessment in Special Populations	16	IV. Recommended Energy Intakes	84
V. Selected Issues in Dietary Assessment Methods	18	References	85
References	22	References	03
CHAPTER 2			
Assessment of Dietary Supplement Use		B. Research and Applied Methods	
Johanna Dwyer and Rebecca B. Costello		for Observational and Intervention Studie	25
I. Introduction	41	CHAPTER 5	
II. Methods for Assessing Dietary Supplement Intake	44	Application of Research Paradigms	
III. Dietary Supplement Composition Databases		to Nutrition Practice	
for Analysis of Dietary Supplement Intake	48	Carol J. Boushey	
IV. The Dietary Supplement Label	50	I. Introduction	91
V. Authoritative Information and Resources	51	II. Broad Research Areas	91
about Dietary Supplements VI. How to Report Problems with Dietary	31	III. Evidence-Based Practice	93
Supplement Intake	54	IV. Translational Research	94
VII. Conclusion	54	V. Summary	95
References	54	References	95

CHAPTER 6		CHAPTER 9	
Overview of Nutritional		Nutrition Intervention: Lessons	
Epidemiology		from Clinical Trials	
Marian L. Neuhouser and Ruth E. Patterson		Linda G. Snetselaar	
I. Introduction	97	I. Introduction	139
II. Principles of Exposure Measurement in Nutritional		II. Conceptual Models of Motivation	139
Epidemiology	99	III. Theories Used in Achieving Dietary Behavior	
III. Study Designs Used in Nutritional		Change in Clinical Trials	140
Epidemiology	101	IV. Summary	147
IV. Interpretation of Cause and Effect in Nutritional Epidemiology	103	References	147
V. Obstacles to Finding Associations of Dietary	105	CHAPTER 10	
Intake and Disease Risk	105 108	Tools and Techniques to Facilitate	
VI. Future Research Directions References	108	Nutrition Intervention	
References	100	Linda M. Delahanty and Joan M. Heins	
		I. Introduction	149
CHAPTER 7		II. The Nutrition Education and Counseling Process	149
Analysis, Presentation, and Interpretation		III. The Teaching/Learning Process	150
of Dietary Data		IV. Nutrition Education Techniques	152
Debra Coward-McKenzie and Rachel K. Johnson		V. Behavior Change Techniques	155
	113	VI. Conclusion	165
I. Introduction	113	References	166
II. Analysis of Dietary Data III. Presentation of Data	117		
IV. Interpretation of Data	117	CHAPTER 11	
V. Conclusion	122	Evaluation of Nutrition Interventions	
References	122	Alan R. Kristal	
References	122	I. Introduction	169
		II. Overview: Types of Nutrition Intervention Program	105
CHAPTER 8		Evaluations	169
Current Theoretical Bases for Nutrition		III. Outcomes or Endpoints Used to Assess Intervention	
Intervention and Their Uses		Effectiveness	170
Karen Glanz		IV. Design of Nutrition Intervention Evaluations	171
I. Introduction	127	V. Measurement Issues When Assessing Dietary Change and Other Intervention Outcomes	174
II. The Importance of Understanding Influences	107	VI. Dietary Assessment Instruments and Their	
on Dietary Behavior	127	Applicability for Intervention Evaluation	176
III. What Is Theory?	128	VII. Conclusion	181
IV. Explanatory and Change Theories	128	References	181
V. Unique Features of Dietary Behavior to Consider When Using Theory	128		
VI. Important Theories and Their	120	CHAPTER 12	
Key Constructs	130	Biomarkers and Their Use in Nutrition Interver	ition
VII. Findings Regarding Applications of Theory		Johanna W. Lampe and Cheryl L. Rock	
to Nutritional Behavior	133	I. Introduction	187
VIII. Constructs and Issues across Theories	133	II. Biomarkers of Dietary Intake or Exposure	187
IX. Implications and Opportunities	135	III. Functional Biomarkers	192
References	136	IV. Biomarkers of Genetic Susceptibility	196

V. Criteria for Selecting and Using Biomarkers	196	CHAPTER 17	
VI. Summary	198	Nutrients and Food Constituents in	
References	198	Cognitive Decline and Neurodegenerative	
No.		Disease	
SECTION; III :		James A. Joseph, Mark A. Smith, George Perry, and Barbara Shukitt-Hale	
Nutrition for Health Maintenance,		I. Introduction	269
Prevention, and Disease-Specific Treatment		II. Gender Differences in Dementia	270
A. Food and Nutrient Intake for Health		III. Oxidative Stress in Aging	271
A. 100ci and Nathern make for Hearth		IV. Inflammation	272
CHAPTER 13		V. Age-Alzheimer Disease Parallels	273
Nutrition Guidelines to Maintain Health		VI. Polyphenol Supplementation and Reductions	
Suzanne P. Murphy		of Oxidative Stress and Inflammation	273
I. Introduction	205	VII. Conclusion	277
II. Guidelines for Nutrient Adequacy and Safety	205	References	278
III. Guidelines for Healthy Food Choices	208		
IV. Beyond Food and Nutrient Guidelines: Physical		CHAPTER 18	
Activity Guidelines	218	Diet and Supplements in the Prevention	
V. Summary	220	and Treatment of Eye Diseases	
References	221	Julie A. Mares and Amy E. Millen	
CHAPTER 14		I. Introduction	289
Nutrition, Health Policy, and the Problem of F	Proof	II. Cataract	293
Robert P. Heaney and Sarah Taylor Roller	1001	III. Age-Related Macular Degeneration	296
		IV. Diabetic Retinopathy	301
I. Background Considerations	225	V. Summary	304
II. The Matter of Proof	227	References	304
III. Approaches	230		
IV. Conclusion	233	CHAPTER 19	
References	234	Nutrition Requirements for Athletes	
CHAPTER 15		Asker E. Jeukendrup	
Choline and Neural Development		I. Introduction	317
Mihai D. Niculescu and Steven H. Zeisel		II. Energy Requirements for Athletes	317
I. Introduction	227	III. Carbohydrate Requirements for Athletes	320
II. Choline Metabolism and Biochemistry	237 237	IV. Protein Requirements for Athletes	324
III. Choline in Foods and Dietary Requirements	238	V. Micronutrient Requirements for Athletes	325
IV. Choline and Neural Development	239	VI. Fluid Requirements for Athletes	326
V. Long-Lasting Consequences of Prenatal Choline	239	VII. Nutrition and Training Adaptations	330
Availability	242	References	331
VI. Implications for Human Brain Development	243	References	551
References	243	CHAPTER 20	
		Nutrition for Children with Special Health	
CHAPTER 16		Care Needs	
Antioxidants in Health and Disease		Anne Bradford Harris, Marion Taylor Baer,	
Harold E. Seifried and John A. Milner		Cristine M. Trahms, and Jennifer Webb	
I. Introduction	249	I. Introduction	335
II. Antioxidants in Disease Etiology, Treatment,		II. The Role of Nutrition in Preventing	
and Prevention	254	Developmental Problems	336
III. Overall Conclusion and Discussion	262	III. The Functional Approach to Nutrition	
References	263	Assessment for Children with Special Needs	340

IV. Evidence-Based Interventions for Selected Conditions	344	III. Relationship of Physical Activity to Obesity in Populations	393
V. Conclusion	348	IV. Energy Expenditure and Etiology of Obesity	395
References	348	V. Role of Physical Activity in Treatment (Weight Loss) of Overweight and Obesity: Evidence from Randomized Controlled Trials	396
B. Overweight and Obesity		VI. Conclusion	401
•		References	402
CHAPTER 21 Genetics of Human Obesity			
Janis S. Fisler and Nancy A. Schonfeld-Warden		CHAPTER 24	
	0.5.5	Macronutrient Intake and the Control	
I. Introduction	355	of Body Weight	
II. Genetic Epidemiology of Human Obesity	355	David A. Levitsky	
III. Gene-Environment Interactions	356	I. Introduction	407
IV. Gene-Gene Interactions	357	II. Fat Chance	407
V. The Obesity Gene Map	357	III. Establishing Causal Links	409
VI. Single-Gene Obesity in Humans	358	IV. Is It Fat or Energy Density?	412
VII. Rare Genetic Syndromes with Obesity as a Prominent Feature	361	V. Are Carbohydrates the Culprit Responsible for Overweight?	413
VIII. Evidence from Linkage Studies of Obesity Phenotypes	361	VI. Energy Compensation for Fat and Sugar Substitutes	416
IX. Studies of Candidate Genes for Obesity		VII. Protein Paradox	418
and Related Phenotypes	362	VIII. Summary and Implications of the Research	
X. Clinical Implications of the Discovery	265	on Macronutrients and Intake	421
of Obesity Genes	365	References	421
References	366	CYTA DEWIN AS	
CHAPTER 22		CHAPTER 25 Polyagianal Right Factors for Overnoight	
Obesity: Overview of Treatments		Behavioral Risk Factors for Overweight	
and Interventions		and Obesity: Diet and Physical Activity	
Helen M. Seagle, Holly R. Wyatt, and James O. Hill		Nancy E. Sherwood, Mary Story, Dianne Neumark-Sztaine and Kate Bauer	Γ,
I. Introduction	371	I. Introduction	431
II. Assessment of Overweight and Obesity	371	II. Physical activity	432
III. Lifestyle Modification	375	III. Dietary Factors	437
IV. Pharmaceutical Intervention	379	IV. Summary and Public Health Recommendations	445
V. Surgical Treatment	382	V. Conclusion	446
VI. Special Issues in the Treatment of Pediatric		References	448
Obesity	383		
VII. Acute Weight Loss versus Maintaining Long-Term		CHAPTER 26	
Weight Loss	384	Dietary Approaches to Exploit Energy	
VIII. The Future of Weight Management	385	Balance Utilities for Body Weight Control	
References	385	Richard D. Mattes	
CHAPTER 23		I. Introduction	457
Obesity: The Role of Physical Activity in Adult	'S	II. Does a Small Positive Energy Balance Lead	
Marcia L. Stefanick		to Substantive Weight Gain Over Time?	457
	201	III. Mechanisms for Dietary Approaches to Moderate	450
I. Introduction	391	Energy Balance	459
II. Current Physical Activity Recommendations for Weight Loss and Prevention of Weight Regain	392	IV. Conclusion	465
tor weight moss and thevention of weight regain	374	References	465

CHAPTER 27		D. Diabetes Mellitus	
Properties of Foods and Beverages That		CHARMED 21	
Influence Energy Intake and Body Weight		CHAPTER 31	
Jenny H. Ledikwe and Barbara J. Rolls		Obesity and the Risk for Diabetes Rejeanne Gougeon	
I. Introduction	469		
II. Variety	469	I. Introduction	577
III. Energy Density	471	II. Definitions and Classifications of Obesity and Diabetes	
IV. Portion Size	474	III. Why Are the Obese at Risk?	580
V. The Complex Eating Environment	477	IV. Conclusion	586
References	479	References	586
C. Cardiovascular Disease		CHAPTER 32 Nutrition Management of Diabetes Mellitus	
CHAPTER 28		Nutrition Management of Diabetes Mellitus Ann M. Coulston	
Genetic Influences on Blood Lipids			
and Cardiovascular Disease Risk		I. Introduction	593
Jose M. Ordovas		II. Energy Intake and Body Weight Management	594
I. Introduction	485	III. Macronutrient Intake	595
II. Exogenous Lipoprotein Pathway	486	IV. Selected Micronutrients	599
III. Endogenous Lipoprotein Metabolism	495	V. Conclusion	601
IV. Reverse Cholesterol Transport	496	References	601
V. Conclusion	502	CIVA PURED, 44	
References	503	CHAPTER 33	
10000000	202	Nutrition Management for Gestational Diabete	35
CHAPTER 29		Maria Duarte-Gardea	(07
The Role of Diet in the Prevention and		I. Introduction	607
Treatment of Cardiovascular Disease		II. Screening and Diagnosis	609
Michael Roussell, Jessica Grieger, and Penny M. Kris-Et	herton	III. Complications	609
		IV. Nutrition Management	610
I. Introduction	515	V. Clinical Outcomes VI. Pharmacological Agents	615 616
II. Dietary Fat	516	VII. Physical Activity	617
III. Dietary Carbohydrate IV. Dietary Protein	526 529	VIII. Postpartum Follow-up	617
V. Alcohol	531	IX. Prevention	617
VI. Dietary Cholesterol	532	X. Conclusion	617
VII. Plant Sterols/Stanols	533	References	618
VII. Frant Sterois/Staniois VIII. Supplements	534	References	010
IX. Food-Based Guidance	535		
X. Summary/Conclusion	539	E. Cancer	
References	539	CHAPTER 34	
References	339	Interaction of Nutrition and Genes	
CHAPTER 30		in Carcinogenesis	
Nutrition, Lifestyle, and Hypertension		Jo L. Freudenheim	
Pao-Hwa Lin, Bryan C. Batch, and Laura P. Svetkey		I. Introduction	623
I. Introduction	551	II. Background and Definitions	623
II. Individual Nutrients and Blood Pressure	552	III. Mechanisms of Diet-Gene Interactions	625
III. Other Dietary and Lifestyle Modifications	560	IV. Methodological Issues	628
IV. Current Recommendations and Implementation	563	V. Diet–Gene Interactions and Cancer	630
V. Summary	564	VI. Future Directions	632
References	568	References	632
	200	0.750.50.50.50.50	

CHAPTER 35		III. Bacterial Colonization, Succession,	
Nutrition and Cancers of the Breast,		and Metabolism	709
Endometrium, and Ovary		IV. Functions of the GI Tract Microflora	711
Cheryl L. Rock and Wendy Demark-Wahnefried		V. Methodology for Studying Intestinal Microflora	713
I. Introduction	635	VI. Influence of Diet on Intestinal Microflora	715
II. Nutritional Factors and Breast Cancer	636	VII. Challenges in the Field	720
III. Endometrial Cancer	643	References	720
IV. Ovarian Cancer	646		
V. Summary and Conclusion	647	CHAPTER 39	
References	648	Nutrition in Inflammatory Bowel Disease	
References	010	and Short Bowel Syndrome	
		Peter L. Beyer	
CHAPTER 36		I. Introduction	- 729
Nutrition and Prostate Cancer		II. Inflammatory Bowel Disease	729
Laurence N. Kolonel and Song-Yi Park		III. Short Bowel Syndrome	743
I. Introduction	659	IV. Conclusion	749
II. Descriptive Epidemiology of Prostate Cancer	660	References	750
III. Studies of Diet in Relation to Prostate Cancer	661	CHAPTER 40	
IV. Genetics and Gene-Environment Interactions	667	Nutrient Considerations in Lactose Intolerance	_
V. Dietary Intervention Trials	668		<i>5</i>
VI. Conclusion and Implications for Prevention		Steve Hertzler, Dennis A. Savaiano, Karry A. Jackson, and Fabrizis L. Suarez	
and Treatment	668		755
References	669	I. Introduction	755
		II. Lactose in the Diet	755
CHAPTER 37		III. Digestion of Lactose	756
Nutrition and Colon Cancer		IV. Loss of Lactase Activity	756
Maureen A. Murtaugh, Martha L. Slattery, and Bette J. C	aan	V. Diagnosis of Lactose Maldigestion	757
-		VI. Lactose Maldigestion and Intolerance Symptoms	760
I. Introduction	683	VII. Lactose Digestion, Calcium, and Osteoporosis VIII. Dietary Management for Lactose Maldigestion	760
II. Model 1: Bile Acids, Dietary Components	685	•	761
III. Model 2: Cooked Foods	689	IX. Gene Therapy for Lactose Intolerance	765
IV. Model 3: Insulin Resistance	690	X. Summary	765
V. Model 4: DNA Methylation	690	References	766
VI. Model 5: Cell Growth Regulators	691	CHAPTER 41	
VII. Food Intake Relationships	692	Nutritional Considerations in the Managemen	ıt
VIII. Prevention of Colon Cancer	694	of Celiac Disease	
References	695	Michelle Pietzak	
F. Continuous and Discours	_	I. Introduction	771
F. Gastrointestinal Health and Disease	2	II. Symptoms of Celiac Disease	771
CHAPTER 38		III. Diagnosis of Celiac Disease	775
Intestinal Microflora and Diet in Health		IV. Treatment of Celiac Disease with a Gluten-Free Diet	777
Merlin W. Ariefdjohan and Dennis A. Savaiano		V. Management of the Complications	
I. Introduction	707	of Celiac Disease	779
II. Distribution and Diversity of the Human		VI. Summary	780
Intestinal Microflora	707	References	781

CHAPTER 42		CHAPTER 44	
Nutrition and Cystic Fibrosis		Osteoporosis: The Early Years	
HuiChuan J. Lai and Philip M. Farrell		Connie M. Weaver	
I. Overview of Cystic Fibrosis	787	I. Introduction	833
II. Malnutrition in Cystic Fibrosis	789	II. Acquiring Peak Bone Mass	
III. Nutrition Assessment	792	and Bone Strength	833
IV. Nutrition Management	796	III. Skeletal Fragility in Children	835
V. Conclusion	799	IV. Nutrition and Development	
References	800	of Peak Bone Mass	83'
		V. Conclusion	84
		References	84′
G. Bone Health and Disease		CHAPTER 45	
CHAPTER 43		Osteoporosis	
Current Understanding of Vitamin D		Robert Marcus	
Metabolism, Nutritional Status, and Role		I. Introduction	853
in Disease Prevention		II. The Skeleton	854
Susan J. Whiting, Mona S. Calvo, and Charles B. Stephensen		III. Adult Bone Maintenance	85
		IV. Diagnosis of Osteoporosis	862
I. Introduction	807	V. Osteoporosis Prevention and Treatment	864
II. Metabolism of Vitamin D	808	VI. Conclusion	860
III. Sources of Vitamin D	813	References	86′
IV. Vitamin D Nutritional Status Assessment	817		
V. Dietary Requirements	825	Appendix	
VI. Safety of Vitamin D	827	Dietary Reference Intakes (DRIs)	87
VII. Conclusion	828		
References	828	Index	87