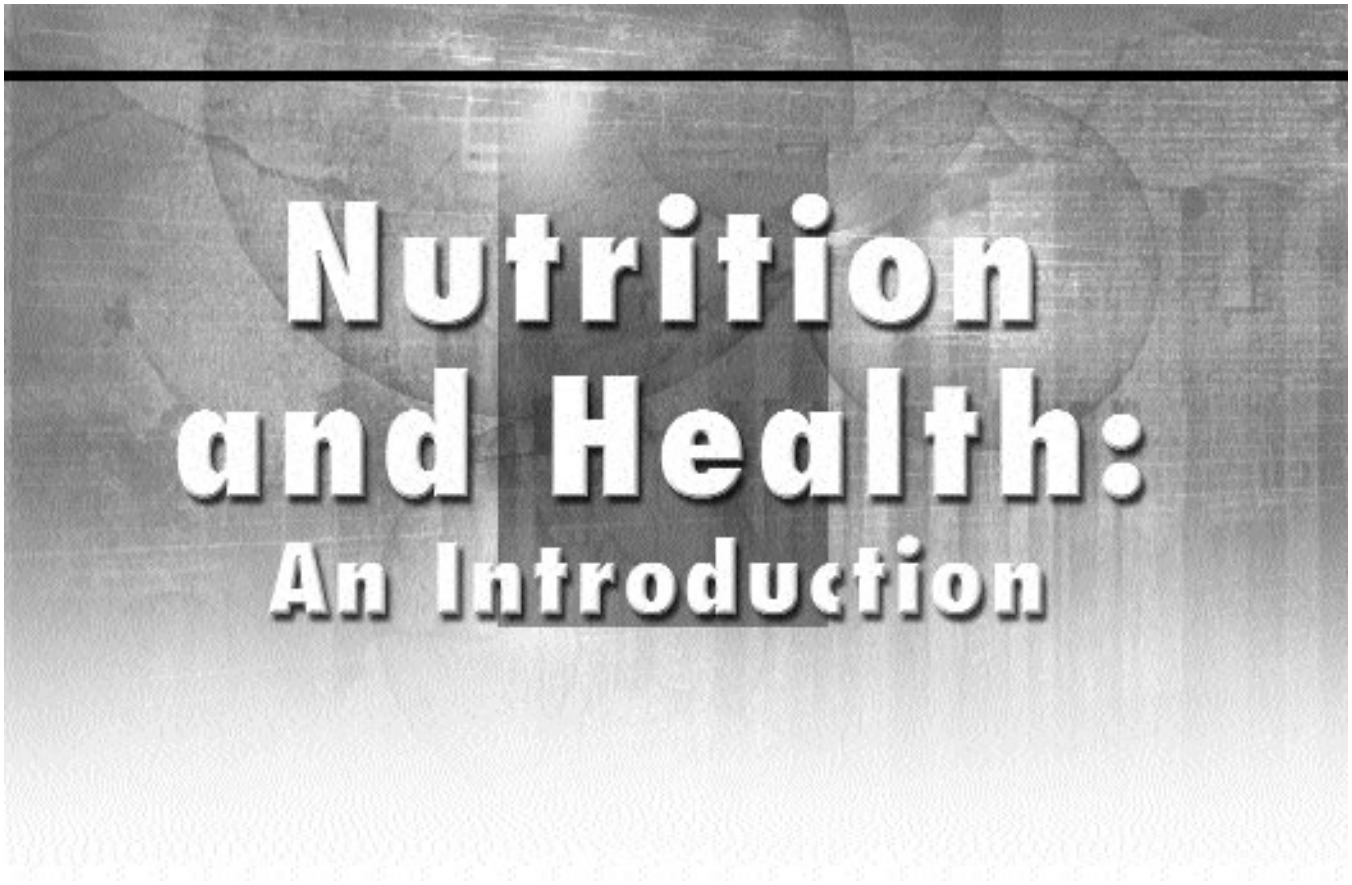

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CAROLINA ACADEMIC PRESS
Durham, North Carolina

Library of Congress Cataloging-in-Publication Data

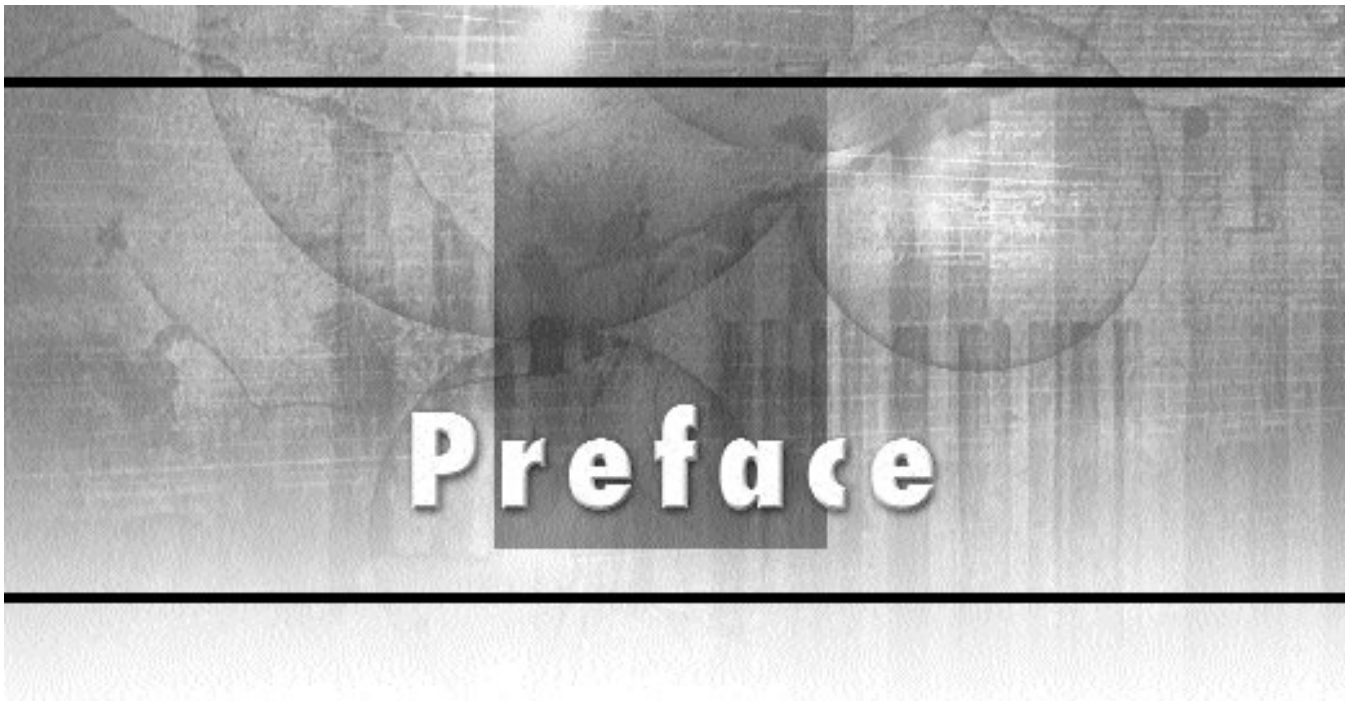
Anderson, John J. B. (John Joseph Baxter), 1934–
Nutrition and health: an introduction / by John J. B. Anderson.
p. cm.
Includes index.
ISBN 0-89089-365-9
1. Nutrition. I. Title

RA784.A5328 2004
613--dc22

2004027501

Carolina Academic Press
700 Kent Street
Durham, NC 27701
Telephone (919) 489-7486
Fax (919) 493-5668
www.cap-press.com

Printed in the United States of America



The goals of this introductory text, Nutrition and Health, are twofold: first, to provide basic information and concepts of nutrition, including basic knowledge of the foods that provide nutrients and non-nutrients (phytochemicals); and, secondly, to enable each student to examine his/her food habits, food beliefs, and nutrient intakes, so that improved food habits will promote health and prevent the common chronic diseases of technologically advanced societies, such as in the US and Canada. These learning exposures and practical experiences should serve the needs of students. Each student should soon recognize that new knowledge about eating practices, processed foods, non-nutrients in plant foods, nutrient functions, and nutrition-disease relationships is advancing at a rapid rate. New findings from research that capture media attention are reported daily. This text attempts to set the stage for continuing learning by students in this interesting field of nutrition.

The essential contents of this introductory book have been offered in a basic nutrition course at the University of North Carolina for more than twenty years. Previous students have offered useful suggestions about the course and its content. Based on these experiences, basic college courses in biology and chemistry have become prerequisites. Constructive comments from users of this book are welcome.

This text consists of four sections: Social and Behavioral Aspects of Nutrition; Nutrients in the Body; Nutrition through the Life Cycle; and Nutrition-Disease Relationships. Recent research findings and new interpretations are provided when appropriate. Throughout the text an epidemiologic or population approach is taken.

The text deals with: (1) the general aspects of foods and nutrition in the context of society and culture; (2) the scientific aspects of nutrients, including their digestion from foods, absorption, utilization in cellular or tissue functions, storage, and excretion; (3) the requirements for nutrients across the life cycle and in physical activities; and (4) diet-disease relationships, including how the patterns of eating contribute to the etiologies of the common chronic diseases of our society. In order to master these broad areas of knowledge, students need a background in basic modern biology and chemistry, including some understanding of the structures of organic molecules.

Appreciation is extended to the following colleagues who have helped in the development of this introductory text: Mary Anthony, Carolyn Barrett, Agna Boass, Daniel Carroll, Joseph Edozien, MaryAnn Farthing, William Forsythe, Sanford Garner, Joyce Harp, William Heizer, Betty G. Kirkley, Philip Klemmer, Martin Kohlmeier, Dexter Louie, David Ontjes, Boyd Switzer, Michael Symons, Roy Talmage, Svein Toverud, and Steven Zeisel. Also, special thanks go to Mike McIntosh, Marian Harrison, and Donna Koehler at UNC-Greensboro for their review of the text. Finally, I wish to thank my many teaching assistants who have been most helpful and supportive, and any others who have helped at one time or another with this text. Gratitude is extended to both Marty Root and Sandy Garner who helped in revising and updating the chapters and also to Sandy for his 135 illustrations.

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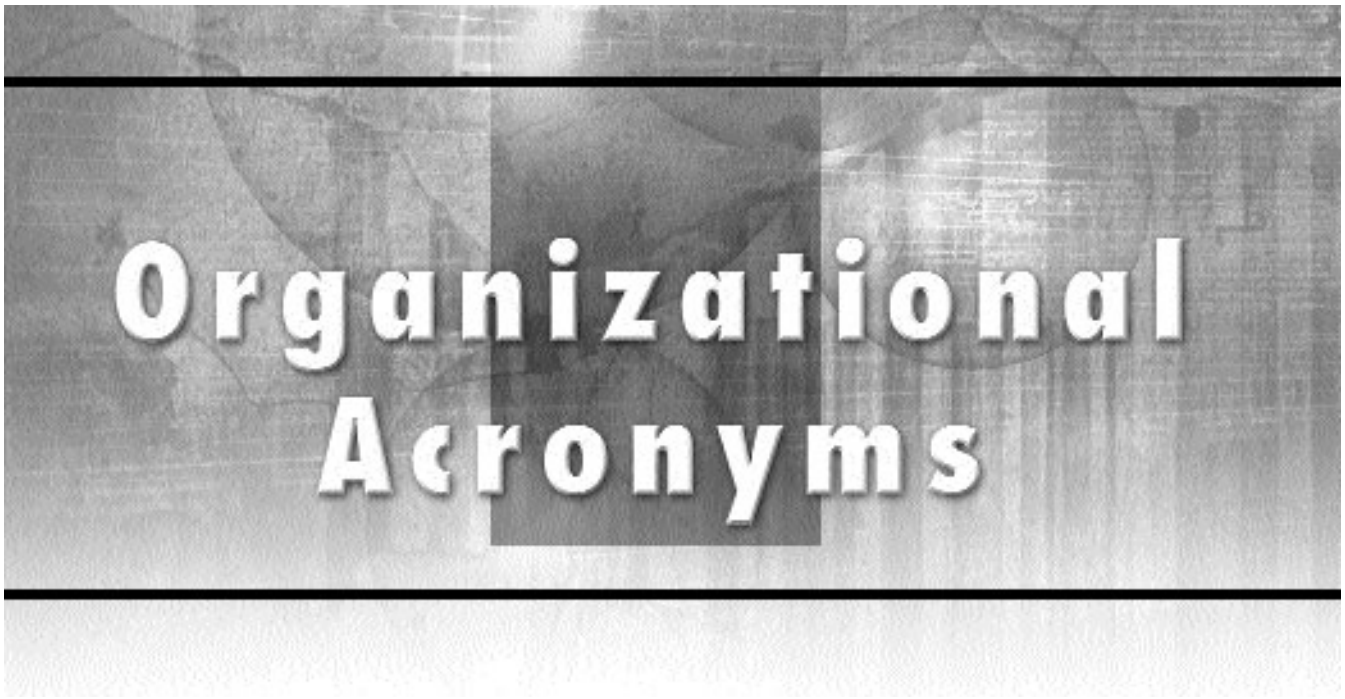
June 2004

Abbreviations

A list of abbreviations commonly used in this text follows:

aa (AA) = amino acid
ADL = activities of daily living
AI = Adequate Intake
AT = active transport
ATP = adenosine triphosphate
BEE = basal energy expenditure
BMC = bone mineral content
BMD = bone mineral density
BMI = body mass index
BMR = basal metabolic rate
BV = biological value
C or c = cholesterol; or cup; or carbon (capitol C only)
Ca = calcium
Ca:P = calcium:phosphorus (dietary) ratio
CA = cancer
CAD = coronary artery disease (see CHD)
Carbo = carbohydrates
CE = cholesterol ester (fatty acid)
C-H = carbon-hydrogen bond
CHD = coronary heart disease (see CAD)
CHO = carbohydrate molecules (various)
chylo(s) = chylomicron(s)
Cl = chlorine or chloride
C-N = carbon-nitrogen bond
CoA = coenzyme A
CRBP = cellular retinol-binding protein
CT = computerized tomography (or computerized axial tomography)
CV = coefficient of variation
CVD = cardiovascular disease
cyto = cytosol (cytoplasm)
DIT = diet-induced thermogenesis
dL = deciliter
DM = diabetes mellitus
DBP = vitamin D-binding protein
DRI = Dietary Reference Intake
DXA = dual-energy X-ray absorptiometry
EAR = estimated average requirement
EFA = essential fatty acid
EHC = enterohepatic circulation
EIT = exercise-induced thermogenesis
en = energy
EPA = eicosapentaenoic acid
ER = endoplasmic reticulum
ERT = estrogen replacement therapy (see HRT)
FA = fatty acid
FAD = flavin adenine dinucleotide
FAS = fetal alcohol syndrome
Fe = iron
FSH = follicle-stimulating hormone
g = gram
g/kcal = grams per kilocalorie (see nutrient density)

GH = growth hormone
GI = gastrointestinal
GM = genetically modified (foods)
GnRH = gonadotropin-releasing hormone
GRAS = generally recognized as safe
GTT = glucose tolerance test
H = hydrogen
HBP = high blood pressure
HFCS = high-fructose corn syrup
HDL = high density lipoprotein
HP/DP = health promotion and disease prevention
H-P-A = hypothalamic-pituitary-adrenal (axis)
H-P-O = hypothalamic-pituitary-ovarian (axis)
H-R = hormone-receptor (interaction)
HRT = hormone replacement therapy (see ERT)
IBW = ideal body weight
IDDM = insulin-dependent diabetes mellitus
IF = intrinsic factor
IGF = insulin-like growth factor
IU = International Unit
K = potassium
kcal = kilocalories
kcal/g = kilocalories per gram (see Atwater equivalents)
kg = kilogram
kj = kilojoule
LBM = lean body mass
LCD = low calorie diet
LDL = low density lipoprotein
LH = luteinizing hormone
LOV = lactoovovegetarian
m = meter
MCT = medium-chain triglycerides
MET = metabolic energy unit
MFA = monounsaturated fatty acid
mg = milligram
mL = milliliter
N = nitrogen
Na = sodium
NAD = nicotinamide adenine dinucleotide
NIDDM = non-insulin-dependent diabetes mellitus
NPU = net protein utilization
O = oxygen
OAA = oxaloacetate (oxaloacetic acid)
ox = oxidation
oz = ounce
P = phosphorus
PBM = peak bone mass
PC = phosphatidyl choline (lecithin)
PDV = percent daily value
PFA = polyunsaturated fatty acid
PGE = prostaglandin E series
pH = negative log of the hydrogen ion concentration
PIR = poverty index ratio
PL = phospholipids
pro = protein
P/S = ratio of polyunsaturated to saturated FAs
PSMF = protein-sparing modified fast
PTH = parathyroid hormone
QFFQ = quantitative food frequency questionnaire
RA = retinoic acid
RBC = red blood cell
RBP = retinol-binding protein
RCT = randonized clinical trial
RD = Registered Dietitian
RDA = Recommended Dietary Allowance
REE = resting energy expenditure (see BMR)
SCAA = sulfur-containing amino acids
SCFA = short-chain fatty acid
SDA = Seventh-day Adventist
SERM = selective estrogen receptor modulator (drug)
SES = socioeconomic status
SFA = saturated fatty acid
T_3 = triiodothyronine (with 3 iodine atoms)
T_4 = thyroxin (with 4 iodine atoms)
TC = total cholesterol
TC:HDL-C = total cholesterol to HDL-cholesterol ratio
TG = triglycerides
TIA = transient ischemic attack (mini-stroke)
TPN = total parenteral nutrition
UFA = unsaturated fatty acid
UL = Upper Tolerable Limit of safety
µg = microgram
US RDI = United States Recommended Dietary Intake (for food and supplement labeling)
UV or UVL = ultraviolet light
VLCD = very low calorie diet
VLDL = very low density lipoprotein
W-H (WHR) = waist to hip ratio
WIC = Women, Infants, and Children



A list of acronyms commonly used in this text follows:

ACN = American College of Nutrition
ADA = American Dietetics Association (and other orgs)
AHA = American Heart Association
AMA = American Medical Association
APHA = American Public Health Association
ARS = Agriculture Research Service (USDA)
ASCN = American Society for Clinical Nutrition
ASNS = American Society for Nutritional Sciences
CDC = Centers for Disease Control and Prevention
DHHS = Department of Health and Human Services
FAO = Food and Agricultural Organization (UN)
FDA = Food and Drug Administration
HFCS = Household Food Consumption Survey (USDA)
LRC = Lipid Research Clinics Program (NIH)
MRFIT = Multiple Risk Factor Intervention Trial (NIH)
NAS = National Academy of Sciences
NCEP = National Cholesterol Education Program (NIH)
NCHS = National Center for Health Statistics
NHANES = National Health and Nutrition Examination Survey (PHS)
NIH = National Institutes of Health
NRC = National Research Council (arm of NAS)
UN = United Nations
USDA = US Department of Agriculture