

# Nutrition

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## Preface

eople's food preferences differ. They overeat.
They undereat. They shop at health food stores.
They eat mostly at fast-food restaurants. They don't eat eggs. But they eat fish. They eat only "organic" foods.

Perhaps the most significant development in the field of nutrition is the recognition that behavior and personal decision making play important roles in the way people eat. Most of us know the difference between healthful and unhealthful diets, but we often ignore what we know. Many people mistakenly believe that good nutrition is incompatible with pleasurable eating. A Harris poll suggests that two in three Americans think they'd be healthier if they changed their diets, but they continue to eat the way they always have because they enjoy it and believe they lack the willpower to change. Willpower, however, is not usually the issue. Instead, many people lack the basic skills and understanding to change their behaviors and make good and healthful choices.

#### **Healthful Choices**

Learning nutrition can be fun and exciting, and understandable. Our new book, Nutrition, will guide students on a fascinating journey beginning, perhaps, with curiosity and, we hope, ending with a solid knowledge base and a healthy dose of skepticism for the endless ads and infomercials promoting "new" diets and food products. We want students to learn enough about their nutritional and health status to use this new knowledge in their everyday lives. Our mission is to give students the tools to interpret more locally the nutrition information provided by the evening on food labels, in popular magazines, and by nent agencies. Our goal is to help them become phisticated consumers of both nutrients and nutrition information. Through this course they will come to under and that knowledge of nutrition allows them to

tion is unique in its behavioral approach. It chalaudents to act, not just memorize the material.

for an entire population.

ilize information, rather than follow every guideline

Familiar experiences and choices draw students into each chapter and analogies illuminate difficult concepts.

In addition, we address important questions that students often raise concerning ethnic diets, eating disorders, nutrient supplements, phytochemicals, vegetarianism, diets for athletes, food safety, and fad diets. We spotlight alcohol, eating disorders, and alternative nutrition. Throughout the book, the relationship of diet and health is incorporated into appropriate chapters (e.g., lipids and cardiovascular disease, carbohydrates and diabetes).

Nutrition research shows that people often respond idiosyncratically to food. Some of us, for example, find that we can liberally salt our food with no effect on our blood pressure. Others, who are salt sensitive, find that even a small amount of salt sends their systolic blood pressure soaring. *Nutrition* brings up-to-date nutritional research into your class. It features the latest standards, such as the *Dietary Reference Intakes* and *Dietary Guidelines for Americans* published in 2000. In addition, the book's web site, **nutrition.jbpub.com**, offers access to the constantly emerging developments in nutrition.

#### **Accessible Science**

Nutrition is based on the latest in learning theory and balances the behavioral aspects of nutrition with an accessible approach to scientific concepts. This introduction to the field allows students to master both areas so that they succeed in subsequent nutrition courses. Scientifically, nothing is left out. You will find the book to be a comprehensive resource that communicates graphically in a personal, interesting way.

We present chemistry in an engaging, nonintimidating way with an appealing, stepwise, parallel development of text and annotated illustrations. Understanding molecular structure, shape, and reactivity is central to understanding nutritional chemistry, so each type of nutrient molecule in this book has a distinct color and





shape. Icons of an amino acid, a protein, a triglyceride, and a glucose molecule represent "characters" in a chemical event, instantly recognizable when they appear in later chapters.

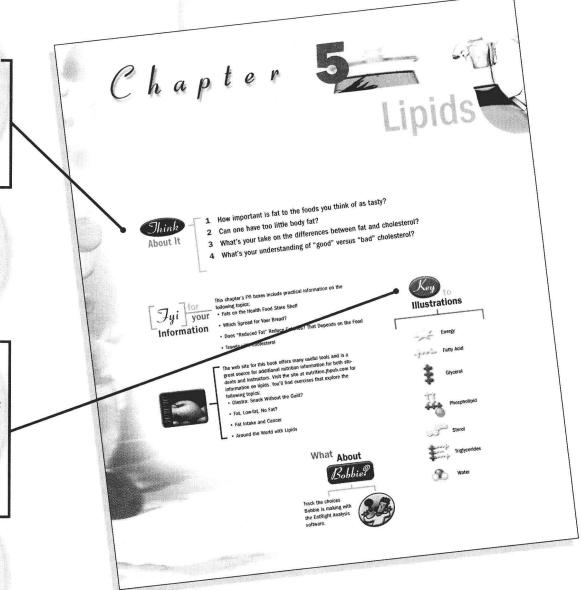
This textbook is unique in the field of nutrition and leads the way in depicting important biological and physiological phenomena, such as transport across cell membranes, emulsification, glucose regulation, digestion and absorption, and fetal development. Extensive graphic presentations make nutrition and physiological principles come alive. Illustrations depict the fine details of important processes in the part of the cell or tissue where the processes occur.

#### The Pedagogy

Nutrition focuses on teaching behavioral change, personal decision making, and up-to-date scientific concepts in a number of novel ways. The interactive approach that addresses different learning styles makes it the ideal text to ensure a high likelihood of success by students. Beginning with Chapter 1, the material engages students in considering their own behavior in light of the knowledge they are gaining. The pedagogical aids that appear in most chapters include:

Think About It questions at the beginning of each chapter present realistic nutritionrelated situations and ask the students to consider how they would behave in such circumstances.

The **Key to Illustrations** at the beginning of each chapter identifies the icons students will encounter throughout the book. These *chemical icons* identify molecular components of nutrient molecules, making their construction and deconstruction visually and conceptually accessible.



Key terms are in boldface type the first time they are mentioned. Their definitions also appear in the margins near the relevant textual discussion, making it easy for students to review material and terms.

718 Chapler 18 WORLD VIEW OF NUTRITION

Food and Agriculture Organization (FAO) The autonomous UN agency; the FAO works to allew yerty and hunger by promoting agency. ting agricultura

Quick Biles

Where were you born?

our survival was greatly influenced by the location of your birth. Angola has the highest incauon or your orrin. Angola has the nighes infant mortality rate (195 deaths per 1,000 live births), according to estimates for 2000. Other countries with high infant mortality rates include Sierra Leone (148 per 1,000), Afghanistan (149 per 1,000), and Liberia (134 per 1,000). At the other end of the spectrum is Finland (4 per 1,000). Canada (5 per 1,000) does (4 per 1,000), canada (5 per 1,000) does better than the United States (7 per 1,000)

Hunger in the developing world is chronic. "It is debilitating. It blights the lives of all who are affected and undermines national economies and the lives of all wno are affected and undermines national economies and development processes where it is found on a large scale, says the Food and Agriculture Organization of the United Nations.24 Although food and agriculture Organization of the United Ivations, "Authorign food shortages severe enough to cause endemic starvation or famine have lessened significantly, natural disasters, epidemics, economic or political upheaval, or war can quickly precipitate famine.

#### Why Hunger?

Why, is a world of plenty, does hunger still exist? The causes are simple, but the solutions are tremendously complex; they require economic, political, and social change, as well as improvements in nutrition, food production, and environmental safeguards, as you study the critical nutrient deficiencies in the developing world, you will be the program inforting the content of th deficiencies in the developing world, you will see that poverty, infection, and social upheaval interact with nutries. Solutions about the deficiencies in the developing world, you will see that poverty, infection, poor sanitation, and social upheaval interact with nutries, shortages to bring about the deficiencies.

### Social and Economic Factors

Poverty, overpopulation, and the migration to overcrowded cities are closely interrelated causes of hunger (Figure 18.6). Each situation worsens the Interrelated causes of nunger (Figure 10.0). Each situation worsens die effects of the others as they steadily drive a population toward malnutrition. Poverty

Poverty is the most important underlying reason for chronic hunger. It limits a second of the chronic hunger in the control of the chronic hunger. Poverty is the most important underlying reason for chronic nunger, it iinst access to food, obviously. It limits purchase of farming supplies to grow food, boats and equipment to fish, and storage equipment to prevent spoilage. It limits access to medical care. It compromises efforts at sanita-

spoilage. It limits access to medical care. It compromises erioris at sanitation. It discourages education and the chance for personal advancement. For nations, poverty means paralyzed economic development and too rou inations, poverty incans pararysed economic development and too few jobs; inadequate investments in infrastructure and basic housing; and too few resources to train doctors, nutritionists, nurses, and other health-

Fyt AIDS and Malnutrition

ike other infections, HIV interacts with mainutrition in a vicious, devastating cycle. Left untreated, HIV infection progresses to the acquired immunodeficiency syndrome (AIDS). The virus attacks by destroying its victim's immune system. Unable to fight infections and malignancies, disease quickly depletes marginal nutrient stores, speeding the way to severe mainutrition and death. But mainutrition and HIV interact on several other

- ers, as werr.

  Low vitamin A levels in pregnant women increase the rate of HIV transmission to their unborn babies.
- HIV is transmitted to infants in bre milk; but in impoverished regions, substitutions for breast milk typically increase infantile diarrhea, malnutrition, and
- AIDS leaves mothers too weak to feed and care for their children. Eventually AIDS turns children into orphans.
- AIDS disables parents so they cannot work to support and feed their families.
- Reduced levels of micronutrients in an HIV-infected person are associated with faster progression of HIV disease and
- Weight loss and muscle wasting in an infected person are associated with faster progression of HIV disease and
- hat accompany AIDS cause tion. Nausea and loss of one malnutris of appetite also contribute to malnutriti
- Severe protein-energy malnut (PEM) is characteristic of untreated AIDS, and frequently the ultimate cau

Quick Bites are sprinkled throughout the book. They offer fun facts about nutritionrelated topics such as exotic foods, social customs, origins of phrases, folk remedies, medical history, and so on.

For Your Information offer more in-depth treatment of controversial and timely topics, such as unfounded claims about the effects of sugar, whether athletes need more protein, and megadoses of vitamins.

**Key Concepts** summarize previous text and highlight important information.

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13. Do not eat charred food. For meat and fish eaters, avoid burning meat juices. Consume the following only occasionally: meat and fish grilled (broiled) in a direct flame; cured or smoked meats.

14. For those who follow these recommendations, dietary supplements are probably unnecessary, and possibly unhelpful. for reducing are probably unnecessary, and possibly unhelpful.

Cancer risk.

Key Concepts. Excessive fat intake has been linked to obesity, heart disease, and cancer. There is a major public heath effort to reduce intake of fat, saturated fat, and cholesterol. Cholesterol-lowering diets have changed over the years, with somewhat less emphasis on reducing dietary cholesterol, and more on reducing fats and saturated fats, and increasing fruits, pegetables, and whole grains. The evidence linking dietary fats with cancer is less clear, but many other dietary factors are important in reducing risk.

Label to Table helps students apply their new decision-making skills at the supermarket. It walks students through the various types of information that appear on food labels, including government-mandated terminology, misleading advertising phrases, and amounts of ingredients.

#### Label [to] Table

The Nutrition Facts panel shown here highlights all of the lipid-related information you can find on a food label. Look to the top of the label where it states that this product contains 35 Calories from Fat. Do you know how you can estimate this number from another part of the label? Recall (or look to another part of the label) that each gram of fat, then it should make sense that grams of fat, then it should make sense that there are approximately 36 kilocalories provided by fat. In this case, because the manufacturer listed only 35 you can assume that the 4 grams fat on the label is rounded up from the actual total fat content of 3.9 grams of fat × 9 kilocalories per gram at the state of the state of the label is conded to the label is conded to

35 kilocalones of fat).

Total Fat is the second thing you'il see along with saturated fat. Recall that fats are classified into 3 types: saturated, monounsaturated, and polyunsaturated. Manufacturers are required to list only saturated fat on the slobel but they can voluntarily list the others. Using this food label, you can estimate the amount of unsaturated fat by simply looking at the highlighted sections. There are 4 total

grams of fat and 2.5 of them are saturated. That means the remaining 1.5 grams are either polyunsaturated or monounsaturated. Without even knowing what food item this label represents, you can decipher that it contains more saturated fat than unsaturated fat (2.5g vs. 1.5g). This is typical of a food that contains fat from an animal source or tropical oil.

or uopwar on.

Do you see the 6% to the right of "Total Fat." This does not mean that the food item contains 6% of its calories from fat. In fact, this food item contains 23% of its calories from fat fat (35 fat koal / 154 total kilocalories from fat (35 fat koal / 154 total kilocalories - 23, or 23% fat). The 6% refers to the Daily Values found below. You can see that a person who consumes 2,000 koalories per day could consume up to 65 grams of fat per day. This product contributes just 4 grams per serving, which is 6% of that amount (4 / 65 = .06, or 6%). Note that the %, Daily Value for saturated fat is 12% which means that just a few servings of this food can contribute quite we servings of this food can contribute quite is also highlighted on this label (20 mg) along with its Daily Value contribution (7%).

#### **Nutrition Facts**

Serving Size: 1 cup (248g) Servings Per Container: 4

Amount Per Serving

Calories 154 Calories from fat 35

Soul work

Total Fet 4g 6%

Saturated Fet 2.5g 12%

Cholesterol 20mg 7%

Sodium 170 mg 7%

Dietary Fiber 0g 0%

Sugars 14g

Vitamin A 4% • Vitamin C 6%

Calcium 40% • Iron 0%

• Percent Dally Mileas are based on a 2,000
calcric del four ability whates may be righter or
lower depending on your Culture emidde.

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The Learning Portfolio at the end of each chapter collects, in one place, all aspects of nutrition information students need to solidify their understanding of the material. The various formats will appeal to students according to their individual learning

and studying styles.

vocabulary alphabetically with the page number of the first appearance. This arrangement allows students to review any term they do not recall and turn immediately to the definition and discussion of it in the chapter. This approach promotes the acquisition of knowledge, not simply memorization.

Key Terms lists all new

Study Points is a bulleted list that summarizes the content of each chapter with a synopsis of each major topic. The points are in the order in which they appear in the chapter, so related concepts flow together.

# LEARNING Portfolio chapter 5

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1				
adipocyte		page	8	
adipose tissue		144	Interna	
alpha-linolenic acid		144	intermediat	e-density
[Al-fah-lin-oh-L	cacid		lipoprote	in (IDL)
atheroscleroci	142	lanugo [lah-	NEW-go]	
[ath-e-roh-scle-	POU .		linoleic acid	
bioavailability	NON-SIS)	151	[lin-oh-LAY-ik]	
cardiovascular	and the	144	lipophobic	
(CVD)	usease			
chain length		167	lipoprotein	
chalesteral		136	136 lipoprotein lipase (LPL)	
[ko-LES-te-rol]			low-density lipo (LDL)	protein
choline		151		
chylomicron		149	lycopene	
[kye-to-MY-kron]			micelles	
cis fatty acids		155	monoglyceride	1
conjugated linoleic		40	monounsaturated	
depot fat	acid 1	40	fatty acid	13
desaturation	14	14	nonessential fatty	acid
diglyceride	14	0	obesity	
eicosanoids	14.	3	olestra	166
elongation	140	)	omega-3 fatty acid	163
enterocytes	140	100	omega-6 fatty and	140
essential	155		mega-9 fatty acid	140
essential fatty acids ester	140	O	xidation	140
	143	pi	hosphate group	147
esterification	193	pt	ospholipid	148
e-ster-ih-fih-KAY-shun]	143	ph	ytosterols	136
at substitutes	163	Pol	yunsaturated	153
itty acid	136	rati	y acid	
ycerol [GLISS-er-ol]	142	sati	rated fatty acid	138
gh-density lipoprotein	142	squa	alene	138
/	159		torrhea	153
rogenation	133	stero		155
h-dro-jen-AY-shun]	140	subci	itaneous fat	136
ophobic	136	trans	fatty acids	144
rcholesterolemia	167	unsati	trated fatty acid	140
hilic	136	very-lo	w-density	138
Philic	200	lipopro	tein (VLDL)	
dro-FILL-ik]	136	viscera	fot	158
	-50			144

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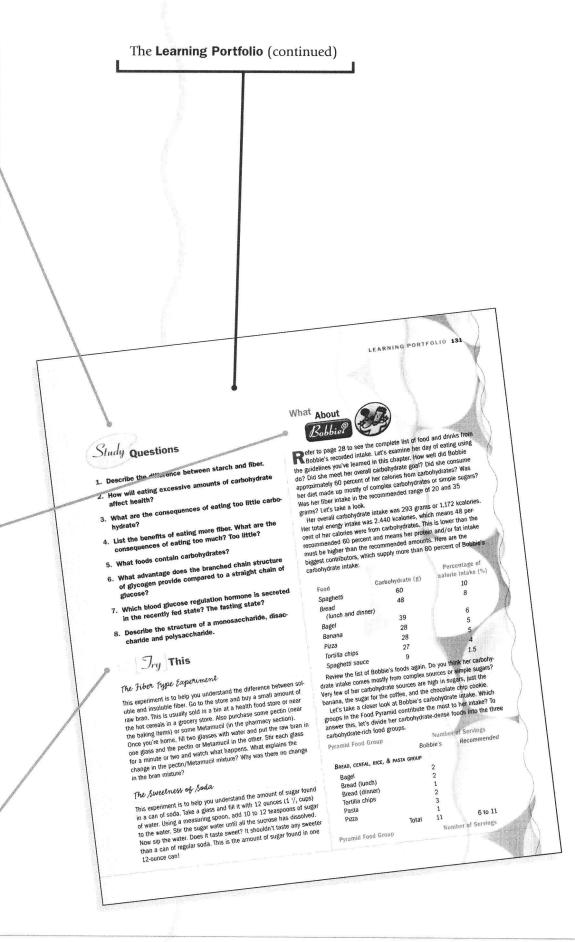
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- organic solvents but not in water. Fats an oils are part of the lipids group.
- There are three main classes of lipids; triglyc phospholipids, and sterois.
- Fatty acids-long carbon chains with methyl and carb groups on the ends-are components of both triglyceride groups on the enus-are components on soon viscoentees and phospholipids, and are often attached to cholesterol.
- Saturated fatty acids have no double bonds between carbons in the chain, monounsaturated fatty acids have one bons in the chair, individualization later acids have one double bond, and polyunsaturated fatty acids have more
- Two polyunsaturated fatty acids, linoleic acid and alpha-Two polyunsaturated fatty acids, linoleic acid and alpha-linolenic acid, are essential; they must be supplied in the diet. Phospholipids and sterois are made in the body and
- Essential fatty acids are elongated and desatura the process of making "local hormones" called ecosanoids. These compounds regulate many body func
- Triglycerides are food fats and storage fats. They are composed of glycerol and three fatty acids.
- in the body, triglycerides are an important source of energy. Stored fat provides an energy reserve. sy, or a sylvarial two fatty acids, and
- a phosphate group with a nitrogen-containing component. a prospirate group with a introgene voluntial components of cell membranes and lipoproteins. Their unique affinity for both fat and water allows them to be effective emulsifiers in foods and in
- Cholesterol is found in cell membranes and is used to Cholesterol is round in cell membranes and is used to synthesize vitamin D, bile acids, and steroid hormones. High levels of blood cholesterol are associated with heart
- Most sources recommend that Americans consume no more than 30 percent of calories as fat, no more than 10 percent of calories as saturated fat, and no more than 300 millistrants of cholesteral each day.
- Diets high in fat and saturated fat tend to increase blood levels of LDL cholesterol and increase risk for heart dis-
- Excess fat in the diet is linked to obesity and some types

Study Questions encourage students to probe deeper into the chapter content, making connections and gaining new insights. Although these questions can be used for pop quizzes, they will also help students to review, especially students who study by writing out material. They can check their work by looking at the Study Questions with Answers feature, which appears at the end of the appendices.

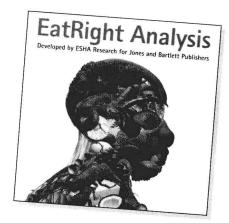
What About Bobbie? tracks the eating habits and healthrelated decisions of a typical college student so that students can apply the material they have learned in the chapter to a typical situation. Following the individual case of Bobbie takes students from the general concepts to the specific application of new information. As a complement to this textual feature, the EatRight Analysis CD allows students to track the various choices Bobbie makes, as well as their own food choices.

Try This! activities are for curious students who like to experiment. These suggestions for hands-on activities encourage students to put theory into practice. It will especially help students whose major learning style is experiential.



### The Integrated Learning and Teaching Package

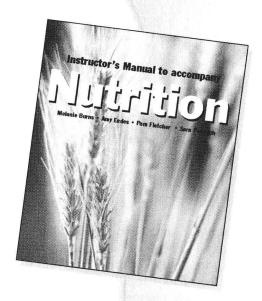
Integrating the text and ancillaries is crucial to deriving their full benefit. Based on feedback from instructors and students, Jones and Bartlett Publishers offers the following supplements.



The **EatRight Analysis CD** is an important component of the behavioral change and personal decision-making focus. EatRight Analysis, developed by ESHA Research and tailored by the authors, enables students to analyze their diets by calculating their nutrient intake and comparing it to recommended intake levels.

The web site for *Nutrition*, **nutrition.jbpub.com**, offers students and instructors an unprecedented degree of integration between their text and the on-line world through many useful study tools, activities, and supplementary health information.

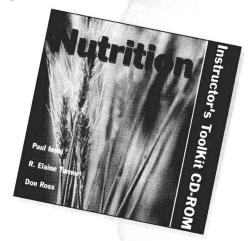


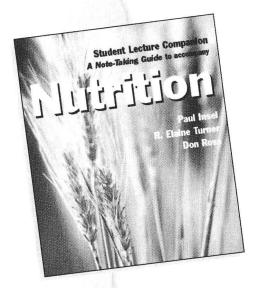


The **Instructor's Manual** is a comprehensive teaching resource available to adopters of the book. It includes chapter summaries, strategies for teaching difficult concepts, and handouts tailored for each chapter.

The **Instructor's ToolKit CD-ROM** features an Image Bank of art that can be imported into tests or projected for class. It also includes:

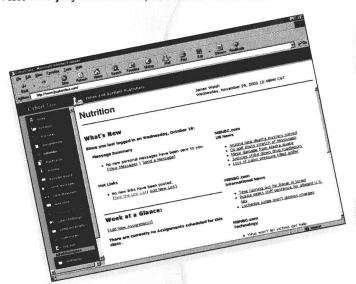
- PowerPoint Lecture Presentation Slides
- Instructor's Guide
- Computerized TestBank





The **Student Lecture Companion for Nutrition** provides a visual guide that follows *Nutrition's* chapter topics and contains a print version of the PowerPoint slides included in the Instructor's ToolKit. Students can concentrate better during lectures and take notes without having to copy down the text from the slides.

**CyberClass** is a Web-based customizable teaching and learning environment that offers on-line course-management tools for instructors (e.g., on-line quizzes) and learning tools for students (e.g., on-line flashcards). You can put your course on-line in less than an hour! Visit **www.jbcyberclass.com**, for more information.





**WebCT** is a customizable, web-based teaching and learning environment that offers distance learning tools for you and your students. Pre-loaded and fully customizable, the WebCT e-Pack offers:

- PowerPoint presentations, lecture outlines, and course syllabus
- Electronic posting and submission of assignments
- TestBank to create and administer online tests or quizzes
- Course management tools such as student rosters and immediate grade tracking and posting
- Student review tools such as review questions, web links, and flashcards
- Communications tools such as discussion boards, chat rooms, and e-mail

## About the Authors

he *Nutrition* author team represents a culmination of years of teaching and research in psychology and nutrition science. The combined experience of the authors yields a balanced presentation of both the science of nutrition and the components of behavioral change.

**Dr. Paul Insel** is Clinical Associate Professor of Psychiatry and Behavioral Sciences at Stanford University (Stanford, California). In addition to being the principal investigator on several nutrition projects for the National Institutes of Health (NIH), he is the senior author of the seminal text in health education and has co-authored several best-selling nutrition books.

Dr. R. Elaine Turner is a Registered Dietitian and Assistant Professor in the Food Science and Human Nutrition Department at the University of Florida (Gainesville, Florida). Dr. Turner has been teaching courses in introductory and life-cycle nutrition for nearly 15 years. Her interests include nutrition labeling and dietary supplement regulations, computer applications in nutrition and education, maternal and infant nutrition, and consumer issues. Dr. Turner was named Undergraduate Teacher of the Year, 2000-2001, for the College of Agricultural and Life Sciences.

Don Ross is co-director of the California Institute of Human Nutrition (Redwood City, California). For 15 years he has created educational materials about health and nutrition for consumers, professionals, and college students. He has special expertise in communicating complicated physiological processes with easily understood graphical presentations. The National Institutes of Health selected his Travels with Cholesterol for distribution to comments. His multidisciplinary focus brings together the fields of psychology, nutrition, biochemistry, and medicine.

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