

SUE RODWELL WILLIAMS

**Self-study guide for
Nutrition
and
Diet
Therapy**

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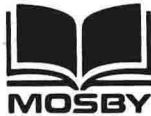
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Nutrition and Diet Therapy

Preface

This study guide is designed to help you in your study of basic nutrition. Its chapter divisions are correlated with those in the textbook *Essentials of Nutrition and Diet Therapy* (Williams, S. R.: St. Louis, 1982, The C.V. Mosby Co.). However, the general study structure may also be useful for many students using the more advanced text *Nutrition and Diet Therapy* (Williams, S.R.: St. Louis, 1981, The C.V. Mosby Co.).

The book is organized to facilitate your study in several ways:

1. To help you summarize and review the main points in each chapter
2. To encourage and stimulate your thinking about several key issues and questions related to the chapter material
3. To help you test your own understanding of the basic content discussed in the text
4. To apply and illustrate the concepts and principles involved, through the use of case problems, individual and group learning activities, experiments, projects, or demonstrations

Thus each chapter consists of four sections: (1) Summary-Review Quiz, (2) Discussion Questions, (3) Self-Test Questions, and (4) Learning Activities.

Summary-Review Quiz. This first section should be completed immediately after the related chapter in the text has been read carefully. This review activity will help you gain, first, a broad view of the basic principles and generalizations presented. Then as you proceed in your studies, each Summary-Review Quiz will provide basic background for grasping the developing material in subsequent chapters.

To complete this Summary-Review Quiz choose the correct words or phrases for each blank from the list provided. Write both the word and its number in the corresponding blank. After you have finished, check your answers against those given at the back of the book. Remember the learning sequence:

1. Read the related chapter in the text thoroughly.
2. Fill in immediately all the blanks in the Summary-Review Quiz.
3. Then after you have completed all blanks, check your answers.
4. Correct any errors and leave the Summary-Review Quiz for any follow-up reference and review needed.

Discussion Questions. These questions provide a more intensive digging into a few selected topics or issues related to the text discussions. They will help you to organize your thinking about problems raised in each chapter and provide valuable practice in writing essay examinations. Think through each question carefully and reread related portions of the text as needed. Then write your answers clearly and completely. You may use these questions to explore ideas individually or as a basis for discussion in small groups.

At this point, to explore these questions more deeply, you may want to consult additional references. Look over the references suggested in your textbook or listed here. It is always a good habit to consult references in addition to your text for a broader range of comparative data and their application. Remember that a lifetime of learning comes only from forming early the mental set of asking questions about everything you hear, read, or observe—especially questions of “How?” “Why?” and “So what?” In other words, *think* about what you read and ask questions constantly.

Self-Test Questions. Here you can narrow your study to specific facts and conclusions by testing your knowledge of the basic content presented at this point. Each self-test is in two parts. First, a list of true-false statements is presented. Select the correct answer by circling either the “T” or the “F” before each statement. Second, there are several multiple choice test items. Here you may circle the letter before the answer you choose. Then after you have completed both parts, check your answers with those listed in the back of the book. To clarify this information in your thinking, reread the material related to any items that you may have marked incorrectly.

Learning Activities. This final section presents a variety of possible learning activities to give you the opportunity to learn by doing, by applying principles to specific life situations or common observations. These life situations may involve individual or family nutritional problems. Other activities include experiments or demonstrations and the gathering of pertinent data needed to solve problems or to discover answers to key questions.

Active participation in problem-solving activities leads to effective learning. Some of these activities are individual, and some are group activities. Some may be done in the classroom, whereas many may be carried out at home or in the community. In each instance, facts and principles will have more meaning to you through your active participation.

Sue Rodwell Williams

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PART ONE

AN INTRODUCTION TO HUMAN NUTRITION

1 Nutrition and health

SUMMARY-REVIEW QUIZ

1. In modern health care new and different problems are being confronted, based on new life-styles, _____, changing values and community patterns, and _____. Therefore the fundamental framework for the study of basic nutrition must be built on the learning concepts of _____ and _____.

2. Formerly and to some extent even now the basic approach to care was _____, and training of hospital and community workers centered on skills for treating _____. Presently, however, education in the health fields is based on a _____ approach and on a _____ concept of _____, or wellness, rather than a _____ concept of _____, or illness. This positive approach values _____ beyond mere physical survival.

3. Two main factors have brought about these changes in health values and practices. These factors are the rapid increase in _____ and in _____. Problems have resulted, however. Increased "know-how" has brought more specialization and higher _____. An increased number of people and length of life have brought a greater increase in the _____ of aging.

4. Changes must follow, therefore, in ways of providing health care. These include changes in focus onto the _____ involved as root causes of disease, malnutrition, and illness; changes in _____ to include more _____ and care in a variety of hospital and _____ and community health centers; changes in the role of the _____, or health clients, to involve them more actively in

their own health needs through better nutrition and health education; and changes in _____ to some kind of health insurance to meet mounting costs.

5. The rapidly changing _____ and increased _____ and action have contributed to new priorities and needs in nutrition education. Attention has been focused on problems of _____, especially in poverty areas and in the _____ persons in our population.

6. In the light of these problems, nutrition must be defined then in terms of what it does toward _____. Nutrition is specifically related both to _____ and _____.

- | | | |
|-----------------------|--------------------------|-----------------------------|
| 1. aging | 11. food environment | 21. physical health |
| 2. balance | 12. health | 22. population |
| 3. change | 13. health care systems | 23. positive |
| 4. chronic illnesses | 14. health teamwork | 24. preventive |
| 5. consumers | 15. illness | 25. quality of life |
| 6. consumer awareness | 16. malnutrition | 26. scientific knowledge |
| 7. curative | 17. medical costs | 27. social issues |
| 8. disease | 18. meeting human need | 28. special clinic settings |
| 9. economic stress | 19. negative | |
| 10. emotional health | 20. payment for services | |

DISCUSSION QUESTIONS

1. What is your own present definition of nutrition?
2. How do you think nutrition relates to the health of individuals and groups? What personal observations can you give to support your statement?
3. What conditions are necessary for sustaining human life?
4. Explain the meaning of the statement: "Food habits do not develop in a vacuum."

5. What does it mean to you to “deal with the whole self” in working with a patient or client?
6. How do you think health professionals may be involved in community and legislative action? Do you think this action is increasingly important? Why?

SELF-TEST QUESTIONS

True-false

Circle the “T” if a statement is true. If it is false, circle the “F” and write the correct statement below it.

- T F 1. American society tends to be youth and action oriented and therefore often isolates and ignores its elderly citizens.
- T F 2. Food habits are closely related to cultural influences and psychosocial development.
- T F 3. Nutrients work independently in the body.
- T F 4. Food processing has little influence on the amount of nutrients in the food or on its safety, appearance, and taste.
- T F 5. Certain foods are called *complete foods* because they contain all the nutrients needed for full growth and health.

Multiple choice

Circle the letter in front of the correct answer.

1. All persons throughout life have need for:
 - a. The same amount of nutrients at any age
 - b. The same nutrients but in varying amounts

- c. The same amount of nutrients in any state of health
 - d. Different nutrients in varying amounts
2. Nutrients are:
- a. Foods necessary for good health
 - b. Chemicals in foods having specific metabolic functions
 - c. Nourishments used to cure certain illnesses
 - d. Metabolic control agents such as enzymes
3. All nutrients needed by the body:
- a. Are available through food in a variety of combinations
 - b. Must be obtained by additional pills
 - c. Must be obtained by specific food combinations
 - d. Have a variety of uses in the body
4. Signs of good nutrition include:
- a. Average weight for body size
 - b. Good muscle development
 - c. Smooth, clear skin
 - d. All the above

LEARNING ACTIVITIES

1. What problems do you see in your environment that are related to nutrition? Consider environment as broadly as you wish—local community, general area, country, or world.
2. Pick one of the problems you noted above. What kinds of information do you need to find some solutions to this problem? Where would you search? What resources (places, persons, or reference materials) would you use?
3. At this point what solutions to this problem can you see? Give any reasons or evidence that you can think of to support your solutions.
4. Select a specific person as a subject. Observe carefully, and make a general assessment of nutritional status, using Table 1-1, p. 8, in *Essentials of Nutrition and Diet Therapy* as a guide.

2 Carbohydrates: the problem of energy

SUMMARY-REVIEW QUIZ

1. The primary survival task of the human body is that of securing _____ to do its work. To obtain _____, a _____ must be changed to a usable refined fuel, which must then be carried to the site of _____, where the fuel can be burned.

2. In the human energy system the major raw fuel source used for quick energy is _____. This is found in plant foods as _____ and _____. Plants transform energy from the _____, using _____ and _____ as raw materials, and _____ in green leaves as a catalyst to manufacture this _____. The name *carbohydrate* comes from its structural chemical elements _____, _____, and _____.

3. The simplest form of carbohydrate is the _____. Three of these simple sugars important in human nutrition are _____, _____, and _____. The somewhat more complex double sugars are called _____. The three main double sugars are _____, _____, and _____. Still more complex dietary carbohydrates made up of many sugar units are the _____. Two of these carbohydrates are important in human nutrition: _____ as a major energy source and _____ as a necessary digestive aid.

4. A relatively small amount of carbohydrate is stored in the _____ and muscles in the form of _____. The _____ constantly carries a small additional amount. Therefore _____ is needed regularly to meet energy demands and to spare _____ from being used too much for energy. Also sufficient carbohydrate has an _____, thus preventing too rapid a breakdown of fat for energy, with the resulting accumulation in the blood of strong acids called _____.

5. Two vital body organs are especially dependent on a constant supply of carbohydrate in the form of _____ to supply energy to operate their specific functions. These organs are the _____ and the _____.

6. The refined fuel used by the cells for making energy available for body work is _____. It is produced from food carbohydrate by the combined action of _____ and _____ digestion. Food substances travel through the successive parts of the gastrointestinal tract—_____, _____, and _____—where they are broken down into increasingly simpler chemical compounds through _____. This chemical activity is aided by a variety of coordinated _____, and the food mass is moved along by _____. As a result of this combined action, the _____ are produced and arrive at the site of nutrient absorption of the _____.

7. Accessory organs adjacent to the gastrointestinal tract—the _____, _____, and _____—also produce and store chemical substances necessary for _____ and release them into the _____ as needed.

8. After digestion is completed, the simple sugars are carried directly into the portal _____ by _____ mainly through the process of active transport. The _____ of the small intestine is uniquely developed to increase and facilitate this transport of nutrients into the circulation by means of three successively smaller parts of the structure: _____, _____, and _____. Only _____ is left for the large intestine to accomplish.

9. The _____ are energy production sites. _____, the refined fuel carried there by the blood, is burned to release stored _____ for cell work through a series of _____ chemical reactions. This overall system of chemical processes by which energy is made available for the body is called _____. A special chemical compound produced anywhere along the way by these may special metabolic processes is called a _____.

10. The key hormone controlling the blood sugar level is _____. It is produced in a special scattered cells of the _____ called _____. This hormone prevents _____, too much blood sugar, by stimulating the conversion of glucose to storage forms of energy—_____ and _____—and allowing more glucose to enter the cell to be burned for _____. _____ is an opposite acting hormone produced in the same organ. It _____ blood sugar by increasing the breakdown of stored liver _____ to produce _____.

11. Through an initial stage of cell work in the cytoplasm, the key _____ of the body's energy system—_____—is produced. This vital common molecule is then burned in the _____, the "powerhouse" of the cell, through another special series of enzyme reactions called the _____. As a result of this series of enzyme reactions, the key powerful compound _____ is formed to _____ energy and then _____ it as needed for use by the body.

- | | | |
|---------------------------------|--------------------------|----------------------|
| 1. absorbing surface | 24. enzyme-controlled | 48. mitochondrion |
| 2. absorption | 25. fat | 49. monosaccharide |
| 3. active acetate | 26. fructose | 50. mouth |
| 4. antiketogenic effect | 27. galactose | 51. mucosal folds |
| 5. ATP (adenosine triphosphate) | 28. gallbladder | 52. muscle actions |
| 6. bind and store | 29. glucagon | 53. oxygen |
| 7. blood circulation | 30. glucose | 54. pancreas |
| 8. blood sugar | 31. glycogen | 55. peristalsis |
| 9. brain | 32. heart | 56. polysaccharides |
| 10. carbohydrate | 33. hydrogen | 57. potential energy |
| 11. carbon | 34. hyperglycemia | 58. protein |
| 12. carbon dioxide | 35. insulin | 59. raises |
| 13. cells | 36. intestines | 60. raw fuel |
| 14. cellulose | 37. islets of Langerhans | 61. release |
| 15. chemical | 38. ketones | 62. simple sugars |
| 16. chlorophyll | 39. Krebs cycle | 63. small intestine |
| 17. common molecule | 40. lactose | 64. starches |
| 18. dietary carbohydrate | 41. liver | 65. stomach |
| 19. digestion | 42. lowers | 66. sucrose |
| 20. disaccharides | 43. maltose | 67. sugars |
| 21. energy | 44. mechanical | 68. sun |
| 22. energy production | 45. metabolism | 69. villi |
| 23. enzyme action | 46. metabolite | 70. water |
| | 47. microvilli | 71. water absorption |

DISCUSSION QUESTIONS

1. What kind of sugar is in the blood? How does it differ from the sugar in your sugar bowl?
2. Where does blood sugar come from? Only from sugar?
3. How are the two hormones insulin and glucagon, related? What is the significance of this relationship?

4. How are other hormones related to the control of blood sugar levels?
5. What is active acetate? Why is it called a *common molecule*? What is its significance in the human energy system?
6. Why is ATP called a *high-energy compound*?
7. How large a proportion of the American diet is contributed by carbohydrate? Why? Of this carbohydrate, what major forms do we consume?
8. From your general observation and experience do you see any trends in form and amount of carbohydrate used in the American diet? As a health worker, does this concern you? Why?
9. Define the term "dietary fiber." Why is more attention being given currently to the role of fiber in the human diet?

SELF-TEST QUESTIONS

True-false

Circle the "T" if a statement is true. If it is false, circle the "F" and write the correct statement below it.

- T F 1. Carbohydrates are composed of carbon, hydrogen, oxygen, and nitrogen.
- T F 2. The main carbohydrate food in our diet is starch.
- T F 3. Modern processing and refinement of our foods has reduced the amount of cellulose in our diet.
- T F 4. In low-income families a proportionately larger amount of the food budget is spent for fats and proteins.
- T F 5. Lactose is a very sweet simple sugar found free in a number of carbohydrate foods.
- T F 6. Honey and table sugar contain the same form of sugar and hence may be interchanged in the diet.
- T F 7. Glucose is the form in which sugar circulates in the blood.
- T F 8. Cheese contains the same amount of carbohydrate as the milk from which it is made.
- T F 9. A small amount of the cellulose in foods that we eat is digested, but the major portion is carried through the body and provides important bulk in the gastrointestinal tract.
- T F 10. Glycogen is an important long-term storage form of energy because relatively large amounts of it are deposited in the liver and muscles.

Multiple choice

Circle the letter in front of the correct answer.

- 1. Carbohydrates provide one of the main fuel sources for energy. Which of the following carbohydrate foods provides the *quickest* source of energy?
 - a. Slice of bread
 - b. Glass of orange juice
 - c. Chocolate candy bar
 - d. Glass of milk
 - e. Bowl of cooked cereal

2. The most nutritionally significant refined fuel form of carbohydrate is:
 - a. Maltose
 - b. Dextrins
 - c. Starch
 - d. Glucose
3. Most of the work of changing raw fuel forms of carbohydrates to the refined usable fuel is accomplished by enzymes located in the:
 - a. Mouth
 - b. Stomach
 - c. Small intestine
 - d. Large intestine
4. An adult intolerance to milk, found mostly in black and Oriental populations, is due to a genetic deficiency of the enzyme:
 - a. Sucrase
 - b. Lactase
 - c. Maltase
 - d. Amylase
5. Chemical digestion of carbohydrates is completed in the small intestine by enzymes from the:
 - a. Pancreas and gallbladder
 - b. Gallbladder and liver
 - c. Small intestine and pancreas
 - d. Liver and small intestine
6. The refined fuel glucose is delivered to the cells by the blood for production of energy. The hormone controlling the use of glucose by the cells is:
 - a. Thyroxin
 - b. Growth hormone
 - c. Adrenal steroid
 - d. Insulin
7. An important activating substance attached in high-energy bonds to store energy in the cell is:
 - a. Sodium
 - b. Potassium
 - c. Phosphate
 - d. Carbon
8. A quickly available form of energy, although limited in amount, is stored in the liver by conversion of glucose to:
 - a. Glycogen
 - b. Glycerol
 - c. Tissue fat
 - d. Amino acids
9. In the "powerhouse" of the cell the final common molecule (a 2-carbon fragment of active acetate) formed from glucose and fatty acids is converted to energy. This powerhouse of the cell is the:
 - a. Ribosome
 - b. Nucleus
 - c. Cytoplasm
 - d. Mitochondrion
10. The unique chemical compound produced in the human energy system in the cell, which traps and stores energy in its high-energy bond, is:
 - a. DNA—deoxyribonucleic acid
 - b. ATP—adenosine triphosphate
 - c. RNA—ribonucleic acid
 - d. AMP—adenosine monophosphate

LEARNING ACTIVITIES

Individual or group experiment: Initial carbohydrate enzyme digestion

Materials. A large pickle, some saltine crackers, a cookie, a saucer, a glass of drinking water, and a timer or watch with a second hand.