**Instructor’s Manual for *Nutrition for Sport & Exercise* 3e**

**Chapter 1 – Introduction to Sports Nutrition**

**Overarching Concepts**

1. Type, intensity, and duration of training are the driving forces in determining energy and nutrient needs.

2. Most recreational athletes do not engage in a level of training that requires a diet different from that recommended for good health to the general population.

3. Athletes need a comprehensive training plan and a matching comprehensive nutrition plan.

4. Supplementation should be considered as part of the comprehensive nutrition plan.

5. Scientific recommendations are only as strong as the studies on which they are based.

6. Food is for fueling exercise and training as well as for enjoyment.

7. Credentialing protects consumers and practitioners and it is important to know and respect professional boundaries.

**Learning Objectives**

LO 1.1 Explain the need for an integrated training and nutrition plan.

LO 1.2 Explain basic nutrition principles and how they might be modified to meet the needs of athletes.

LO 1.3 List sports nutrition goals.

LO 1.4 Outline the basic issues related to dietary supplements and ergogenic aids, such as legality, ethics, purity, safety, and effectiveness.

LO 1.5 Distinguish between types of research studies, weak and strong research designs, and correlation and causation.

LO 1.6 Compare and contrast the academic training and experience necessary to obtain various exercise and nutrition certifications.

**Chapter Outline**

I. Introduction

A. Pre-test assessment

B. Introductory concepts

1. Sports nutrition is a blend of nutrition and exercise physiology

2. Science-based but there is an art to application

II. 1.1 Training, nutrition, and the athlete

* Sports nutrition requires an understanding of the physiological challenges of training and competition and the scientific and applied principles of nutrition.
* The physical demands of activity, exercise, and sport can vary dramatically between athletes and for individual athletes over a given time period.
* Training and nutrition go hand in hand.
* An organized training plan that takes into account specific goals and incorporates basic principles of training is critical for excellent performance.
* Athletes need a nutrition plan that complements the physical demands of training and performance and supports good health.

A. Sports nutrition is a blend of exercise physiology and nutrition.

B. The term *athlete* is very broad and inclusive.

1. Differences between elite, well-trained, and recreational athletes

C. Physical activity, exercise, and sport differ from each other

1. Differences between physical activity, exercise, and sport

2. Aerobic and anaerobic exercise

3. Endurance and strength athletes

D. Training and nutrition go hand in hand.

1. “Everyone is an athlete”

2. Training is key to improving performance

3. Nutrition supports training and good health

4. Dietary intake needs daily attention but an athlete’s diet must be flexible

E. Nutrition supports training and performance.

1. Main goal for athletes is to improve performance

2. General training goals

a. Improve performance

b. Improve fitness

c. Avoid injury and overtraining

d. “Peak” at appropriate times

3. General (long-term) sports nutrition goals

a. Adequate energy intake to fuel training

b. Adequate carbohydrate intake to replenish depleted glycogen stores

c. Adequate protein intake for growth and repair of muscle

d. Adequate overall diet for good health, particularly the immune system

e. Adequate hydration for proper thermoregulation

4. Specific (short-term) sports nutrition goals

a. Consumption of food and beverages to delay fatigue

b. Consumption of fluid to minimize dehydration and hypohydration

c. Application of specific dietary strategies such as carbohydrate loading

d. Intake of nutrients that support recovery

F. It is important to understand basic training principles.

1. The principle of progressive overload

2. The principle of individuality

3. The principle of specificity

4. The principle of hard/easy

5. The principle of periodization

a. Macrocycle

b. Mesocycle

c. Microcycle

6. The principle of disuse

G. In addition to a training plan, an athlete needs a nutrition plan.

1. Nutrition periodization: Nutrition plan to support training and body composition goals

*Question for discussion:* What would be some specific training goals of a collegiate-level soccer player?

III. 1.2 Basic nutrition standards and guidelines

* The Food Pyramid for Athletes is an excellent meal-planning tool for athletes.
* The Dietary Guidelines, MyPlate, and the Nutrition Facts label are tools that can be used to develop a nutritionally sound diet plan.
* The Dietary Reference Intakes (DRI) is a standard used to assess and plan diets.

A. The Dietary References Intakes (DRI) is a standard used to assess nutrient intake.

1. Standard used to assess and plan diets

2. Applicable to athletes with a few exceptions (e.g., energy, water)

B. The Dietary Guidelines for Americans provide basic dietary and exercise advice.

1. General diet and exercise advice

2. Applicable to athletes with a few exceptions (e.g., sodium)

3. Basic recommendations can be modified to meet the athlete’s needs

C. MyPlate is a tool that can be used to create a nutritious diet.

D. A food pyramid has been developed for athletes.

E. There are several other meal-planning tools available.

1. Food Exchange System

2. Carbohydrate counting

F. The Nutrition Facts label provides specific nutrition information.

*Question for discussion:* Are the various meal-planning tools substantially different from each other?

IV. 1.3 Basic sports nutrition guidelines – to support training, performance and health

* Sports nutrition recommendations include guidelines for energy, nutrient and fluid intake, and nutrient timing.
* It is important to understand the specifics of the athlete’s sport and position played when making nutrition recommendations.

A. Overview of key sports nutrition recommendations

1. Adequate energy intake

a. Energy intake needed to maintain energy balance

b. Adjustments to energy intake (e.g. change body composition)

2. Adequate carbohydrate intake

a. 3-12 g/kg body weight daily

b. Proper timing of intake

c. Use of glycemic index

3. Adequate protein intake

a. 1.2-1.7 g/kg body weight daily

b. Proper timing of intake

4. Adequate fat intake

a. Fat intake is typically 20-35 percent of total calories

b. Proper timing of intake

5. Vitamin and mineral intake

a. Meet the DRI

b. Emphasis on nutrient-dense foods

6. Fluid intake

a. Match fluid intake with fluid loss

7. Food and fluid intake prior to exercise

8. Food and fluid intake during exercise

9. Food and fluid intake after exercise

10. Other

a. Appropriate body composition

b. Healthful weight-loss practices

c. Avoidance of disordered eating or eating disorders

d. Flexible eating plan

B. The demands of an athlete's sport must be carefully considered.

*Question for discussion:* Why might a lineman, linebacker, and wide receiver on the same football team have very different nutrition needs?

V. 1.4 Dietary supplements and ergogenic aids

* In the United States, dietary supplements are not required to be proven safe or effective before being sold.
* The majority of athletes at all levels use at least one dietary supplement.
* In many cases, athletes use a random approach to choosing dietary supplements.
* Some supplements may contain banned substances.
* Many dietary supplements are safe, but some are not.
* Some supplements are contaminated, particularly weight loss and muscle-building supplements.
* Only a handful of supplements have been proven to be effective.

A. In the United States, the law that governs dietary supplements is the Dietary Supplement Health and Education Act (DSHEA).

a. Terminology

b. Areas covered by the law

c. Areas not covered by the law

d. Potency and purity issues

B. Many products fall under the umbrella known as dietary supplements.

C. Dietary supplement use among athletes is high.

D. Athletes consume supplements for many reasons.

E. Knowledge of a supplement’s legality, safety, purity, and effectiveness is crucial.

1. Legality of dietary supplements

2. Safety of dietary supplements

3. Purity of dietary supplements

4. Effectiveness of dietary supplements

5. Quackery

a. Multilevel marketing (MLM)

b. Internet resources regarding quackery

F. Spotlight on supplements: Evaluating dietary supplements – Process for evaluating dietary supplements

1. Gather information

2. Weigh the information

3. Judge the information

4. Use critical thinking skills to make a decision

*Question for discussion:* What specific things should an athlete consider before choosing to take a dietary supplement?

VI. 1.5 Understanding and evaluating scientific evidence

* Sports nutrition recommendations should be evidence based.
* The strength of any scientific recommendation depends on the quality of the research conducted.
* A strong research design is fundamental to obtaining accurate results.
* Epidemiological and experimental studies provide different types of data.
* Individual research studies are important, but knowledge of the body of literature is necessary to understand a topic.
* Much of the information on the Internet about exercise, nutrition, and dietary supplements is inaccurate.

A. There are three basic types of research studies.

1. Case studies

2. Epidemiological studies

3. Experimental studies

B. The basis of good research is strong research design and methodology.

1. Randomization

2. Use of placebo

3. Blinding

4. Familiarization trial

5. Crossover

C. Peer review is an important safeguard in the publication of scientific research.

1. Peer review process

2. Peer-reviewed journals

D. Levels of evidence and grades of recommendations put the scientific body of literature in perspective.

1. Grade I (Level A)

a. Rich body of data

b. Consistent results from large, well-designed studies

2. Grade II (Level B)

a. Limited body of data

b. Inconsistent results or consistent results from limited number studies

3. Grade III (Level C)

a. Limited evidence

b. Results from studies with design limitations

4. Grade IV (Level D)

a. Consensus opinion

b. Based on limited evidence, observations, and clinical experiences

5. Anecdotal evidence

E. Conclusions from scientific studies can be misinterpreted.

1. Distinguish between causation and association

2. Understand the importance of replicating results

3. Extrapolate results of scientific research with caution, if at all

4. Interpret results correctly

5. Focus on cumulative results and consensus

6. Recognize the slow evolution of the body of scientific knowledge

F. Not only scientists read scientific studies. – Consumer exposure to scientific studies

1. Spotlight on supplements – Using scientific studies as a marketing tool

G. Much of the nutrition-, exercise-, and health-related information on the Internet is inaccurate.

H. The Internet café – Use of the Internet for finding scientific information about sports nutrition

*Question for discussion:* How would you design a research study to determine the effect of Supplement XYZ on vertical jump height?

VII. 1.6 Exercise and nutrition credentials and certifications

* Certifications vary widely in their requirements.
* Many exercise- and nutrition-related certifications do not require a bachelor’s degree.
* Practitioners must recognize the limits of their knowledge, training, and expertise or athletes can be harmed.

A. There are many types of practitioners in the area of exercise science.

B. There are many types of practitioners in the area of nutrition.

C. Scope of practice helps establish professional boundaries.

1. Establishing professional boundaries

2. Exercise-related certifications

3. Nutrition-related certifications

4. Use of public domain documents

*Question for discussion:* What’s the difference between a sports dietitian, a sports nutritionist, and a nutritionist who works with athletes?

VIII. Summary and review

A. Chapter summary

B. Post-test assessment

C. Review questions

D. References

**Supplementary Teaching Materials and Classroom Activities**

*Note:* The text chapter includes an application exercise featuring an ex-collegiate tennis player who returns to competitive play (p. 15).

**Activity 1-1**

The first day of class is always exciting. Teachers and students alike are renewed after some time away from the classroom and there is excitement in the air. One of the challenges of teaching is to capture that first day enthusiasm and maintain it throughout the semester. While much of the first day of class is devoted to the details of enrollment, expectations, and course syllabi, there is usually enough time to begin to get the know the students and the sports-related experiences they bring to the classroom. Here are some examples of first-day classroom activities that may be useful in efforts to discover each student’s connection to sports, training, and nutrition.

Take an inventory of the many sports that may be represented in class, either by the students’ participation and/or interest. Are there athletes who are currently training or competing? How many have trained or competed in high school and in what sports? What activity do students do for their main type of exercise? Not all students can be drawn into the discussion but many are willing to “represent” their sport or exercise activity when questions arise during the semester.

Make a list of questions that students have about sports nutrition. What have they “heard”? Which topics do they have the most interest in? What topics do they expect to learn about? What kinds of sports nutrition questions do they expect to answer as a professional?

**Activity 1-2**

Most students have a favorite sport and know a lot about it. Have each student choose a sport and briefly sketch out a training plan using the three general training periods—preparation, competition, and transition (“off-season”). The plan can be referred to throughout the term to help illustrate how training drives the need for energy and nutrients and how realistic body composition goals are established. This activity may be done individually or in groups. Sharing the various training plans can help students increase knowledge of sports they are unfamiliar with.

If the sports nutrition course is offered during the same term as a related course such as sports performance, consider coordinating projects so that students prepare training and nutrition periodization plans concurrently.

**Activity 1-3**

Have students become familiar with research that appears in peer-reviewed journals (some examples are given in Figure 1.15 on page 26) by summarizing a journal article. This assignment may be completed in class if copies are made of an article or as an outside-of-class assignment by having students locate an article.

**Journal Article Summary Assignment**

The purpose of this assignment is to examine original research papers in peer-reviewed exercise physiology or sports nutrition journals and to write a concise summary of the important aspects of the article. The assignment consists of two parts:

***Annotated citation*** - consists of correct citation in APA (American Psychological Association) format, followed by a concise description of the major findings and important aspects of the study. The article should be an experimental research study (not a case study, clinical study, or review article). If you have any doubts about the type of article or journal you have selected, check with the instructor.

The annotation should be a concise summary of the major findings and important aspects of the study. It should be approximately 1-3 paragraphs in length, and should include the purpose of the study, important details of the study design and methods, and a summary of the results, conclusions, and practical application(s) or significance of the study.

The annotation is written in your own words! Do not copy the purpose statement or concluding statements of the authors from the article.

***Journal article copy*** - make a complete copy of your article including references to turn in with your review.

**Crossword Puzzle Answer Key[[1]](#footnote-1)**

1. macronutrient

2. fatigue

3. electrolyte

4. overload

5. energy

6. nutrient dense

7. placebo

8. training

9. mortality

10. correlation

11. A: atrophy; D: aerobic

12. fiber

13. intensity

14. anaerobic

**Word Find Puzzle Answer Key**

* 6 basic training principles: progressive overload, individuality, specificity, hard/easy, periodization, disuse
* 4 types of reference values that make up the DRI: RDA, AI, EAR, UL
* 6 minerals Americans tend to under-consume: potassium, calcium, iron
* 2 supplements that are considered safe and effective for improving athletic performance: caffeine, creatine
* 3 categories of research studies: case, epidemiological, experimental
* 4 characteristics of a strong research protocol: randomized, double-blind, placebo-controlled, crossover

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**Chapter 1 Crossword Puzzle**

|  |  |
| --- | --- |
| **Across** | **Down** |
| 4. An exercise stimulus that is of sufficient magnitude to cause enough stress to warrant long-term changes by the body.  6. A food containing a relatively high amount of nutrients compared to the caloric content.  8. A planned program of exercise with the goal of improving or maintaining athletic performance.  10. A relationship between variables.  11. A wasting or decrease in organ or tissue size.  13. The absolute or relative difficulty of physical activity or exercise.  14. Exercise that primarily uses one or both of the energy systems that are not dependent on oxygen. | 1. Any essential nutrient needed in large quantities.  2. Decreased capacity to do mental or physical work.  3. A substance in solution that conducts an electrical current.  5. The capacity to do work.  7. An inactive substance.  9. Death; the number of deaths in a population.  11. Exercise that primarily uses oxidative phosphorylation.  12. A component of food that resists digestion. |

**Chapter 1 Word Find Puzzle**

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| I | R | O | N | E | H | E | X | P | E | R | I | M | E | N | T | A | L | T |

**Instructions:** In the grid above, find the following words or phrases, and then write them beside each clue.

* 6 basic training principles:
* 4 types of reference values that make up the DRI:
* 6 minerals Americans tend to under-consume:
* 2 supplements that are considered safe and effective for improving athletic performance:
* 3 categories of research studies:
* 4 characteristics of a strong research protocol:

1. Crossword and word find contributed by Elesha Feldman [↑](#footnote-ref-1)