

Lecture 1: Nutrition, Exercise and Sports Related Fitness Course: Introduction to Sports Nutrition and Performance



Presentation Created by
Melissa Halas-Liang, MA, RD, CDE, CNSD

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Objectives

1. To be able to state health related fitness components.
2. To understand the role of exercise in health promotion.
3. To be able to define basic guidelines of physical activity and fitness.
4. To understand principles of Nutrition, Exercise, and Sports-Related Fitness.
5. To be able to define sports nutrition.
6. To be able to understand the factors that influence the importance of nutrition on performance.

Course Material

- Chapter 1: Intro to Nutrition for Health Fitness and Sports Performance
- Chapter 2: Healthful Nutrition Fitness and Sports
- Chapter 3: Human Energy
- Chapter 4: The Main Energy Food

Course Materials

- Chapter 5: Fat: An Important Energy Source During Prolonged Exercise
- Chapter 6: Protein: The Tissue Builder
- Key Points on Body Weight, Water, Electrolytes, Ergogenic Aids and Sports Event Meal Planning
- *Vitamins and Minerals covered in New in Wellness Course*
- *Weight Management is covered in Weight Management Throughout the Lifecycle*

Outline

- Physical Fitness
- Guidelines for Exercising
- Classes of Nutrients
- Introduction to Sports Nutrition



Nutrition, Fitness and Sport

- Success in sport is dependant on two factors
 - Genetic endowment
 - State of training
- Specialized exercise training is the major means to improve athletic performance
- Proper nutrition is an important component of the total training program

Physical Fitness

- “The ability to perform moderate to vigorous activity without undue fatigue”
- Fat usage by the body
 - Increased physical fitness means improved usage of fat for energy

Physical fitness

- Health-related fitness components
 - A healthy body weight and composition
 - Cardiovascular-respiratory fitness
 - Adequate muscular strength and endurance
 - Sufficient flexibility



Physical fitness

- Unstructured physical activity
 - (1) Leisurely walking and cycling
 - (2) Climbing stairs
 - (3) Dancing
 - (4) Gardening and yard work
 - (5) Occupational and domestic activities
 - (6) Games
- Structured physical activity

Benefits of Regular Physical Activity



Health & Nutrition

- Health promotion and disease prevention is the best approach to the health care financial crisis
- Health promotion life-style behaviors cited in *Healthy People 2010*
 - Physical activity and fitness
 - Nutrition/overweight

Role of Exercise in Health Promotion

- Exercise is a means to help prevent and treat many chronic diseases
 - a. Coronary heart disease
 - b. Stroke
 - c. Hypertension
 - d. Cancer
 - e. Diabetes
 - f. Arthritis
 - g. Osteoporosis
 - h. Obesity
 - i. Chronic lung disease

Healthy People 2010

- Decrease inactivity in adults.
- Increase the number of people who exercise regularly (moderate physical activity for 30 minutes a day).
- Increase the development of vigorous physical activity (cardiovascular fitness 3 or more days a week for 20 or more minutes).
- Increase adults who perform muscular strength and endurance activities.
- Increase the percentage of people who engage in leisure time physical activity.

Role of Exercise in Health Promotion

- Exercise benefits accrue to both sexes, all races, and all ages
- Active individuals enjoy a higher quality of life
- Physical activity may increase the quantity of life by averting premature mortality



Two Categories of Fitness

➤ Health-Related Fitness:

- Healthy body weight and composition
- Cardiovascular strength
- Muscular strength and endurance
- Sufficient flexibility

➤ Physical Activity:

- Unstructured activity such as gardening, yard work, leisurely walking
- Structured physical activity, brisk walking, planned vigorous exercise

Two Categories of Fitness

- Sports-related fitness - develop skills that are related to a specific sport
 - Strength
 - Power
 - Speed
 - Endurance
 - Neuromuscular motor skills



Lack of activity destroys the good condition of every human being while movement and methodical physical exercise save and preserve it. -Plato

Considering the tremendous amount of research in the past decade that has shown that exercise can help prevent many diseases, delay aging and help prevent memory loss, Plato was ahead of his time!

Surgeons General Report on Physical Activity and Health

- Need not be strenuous to achieve health benefits.
- Children, adolescents and adults of all ages may benefit from a moderate amount of daily unstructured physical activity such as washing the car or raking leaves.
- Moderate structured exercise such as brisk walking for 30 minutes or three 10 minute walks daily, may also confer significant health benefits.

Health Related Fitness

- Health related fitness includes a healthy body weight, cardiovascular-respiratory fitness, adequate muscular strength and endurance, and sufficient flexibility.
- One of the key points of the Surgeon General's report is that physical activity need not be strenuous to achieve health benefits, but additional benefits may be gained through greater amounts of physical activity.

Physical inactivity may be dangerous to your health. As documented in the *Surgeon General's Report on Physical Activity and Health*, exercise, as a form of physical activity, is becoming increasingly important as a means to help prevent, and even treat, many chronic diseases.

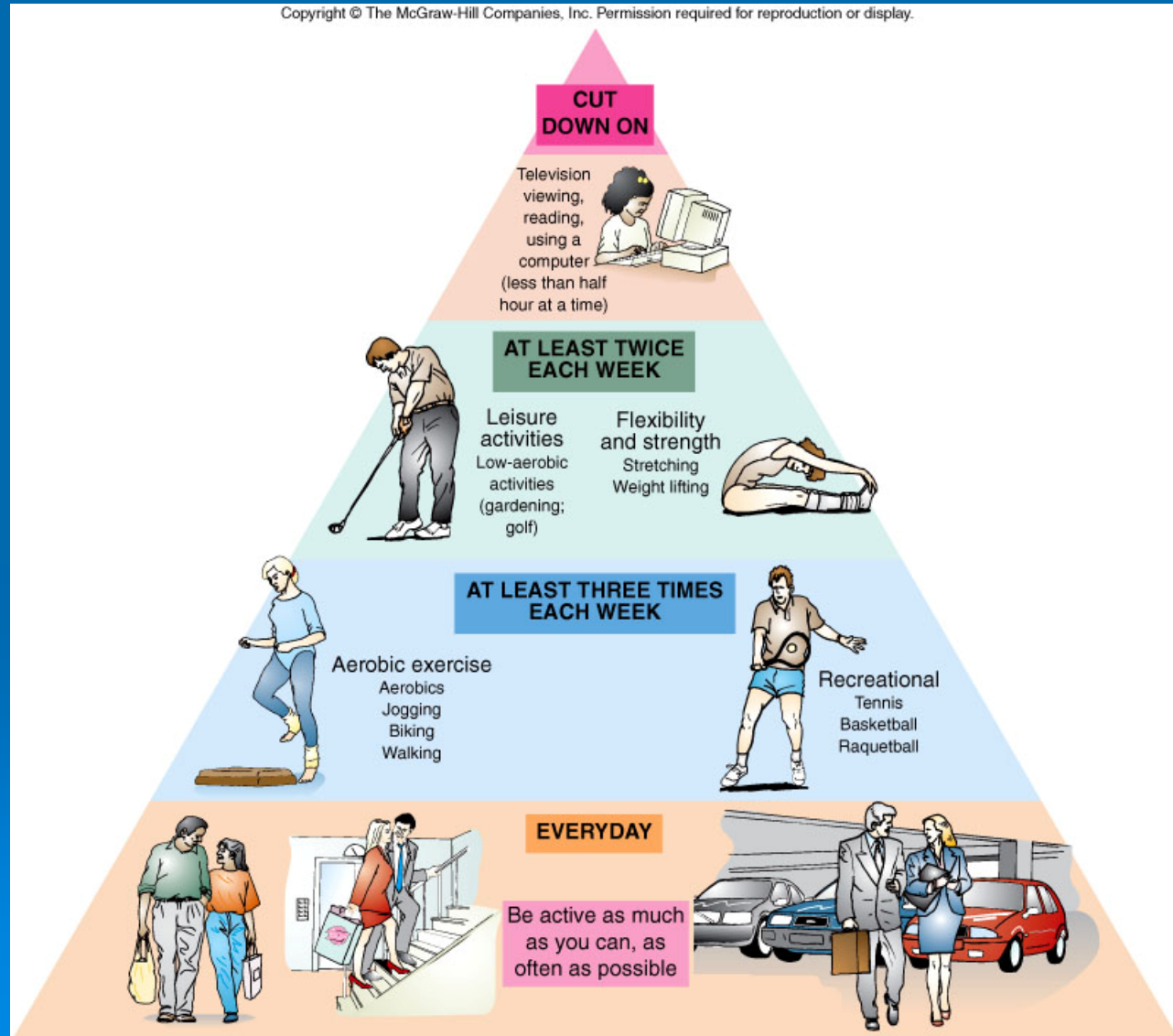


Fitness in the US

- Most Americans have little or no physical activity in their daily lives
- 28% of adults engage in the recommended levels of physical activity
- 43% of adults are not regularly active during leisure time
- 29% of adults report no activity during leisure time
- Activity decreases with age in adults

Physical Activity Pyramid

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Fitness in the US

- Boys report participating in vigorous physical activity more than girls
- Vigorous physical activity declines with advancing age and grade
- Participation in physical education has declined since the early 1990's
- Progress toward meeting the physical activity objectives established in 1990 has shown little improvement or even movement in the wrong direction

Fitness in the US

- The Physical Activity Pyramid is in accord with guidelines to obtain adequate amounts of aerobic activity, muscular strength and endurance, and flexibility training
- Inappropriate exercise may be hazardous to one's health

Guidelines for Activity

- Physical activity need not be strenuous to achieve health benefits
- One should try to average 30 minutes of moderate exercise per day
- Exercise minutes may be accumulated in several sessions
- Those who maintain a regular routine of physical activity that is of longer duration or of greater intensity are likely to derive greater benefit
- There is a dose-response relationship of exercise to longevity
- Avoid excessive amounts of high intensity exercise if your goal is health improvement

Beginning an Exercise Program

- Start out slowly
- Vary your workout---Make it fun
- Include others---Keep accountable
- Set attainable goals
- Set aside specific time
- Reward yourself
- Focus on long-term and not on occasional setbacks

General Guidelines for Exercising Properly for Someone Who Wants to be More Physically Active

- **Level 1** - Every day for at least 30 minutes: do low-intensity activities such as playing golf, walking, gardening, climbing stairs, and active household chores
- **Level 2** - At least three, preferably six, days a week for at least 20 minutes: Do aerobic exercise that increases your heart rate up to 50 to 80 percent of your maximal through exercise tasks such as running, bicycling, tennis, soccer, or other active sports
- **Level 3** - At least three, preferably seven, days a week: Do stretching exercises to increase the flexibility of the major muscles in your body, particularly in your lower back and your legs.

General Guidelines for Exercising Properly for Someone Who Wants to be More Physically Active

- **Level 4** - At least two, preferably three, days per week: Do resistance (strength) type exercises, such as weight lifting or calisthenics, to improve muscular strength and endurance.
- **Level 5** - Rarely: Physical inactivity, such as television viewing and computer games.
- If you are interested in starting an exercise program, you may preview those chapters or access excellent programs at www.smallstep.gov , www.Americaonthemove.org , or www.acsm.org , for the latter click on “Health and Fitness Information.” Considerable information on physical fitness may also be accessed at www.fitness.gov .

*Let food be your medicine and
medicine be your food.*

This statement has been attributed to Hippocrates for over two thousand years, and it is becoming increasingly meaningful as the preventative and therapeutic health values of food relative to the development of chronic diseases are being unraveled.



Nutrition

- A nutrient is a specific substance found in food that performs one or more physiological or biochemical function in the body.
- Vitamins, minerals, and water are not energy sources.
- A useful in depth, dietary (and physical activity) assessment may be found online at www.mypyramid.gov
 - Click on MyTracker for details

The Six Classes of Nutrients

- Carbohydrates
- Fats
- Proteins
- Vitamins
- Minerals
- Water

Essential Nutrients *

➤ Macronutrient

- CHO
- FAT
- PRO

➤ Micronutrient

- Vitamins
- Minerals

➤ Water



Nutrition

- Essential Nutrients
- CHO - fiber, sugar, starches
- Fats - linoleic and linolenic fatty acids
- Protein - amino acids
- Vitamins - A, B, C, D, E, K
- Minerals – Iron, calcium, chloride, magnesium, phosphorus, potassium, sodium, sulfur
- Water

Nutrients

- Kcals
- Essential nutrients: body needs but cannot produce at all or cannot produce in adequate amounts
- Nonessential nutrients
- Energy-yielding nutrients
- Nutrients for growth, development, and maintenance
- Nutrients that regulate body processes

Nutrition

- Living beings intake and use food for various processes:
 - Ingestion
 - Digestion
 - Absorption
 - Transport
 - Metabolism of nutrients

The biochemical or physiological function of food is important.

Energy *

- A calorie is a measurement of energy from macronutrients
- We get calories or energy from
 - CHO's - 4 calories/gram
 - Protein - 4 calories/gram
 - Fat - 9 calories/gram
 - Alcohol - 7 calories/gram

Nutrition

- Eat nutrient rich foods - whole grains, vegetables, fruits, low or nonfat dairy, and lean proteins (lean meats, chicken, fish, and beans)
- Energy in = energy out
- Maintain adequate energy to sustain workout intensity
- Hydrate - at least 64 ounces of water per day
- Drink water before, during, and after working out to replenish lost fluids

Proteins

Build and Repair Body Tissues

- Muscles
- Other soft tissues
- Enzymes
- More on Proteins in Lecture _____

Minerals

- Minerals make up the skeletal framework



Regulate Body Processes

- Vitamins
- Minerals
- Proteins

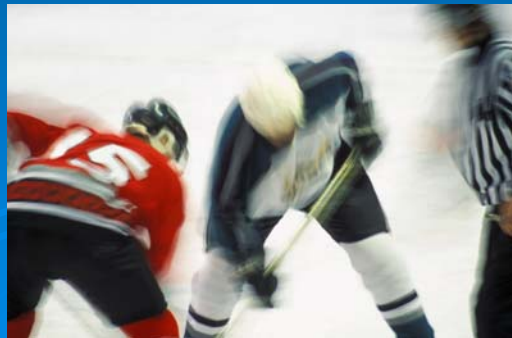
Sports Nutrition



Sports nutrition involves the application of nutritional principles to enhance sports performance

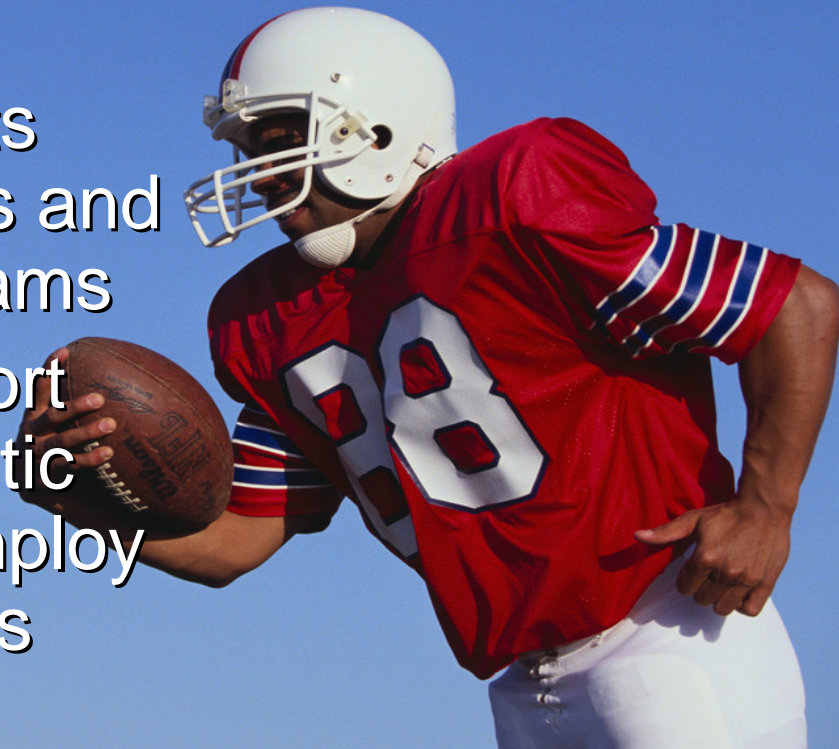
Sports Nutrition

- It is an area that is becoming increasingly important for optimal athletic performance and is a viable career opportunity
 - Published literature about sport nutrition has become voluminous
 - International meetings focus on sport nutrition
 - Professional associations have formed subsections in sports nutrition
 - Corporations support research, meetings, and publications focusing on sports nutrition



Sports Nutrition

- Sport magazines and books contain nutrition-related information
- Colleges have developed sports nutrition courses and curricular programs
- Professional sport teams and athletic departments employ sport nutritionists



Factors Contributing to Why Athletes Are Not Getting Adequate Nutrition

- Inadequate nutrient intake is usually due to very low caloric intake
- Athletes may be confused about the nutritional content of the foods they eat
- Finances and time may limit food selection and preparation
- Athletes may not be receiving sound nutritional information from coaches or trainers



Nutritional status may exert a significant impact upon athletic performance.



Malnutrition

- Inadequate intake of certain nutrients may impair performance
 - Insufficient energy supply
 - Inability to regulate exercise metabolism at an optimal level
 - Decreased synthesis of key body tissues or enzymes

Excessive Intake of Some Nutrients May Also Impair Performance And Even Health

- Disrupting normal physiological processes
- Undesirable changes in body composition
- Risk for nutrient interactions or toxicities which could impair or damage organ function

Nutrition, Exercise, and Sports-Related Fitness

- One of the key factors determining success in sport is the ability to maximize your genetic potential with appropriate physical and mental training to prepare both mind and body for intense competition.
- Athletes develop sports-related fitness, such as strength, power, speed, endurance, and neuromuscular motor skills specific to their sport.



Nutrition, Exercise, and Sports-Related Fitness

- Training of elite athletes at the United States Olympic Training Center (USOTC) focuses on three attributes:
 - physical power
 - mental strength
 - mechanical edge



Nutrition, Exercise, and Sports-Related Fitness

- Athletes at all levels of competition, whether an elite international competitor, a college wrestler, a high school baseball player, a seniors age-group distance runner, or a youth league soccer player, can best improve their performance by intense training appropriate for their age, physical and mental development, and sport.

Nutrition Factors May Impact Favorably Upon Athletic Performance

- Losing excess body fat will enhance biomechanical efficiency
- Consuming carbohydrates during exercise may maintain normal blood sugar levels and prevent psychological fatigue
- Providing adequate dietary iron may ensure optimal oxygen delivery to the muscles



Sports Nutrition

- Louis Burke, a prominent sports nutritionist from Australia, defines sports nutrition as the application of eating strategies to promote good health and adaptation to training, to recover quickly after each exercise training session, and to perform optimally during competition.
- It is only within the past few decades that extensive research has been undertaken regarding specific recommendations to athletes.

“Nutrition and Athletic Performance”
issued jointly by the American Dietetic
Association, Dietitians of Canada, and
The American College of Sports
Medicine.

You may access this position statement at

www.acsm.org

Click on Publications and the Position
Stands

Sports Nutrition

- Some studies find that athletes may be eating as well or better than non-athletes and meeting or exceeding the RDA for many nutrients, while other studies reveal diets inadequate in energy intake or specific nutrients.
- Even though the dietary status of the group of athletes as a whole may appear appropriate, wide individual variability indicates that individual athletes may be undernourished, which is typical of the population at large.

Sports Nutrition

- Inadequate nutrient intakes have been reported for athletes of both genders and all age levels, ranging in athletic ability from the high school level to Olympic caliber.
- Athletes involved in weight-control sports, such as dancers, gymnasts, bodybuilders, distance runners, and wrestlers, are most susceptible to poor nutrient intake.
- Female athletes were much more likely than males to incur inadequate nutrient intake.
- The most significant dietary deficiency in most studies was iron, although zinc, calcium, protein, and several of the B vitamins also were found to be inadequate by several investigators.

Elite Athletes

- In many of these studies, including a nationwide survey of elite athletes, inadequate nutrient intake was due to a very low caloric intake.
- Several studies have revealed a high incidence of eating disorders in these groups of athletes as they adopted bizarre techniques in attempts to control body weight.
- Although this problem is more prevalent in females, a small percentage of male athletes also exhibit disordered eating behaviors.
- These surveys have analyzed the diets of the athletes only in reference to a standard, like the RDA.

Many studies have not analyzed the actual nutrient or biochemical status, such as by a blood test, of the athlete or the effects that the dietary deficiency exerted on exercise performance capacity or sport performance.

Elite Athletes

- The RDA for vitamins and minerals incorporates a safety factor, so an individual with a dietary intake of essential nutrients below the RDA may not necessarily suffer a true nutrient deficiency.
- On the other hand, if the athlete does develop a nutrient deficiency, then athletic performance may deteriorate and health may be impaired.

Athletes Nutrition Knowledge

- Athletes continue to have misconceptions about the roles of specific nutrients in sport performance, and if they chose foods based on these misconceptions then sports performance may suffer.
- Some athletes received nutrition information from reliable sources, such as dietitians and athletic trainers (who are required to have a nutrition course for certification).
- Yet a considerable amount of nutrition information was obtained from less reliable sources such as magazines.

Athletes Nutrition Knowledge

- Other constraints, such as finances and time, may limit food selection and preparation.
- Many athletes receive nutrition information from their coaches, who may not have the background to provide proper advice.
 - Surveys of coaches indicated that 60 to 80 percent had not had a formal course in nutrition or were in need of a better nutrition background.



How Important Is Nutrition to Athletic Performance?

- A world-class male marathoner must have a high aerobic capacity and a low body fat percentage in order to run over 26 sub-five-minute miles.
 - Unless he has undergone a strenuous training program and maximized his genetic potential, his performance will be suboptimal.
 - The state of training is the most important factor differentiating athletes of comparable genetic endowment.
- The nutritional status of the athlete may also exert a significant impact upon athletic performance.
 - When everything else is equal, nutrition can make the difference between winning and losing.

Nutrition for Competition

- Intensity and duration of exercise will determine the body energy sources and systems utilized
- Competition will not impose any special demands for any of the six major classes of nutrients for the well-nourished athlete



Nutrition for Competition

- Certain dietary modifications may enhance performance when used prior to or during competition
 - Carbohydrate intake prior to and during exercise bouts of long duration at moderate to high intensity
 - Adequate fluid intake prior to and during similar endurance events conducted in warm or hot conditions



Nutrition for Training

- Select additional calories (500-1000) wisely from a wide variety of foods
- Many of the body's adjustments to training incorporate certain specific nutrients
- *Nutrient supplementation does not appear to be necessary for the well-nourished athlete*

Nutrition for Training

- Carbohydrate intake prior to and during exercise bouts of long duration at moderate to high intensity and adequate fluid intake prior to and during similar endurance events conducted in warm or hot environmental conditions are two dietary practices that have consistently been shown to increase performance capacity.
- Chris Carmichael, coach and nutritionist for seven-time Tour de France champion Lance Armstrong, indicates that athletes need to match their nutritional intake to the demands of their training in order to achieve peak performance.
 - Because energy expenditure increases during a training period, the caloric intake needed to maintain body weight may increase considerably- an additional 500-1000 calories per day.

Nutrition for Training Endurance Athletes

- For endurance athletes, dietary carbohydrates should receive even greater emphasis.
- For example, during the early phases of training, the body will begin to make adjustments in the energy systems so that they become more efficient.
 - This is the so-called chronic-training effect, and many of the body's adjustments incorporate specific nutrients.
 - One of the chronic effects of long distance running is an increased hemoglobin content in the blood and increased myoglobin and cytochromes in the muscles cells; all three compounds need iron in order to be formed.
 - Daily diet would need to contain adequate amounts of iron not only to meet normal needs but also to make effective body adjustments due to the chronic effects of training.

Nutrition for Training Endurance Athletes

- Proper timing of both carbohydrate and protein intake following exercise may be associated with optimal recovery.
- Based on the available scientific data, nutrient supplementation does not appear to be necessary for the well-nourished athlete during training.
- Although the use of a very low-Caloric diet to achieve a desirable competitive weight is not advised, vitamin-mineral supplements may be recommended to prevent a nutrient deficiency in athletes who use such a procedure.

Factors That Influence The Importance Of Nutrition On Performance

- (1) Gender
- (2) Age
- (3) Body weight status
- (4) Eating and life-style patterns
- (5) Environment
- (6) Type of training
- (7) Sport or event

What to Eat to Optimize Athletic Performance

- The key is to eat a wide variety of healthful foods
- Females need to pay attention to iron and calcium
- Nutrients needed during growth and development
 - (1) Protein
 - (2) Calcium
 - (3) Iron
- A nutritionally balanced diet is the keystone of sports nutrition, but some athletes may benefit from dietary modifications

Influence Of Gender and Age on Nutritional Recommendations for Enhanced Physical Performance

- Adolescent and adult premenopausal females need more dietary iron than males
- Disordered eating in females may contribute to the development of premature osteoporosis
- Children are not little adults relative to sports participation
- Older athletes may have special nutrient needs
 - Caloric need decreases
 - Several nutrients may often be inadequate in the diet
 - Vitamins B6, B12, and D
 - Calcium

Thank You!!

