Name:

Date:

Nutrition

In this chapter

Introduction

Good nutrition is essential for optimal health and physical performance. Most people understand the importance of good nutrition but still have a difficult time achieving it, or are so confused by all the "advice" available, that they are unsure of where to begin. Optimal nutrition is essential for the production of energy (ATP), ongoing tissue repair, and normal everyday function including growth and development, and immunity.

Nutrients

There are six classes of nutrients each with a different but significant role to play in health and performance.

CLASSIFICATION OF NUTRIENTS	
Nutrient	**Major Functions**
Protein	Growth and development Tissue Repair Essential element of enzymes & hormones
Carbohydrates (CHOs)	Major Fuel source for energy (ATP) production
Fats	Source of stored energy especially for long term activities Source of fat soluble vitamins Insulate and protect
Vitamins	Regulate functions of normal body functions and assist in energy production.
Minerals	Major component of musculoskeletal systems Help enzymes function
Water	Compose 60-70% of the body Necessary for normal metabolic function

Many nutrients are classed as "essential" – i.e. can not be manufactured by the body and must be taken in as part of the diet.

Normal Mixed Diet

Normal, healthy individuals, i.e. average build and activity level should consume a balanced diet including optimal amounts of all **six classes of nutrients.**

Protein	=	15 - 20%
Carbohydrate	=	55 - 65%
Fat	=	25 - 30%
Minerals	=	Recommended daily allowance
Vitamins	=	Recommended daily allowance
Water	=	Varies with body size and activity level

Caloric Value:

Carbohydrate	1 gram = 4 kcal of energy
Fats	1 gram = 9 kcal of energy
Protein	1 gram = 4 kcal of energy

Kilocalorie:

When ingested and absorbed food is "burned" (oxidized) and energy is released. This energy can be then used for muscular activity or any of the ongoing metabolic processes of the body e.g. digestion and respiration.

A **kilocalorie** is a measure of the energy released and 1 Kilocalorie is equal to 1,000 calories. A calorie is a very small value so when caloric value of food is supplied it is usually more accurate to use the term kilocalorie.

Basal Metabolic Rate (BMR)

BMR is the number of calories needed to meet basic energy needs of the body at rest. If an individual increases their BMR (e.g. increases muscle tissue mass), they will burn more calories- approximately 50 kcals/day for each pound of muscle.

Metabolic Rate (MR)

Number of calories utilized at rest (BMR) plus during normal daily activities. This value would usually be higher for males (due to increased size and muscle mass), young adults and those who are physically active.

The energy for metabolic activity comes from three main sources: carbohydrates, fats and proteins.

Carbohydrates

Carbohydrates (CHOs) serve as the primary source of energy for exercise and competition. Through the breakdown of ingested or stored carbohydrates (glycogen), ATP can be produced for normal daily functions and muscular work.

Classification of Carbohydrates

1. Monosaccharides (simple): sucrose, lactose, fructose, and galactose. These simple sugars found are generally low in nutrition and high in calories.
2. Complex: starches, fruits, vegetables, and whole grain. Complex "carbs" are generally nutritionally dense and contain dietary fiber that aids in digestion.

Optimal carbohydrate intake is necessary for delaying muscular fatigue and retaining normal brain and nervous system functions.

Dietary Recommendations

1. Carbohydrates should account for 55 - 65% of daily calorie consumption.
2. Keep ingestion of simple carbohydrates to a minimum (less than 15% unless high activity level).
3. Include fiber in the daily diet.

Glycemic Index

Glycemic index is the rate of digestion and absorption of carbohydrates compared to white bread, which has a rating of 100.

Not all carbohydrates affect the body in the same way. Some carbohydrates are absorbed into the blood stream very quickly and produce a surge in insulin production to drive glucose into cells. Other carbohydrates reach the blood stream slower and the insulin response is more gradual.

The rapid insulin response after ingesting simple or HG carbohydrates (high glycemic) can lead to "hypoglycemia" - low blood sugar - leaving feelings of light-headedness, lethargy and irritability.

Sample Glycemic Index					
HIGH		**MODERATE**		**LOW**	
Glucose	137	brown rice	79	Multigrain	69
*white bread	100	banana	77	Apple	54
doughnut	108	orange juice	74	Orange	63
Raisins	91	chocolate	70	Grapes	66
baked potato	121	popcorn	49	Barley	49
instant rice	128	corn	78	Fructose	32

*Standard for comparison

Use of Glycemic Index (GI)

The use of the GI best comes in selection and mixture of the CHOs to ensure a constant supply of energy from carbohydrates

High glycemic "carbs" get into and leave the blood stream quickly so they would be more useful following exercise, at the start of recovery, but could be detrimental if ingested by themselves prior to a workout.

Low glycemic foods may assist in regulating insulin production and cell response and appear to "satisfy the appetite" more than HG carbohydrates - a big help for diabetics and individuals concerned with weight loss.

Ensuring that a mixture of high and low glycemic foods is ingested together will lower the glycemic index of individual foods e.g. taking in protein at the same time as CHOs will decrease the GI of the individual carbohydrates.

Carbohydrate Loading

The practice of ingesting more carbohydrates than "normal" to increase the muscle glycogen stores is **carbohydrate loading**. Carbohydrate loading does appear to have positive effects on endurance athletes (they can go longer before fatigue sets in).

There are many different approaches to carbohydrate loading. Some athletes simply ingest large amounts of "carbs" the night before the event (i.e. the "pasta party"). At the elite level, carbohydrate loading is more commonly done by first depleting the existing glycogen store, then loading up with carbohydrates for 3 - 4 days before the event.

Exercise Carbohydrate Needs

Endurance Training

Endurance athletes exercising at a low to moderate intensity level should usually be ingesting 60 - 70% of their daily intake as carbohydrates. During the heavy training and competition phase carbohydrate intake should be at the 70% level and at other times at 60%.

Pre-Exercise
Often the glycogen stores are inadequate to meet the demands of the long endurance events. It appears that glycogen stores are adequate (if full to start) for about 1½ - 2 hours.

Time: 2 - 4 hours before exercise
Suggestion: 200 - 300 grams of CHOs 2 - 4 hours before training or competition to ensure glycogen stores are full.
Time: 30 - 60 minutes before
Suggestion: 60 - 75 grams of CHOs 60 minutes before exercise

Post-Exercise

The goal during this time is to speed up the refilling of depleted glycogen stores so that energy is available for the next exercise session. Recent research clearly indicates that need to begin carbohydrates refilling immediately after exercise.

Guidelines: .7 - 1.0 gr. CHO/kg of body weight for the first few hours. Liquid forms work well as an option at this time.