

SPORTS PHYSICAL THERAPY

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LECTURE NO 12

NUTRITIONAL CONSIDERATIONS FOR PERFORMANCE AND REHABILITATION

NUTRITIONAL CONSIDERATIONS FOR PERFORMANCE AND REHABILITATION

CHAPTER OBJECTIVES

what is sports nutrition? Sports nutrition encompasses what, when, and how much athletes eat. It takes account of how nutrients are digested and absorbed and how foods are metabolized for energy or assimilated into body tissues.

During this chapter you will learn about

1. Energy balance
2. Energy and calories
3. The nutrients and how to obtain them
4. The importance of a balanced diet for health and performance
5. Energy requirements for specific sports

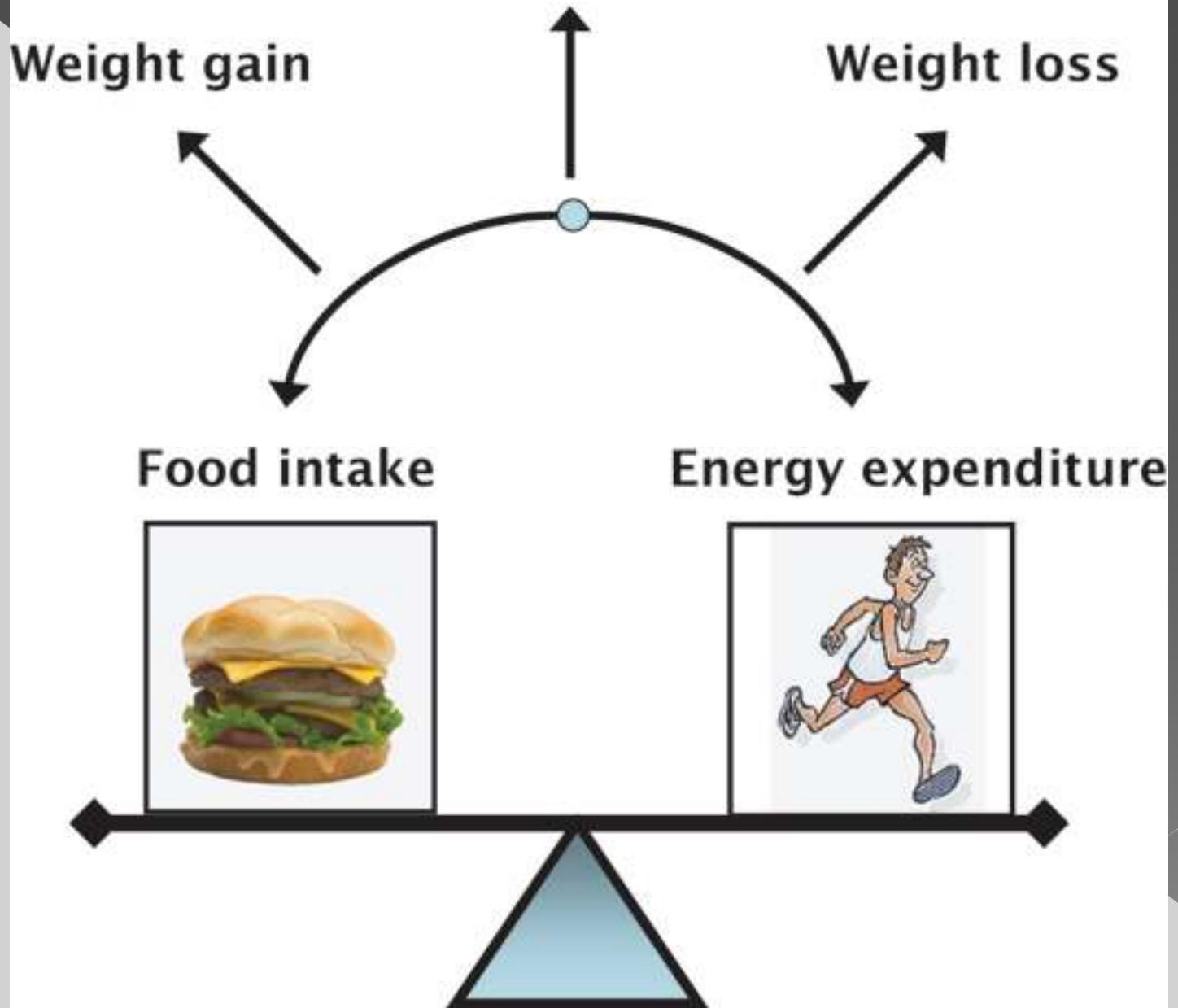
During this chapter you will learn about

6. Nutritional strategies for optimal performance and the evidence to support them
7. Nutritional strategies for injury prevention
8. Nutrition for the injured athlete

ENERGY BALANCE

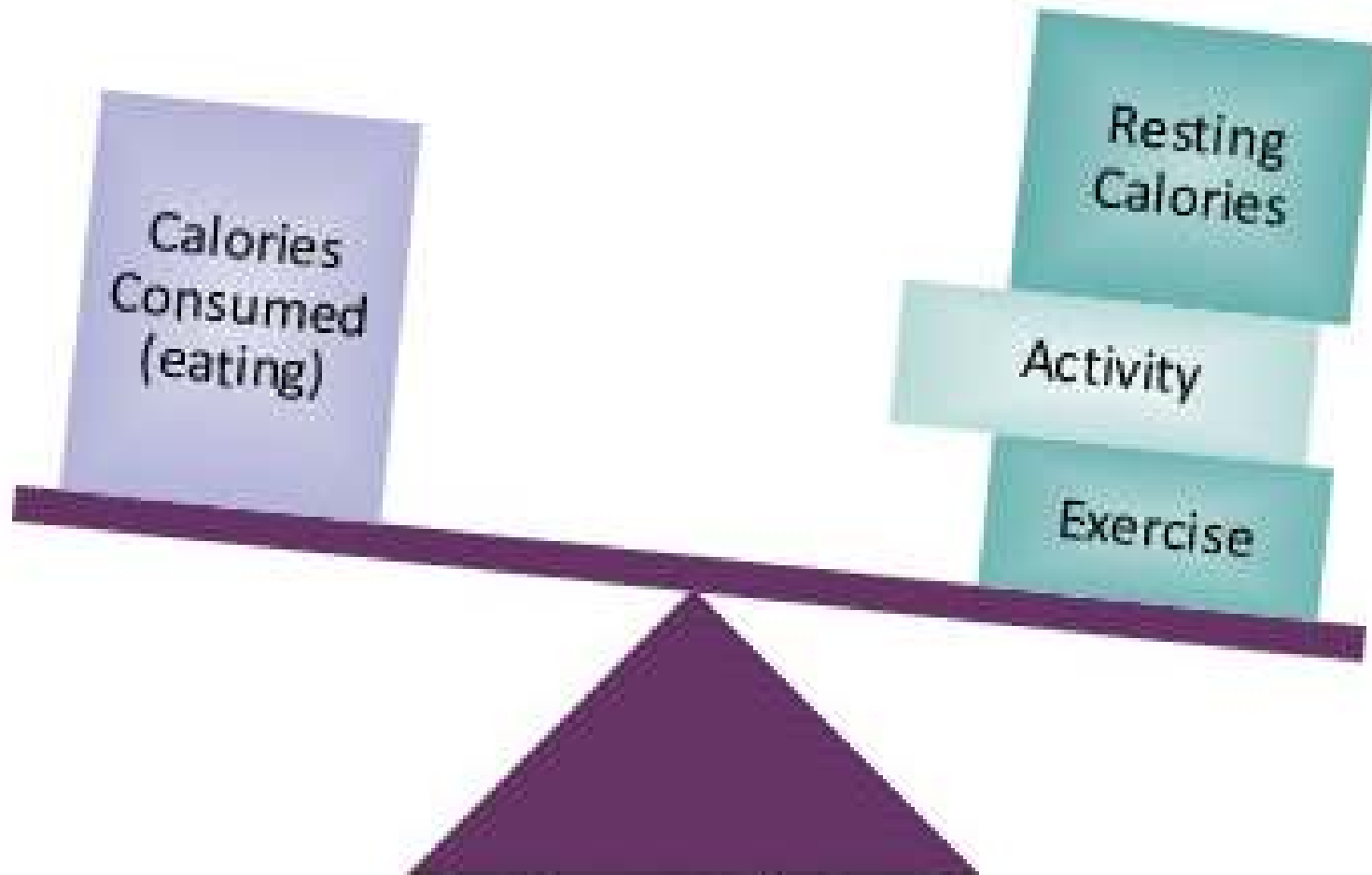
To maintain weight and body composition at the optimal level for sport, athletes must manage both the amount of energy they consume and the amount they expend. This is called managing the energy balance.

Weight maintenance

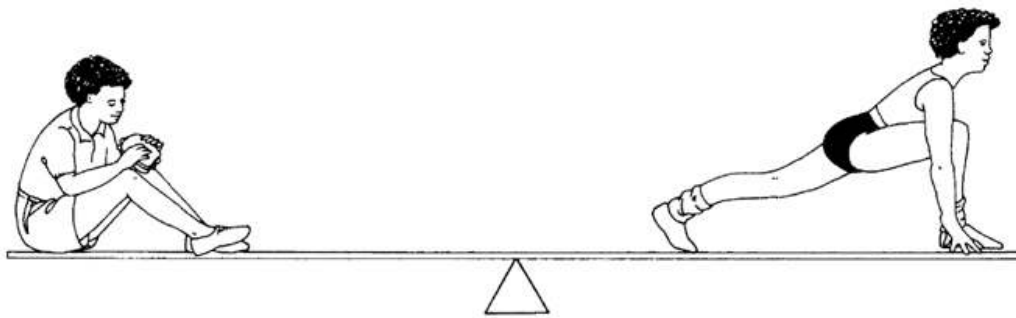


Energy Intake

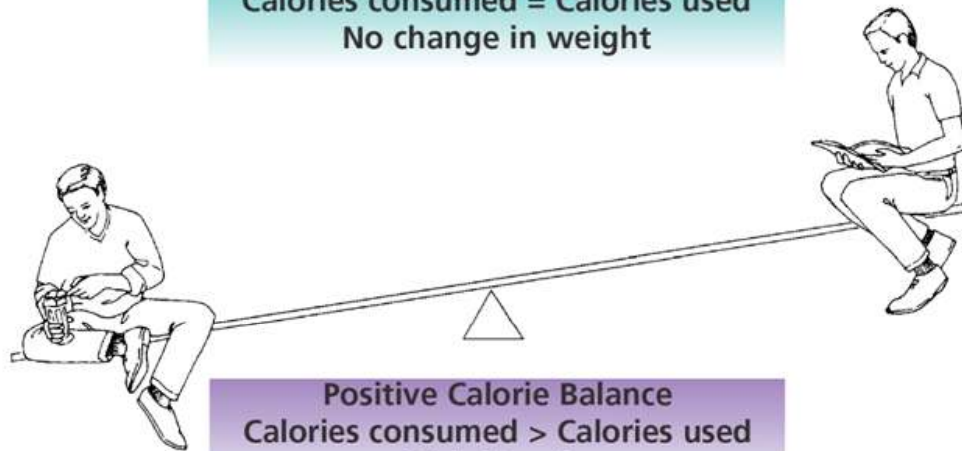
Energy Expenditure



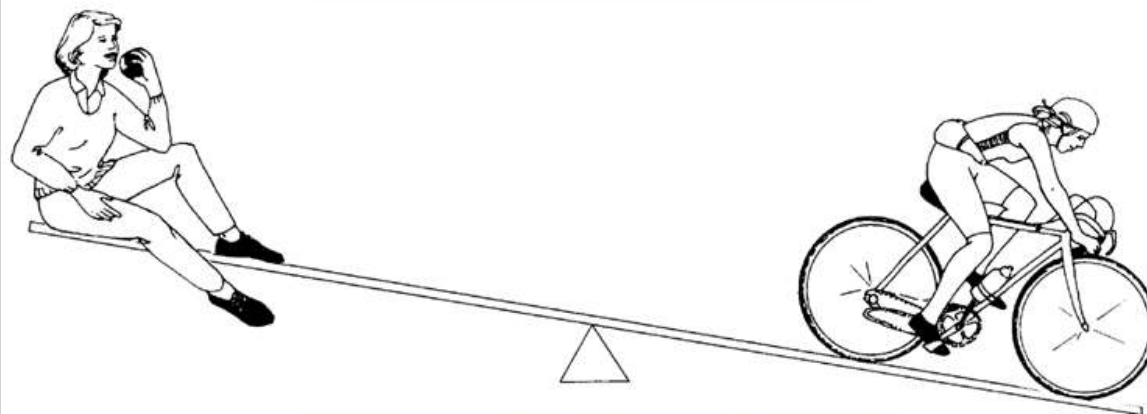
Energy Balance



Neutral Calorie Balance
Calories consumed = Calories used
No change in weight



Positive Calorie Balance
Calories consumed > Calories used
Weight gain



Negative Calorie Balance
Calories consumed < Calories used
Weight loss

ENERGY BALANCE

- If athletes consume more energy than they use then they will gain weight – **Hypercaloric Diet.**
- If athletes consume as much energy as they use then they will stay the same weight – **isocaloric diet.**
- If athletes consume less energy than they use then they will lose weight – **hypocaloric diet**

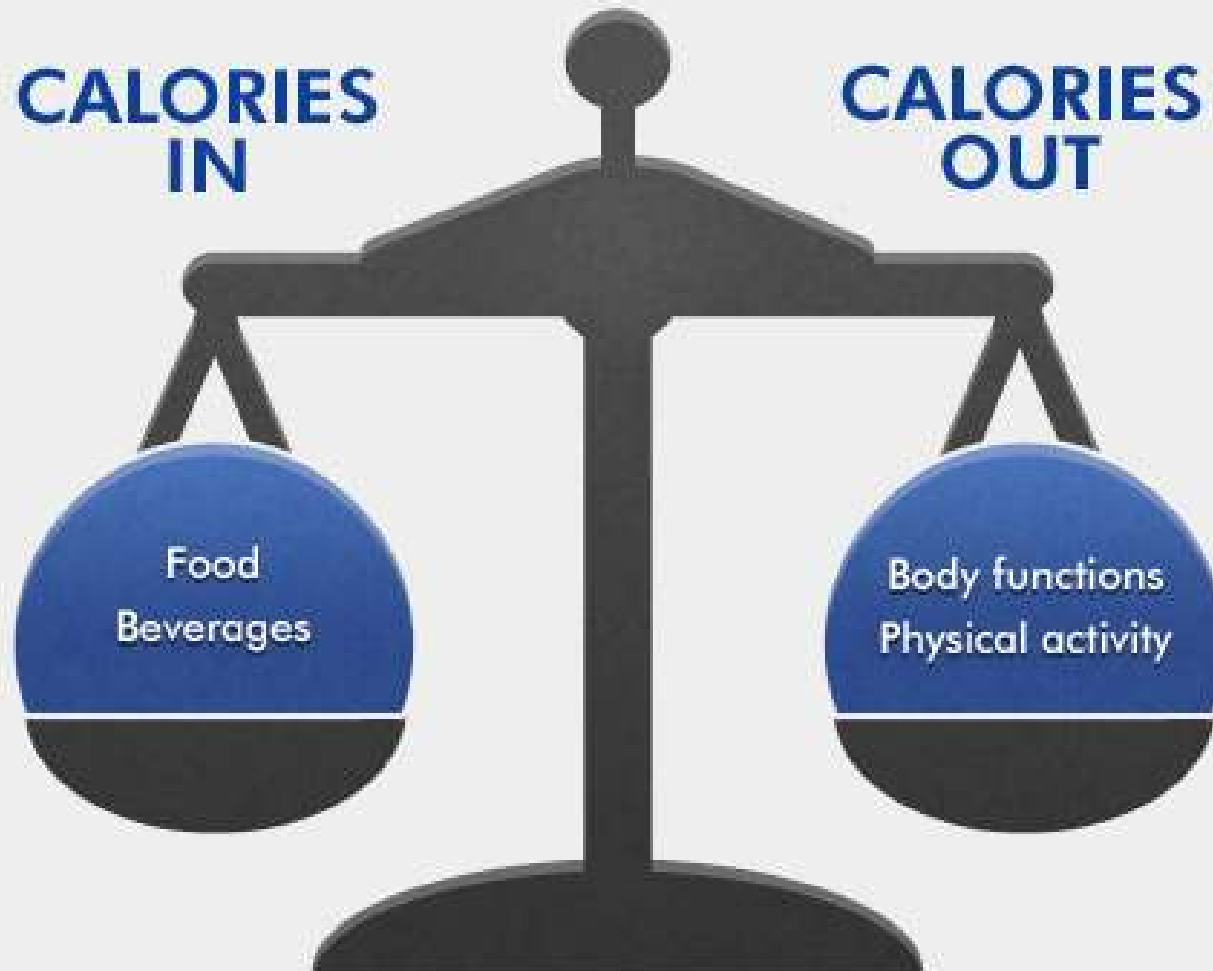
ENERGY AND CALORIES

- Energy is measured in Joules, however the term most often used in dietetics and amongst athletes is the kcal

one kcal equals 4.2 kJoules

**CALORIES
IN**

**CALORIES
OUT**



ENERGY AND CALORIES

- To maintain energy balance, the estimated average energy intakes required in 'healthy' adults are
 - > 2550 kcal/day for males
 - > 1940 kcal/day for females

NUTRIENTS AND WHERE TO GET THEM

- ◉ There are six key nutrient classes
- ◉ CARBOHYDRATES
- ◉ FATS
- ◉ PROTEINS
- ◉ VITAMINS
- ◉ MINERALS
- ◉ WATER

NUTRIENTS AND WHERE TO GET THEM

The correct nutrient balance will help athletes remain healthy and perform optimally.

Too much or too little of any one nutrient will affect both health and performance.

NUTRIENTS AND WHERE TO GET THEM

◎ CARBOHYDRATES

Carbohydrates are the single most important source of energy for athletes. They provide approximately **four kcal per gram** and are the primary fuel source for high intensity exercise.

For the **healthy population**, carbohydrates should contribute approximately **50–60%** of the energy intake in the diet, This should increase to approximately **60–70%** in an **athletic population**.

NUTRIENTS AND WHERE TO GET THEM

- ◎ CARBOHYDRATES

- ◎ Carbohydrates can be classified as simple and complex.

Simple carbohydrates

Simple carbohydrates are found in foods such as fruits, milk, and vegetables

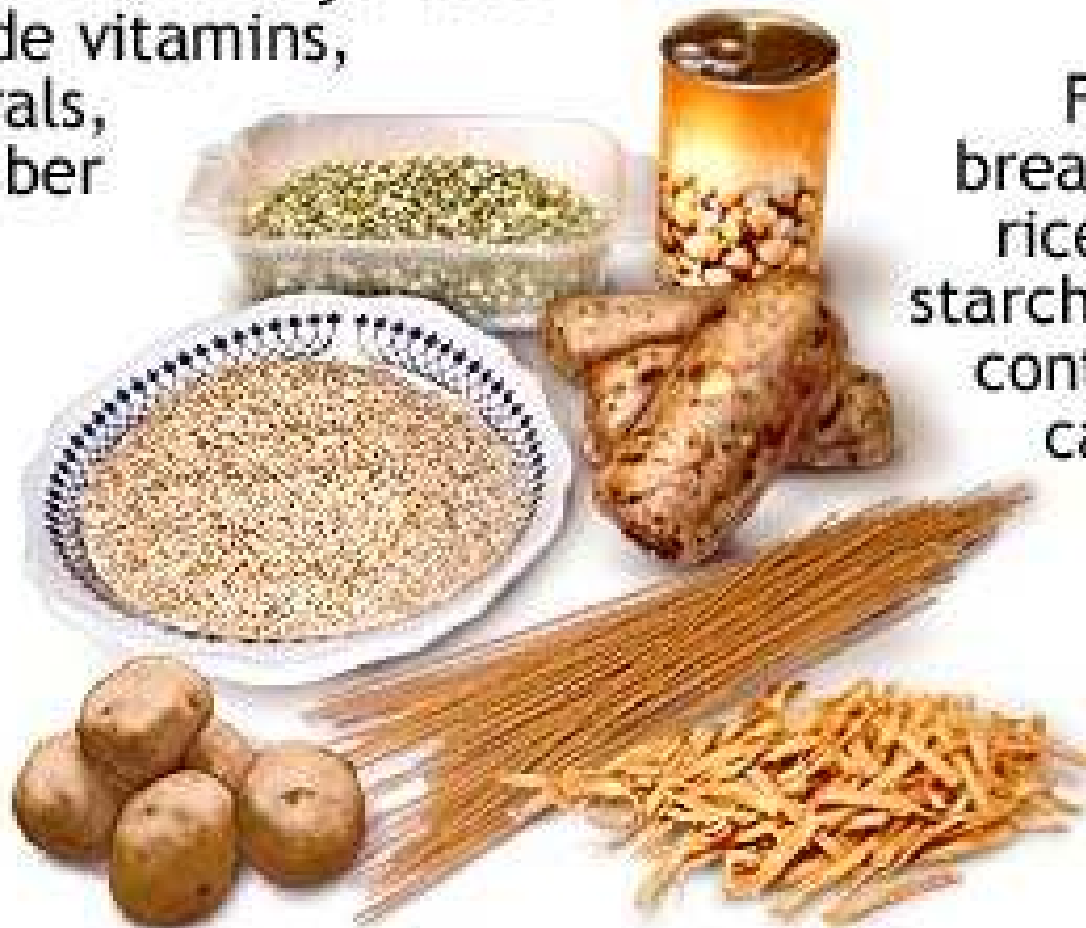
Cake, candy, and other refined sugar products are simple sugars which also provide energy but lack vitamins, minerals, and fiber



A quick but short-lasting source of energy.

Complex carbohydrates

Complex carbohydrates provide vitamins, minerals, and fiber



Foods such as breads, legumes, rice, pasta, and starchy vegetables contain complex carbohydrates

Provide a stable supply of longer-term energy.

NUTRIENTS AND WHERE TO GET THEM

CARBOHYDRATES

- ◉ Foods, and in particular carbohydrates, can also be classified by their glycaemic index.
- ◉ The glycaemic index (GI) is a measure of the extent to which a certain food raises blood glucose (Jenkins et al. 1981).

NUTRIENTS AND WHERE TO GET THEM

◎ CARBOHYDRATES

High GI foods, such as white bread, potatoes, corn-flakes and jelly beans, cause a sharp rise in blood glucose, which is often short lasting and followed by a rebound drop in blood glucose.

NUTRIENTS AND WHERE TO GET THEM

◎ CARBOHYDRATES

Low GI foods, such as porridge, high-fibre cereal, beans, peanuts and apricots, which are high in fibre and/or protein, give a slower, but more sustained release of glucose causing a slower rise in blood glucose and no rebound drop.

NUTRIENTS AND WHERE TO GET THEM

PROTEINS

- Protein, which contains approximately 4 kcal/gram, is also used as an energy source, supplying about 5–10% of energy expenditure.
- The recommended intake of protein for a healthy sedentary person is 0.75g/kg or approximately 15% of the diet.

Proteins



Top 10 Sources of Veggie Protein

design / layout by:
Q-Mars Imandel
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Where do you get your protein?

(brought to you by The GIVE Project)



thegiveproject.org

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Spinach
49% protein



Kale
45% protein



Broccoli
45% protein



Cauliflower
40% protein



Mushrooms
38% protein



Parsley
34% protein



Cucumbers
24% protein



Green Pepper
22% protein



Cabbage
22% protein



Tomatoes
18% protein

Protein in Meat:



Beef
25.8% protein



Chicken
23% protein



Eggs
12% protein

NUTRIENTS AND WHERE TO GET THEM

PROTEINS

- Proteins are made up of amino acids, and it is these amino acids that are the real building blocks of the body.
- There are 20 amino acids, 12 of which can be synthesised from other amino acids and are considered non-essential and eight that are considered essential as they cannot be made within the body and therefore must come from the diet.

NUTRIENTS AND WHERE TO GET THEM

◎ FATS

◎ Fat has many essential functions within the body that include:

1. ENERGY PROVISION,
2. FORMATION OF CELL MEMBRANES AND NERVE FIBRES,
3. PROTECTION OF VITAL ORGANS,
4. PRODUCTION OF HORMONES,
5. STORAGE AND TRANSPORT OF FAT SOLUBLE VITAMINS,
6. INSULATION,
7. SUPPRESSION OF HUNGER



NUTRIENTS AND WHERE TO GET THEM

- FATS
- Fat contains approximately **9kcal/gram** making it a very efficient way for the body to store large amounts of energy.
- Current guidelines for fat intake in a healthy diet recommend no more than **30% of energy intake** as total fat, and less than 10% as saturated fat

NUTRIENTS AND WHERE TO GET THEM

◎ FATS

- ◎ Unsaturated fatty acids are generally liquid at room temperature and are found in plant sources and fish.
- ◎ Saturated fats tend to be solid at room temperature and come from animal sources

NUTRIENTS AND WHERE TO GET THEM

◎ FATS

- ◎ Saturated fats are associated with increased levels of low-density lipoproteins (LDL cholesterol) and an increased risk of coronary heart disease,
- ◎ Whereas unsaturated fats are associated with a lower risk by reducing serum LDL

Saturated fats

Saturated fats are found in animal products such as butter, cheese, whole milk, ice cream, cream, and fatty meats, and oils such as coconut, palm, and palm kernel oil.



UNSATURATED FATTY ACIDS

Fats



Trans-fatty acids

Trans-fatty acids are found in fried foods, commercial baked goods, processed foods and margarine





**Did you know?
Fats from junk food trigger
the brain to want more food.
This effect can last for
several days.**

NUTRIENTS AND WHERE TO GET THEM

◎ FATS

While most fatty acids can be synthesised within the body, there are two that are essential. The essential fatty acids are

1. linolenic (omega-3)
2. linoleic (omega-6)

Beneficial effects on the cardiovascular system

NUTRIENTS AND WHERE TO GET THEM

◎ FATS

Athletes should aim to avoid or reduce their intake of the following high fat foods: cake, biscuits, chocolate, fat on meat, sausages, pasties, pies, beef burgers, cheese, butter and cream.

Moreover, athletes should aim to get the majority of their fat intake from oily fish, white fish, vegetable seeds and oils, soya beans and nuts.

The Real Story about FATS

by Ian Cohen
H.I.C.

The TRUTH

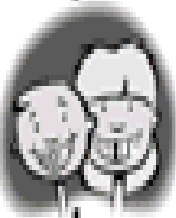
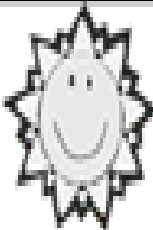


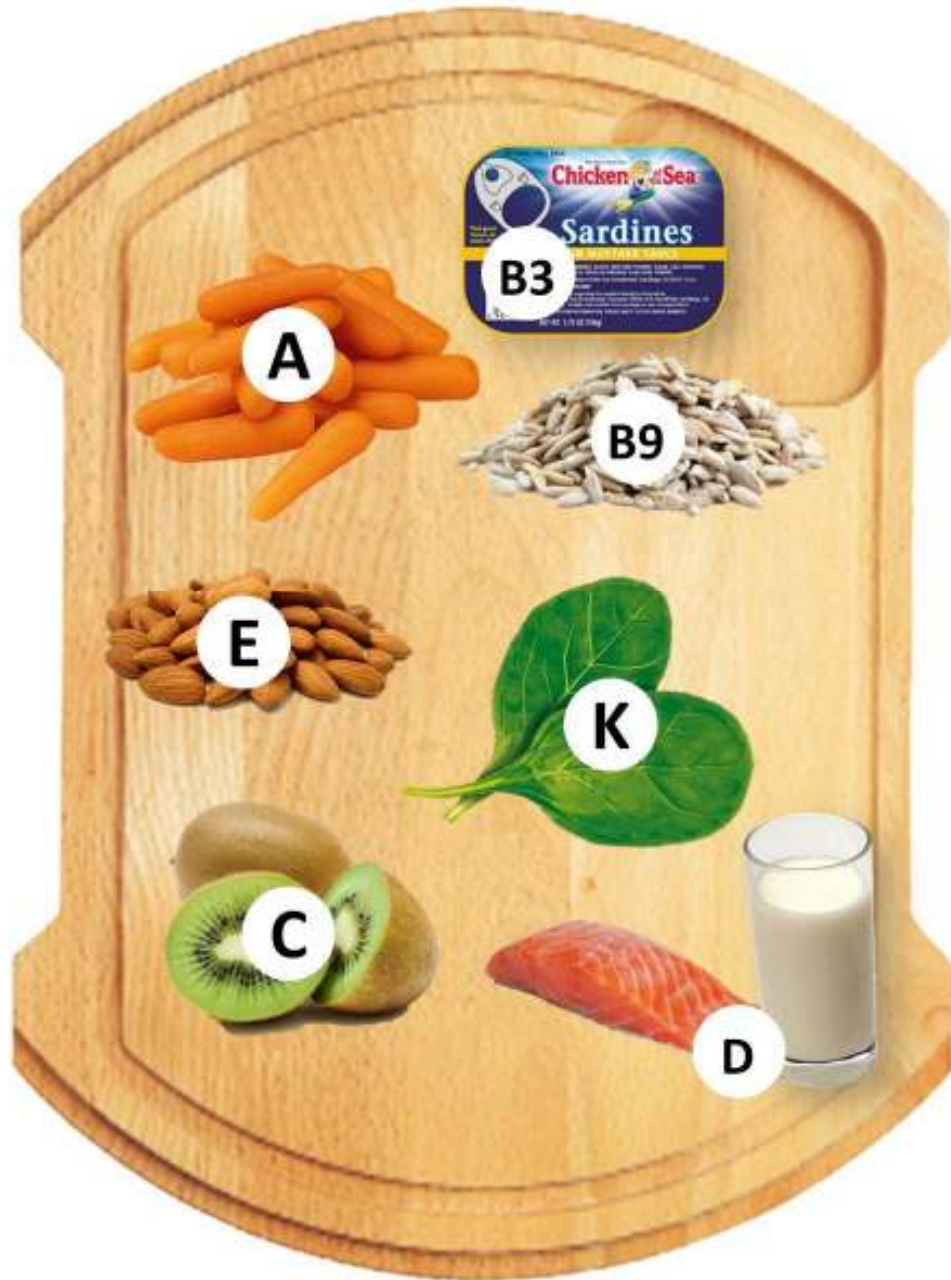
NUTRIENTS AND WHERE TO GET THEM

- VITAMINS

- There are 13 compounds commonly identified as vitamins that are broadly categorised as either water-soluble or fat-soluble



Vitamin	Functions	Sources
A	Healthy teeth, skin, and eyes	Eggs, meat, milk, cheese, dark green leafy vegetables, squash, carrots
B	Helps body use food energy, digest proteins, function of central nervous system, digestion and metabolism	Lean meats, eggs, fish, dairy products, soybeans, yeast, broccoli, lean beef, cabbage, whole grains *note there are a variety of B vitamins; this is a summary
C	Helps immune system, helps wound healing, helps absorb iron	Citrus fruits, green peppers, strawberries, tomatoes, broccoli, sweet and white potatoes, cantaloupe
D	"sunshine vitamin" - helps absorb calcium (for healthy bones and teeth)	 Dairy products, fish, oysters, sunshine! 
E	Protects body against damage from free radicals, helps form red blood cells (to carry oxygen)	Wheat germ, corn, nuts, seeds, olives, spinach, green leafy vegetables, vegetable oils (sunflower oil, soybean oil)
K	Blood clotting, strong bones	Cabbage, cauliflower, spinach, soybeans



NUTRIENTS AND WHERE TO GET THEM

◉ MINERALS

Some minerals occur in the body in relatively large amounts. These are known as the **major minerals** and include: **calcium, phosphorus, sulphur, potassium, chlorine, sodium, magnesium, zinc and iron.**

Other minerals occur in minute quantities. These are called **trace minerals** and include: **chromium, cobalt, copper, fluorine, iodine, manganese, molybdenum, nickel, selenium, silicon, tin and vanadium**



NUTRIENTS AND WHERE TO GET THEM

◎ MINERALS

Two of the most important minerals for athletes are iron and calcium.

NUTRIENTS AND WHERE TO GET THEM

◎ WATER

For optimal cardiovascular and thermoregulatory function athletes must therefore maintain sufficient body fluid levels and **avoid dehydration**, which results in a decrease in both cardiovascular and strength and power performance



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THE IMPORTANCE OF A BALANCED DIET

- There are several tools and guidelines to ensure the correct quantities and balance of nutrients for health. The most common tool is the **reference nutrient intake (RNI)**.

THE IMPORTANCE OF A BALANCED DIET

◉ REFERENCE NUTRIENT INTAKE (RNI)

The amount of a nutrient required to maintain adequate health for the majority of the population

The current UK government guidelines for health suggest a balance of approximately

- ◉ 55% carbohydrate,
- ◉ 15% protein
- ◉ less than 30% fat.

THE IMPORTANCE OF A BALANCED DIET

- The optimal diet for an athlete will depend on the;
 - > Sport
 - > Activity levels
 - > Body size
 - > Weight gain or weight loss,
 - > The type of training performed at any given time.

others



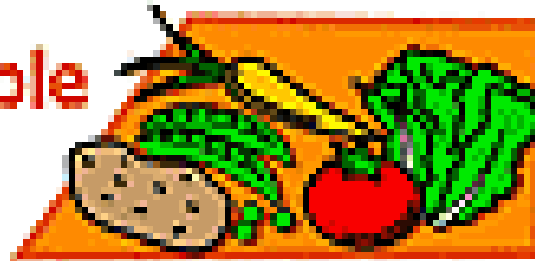
milk



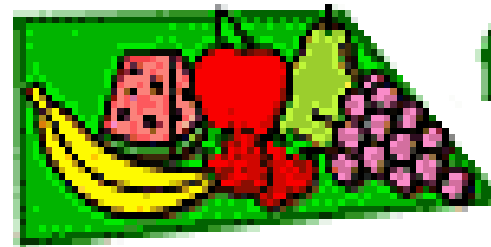
meat



vegetable



fruit



grain



NUTRITION FOR PERFORMANCE

- Optimal nutrition for performance is determined by **what, when and how** much an athlete eats
- Athletes will require more energy, greater quantities of certain nutrients (carbohydrates, protein) and will need to consume food at key times **before, during and after training or competition.**

Energy requirements for specific sports/training activities

- For example
 - > Male boxers (57kg) expend 2900kcal;
 - > Male weightlifters (110kg), 4900kcal;
 - > Female basketball players (61.4kg), 3100kcal
 - > Male cross-country skiers (during periods of hard professional training) use around 8600kcal/day

Energy requirements for specific sports/training activities

CALCULATING ENERGY NEEDS

- Energy needs can be calculated by the following formula:

$$\text{Energy EAR} = \text{BMR} \times \text{PAL}$$

- > EAR (estimated average requirement)
- > BMR (basal metabolic rate)
- > PAL (Physical Activity Level).

Energy requirements for specific sports/training activities

- PAL refers to the ratio of total energy required over 24 hours
- For example a PAL of 1.4 represents very low activity levels, 1.6 represents moderate activity levels, and 1.9 represents high activity levels.
- Most athletes will have a PAL of 1.9 or above.

NUTRITION FOR INJURY PREVENTION

Delaying fatigue

- ⦿ The most important nutritional consideration for injury prevention is in delaying the onset of fatigue
- ⦿ If an athlete is fatigued,
 - > there is a change in running mechanics, landing mechanics,
 - > A decreased ability to maintain joint alignment
 - > Control and appropriate muscular activation patterns during potentially risky manoeuvres

NUTRITION FOR INJURY PREVENTION

- To limit fatigue, athletes should consume a diet that allows them to maintain optimal performance throughout the duration of a race, match or training session. The two most important nutrients to prevent fatigue are
 - > Carbohydrate
 - > water

NUTRITION DURING INJURY

- Injury can lead to a range of complex nutritional issues for some athletes.
- Body mass management (preventing weight gain during injury, restoration of muscle mass post injury) is crucial for effective rehabilitation.

NUTRITION DURING INJURY

- Education is a priority. Athletes must aim for a nutrient rich and healthy diet that is sufficient to maintain energy balance. **Athletes should focus on low-fat, low-sugar, high-fibre foods** that provide sufficient carbohydrate, protein and fat, and which provide optimal vitamin and mineral intakes.

SUPPLEMENTS

- The use of supplements by athletes requires caution. Whilst there is a substantial body of evidence that some substances found in the diet have an ergogenic or anabolic effect under certain conditions – for example, caffeine for endurance and power performance, and creatine for increasing short-term high-intensity exercise and muscle mass

SUPPLEMENTS

- many supplements contain substances not declared on the label and in some cases these substances contravene IOC or WADA doping regulations and would cause an athlete to fail a drugs test

SUPPLEMENTS

- an IOC funded study of 634 products labelled as non-hormonal nutritional supplements from 13 countries and 215 different suppliers, 14.8% contained anabolic steroid precursors not declared on the label

Make your own sports drink

- ◉ For training
 - > 1 LITRE OF WATER
 - > 60G TABLE SUGAR (OR IDEALLY POWDERED GLUCOSE/DEXTROSE)
 - > PINCH OF SALT
 - > DIET CORDIAL (TO TASTE).

Make your own sports drink

- For recovery
 - > 500ml skimmed milk
 - > banana
 - > 2 heaped tablespoons of malted drink powder (Horlicks, Ovaltine, Nesquick)

*Thank
You!*

