12PDHPE HSC COURSE

Core 2

Factors affecting Performance

Focus Question 3

How can nutrition and recovery strategies affect performance?
**Students learn about:**

- **Nutritional considerations**
  - pre-performance, including carbohydrate loading
  - during performance
  - post-performance

- **Supplementation**
  - vitamins/minerals
  - protein
  - caffeine
  - creatine products

- **Recovery strategies**
  - physiological strategies, eg cool down, hydration
  - neural strategies, eg hydrotherapy, massage
  - tissue damage strategies, eg cryotherapy
  - psychological strategies, eg relaxation.

**Students learn to:**

- Compare the dietary requirements of athletes in different sports considering pre-, during and post performance needs

- Critically analyse the evidence for and against supplementation for improved performance

- Research recovery strategies to discern their main features and proposed benefits to performance.
Supplement intake is routine for many competitors because it is believed to **improve athletic performance**. However, while perhaps supplying a psychological boost, supplements may be of **little value if the diet is already well balanced** in terms of nutritional requirements.

**What are the common supplements used to enhance performance?**
Vitamins are inorganic compounds that are essential to maintaining bodily functions.

They **do not contain energy**, but they function as catalysts that help the body use energy nutrients. In this capacity they assist such functions as energy release, metabolic regulation and tissue building.

Minerals are inorganic substances found in the body that are necessary for it to function adequately.

Like vitamins, **minerals** belong to the group of micronutrients that are essential for the body to function properly, but **do not provide energy**. **Iron** and **calcium** are the two minerals that are most commonly **deficient in athletes**, and inadequate supplies will **affect performance** and contribute to health problems.
Iron is found in **haemoglobin**, which comprises most of the **red blood cells** in the body. These **cells collect** and **transport oxygen**, delivering it to where it is needed. **Diminished haemoglobin levels affect performance** because the muscle cells are deprived of oxygen, which is needed to break down the **Nutrients and produce energy**.

A condition commonly associated with activity is **‘sports anaemia’**. Most frequently experienced in the early stages of heavy training programs, it is **characterised** by a **lack of energy and general fatigue**. The condition tends to subside if training is gradual, progressive and supported by a balanced diet. It is unknown exactly why **‘sports anaemia’** develops. However, it is thought to be attributable to either **a lower iron intake relative to the boost in exercise, or the body’s use of protein for functions other than red blood cell production**. Again, a balanced diet is an excellent source of iron. High amounts are found in lean meat, while grain products and dark, leafy green vegetables such as spinach and lettuce are other valuable sources.
The main vitamins that athletes need are **water-soluble vitamins**. The main sources of these vitamins are fruits and vegetables, wholegrain.

Vitamins & Minerals assist with the:
- immune system
- formation of haemoglobin
- muscle contraction
- helping to activate enzymes for energy

Some athletes that may need supplementation:
- Female athletes (calcium and iron)
- Vegetarians (iron)
- highly physical people (sodium and magnesium due to sweat)
Protein supplements have had strong favour with weight-lossers, bodybuilders and strength athletes for a long time. Many athletes believe that protein supplements are important because of their muscle building qualities, with higher intake positively affecting muscle size.

Protein's primary importance to the body is its structural role in holding the cells together and in the growth, repair and maintenance of body tissue. It also has a functional role in hormone production and nervous system transmissions.

Protein is composed of various types of amino acids. It can be a source of energy under extreme conditions, when carbohydrate and fat supplies are in very short supply or exhausted.
On average, an Australian diet, **12 to 15 per cent of the recommended intake should consist of protein**. Studies indicate that this level is easily achieved, with most people attaining **150 per cent of the recommended intake**. Athletes, because of their high energy usage, may consume amounts in excess of this.

On the whole, research supports the idea that most athletes do not need or benefit from protein supplementation as they meet requirements easily within their balanced diet.
Furthermore, excess protein can negatively affect health. High amounts of protein can increase the amount of calcium excreted in the urine and possibly contribute to osteoporosis. Unlike carbohydrates that can be stored in the body, excess protein must be eliminated. The processing and filtration of additional urea can interfere with kidney function. Diets high in protein such as those containing large amounts of meat and dairy foods can contribute to obesity as a result of their high fat content.
As little as 2–3 milligrams per kilogram body weight is enough to potentially improve performance.

Caffeine is a mild diuretic but during exercise this diuretic effect falls off dramatically and will not exacerbate dehydration during exercise.

Athletes should also be aware that caffeine may reduce sleep quality and quantity, which may adversely affect their recovery.

Caffeine has ergogenic aid properties, which means that it improves performance by assisting specific metabolic processes (metabolises fat fast to produce more energy).
A **diuretic** is a drug that increases the amount of fluid (water and urine) passing from the body.

An **ergogenic aid** is a substance or practice that improves or is believed to improve physical performance.
Creatine is a compound that occurs naturally in the body. It is found mainly in the muscle tissue in the form of creatine phosphate, which provides a ready source of ATP to the working muscle.

The body has a maximum, or ceiling, amount of creatine it can store and once this maximum is reached it will break down the excess creatine into creatinine and excrete it through the urine.

By supplementing creatine, athletes are trying to enhance the efficiency of the ATP-PC system to provide energy during high-intensity activities.
• Studies have shown that while creatine is able to improve the recovery rate (faster resynthesis of ATP) it does not extend the length of time a performance can be maintained.

• It is likely to only be of benefit to athletes who are undertaking explosive short-duration activities with short rest periods in between, rather than one off sprints or endurance events.
In your workbooks, state point FOR and AGAINST supplementation

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