

Ideas to relate the science in rugby to fictional reading

Eating healthily

Professional rugby players require high levels of endurance and stamina to play the very physical sport of rugby. Good nutrition is essential to give them the energy levels they need. Players monitor their diets carefully to maximise their performance during the game and to aid their recovery after.

As game day gets closer, players concentrate on reducing their sugar intake and eating more protein rich foods, such as nuts, eggs, lean meat and dairy products. They also drink plenty of fluids.

A couple of days before the game, players increase the amount of healthy carbohydrate-rich foods they eat. Carbohydrates are the most important source of energy for endurance and power. Foods like starchy vegetables and whole grain cereals release this energy slowly. Pasta and breads are often eaten on the night before a game.

On game day it is important not to eat too much or too little. Players start the day with a healthy breakfast, such as porridge, eggs, fruit and other easily digested foods.

A pre-game meal, eaten about three to four hours before the game, includes carbohydrate-rich foods with some protein, for example lean meat with pasta, rice or noodles. This meal provides sustained energy for the game. Pre-match light snacks to give players quick release energy are also important. Museli bars, fruit smoothies, fruit buns and special sports bars provide extra fuel. Players also sip plenty of fluids, including isotonic sports drinks, so they are well hydrated.

Post-game, players begin their recovery. Within 30 minutes of finishing the game, small amounts of carbohydrate and protein should be eaten. The after match meal is high in carbohydrates and protein to replenish players' energy stores. Fresh herbs, such as ginger, garlic, coriander or basil have an anti-inflammatory effect and are good to include in the meal. Players also drink plenty of fluids to replace those lost during the game.

After a strenuous game, it is important to replenish the body's energy reserves and repair any injuries so players eat carbohydrate-rich foods for several days to increase their recovery rate.

Protein

What is protein?

Protein is an essential nutrient for life. It is found in every part of our bodies – skin, muscles, blood, organs, bone, hair, fingernails – and, after water, is the most plentiful substance in our bodies. Proteins are made up of small units called amino acids, strung together in many different combinations.

There are different types of protein. Complete proteins come from animal sources, soy and quinoa (a seed) and contain all nine essential amino acids. Plant protein is called incomplete because it lacks one or more of the essential amino acids our bodies require.

What do our bodies use protein for?

Our bodies use protein as a source of energy and to build, maintain and repair body tissues. Protein helps us grow muscles, digest food, and make red blood cells, hormones, enzymes and other substances our body needs. Our immune systems resist illnesses with special proteins called antibodies. Other proteins control our brains and nerves. Muscle proteins help us move, breathe and

keep our hearts beating. Protein is the main component of hair and fingernails and is essential for healthy skin and bones.

Which foods are good sources of protein?

Although the human body produces about thirteen amino acids, we need to get the nine essential amino acids from our diets. Protein in the food we eat supplies these amino acids, which the body uses to make its own proteins.

Dairy foods, lean meat, poultry and seafood are all excellent sources of complete proteins. These animal protein sources may contain high levels of saturated fats, so it is important to choose leaner meats, low fat dairy products, eat smaller amounts and mix with other sources of protein.

Most vegetable sources of protein, such as nuts, beans and whole grains, have some or all of the essential amino acids, but in smaller amounts. To get complete protein from vegetable sources requires some care. Eating one type of plant protein with another improves the nutrition value of the protein, eg. combining beans with rice.

Carbohydrates

What are carbohydrates?

Carbohydrates are molecules of sugar, or saccharides. They are chemical compounds made up of carbon, hydrogen and oxygen atoms, which join together to form the sugar molecules.

There are two main types of carbohydrates, simple and complex. Simple carbohydrates are single sugar molecules or two sugar molecules joined together, eg. glucose, fructose (found in fruit) and lactose (found in milk). Complex carbohydrates, starches and fibre, are made up of many sugar molecules joined together.

What do our bodies use carbohydrates for?

Carbohydrates are important sources of energy for the brain and heart, nervous, digestive and immune systems. Our bodies use carbohydrates to make glucose, a simple sugar, which is transported in the blood around the body into the cells, where it is converted to energy. This energy can be used immediately or stored in the liver and muscles, the storage form of glucose is called glycogen, for when it is needed.

Fibre helps to eliminate waste and toxins from the body and keeps the gut healthy.

A diet lacking in carbohydrates can lead to tiredness, poor concentration and thinking, muscle cramps, and a lack of stamina and endurance.

Which foods contain carbohydrates?

Most foods we eat contain carbohydrates. Some carbohydrates are healthier than others.

Simple carbohydrates, the sugars, occur naturally in fruits and dairy products. Refined sugars are natural sugars that have been broken down and then processed into products, such as white sugar, pastas and white bread.

Simple carbohydrates cause blood sugar levels to rise rapidly because they are easily digested and quickly absorbed into the bloodstream. Often this is followed by a sharp drop in blood sugar levels, making our energy levels crash. Foods which give us a quick release of energy are called high GI (glycaemic index) foods.

Sucrose, a simple carbohydrate, is the sugar we use to sweeten drinks, cakes, pastries, jams, sweets, and many other processed foods. This type of sugar is a major cause of tooth decay and weight gain. The body breaks down sucrose quickly, a large amount of energy at one time means that there is a surplus, which is converted into fat, rather than converted into glycogen and stored.

The natural sugars in fruit release energy slowly, contain lower levels of sugar and are high in fibre and vitamins.

Complex carbohydrates are found as natural starches in some fruits, vegetables, legumes, brown rice, nuts, wholegrain and wholemeal cereals, breads, flour and pasta. These carbohydrates take longer for the body to digest and are low GI foods. Energy in these foods is released at slow and steady rate.

Complex carbohydrates as refined starches are found in biscuits, pastries, cakes, pizza and white bread, flour, pasta and white rice. These “bad carbohydrates” often contain large amounts of added sugar and saturated fats.

For a healthy diet, refined carbohydrates should be kept to a minimum. Instead, base meals around a balance of complex and simple carbohydrates, choosing fibre-rich fruits, vegetables and whole grains. Carbohydrates should make up about 50% of our daily calorie intake, with at least a third being from starchy carbohydrates

Fats

Our bodies require healthy amounts of fat to provide energy and essential fatty acids. Fats also help our bodies use vitamins, transport substances in and out of cells and keep the brain, skin and nervous system healthy.

Good fats are the monosaturated fats found in some meats, seeds and nuts, avocados and whole milk products. However, they should still be eaten in moderation. Fats found in oily fish, such as salmon and sardines, are called the omega-3 fats. These fats are good for our hearts, joints and skin.

Water

Every cell, tissue and organ in our bodies and almost every living process depends on water. The human body is about 60% water, the brain is about 70% water and our lungs are 90% water.

To replace fluids lost through sweating and other body processes, we need to drink about 2.4 litres of water per day, and more in hot weather, periods of high activity or illness.

Some of this water comes from the fluids we drink and the rest from the foods we eat. Dehydration makes us feel dizzy, lightheaded, nauseous, weak and lacking in concentration.

What do we need water for?

Here are some of the essential body functions and processes our bodies use water for.

Digestion and elimination: Water is needed to break down and digest food. Water helps us to get rid of toxins and waste material in our bodies through the processes of urination, perspiration and bowel movements. It keeps our kidneys healthy and aids in the metabolism and elimination of fats.

Temperature regulation: Water helps the body to keep its temperature stable. When we exercise, if we have a fever, or it is a hot day, our bodies generate more heat and our core temperature rises. We lose fluids through sweating as our bodies try to cool down. Water is released onto the surface of the skin and, as it evaporates, absorbs body heat so the body cools down.

Lubrication: Water keeps our joints lubricated and prevents our eyes from drying out.

Protection: The spinal cord and other sensitive tissues have coatings or protective fluids surrounding and cushioning them. Our skin, the largest organ in our body, needs water to keep it hydrated and supple.

Circulation: Water is a major component of blood, which carries substances to every part of the body through the blood vessels.

Exercise

Exercise is good for both the body and the mind. Our bodies function more efficiently, our energy levels increase, we feel less stressed and it helps to put us in a good mood. Regular exercise increases stamina and endurance. It makes us fit for everyday life and for the recreational activities we enjoy, including rugby and other sports.

How does regular exercise help us?

When we exercise our bodies release endorphins, chemicals in our brains that can make us feel happier and peaceful. It also helps us to sleep better.

Maintaining a healthy body weight is important in disease prevention. Regular exercise lowers the risk of developing certain diseases, including heart disease, cancer and diabetes. Exercise can also delay the aging process because it keeps the muscles and bones strong and joints flexible.

Types of exercises

Our bodies use energy when we exercise. This comes from the stored chemical energy of the food we eat. Our muscles convert this energy into heat and the energy of motion (kinetic energy).

Aerobic exercises are those that make the heart beat faster and breathing quicker and deeper, eg. running, swimming and cycling. Aerobic exercises increase the efficiency of the heart and lungs, maximising the amount of oxygen in the blood. Physical activities become easier with better aerobic fitness.

Exercising with weights helps to increase bone, muscle and ligament strength, and helps with endurance. It is also a good way to lose weight, even after an exercise session the body continues to burn up calories as the muscles re-build and recuperate.

Possible Learning Activities

Identify the food types that are mentioned in the story. Is it a healthy food? Will it provide the nutrients and energy for strenuous activities or exercise?

Identify different physical activities that take place in stories. This could include, walking, running, jumping, lifting, throwing, swimming, playing games or sports, like rugby, football, hockey, netball, basketball etc. Work out which muscle groups were used, eg: cycling is good for leg muscles.

Is the sport good for stamina, endurance or both? Does it use short bursts of energy, like sprinting, or long sustained exercise, like running? Draw up a chart, comparing the different sports.

Design a healthy lunch for the hero in the story to take on their mission. Include the foods the hero needs to give them stamina to successfully complete the mission?

Keep a food diary of everything you eat during the week.

Keep an exercise log. Download an app to work out the number of calories you used. There are also several website that can calculate this for you. Here is one:

<http://caloriecount.about.com/calories-burned>

Use a digital device, eg. Smartphone or Ipad, to keep a record of your physical activity. Measure your heart rate, speed, and distance, calories used, for many of your daily physical activities, eg. walking, running, cycling, riding a scooter.