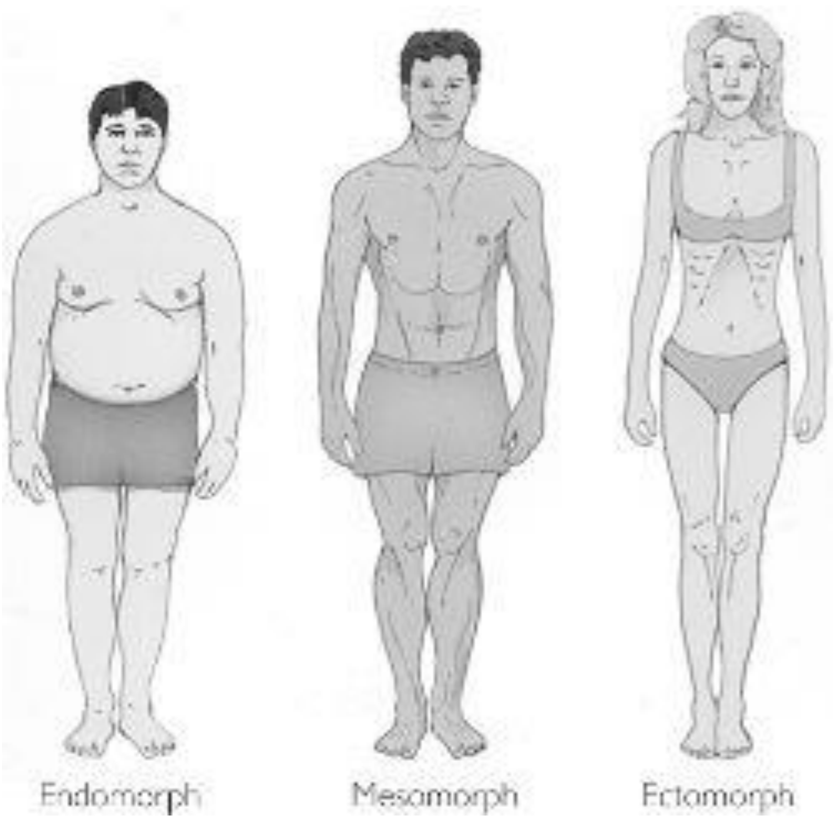
SIS40215 : Certificate IV in Fitness

Notebook

SISFFIT020

Instruct exercise programs for body composition goals



Introduction

There's nothing like the subject of nutrition to stir debate. It seems like the experts change their minds almost daily about what we should and shouldn't eat. In truth, scientific nutrition hasn't changed much at all in the last fifteen years.

It's the constant and never-ending emergence of fad diets and weight loss programs that adds to the confusion. It appears everyone has differing opinions...

Fortunately, scientific sports nutrition is a little less contested. There are some very well-researched, well-practised dietary strategies that have been used by athletes for many years. They are applicable to most sports. In fact, they are more than applicable - they are a pre-requisite to peak performance.

The aim of this course is to outline the basics of sports nutrition with an emphasis on **practical application**.

Carbohydrates

All energy, whether it's to play sport or carry out any other activity, comes from three classes of food called **macronutrients**. These nutrients are better known as carbohydrates, fats and proteins. Each is important - not only to fuel athletic performance but also for overall health and well-being.

Weight for weight carbohydrates contain the **least amount** of energy out of the three macronutrients. **Yet they are the most important type of fuel to an athlete.**

During short, intense bouts of exercise (like sprinting), carbohydrate is the only fuel capable of supplying the body with energy quickly enough. In the first few minutes of any activity, it is carbohydrate that almost exclusively meets energy demands. In addition, the ability to repeat a sprint at the end of a game or race, to the same high level as at the start of the game relies, in part, on the body's carbohydrate stores.

Although the body does use fat for lower intensity activity, carbohydrate acts as a "primer" or catalyst for fat to be broken down. Finally, carbohydrates play a key role in central nervous system function. The brain for example, uses glucose almost exclusively as its fuel.

Can diet significantly affect the body's carbohydrate stores?

The average person has about **2000 calories** of stored carbohydrate. An overnight fast (8 to 12hrs) and a low-carbohydrate diet can dramatically lower these stores. More importantly, a carbohydrate-rich diet can more than double them. The body's upper limit for carbohydrate storage equates to about 15 grams per kilogram (2.2lbs) of bodyweight. So an 80kg (175lb) person can potentially store up to 1200 grams of carbohydrate or 4800 calories worth of energy - all with just a few dietary modifications.

There are different types of carbohydrates. Understanding what they are and how they affect the body differently, is important to athletes and what they eat before and after a game.

Monosaccharides

This is the most basic unit of carbohydrate. Examples of monosaccharides include **fructose** (sugar found in fruit) and **glucose** (also called blood sugar). Cells can use the glucose found in food directly for energy, while fructose is converted to glucose in the liver.

Disaccharides

Combine two monosaccharides and the result is a disaccharide. **Sucrose** or table sugar is a disaccharide and it's the result of combining glucose and fructose. The sugar in milk, lactose, is another disaccharide. The collective name for both monosaccharides and disaccharides is **simple sugars**. Simple sugars are quickly absorbed by the body and provide a rapid source of energy.

Simple sugars such as fruit and energy drinks are a good food choice to refuel **AFTER** a game when the body's energy stores are low.

Polysaccharides

Starch and fibre are both polysaccharides. Starch is the combination of hundreds of monosaccharides joining together. Nutritionists often refer to polysaccharides as **complex carbohydrates**. Examples include bread, potatoes, rice and pasta. It takes longer for the body to break these complex structures down so they release their energy over a longer period than simple sugars.

Fibre differs from starch in that it cannot be digested and used for energy. It's still an important dietary component though and there is a growing link between lack of fibre and certain degenerative illnesses.

Starchy complex carbohydrates are the best choice BEFORE a game as a pre-match meal.

In Part 5 of this series, we'll cover sample pre and post competition meals and what they should contain. Closely related to the subject of carbohydrates is the **Glycemic Index** and that's something we'll cover later also.

In Part 2, we'll examine **protein** and in Part 3, the different types of fat available to the body. We'll also cover what the optimal balance of these three macronutrients is and how you can easily measure that.

Fat

Fat contains more than twice the amount of energy as carbohydrate. A single gram contains nine calories making it a valuable source of fuel for longer duration activities. While fat **cannot** supply energy quickly enough for very intense activity, it can be used by the body to power lower intensity exercise such as jogging and walking.

Fat also provides insulation and protection to vital organs such as the heart, lungs and liver and transports vitamins throughout the body.

Not all dietary fat is the same. Like carbohydrate, fat can be broken down into several different groups:

Saturated Fats

Saturated fats are found in foods such as red meat, egg yolks, cheese, butter, milk and commercially prepared cakes, pies and cookies. The typical western diet consists of almost 40% total fat. Of this, 15% is made up of saturated fats, which is considered a major cause of coronary heart disease, diabetes and other degenerative illnesses. No more than 10% of the diet should come from saturated fats.

Unsaturated Fats

Unsaturated fats come in the form of monounsaturated fats and polyunsaturated fats. Monounsaturated fats can actually lower the risk of coronary heart disease and are found in foods like olive oil, canola oil, avocados, almonds and pecans. Polyunsaturated fats, found in sunflower oil, safflower oil and corn oil are not thought to contribute to heart disease but don't offer the same protection as monounsaturated fats.

Essential Fatty Acids

Essential fatty acids are a class of polyunsaturated fats that have received a lot of attention in the media recently. They are thought to be cardio-protective and may help prevent a range of other illnesses. There are three types of essential fatty acids - Omega 3, Omega 6 and Omega 9. Omega 3 and Omega 6 must be consumed while the body can produce some Omega 9 on its own. Essential fatty acids are required for healthy cardiovascular, reproductive, immune, and nervous systems. Found in foods like walnuts, pumpkin seeds, Brazil nuts, sesame seeds, avocados, some dark leafy green vegetables and oily fish, the typical Western diet is often deficient of essential fatty acids.

Cholesterol

Despite its bad press, cholesterol is actually essential for many important bodily functions. There are essentially two types of cholesterol - low-density lipoprotein (LDL) and high-density lipoprotein (HDL). LDL is known as the "bad" cholesterol because it carries and then deposits cholesterol at the artery walls. HDL on the other hand, is known as "good" cholesterol because it acts as a scavenger removing cholesterol from artery walls and transporting it to the liver to be excreted.

Although some foods like cream, butter, ice cream, egg yolks, shellfish and red meats contain cholesterol, it's a high intake of saturated fat that causes the body to synthesize too much cholesterol. The maximum amount of dietary cholesterol recommended each day is 300mg.

That concludes part 2 of this sports nutrition series. Part 3 covers protein and how much the scientific literature says athletes really need. We'll also combine these first three days into a sample eating plan with the right balance of protein, fat and carbohydrate.

Protein

Correct and adequate protein intake is crucial for anyone involved in vigorous training. Protein is essential for the growth and repair of skin, hair, nails, bones, tendons, ligaments and muscles. It also serves a crucial role in enzyme production and maintaining a strict acid-base balance.

The Recommended Dietary Allowance (RDA) for the average male and female adult is just **0.83 grams of protein per kilogram (2.2lbs) of bodyweight**. In a 70kg (154lb) individual this equates to just 58 grams of protein per day or about two chicken breasts worth.

Some research shows that competitive athletes, particularly those involved in heavy weight training, may require more protein. The recommendation for strength and endurance athletes ranges from **1.2 to a maximum of 2.0 grams per kilogram (1kg = 2.2lbs)**. Research has shown that consuming more protein than this serves no benefit and may be harmful in the long term.

Good sources of protein include low fat milk, poultry, fish, lean red meat, eggs, nuts, beans and lentils and soy products. Fatty meats like pork and fast food hamburgers as well as most cheeses contain a lot of saturated fats so are not as suitable sources of protein.

Recently, the emergence of high protein, low carbohydrate diets have become popular in the weight loss industry. While they may or may not help to shed the pounds, high protein, low carbohydrate diets are unsuitable for athletes.

Many athletes are afraid that their heavy training schedule will force their bodies to breakdown lean muscle mass and then use it as energy. The body does use protein sparingly as a source of fuel after 45 minutes of exercise, however consuming more protein is not a good strategy.

By consuming plenty of carbohydrates before, during and after exercise it acts as a protein "sparer". Only in the absence of adequate carbohydrate stores will the body begin to metabolise significant amounts of protein for use as energy.

The Athlete's Diet

A typical western diet contains too much fat and not enough healthy, whole grain carbohydrates.

Athletes should aim to make **60-65%** of their diet carbohydrate, with an emphasis on fresh fruit and whole grains such as brown rice and pasta, wholemeal bread, potatoes and high fibre cereals. About **20-25%** of total calories should be in the form of fat.

The majority of this should be in the form of good fats (monounsaturated, polyunsaturated, omega fatty acids) found in oily fish like mackerel and salmon, olive oil, avocado and raw nuts (not roasted or salted). Protein should make up the remaining **10-15%** of an athlete's diet derived from fish, poultry, low fat milk and lean red meat for example.

Ideal Diet Composition for a Sport Player

	Carbohydrate	Fat	Protein
Average Western Diet	46%	38%	16%
Ideal Sport Player's Diet	60%	25%	15%

Take a look at the table below for a sample day's eating plan:

Sample Day's Diet for a Sport Player in Training

Breakfast	Piece of fruit Bowl of oatmeal or porridge (sweeten with dried fruit or honey) 3-4 slices wholemeal bread toasted with small amount of butter/olive oil spread, jelly/jam Glass of fresh fruit juice (not concentrated)
Snack	Piece of fresh fruit Plain yoghurt 2-3 fig biscuits/cookies
Lunch	Tuna or grilled chicken Bagel, baguette etc. (preferably wholemeal) Mixed salad with olive oil and lemon juice dressing Glass fresh fruit juice or low fat milk Low fat or bran muffin 1-2 bananas
Snack	Bag of nuts and raisins (such as almonds, pecans, Hazelnuts etc)
Dinner	Large serving rice or pasta Tomato sauce Grilled fish, chicken or lean beef mince Large mixed vegetable salad with dressing Small serving of ice cream and strawberries

This is one sample day only and a wide range of foods should be eaten. Try also to drink 2 litres (68 oz) water each day (fluids as part of a sports drink count).

Vitamins

Thirteen different vitamins have been identified and studied to date. They are classed as either **fat-soluble** (vitamins A, D, E, K) or **water-soluble** (vitamin B complex, vitamin C). Together they are responsible for blood clotting, neuromuscular function, healthy skin, teeth and bones and numerous other bodily functions.

A well-balanced diet should provide an adequate supply of all the vitamins regardless of age and level of physical activity. During periods of intense training, **a natural increase in food intake supplies any extra vitamin demand the body may have.**

Free Radicals, Antioxidants & Exercise

Free radicals are highly reactive molecules that can cause damage to the cells and are thought to accelerate the aging process and contribute to cancer, heart disease and diabetes. They are found in cigarette smoke, environmental pollution and some medications. Exercise may also increase the production of free radicals.

The body has an elaborate defence system against free radicals in the form of antioxidant enzymes. Vitamins A, C and E are known as antioxidant vitamins and can protect the cells against free radical damage. Although foods like citrus fruits, green vegetables and nuts contain antioxidant vitamins, some athletes feel the need to take a supplement due to the high level of training they undergo.

Although exercise is thought to increase free radical production, it also appears to increase the body's antioxidant defence system at the same time. However, there is some research to suggest that a vitamin E supplement can reduce harmful free radical production associated with exercise. Whether this offers any overall health benefits is still unclear.

Over 40 years of research has failed to show that vitamin supplementation can offer any sort of performance enhancement when a nutritionally balanced diet is present. Some vitamins (such as vitamin C) taken in excess can actually be harmful. The recommendation is to eat a well balanced diet rich in fresh fruit and vegetables.

Minerals

Minerals account for roughly 4% of a person's body mass. They provide the structure for forming bone and teeth. They also help muscles to contract, maintain normal heart rhythm and control the acid-base balance as well as other important bodily functions.

Minerals are classed as either **major** or **trace** depending on how much is required per day. Major minerals include calcium, phosphorus, sodium, potassium and magnesium. Trace minerals include iron, zinc, copper, selenium and chromium.

Calcium

The typical Western diet contains too little calcium. The RDA for calcium is 800-1000 mg for adults and 1200 mg for adolescents. The average adult consumes just 500-700 mg per day and for many it's as little as 300 mg per day. Calcium deficiency can lead to a condition called osteoporosis - a weakening of the bones. Exercise actually helps to maintain healthy bone density.

Sodium

Most adults consume too much sodium (found in abundance in processed foods), which can lead to high blood pressure. The RDA of 1100-3300 mg is equivalent to 0.5-1.5 teaspoons of table salt. Most people consume more than 2 teaspoons from processed foods even when table salt isn't used as seasoning.

Iron

Iron is helps the blood to carry oxygen so an iron deficiency (called anaemia) can lead to fatigue even with mild exercise. Some research has suggested that heavy exercise training creates an increased demand for iron. However, even in elite athletes, supplements are unnecessary if the diet contains iron-rich foods.

As with vitamins there is no convincing research to suggest taking mineral supplements can improve sporting performance. Exceeding the recommended daily allowance can also

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be potentially harmful. The only exception is adding a small amount of sodium to sports drinks during hot weather (¼ -½ teaspoon per litre of water).

Pre & Post Competition Eating

Long gone are the days when athletes thought that eating a big steak before a game would give them lots of energy. Today's elite sports men and women follow a strict diet, particularly on the day of a competitive match or event. While diet won't turn poor athletes into great ones, it can make the difference between performing poorly and tapping your full potential.

The Glycemic Index

Not all carbohydrate is digested and absorbed at the same rate. The **Glycemic Index** (GI) is a scale of how much a particular type of food raises blood sugar over a two-hour period compared to pure glucose.

For example, a piece of food with a **GI score of 45** means that it raises blood sugar **45%** as much as pure glucose in that two-hour period.

Common sense says that **simple sugars** which are broken down quickly, like fructose in fruit, should have a higher GI than complex carbohydrates, but that's not always the case. White bread, white rice and potatoes (all classed as complex carbohydarets) have a **very high** GI. That means they raise blood sugar almost as much or even more than pure glucose. Fructose has medium GI because the fibre found in fruit slows digestion and absorption.

Choosing foods with a **high GI** will help to quickly replenish carbohydrate stores **after** a game or event. Before a game or event, **low GI foods** are more appropriate as they release energy more slowly and for a longer period.

Pre Match Eating

The goal prior to a game or event (and even a training session) is to maximise carbohydrate stores in the muscles and liver and to top up blood glucose stores. Studies have shown that consuming foods with a high GI within an hour of exercise can actually **lower** blood glucose, which is not what an athlete wants! The reason is because the body produces an "overshoot" of insulin, which helps muscles to take up sugar in the blood. This in turn causes low blood sugar levels.

Athletes should eat foods with a **low to medium GI** before a match. This allows for a relatively slow release of glucose into the blood and avoids the unwanted insulin surge.

Consuming carbohydrate at least an hour before the start allows any hormonal imbalance to return to normal.

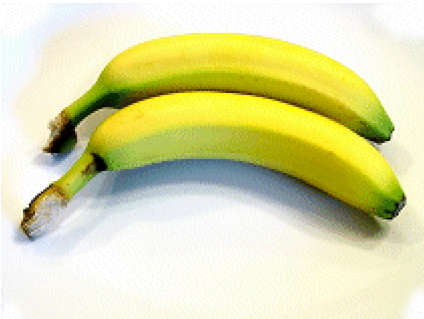
Example **low GI** foods include pasta, whole grain breads and rice, oatmeal, milk and milk products and fruit (except bananas and dried fruit).

The pre-match meal might consist of pasta in a low-fat tomato sauce, baked beans or scrambled eggs on toast and fresh fruit such as apples, pears or orange juice. Some grilled fish or chicken and vegetables could accompany the carbohydrates. Ideally this meal should be eaten at least three hours prior to the start - especially if nerves are a factor, which can impair digestion.

Food in the stomach is given a high priority to be digested before it has chance to spoil. As a result greater blood flow is directed to the digestive tract - not good news when players' muscles will soon be demanding an increase in blood flow too. The result of performing with a full stomach is nausea - the body's attempt to cease exercise so that it can redirect blood flow back to the stomach.

There is one exception to consuming carbohydrate immediately prior to the start of a game and it's in the form of a **sports drink 5 or 10 minutes before kick off**.

Post Match Eating



As an example, soccer players can use up 200 to 250 grams of carbohydrates during a game. It's important that they (and other athletes that perform for a similar duration) replenish those stores as quickly as possible. It becomes even more important if the athlete has more than one competition in the week or are involved in heavy training.

Ideally, a **large, high-carbohydrate meal** should be eaten **within two hours** of the finish and it can and should consist of **high GI foods**. Bananas and dried fruits are good immediately following a match, as are sandwiches and high-carbohydrate drinks like Gatorade Exceed and Lucozade. A main meal several hours later might consist of bread, pasta, potatoes and rice as well as other simple sugars like cakes and sweets.

Even under the best circumstances it can take over twenty hours to fully restore carbohydrate stores. This has implications for athletes who are competing five or six days a week (perhaps during a tournamnet). In this case carbohydrate replenishment at regular intervals during training sessions becomes very important. This is where high-carbohydrate drinks can offer a real advantage.

Carbohydrate Loading

Carbohydrate loading is often used by long distance athletes to "pack " their muscles with energy. The actual process involves depleting the muscles of carbohydrate a week or so before the event with exhaustive exercise and a low-carbohydrate diet.

Two to three days before the event the athlete switches to a very high-carbohydrate diet. In their depleted state, muscles take up more carbohydrate than they normally would giving the athlete a large store of energy.

For most sports and events, carbohydrate loading is unnecessary. In fact a disruption in an athlete's normal eating pattern can actually cause stomach upset and lead to impaired performance. A more sensible approach is to increase carbohydrate intake in the days leading up to a game or event.

Fluid Replacement

Athletes can lose between 2-3 litres of sweat during 90 minutes of intense exercise, particularly in hot and humid conditions. They can also lose as much as 2-3 kg (4½-6½ lbs) in bodyweight during the same period. This amount of fluid loss will certainly have a negative affect on performance.

Ideally to counteract dehydration, athletes should consume **200-400 ml (7-14 oz)** of cold water or a suitable carbohydrate solution **5 to 10 minutes** prior to the start of their event. During the any intervals, they should try to drink another 300-500 ml (10-17oz) of a sports drink. During hot weather or strenuous training sessions, coaches should try to provide their athletes with 150-250 ml (5-8oz) of drink about every 20 minutes.

Following a match or hard training session, it's essential that lost fluids be replaced. Water on its own is fine, but to replace fluid AND replenish energy stores, a **high carbohydrate drink** may be more suitable.

Drinking Before & During Competition

The right carbohydrate drink taken before and during composition can postpone fatigue and stabilize blood sugar preventing light-headedness, headaches, nausea and "jelly-like" muscles. However, not all carbohydrate drinks are created equal. Too much carbohydrate or sugar can actually **hinder performance**.

A solution that contains 40% carbohydrate empties the stomach **much slower** than plain water (which is 0% carbohydrate). This means that high sugar drinks such as Coca Cola, regular Lucozade, Exceed High Carbohydrate Source and Gator Lode (up to 40% carbohydrate) are **NOT** the best fluids to consume before or during exercise.

The ideal sports drink should contain **6-8% carbohydrate**. It should also contain a small amount of salt. Sodium concentration in the blood can reduce due to sweating and drinking lots of diluted fluids. If it gets too low it can lead to nausea, headaches and blurred vision. Adding just a pinch of salt can offset this potential danger.

Sodium is also an **electrolyte.** Electrolytes help control the passage of water between body compartments and they also help to maintain the acid-base balance of the body. Electrolytes (or lack of them) have been associated with muscle cramps in the latter stages of sport games.

Here are some effective sports drinks currently on the market suitable **before and during** a match or training session:

Suitable Sports Drinks for Sport

Brand	Amount of Carbohydrate
Gatorade	6%
Lucozade Sport	6.4%
Exceed	7.2%
Quick Kick	4.7%
Isotar	NA
High Five	6%
Powerade	6%

Drink 200-400 ml (7-14oz) of a suitable sports drink 5 to 10 minutes before the start but no earlier unless it's several hours before the start. During any intervals drink up to 300-500 ml (10-17oz). In hot climates try to drink 150-250 (5-8oz) ml every 20 minutes or so.

Drinking After Competition

Within two hours after the event you should aim to consume **100-200 grams of carbohydrate.** Muscles are depleted of carbohydrate stores, which need to be replenished as quickly as possible. Sometimes it can be impractical or unpalatable to eat a large meal immediately afterwards. High carbohydrate drinks offer a convenient alternative.

The sports drinks mentioned in the table above are good but this is one of the few occasions when taking a **high carbohydrate drink** is preferable.

How to Make Your Own Sports Drinks

You may have heard of **"isotonic"** sports drinks that have been "scientifically developed in conjunction with top athletes". But it's very easy to make your own, low-cost carbohydrate drink that is just as effetive!

Isotonic means a fluid containing **electrolytes** and **6-8% carbohydrate** (such as the sports drinks in the table above). To make your own add 200 ml (7oz) of concentrated orange juice (orange squash) to 1 litre (34oz) of water and add a pinch (¼-½ teaspoon) of table salt.

Hypotonic is a fluid that contains electrolytes and a **very small** amount of carbohydrate. This is used in very hot conditions where fluid replacement is the most important factor. To make your own add 100 ml (3.5oz) of concentrated orange juice to 1 litre (34oz) of water and add a pinch (¼-½ teaspoon) of table salt.

Hypertonic refers to a fluid that contains a **large** amount of carbohydrate and is ideal for refuelling after a game. To make your own add 400 ml (13.5oz) of concentrated orange juice to 1 litre (34oz) of water and add a pinch (¼-½ teaspoon) of table salt.

Supplements & Ergogenic Aids

Erogenic aids consist of supplements, drugs or procedures believed to improve athletic performance. Some of these substances are completely legal while others remain banned and unethical. Many are completely untested yet still receive endorsements from professional sports stars.

Those supplements that do have some limited research to back up the claims seem to receive even greater media hype. This section examines some of the more popular substances that many enthusiastic athletes consider a necessary training and performance aid.

Amphetamines

Often referred to as "pep pills", amphetamines exert a powerful stimulating effect on the central nervous system. Two of the most commonly used substances at the time of writing are Benzedrine and Dexedrine. They increase blood pressure, heart rate, breathing rate, cardiac output and blood glucose. They are said to increase alertness and a feeling of energy, decrease the sensation of fatigue and enhance self-confidence. Amphetamines create similar stimulatory sensations to that of cocaine but the effects last considerably longer. Some of the short-term side effects include headaches, insomnia, hallucinations, convulsions and even heart attack. Longer-term use can lead to uncontrollable movements of the face, paranoid delusions and nerve damage.

Amphetamines are a banned substance and if athletes are made aware of the well-documented side effects it's unlikely they would consider using them. However, sport is not immune to amphetamine abuse. The National Center For Drug Free Sport (NCDFS) completed a survey in 2001 amongst college soccer players in the USA. Approximately 2.9% of those surveyed admitted taking amphetamines on a regular basis. The percentage of women's soccer players admitting to amphetamine use in 2001 was higher than in any other sport at 4.6%.

Ironically, the majority of the research shows that taking amphetamines prior to an event has no advantage. While it may "psyche up" athletes, excessive stimulation and palpitations can severely hinder performance.

Another banned stimulant commonly used by athletes in many sports is **ephedrine**. Ephedrine is found in many cold remedies and can be bought as a weight loss supplement in the UK (although it is now banned for this use in many countries including the USA). Although there are a few studies that show limited beneficial effects to athletic performance. thought to be due a reduced perception of exertion, the overall evidence is by no means convincing. Ephedrine use has also been linked with serious health concerns such as heart attack and stroke.

Anabolic Steroids

An estimated one to three million athletes (90% of male and 80% of female bodybuilders) in the USA use steroids or androgenic substitutes. Statistics for the UK are unknown but many believe it to be proportionally similar to the US. The drug is not just reserved for bodybuilders and power athletes either. As team sports becomes faster and athletes become stronger and more powerful, more and more players are inclined to experiment with steroids.

Anabolic steroids function in a similar manner to the male sex hormone testosterone. Testosterone contributes to gender differences such as greater muscle mass and strength. The hormone's effects are lessened when synthetically prepared in the form of anabolic steroids but they still augment an increase in lean muscle mass and strength gain when combined with resistance training. Athletes often take a combination of steroids (called "stacking") in an increasing dose (called "pyramiding"). Dosages for medical uses are usually in the 5-20mg range, however, athletes take between 50-200mg to achieve an ergogenic effect.

Despite the positive gains in strength and power, there are many, well documented negative side effects to taking steroids (which is banned by all sporting governing bodies). They include: damage to the cardiovascular system, increased risk of coronary heart disease, alterations to normal hormonal balance, infertility, abnormal liver function and interference with the immune system.

A substance called Androstenedione (known as "Andro") claims to offer similar androgenic effects to anabolic steroids and can still be bought over-the-counter without prescription in some countries at the time of writing. It's often marketed as "one step away" from testosterone without the negative side effects of steroids. Some sporting governing bodies such as the IOC and the Men's Tennis Association ban its use because it may endanger health. Andro is classed as a food and so bypasses the Food & Drug Administrations rules. It can even be bought in the form of chewing gum.

There is little scientific evidence to support the use of Andro in sport. Studies comparing a supplemented group who undergo a weight training program versus a placebo group show that gains in strength and lean mass are the same. Unfortunately, HDL (good cholesterol) is often reduced in those taking Andro potentially increasing their risk of coronary heart disease. Serum estrogen (female sex hormone) has also shown to increase with Andro supplementation, which can lead to gynecomastia (breast development). One of the appeals to athletes is that there is no specific test for Andro. However, because commercially produced Andro is not always pure and may contain testosterone, there is a real risk athletes may test positive for steroid use anyway.

Other common substances often used by athletes, known as prohormones, include **Clenbuterol** and **DHEA**. Clenbuterol, a drug often prescribed in Europe for obstructive pulmonary disease, is banned for sporting use in the UK. Studies show that, like anabolic steroids, it can increase lean muscle mass but also has potentially serious side effects. DHEA has been labelled in the media as "the mother of all hormones" and receives much hype in the anti-aging community. Athletes believe that it can also provide androgenic effects similar to testosterone but there is little research to back up this theory. Although DHEA is available without prescription at this time, it is banned by many Sporting Committees because of the long term health concerns that have yet to be researched.

Caffeine

In athletes, caffeine is a controlled / restricted drug. Found naturally in coffee beans, tea leaves, cocoa beans and carbonated drinks it stimulates the central nervous system within 30 to 120 minutes of consumption. While not all studies support the beneficial affects of caffeine, ingesting an amount of caffeine equivalent to 2.5 cups of regular, percolated coffee (330 mg) an hour before exercising has been shown to increase endurance performance on a number of occasions.

As with other stimulants (such as amphetamines) the effect is thought to come from a greater tolerance to fatigue rather than an increase in cardiopulmonary variables. It may also help the body to use fat as a source of fuel thus sparing carbohydrate reserves.

Individuals who do not normally drink coffee or try to avoid dietary intake of caffeine may experience undesirable side effects if they take it in supplemental form. It can produce restlessness, headaches, insomnia, irritability and muscle twitching. Caffeine also acts as a potent diuretic, which may cause pre-exercise fluid loss, negatively affecting performance in a hot climate.

Supplemental caffeine is taken in tablet form rather than drinking coffee. Lower doses (3-6mg per kg body mass) have shown the same beneficial effects as higher doses with a decreased risk of dehydration. Although caffeine is one of the few legal substances with scientific evidence to back it up, there is no reason for athletes to feel they should take it prior to a game or event and should be extra cautious if they maintain a low-caffeine diet.

Creatine

Creatine is an organic compound found in foods such as meat, poultry and fish. The body can only create a limited amount of creatine on its own so dietary intake becomes important. Nearly all creatine taken in from food becomes incorporated into the body's muscles. A large amount combines with phosphate to form a substance called phosphocreatine and it's this substance that powers muscles during very intense, short-term activity - such as sprints in sport.

The body has only a limited store of phosophcreatine, enough to power just 5 to 8 seconds of all-out sprinting. Once this has been used, the body must rely on other metabolic systems to produce energy and during intense activity this quickly leads to a build up of blood lactate and subsequent fatigue.

Taking creatine in supplemental form significantly increases intramuscular stores of creatine. The rationale behind taking it as a performance aid is that it will allow athletes to perform a higher level of explosive activity for longer. It should also delay the onset of blood lactate accumulation.

Creatine is probably the most well-researched supplement on the market. Numerous studies **do confirm that it improves performance in high intensity exercise**, particularly in repeated bouts of effort. It has been used successfully by sprinters, football players, weight lifters and is now becoming more commonplace in other sports. Creatine is most often taken in a loading format. Athletes take 20 to 30 grams of creatine a day (usually in the form of powder added to liquid) for 5 to 7 days. A maintenance phase then follows during which athletes take as little as 2 to 5 grams daily.

Maintaining high levels of creatine through supplementation has lead to reports of some minor negative side effects including abdominal cramping, muscle cramping and diarrhoea. The main concern regards the long-term effect that regular creatine consumption may have on the liver and kidneys. As this time it is still too early to say.

Glutamine

Glutamine is a non-essential amino acid that serves many regulatory functions in the body. It's use by athletes falls under two categories - to prevent muscle breakdown and to protect the immune system. Some studies have shown that supplemental glutamine can help to prevent protein breakdown (beneficial for anyone following a strength training program) but the research is by no means conclusive.

In the body, glutamine is an important fuel for some cells of the immune system. In situations of stress, such as clinical trauma, starvation, or prolonged, strenuous exercise, the concentration of glutamine in blood is decreased, often substantially. In endurance athletes (such as marathon runners) this decrease occurs alongside temporary immunodepression. Heavy training schedules have also been linked to increase the occurrence of minor infections, particularly in the upper respiratory tract. Several clinical studies have found that oral glutamine can decrease the incidence of illness and infection in endurance athletes or athletes undergoing heavy training.

Glutamine is a classed as a nutritional supplement and is considered completely legal and ethical by all sporting bodies (as are all amino acid supplements). It can be found in most health food stores in the form of gels or tablets and is often an ingredient in many commercial protein powders. Due to the lack of research there are no guidelines for doses. Bodybuilders take up to 15mg per day but a more sensible recommendation for athletes trying glutamine is to start at 2-6mg per day and gauge reaction.

While some early research appears promising (particularly in relation to immune function) there is not enough evidence to suggest healthy individuals, even those involved in intense training, should take glutamine as a matter of course.

Growth Hormones

Doctors and phramacologists are predicting that human growth hormone will overtake anabolic steroids as the most widely used training and performance aid. Human growth hormone (hGH) stimulates bone and cartilage growth, enhances fat metabolism and inhibits amino acid (and therefore muscle) breakdown. With age, there is a natural reduction in lean muscle mass and an increase in fat mass. Genetically engineered hGH can reverse these negative effects and is often used to treat children who suffer from kidney failure and the inability to thrive.

The innumerable advertisements off and online are for a supplemental form of hGH (as opposed to the injected, genetically engineered form). To date there is no proven replacement for injectable hGH and very few well-controlled studies have examined how hGH supplements (such as an oral spray) affect exercise performance. Genetically engineered hGH is only available to healthy individuals on the black market and is often in an adulterated form. Child athletes who take hGH in the belief it will give them a competitive edge have an increased risk of gigantism, while adults can develop acromegalic syndrome and insulin resistance leading to type II diabetes.

For obvious reason, genetically engineered hGH is banned in sport and as yet there is no evidence to suggest supplemental hGH is effective and safe long term.

Sodium Bicarbonate

During all-out exercise lasting between 30 and 60 seconds (such as several sprints up and down a soccer / rugby field), dramatic alterations take place in the chemical balance of the body's fluids. This occurs because the body must use anaerobic energy pathways to supply muscles with energy - and a by-product of this process is a sharp increase in blood lactate. To defend against an increase in acidity, the body has a buffering system, part of which is bicarbonate (which is highly alkaline). In theory, if high levels of bicarbonate can be maintained during exercise it will help to offset the increase in acidity and reduce the limiting affects of blood lactat accumulation.

Compared to many popular, commercial supplements, sodium bicarbonate is fairly well researched. While studies have produced conflicting results, many trials have found that taking a bicarbonate solution prior to exercise can indeed increase anaerobic exercise performance. One study into 800-m race performance showed that taking a sodium bicarbonate solution prior to the start decreased race time by a significant 2.9 seconds compared to a placebo. Other studies, while less dramatic, support the benefits of sodium bicarbonate and many studies show no effects at all. There seems to be a wide variation between individuals, which may be related to their level of fitness.

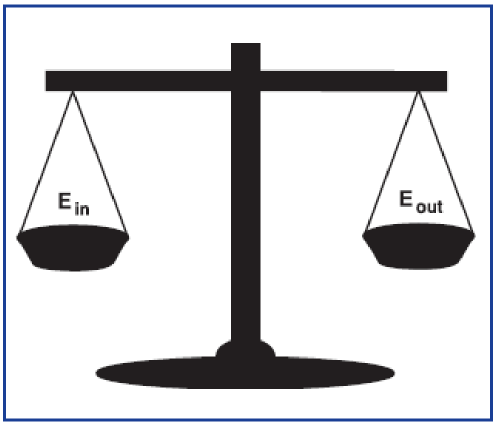
The type of exercise also seems to play a major role. Continuous, all-out activities like sprint swimming or cycling are easier to measure than intermittent sports such as soccer or rugby. However, recent studies have shown that sodium bicarbonate can improve the performance in a multi-sprint test and intermittent sports.

Currently, taking sodium bicarbonate (considered a food not a drug) is not banned by any sporting governing bodies. A typical dose, 1 to 2 hours prior to exercise is 300 mg per kg of bodyweight. There are some reported side effects, which include stomach cramps, nausea and diarrhoea. These negative effects would minimize and positive benefits gained from taking sodium bicarbonate so it's important athletes do not try the supplement for the first time on the day of an important competitive event.

There are many more supplements and performance enhancing aids on the market and this list is by no means exhaustive. Before you add to the industry's multi million pound turnover, and before you potentially put your health at risk, be sure to spend time researching any supplement you are unfamiliar with.

Important Concepts Related to Energy

Intake and Energy Output- The energy balance equation.



The energy balance equation includes terms that refer to energy intake and energy output. For some individuals, the equation must also include terms for the energy required for growth and for energy that is stored.

Energy In (Ein): Energy is available from the foods we eat; this energy input is represented by Energy In, or Ein. Although foods contain a number of nutrients, energy is provided by proteins, carbohydrates, and fats. Vitamins and minerals in foods, although essential for normal metabolic functions, do not contribute calories to our diets. Each gram of protein or carbohydrate we consume contributes 4 calories of energy. In contrast, fat provides 9 calories per gram. Interestingly, alcohol has 7 calories per gram. Alcohol-containing products have calories and few nutrients; their consumption may upset both energy balance and nutritional status.

A food calorie is the equivalent of 1,000 calories, or 1 kilocalorie. The food calorie is sometimes represented by "Calorie," with a capital C. In keeping with the usual format in nutrition studies, this curriculum supplement uses "calorie" to mean the food calorie. A food calorie (1 kilocalorie) is defined as the amount of energy required to raise the temperature of a liter of water 1ºC at sea level.

The Food Guide Pyramid, which is based on the foods Australians typically eat and the nutrients in these foods, is designed to help people choose what and how much to eat from each food group to get needed nutrients, without excessive intake of calories, saturated fat, cholesterol, total fat, and sugar. The Food Guide Pyramid shows a range of servings for each major food group. This range is based on the caloric needs of the individual. Almost everyone should have at least the lowest number of servings in the ranges.

The Food Guide Pyramid is easily adaptable to ethnic and cultural preferences by including specific types of fruits, vegetables, and grain products. It is also adaptable to vegetarian diets by allowing for meat substitutes, such as beans, soy-based meat substitutes, and eggs (although some vegetarians (vegans) do not eat eggs).

A balanced diet provides 45 to 65 percent of total daily calories as carbohydrate, most of which should be from complex carbohydrates, such as starches; 10 to 35 percent of daily calories from protein; and no more than 30 percent of calories from fat.52 The needs of athletes and other more physically active people may differ in both energy and nutrient intakes, depending on the intensity and duration of their physical activities. People with special needs due to illness or medications should consult a physician and a registered dietitian to create an appropriate plan to meet nutritional demands.

Energy Out (Eout): Total energy expenditure is represented by Energy Out, or Eout. Eout has three major components, which, added together, provide an accurate measure of an individual's daily caloric requirement: the **basal metabolic rate** (BMR), the energy used for physical activity, and the **thermic effect of food**.

The BMR represents the energy used to carry out the basic metabolic needs of the body.

Energy must be provided for maintaining a heartbeat, breathing, regulating body temperature, and carrying out other activities that we take for granted. Most of our daily energy expenditure, about 60 to 70 percent, is represented by our BMR. A person's actual

BMR changes over time. This depends on a number of factors, including several that distinguish groups of people:

Age—Younger people have higher-than average BMRs. As children grow, their body composition (percent body fat and mass) changes. As they continue to age, BMR decreases as the percent muscle mass decreases.

Growth—Children and pregnant women have higher-than-average BMRs.

Height—Tall, thin people have higher than- average BMRs.

Body Composition—People with higher than- average or increased muscle mass have higher-than-average BMR's.

Other factors cause variation within individuals:

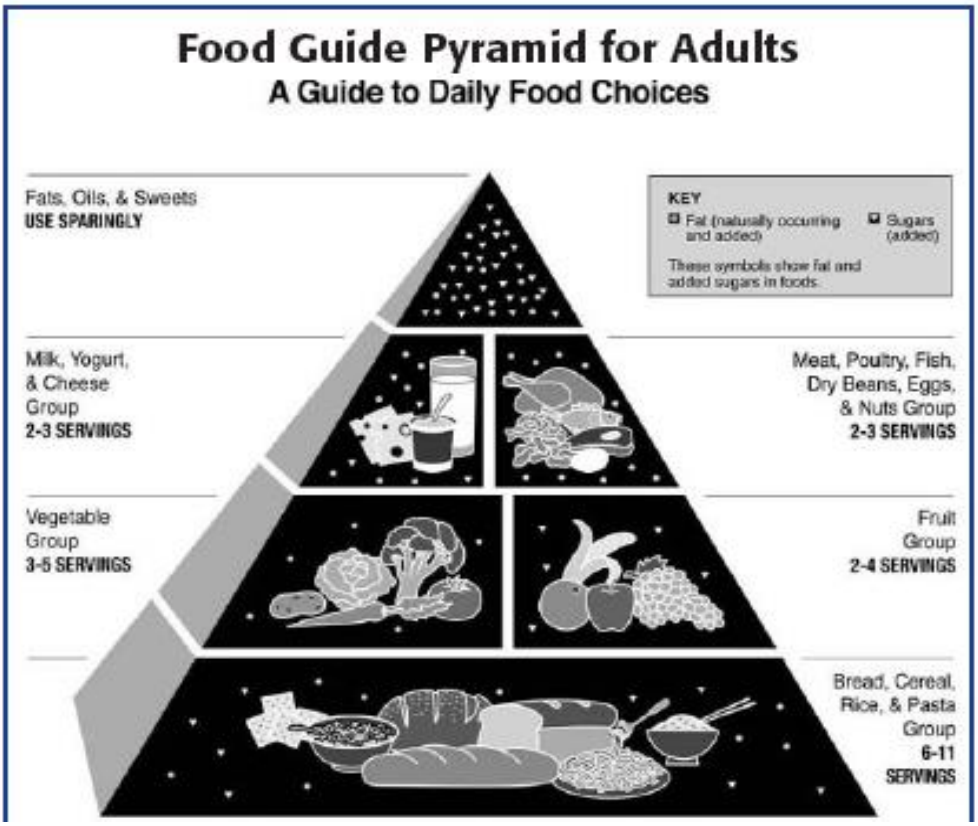
Fever—Fever increases your BMR.

Stress—Physical stress, such as recovering from an illness, increases your BMR; mental or emotional stress may lead to lethargy or depression and decrease your BMR.

Inside/Outside Temperature—Both heat and cold raise your BMR.

Fasting—Fasting lowers your BMR.

Physical activity amounts to about 20 to 30 percent of the body's total energy output. Energy expended during physical activity varies with the level and duration of the activity. It is also affected by the age, gender, height, and weight of the individual performing the activity. Examples of the calories used by different individuals for walking and running are presented in the table below. The values in the table include the calories for BMR.



<u>Food Fuels used for Exercise</u>

Certificate III in Fitness (SIS30310) covered the basics of; carbohydrates, fats (lipids) and proteins.

Here we will mainly look at the preferred fuel for different types of exercise, so we have an idea as to what to suggest to our clients. As a personal trainer, with no additional nutritional or dietary qualifications, we are only able to advise our clients of good nutritional habits. Legally, we are unable to design a full nutritional plan, complete with macronutrients and micronutrients planned for the individual.

If a client has eating habits that are beyond our scope of knowledge, or they really have no idea of correct eating habits/nutrition, then it may be best to refer them to a professional dietician or nutritionist.

Duration and intensity are the main dominant factors influencing the types of fuels that the body will utilize for energy. Generally, the higher the level of intensity of activity, the more carbohydrate is used as an energy source. The longer the duration of exercise, the body relies more on fat reserves and some protein (It converts protein to glucose by the liver through a process known as gluconogenesis). The breakdown of food such as glucose produces adenosine triphosphate (ATP) which is used for energy production.

When exercising at a high intensity, the rate at which fat is oxidized and mobilized is limited. CHO is the preferred fuel for exercising muscle, as it is quickly mobilized, and the glucose used to produce ATP. The CHO comes from liver and muscle glycogen, as well as blood glucose. A typical 70-75kg athlete stores 100gm glycogen in the liver, and 500gm in the muscle. Considering the same athlete may store 8-15kg of body fat, it is easy to see that CHO, not fat, may be limiting. This therefore, highlights the importance of regularly consuming CHO rich foods. This is a reason why the “NO CARB diet” is generally not a good idea for someone who is also training.

CHO requirements required by clients

- 4-5gm/kg body weight/day – walking, moderate exercise (3-5hrs a week)
- 5-7gm/kg body weight/day – moderate intensity exercise (1 hr/day). Serious amateur athlete
- 7-10gm/kg body weight/day – 20+ hours/wk, professional athlete, maximizes glycogen recovery, used for CHO loading.

The following table provides a list of carbohydrate rich foods, each serving provides about 50 gms of carbohydrate.

CEREALS

Wheat biscuit cereal eg. weetbix	60gm/ 5 biscuits
Light breakfast cereal,eg. cornflakes	60gm/2cups
Muesli flakes	60gm/1-1.5cups
Toasted muesli	90gm/1 cup
Porridge with milk	350gm/1.3 cups
Porridge with water	550gm/2.5cups
Rolled oats	90gm/1cup
Muesli bar	2.5
Rice cakes	6
Rice, boiled	180gm/1 cup
Pasta or noodles cooked	200gm/1.3 cups
Canned spaghetti	440gm

Bread	110gm/4 slices white/3 slices wholemeal
English muffin	150gm/2.5
crumpet	2.5
pancakes	150gm/2 medium
croissant	140gm/1.5 large/2 medium
FRUIT	
bananas	2 medium-large
Mangoes, pears, grapefruit	2-3
Oranges, apples	3-4
Nectarines, apricots	12
grapes	350gm/2 cups
melon	1000gm/6 cups
strawberries	1800gm/12 cups
Sultanas and raisins	70gm
Dried apricots	115gm/22 pieces
VEGETABLES AND LEGUMES	
potatoes	350gm/1 large
Sweet potato	350gm/2.5cups
corn	300gm/2 cobs
Green beans	1800gm/14 cups
Baked beans	440gm
lentils	400gm/2 cups
Pumpkin and peas	700gm/5 cups
DAIRY PRODUCTS	
milk	1 litre

Flavoured milk	560ml
Diet yoghurt/natural yoghurt	800gm/4 tubs
icecream	250gm/2 tubs
SUGARS/CONFECTIONARY	
sugar	5gm
jam	3tbs
honey	3tbs
chocolate	80gm
Mars bar and other bars	1.5bars
Jubes, jelly babies	60gm
MIXED DISHES	
pizza	200gm
hamburgers	1.3 bigmacs
lasagna	400gm serve
Fried rice	200gm/1.3 cups
SPORTS DRINKS	
Fruit juice unsweetened	600ml
cordial	500ml
Soft drinks	500ml
Fruit smoothie	250-300ml
Sports bar	1-1.5bars
Sports gels	1.5 sachets
Liquid meal supplement	250-300ml
Sports drink eg. gatorade	700ml

Protein requirements required by clients

- sedentary adult population – 0.8-1.0gm/kg bodyweight
- recreational athletes- 1.0-1.2gm/kg bodyweight
- endurance athletes- 1.2-1.6gm/kg bodyweight
- football/power sports- 1.4-1.7gm/kg bodyweight
- resistance athletes- 1.5-1.7gm/kg bodyweight (early training), 1.0-1.2gm/kg bodyweight (steady state)

❖ female athletes- 15% less than male athletes (due to females being able to spare glycogen more effectively when exercising)
❖ adolescent athletes (growth spurt)- 2g/kg

The "thermic effect of food" refers to the energy required to digest food. This term indicates what is usually obvious: we must expend some energy to make materials available in the body that will be used for the production of much larger amounts of energy. The thermic effect of food can be estimated as approximately 10 percent of total calories consumed.

The energy balance equation. The equation for energy balance is **Ein** = **Eout**. This means that caloric intake equals caloric output. It is the desirable condition for adults who are at a healthy weight. One way to understand the concept of energy balance is to use a two-pan balance analogy. On one pan of the balance are weights representing **Ein** (foods, which contain carbohydrate, protein, fat, and alcohol). On the other pan are weights representing energy expenditures (**Eout**) as metabolic activities and physical activities (and the thermic effect of food). If adults consume more calories than are used for metabolic and physical activities, then **Ein > Eout**, and the extra energy is stored as body fat. They are in a state of positive energy balance. The pan scale would tip to the **Ein** side.

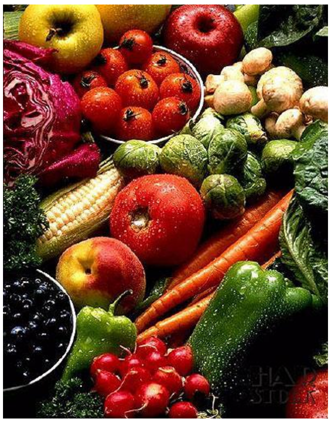
If adults lose weight (as, for example, with dieting), they are in a state of negative energy balance. In this case, **Ein < Eout**, and the pan scale would tip to the **Eout** side.

Nutrition for your clients

As a Fitness Trainer, you are a role model for your clients, and the general public!

It is important that your clients don't see you down at Mc'Donalds or Pizza Hut, as to them, you are the epitome of HEALTH AND FITNESS! This is a major thing to remember, as during consultations with clients, they may ask what your eating habits are like. If you are to tell a client that they can't eat pizza, they can't then see you frequenting your local takeaway shop, ordering a large pizza with all the toppings!

Whatever eating plan you decide on for yourself is irrelevant to your clients, and so if they do ask what you eat, ask them what they think you eat? This may give you their position on healthy eating. Most people who have an issue with their diets, will have some idea on proper nutrition but may have an emotional attachment to food, or other reason to eat incorrectly.



There is no “perfect” eating plan, but it is important that the choices you or your client makes, is the one that suits their level of activity the most appropriately. Obviously a bodybuilders diet will differ greatly from a marathon runners or the average gym goer!

- For the everyday person, it is not normal to count calories or food choices rigidly, weigh foods, or eat the same foods, at the same time every single day

- It is important and natural to make sure that your diet contains foods from all food groups, that you eat regularly/consistently, small meals with foods as unprocessed as possible.

- Food is one of the greatest pleasures in life! People associate pleasurable experiences with food and eating. For this reason, it is important to eat certain types of foods for no reason and just because they taste good! But alas, people must learn the principles of moderation. Most foods are ok in moderation, but a lot of your clients will be coming to you as they have no concept of moderation and hence overweight.

Measuring the food intake of your clients

A valuable tool to use in achieving an overall picture of a persons general health, is to create food frequency questionnaires, to get your clients to keep a food diary, or a method called 24 hr recall (recall all foods and beverages consumed over a period of 24 hours). It is vital to understand what the eating habits of your client are like, as 85% of weight loss is bad nutrition. A plateau is what occurs when your results slow down and you become stuck at a certain point in your progress. A change in nutrition may be what your client needs to alter this and start getting results again.

Remember: CLIENTS FLAW THE TRUTH. People tend to alter or minimise their food intake, as they don’t want to disappoint you, or to get in "trouble".

➢ Clients may be asked to bring their diaries along to every training session, an idea is to have stars and give their page a star when their eating has been good.

➢ Little facts, or "did you know" statements are a great thing to have to put in their diaries. For example, things such as

"Did you know?? A bite out of a white potato turns to sugar in your system quicker than a sugar cube, because of how starchy the potato is!"

The *SMARTIE* principle

A good tool for your client, they can put this into action to assist with their healthy eating lifestyle. A good idea to write in the front of their eating diary!!

S something you can stick to for the rest of your life

M moderation

A achievable

R realistic

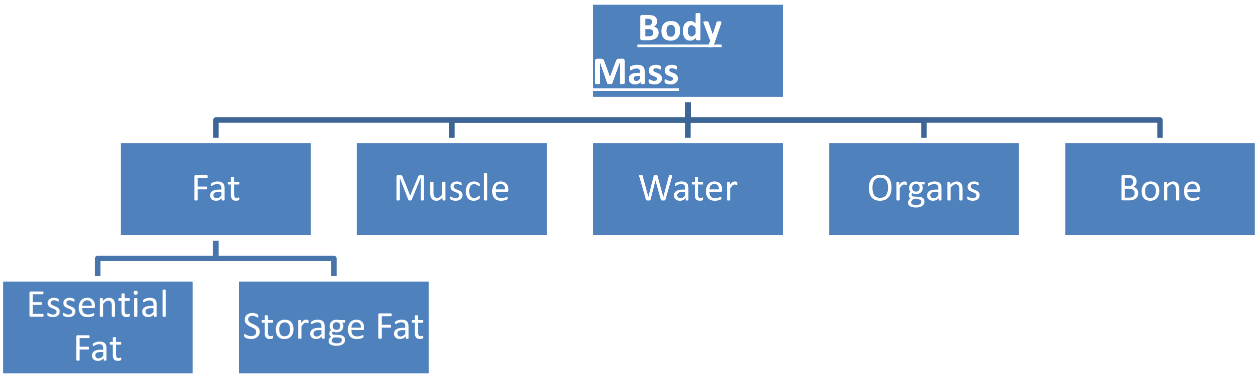
T time efficient

I interesting

E enjoyable

GLOBAL FITNESS INSTITUTE

Anthropometrics



Anthropometrics provides information on body muscle and fat reserves.

Understanding the relationship between energy requirements and desirable body weights should take into account not only the total weight, but also the composition of the weight. This is important because muscle mass and body fat make different demands on daily energy requirements and can have different long-term health consequences.

Considerable variation among individuals in resting metabolic rates is due in part to variation in body composition or, more specifically, to the ratio of muscle to fat tissue in the body. Muscle tissue is more effective than fat at burning calories, expending more than three times as much energy under resting conditions.

Therefore, the ratio of muscle to fat tissue is an important determinant of the total daily energy requirement.

Significant changes in the ratio of muscle tissue to fat tissue occur during adolescence. In females, body fat increases from a mean of 17 percent of body weight to 25 percent of body weight during adolescence. Males, in contrast, experience a decline in body fat, from a mean of 18 percent of body weight to 11 percent of body weight during this period.

Body composition is a much better predictor of one’s level of health and risk of disease than is weight. Muscle mass or a measure of body fat is used to assess body composition. Professionals estimate body-fat content using tools and techniques such as circumference measurements (of abdomen, hips); a height and hip-girth chart; the caliper measurement method; and the water-weighing measurement method.

Hydrostatic weighing

“under-water weighing” or the “dunk tank”

The client is suspended in a harness attached to a set of scales, and lowered into a tank of water. This can be a very accurate method, although it is probably one of the most expensive and time consuming.

Bioelectrical Impedance (body fat scales)

This type of testing is conducted using a set of body-fat % scales, similar to those advertised on television and in magazines. The theory behind this is based on the fact that an electrical signal is sent through the body, and measures the difference in electrical conductivity between lean tissue like muscle and fat tissue. This type of testing can be very inaccurate as a lot of factors alter the outcome, for example, raised HR, excessive or insufficient water consumption.

Skinfold Measurements

Skin fold measurements are one of the most common methods for measuring body-fat. Skin-fold calipers are used to measure the thickness of body fat, by having the tester firmly pull the fat away from the muscle, pinching the skin with the calipers. A skin fold will therefore be comprised of 2 layers of skin plus the fat tissue. This test will require three to seven different measurements taken in different areas of the body to be the most accurate.

Measuring body fat by using tape or circumference measurements

Measuring with a tape is an easy yet effective way to measure your client’s results. Using the tape parallels the question “how do your clothes fit?”. These measurements are taken with the client’s body in a relaxed position, from numerous areas, example, chest, upper arm, waist, hips and thigh.

Body Mass Index (BMI).

BMI expresses the relationship between an individual’s weight in kilograms (or pounds divided by 2.2) and height in meters (or inches divided by 39.4).

For adults, the formula is **BMI = weight/height**

For children over two years old and adolescents, the formula is

BMI = (weight in kg/height in metres^2)

BMI is a helpful indicator of obesity and underweight and has two primary uses. It can be used to screen and monitor a population for risks to health or for nutritional disorders. Alternatively, BMI, along with other necessary information, can be used to assess risks to health for an individual.

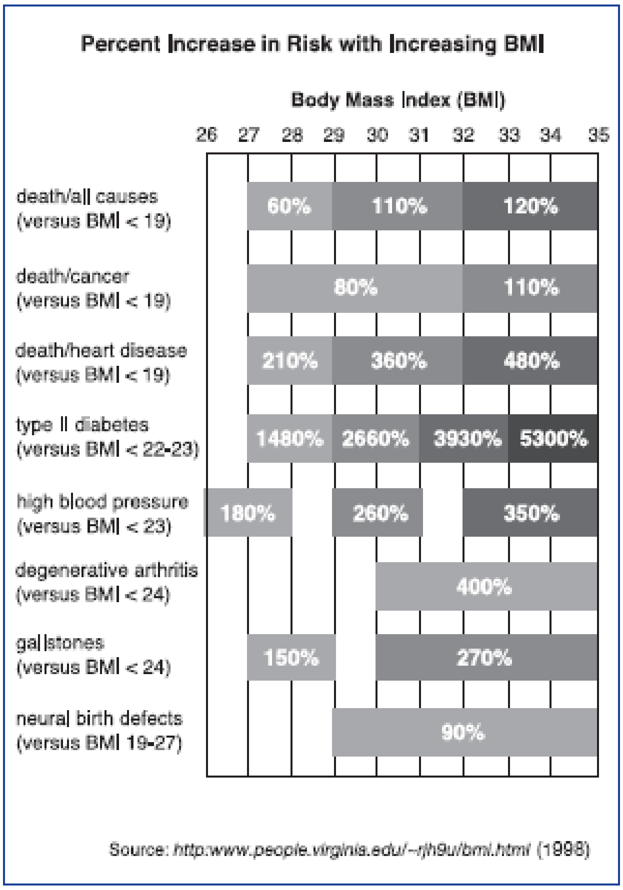
Scientists and health officials have arrived at the following classifications for *adults*, based on the effect that body weight has on disease and death:

BMI less than 18.5 underweight

BMI between 18.5 and 24.9 healthy range

BMI between 25 and 29.9 overweight

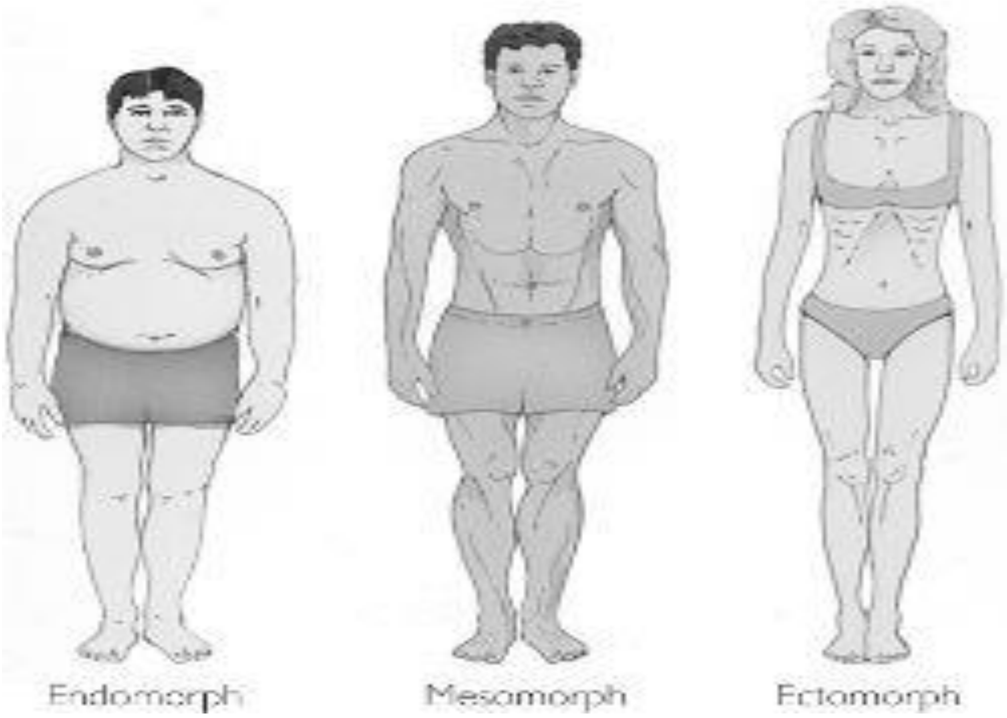
BMI equal to or over 30.0 obese



Somatotyping

Body structure or somatotype refers to the distribution or arrangement of body parts such as the skeleton and muscle-fat distribution. There are 3 main classifications; Endomorph, Ectomorph and Mesomorph. Although a client can change their body shape by altering the amount of fat and muscular tissue they carry, they can generally not change between somatotypes.

- Endomorph: characterised by a soft roundness throughout the body, this type of person usually exhibits a large digestive viscera and accumulations of fat with a large trunk and thighs and tapering extremities.
- Ectomorph: characterised by linearity and delicateness, a large surface area, small thin muscles and little subcutaneous fat.
- Mesomorph: characterised by muscular body shape, with a heavy hard physique of rectangular outline. This shape is usually placed between ectomorph and endomorph.



Fad diets & myths

Many different diets claim a “quick fix” for excess weight, which are just that, A QUICK FIX!

These diets are often too low in calories and vital nutrients, which make them unsuitable for optimum health. The result of these fad diets is often a loss of water and muscle bulk leaving much more fatty mass than before the diet was started. This loss of muscle tissue causes a slower metabolic rate, as lean muscle mass has a higher metabolic rate than fatty tissue. This means when a person does start eating as they did previously, their metabolism is lower and will end up putting on more weight than they lost (yo-yo dieting). This is backed up by science, in that the enzymes responsible for the storing of fat in the body’ cells, is increased during a diet.

Weight loss is generally encouraged at a slow, steady pace, of about 0.5kg per week, to ensure that muscle is not lost and the changes made to the person’s lifestyle are able to be made long term. Many of the fads and trends that are making companies millions of dollars a year include no exercise, which is vital for the short term and long term health of the client. Exercise also limits the risk of life threatening diseases such as heart disease. Exercise improves energy levels, weight management, blood cholesterol levels and the strength of bones.

Low carbohydrate diets are very popular, although many of these diets involve severe restriction of important nutrients such as calcium, fibre and folate. We must also consider the alternative foods that are eaten instead, as usually they will contain high levels of saturated fats which is associated with the onset of cancer, type 2 diabetes and heart disease.

→ basically: cut down on fat, simple sugars, volume and processed foods!!

- ❖ Grelin- a hormone in your stomach that sends a message to your brain to eat.
- ❖ Leptin- from fat cells, tells the body to stop eating, that it’s full.

▪ corn syrup doesn’t register leptin, and so the body will never feel full. Be aware of this added to fast foods.

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Australian dietary guidelines

- For adults, children and adolescents, the following guidelines have been developed and published for all Australians;
  - Prevent excess weight gain
  - Enjoy a wide variety of nutritious foods
  - Eat plenty of legumes, vegetables and fruits
  - Eat plenty of cereals preferably wholegrain
  - Include lean meats, fish, poultry and/or alternatives (creatine and protein source)
  - Include milk, yoghurt, cheese and/or alternatives
  - Drink plenty of water
  - Limit saturated fats and moderate total fat intake
  - Choose foods low in salt (2gm salt a day)
  - Limit your alcohol intake if you choose to drink
  - Consume only moderate amounts of sugar and foods containing added sugars
  - Care for your food, prepare and store it safely
  - Encourage and support breast feeding

<u>Summary of food label terms:</u>

On the food label	What does it mean?
Ingredients	Listed in ascending order, the main ingredients will be given as a percentage
Made by	The address of the manufacturer, or the local distributor if made overseas
Reduced fat	The fat amount has been reduced by at least 25%
Low fat	Very little fat present, less than 3% in most foods
X% fat free	Should be at least 97% fat free, therefore a low fat food
Low cholesterol	A food may be low in cholesterol, but check the saturated fat content
Fibre	High fibre food contains at least 3gm per serve
Low salt	Less than 120mg salt per 100g of food

Salt reduced	The sodium amount must have been reduced by at least 25%
Light, lite	Will be light in a certain ingredient, will normally say what ingredient
Low joule	“low calorie”, virtually kilojoule free
No added sugar	No added sugars, sucrose, glucose, dextrose, maltose, fructose
Natural	Could mean anything, most manufacturers use the term responsibly

Maximizing energy stores

The fuel the body uses depends on the intensity and duration of the exercise, as well as the fitness and nutritional level of the athlete.

- Carbohydrates and fat are the two main sources of energy used in athletic activity, protein only becomes significant once the carbohydrate stores have been depleted.
- In high intensity exercise of short duration (1-2mins) almost all energy is supplied from glycogen stored in skeletal muscle. Carbohydrate provides the energy during anaerobic exercise, also producing lactic acid as a by product. Fat is not a significant fuel source during high intensity activity, as it breaks down too slow to meet an athletes needs.
- During low intensity exercise, fat is used as the primary fuel source. The longer the time spent exercising the greater the contribution as fat as a fuel.
- The ideal training diet for an athlete, in particular endurance athletes, is 60-70% carbohydrates as energy and <30% fat as energy, which is a great deal different to the average Western diet.
- An athlete undertaking strenuous training sessions exceeding 90 mins, should have an intake of carbohydrates of between 8-10g/kg of bodyweight, to replenish glycogen stores.
- The protein requirements of an endurance athlete is approximately 1.2-1.7g/kg bodyweight, with higher levels needed for those undertaking strenuous strength training. Most athletes protein requirements are usually met if 12-15% of total energy needs are provided by protein.

Nutritional assessment

The interaction between illness and nutritional status is complex. The field of clinical nutrition has specialized reviews, physical examinations and laboratory approaches that are all important for completing a thorough nutritional assessment. These tools for analysis are directed toward identifying underlying mechanisms that may put a client at risk of either a nutritional excess or a deficiency. The following table lists the individuals with characteristics that pose a risk of having nutritional deficiencies. These patients must be assessed by an allied health professional before being given an exercise program.

THE HIGH RISK PATIENT

- Underweight: (weight for height < 80% of standard) and/or recent loss of 10% or more of usual body weight
- Poor intake: anorexia, food avoidance (psychiatric condition), NIL by mouth status for more than 5 days
- Protracted nutrient losses: malabsorption, enteric fistulae, draining abscesses or wounds, renal dialysis
- Hypermetabolic state: sepsis, protracted fever, extensive trauma or burns
- Chronic use of alcohol or drugs with anti-nutrient or catabolic properties: steroids, antimetabolites, immunosuppressants, anti-tumor agents
- Impoverishment: isolation, advanced age

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HEALTHY NUTRITION PLAN

Breakfast-

1 cup wholegrain cereal with ¾ cup low fat milk

1 piece fresh fruit

1 slice wholegrain or whole wheat toast with 2 tsp jam or honey

1 glass 100% fruit juice

Snack-

1 piece fresh fruit or

savory crackers with low fat dip/cheese & tomato

Lunch-

2 whole grain sandwiches/rolls/pita bread each filled with lean meat/low fat cheese/ skinless chicken/turkey/tuna/salmon with plenty of salad

1 serve fresh fruit salad or 1 piece fresh fruit

water/ low joule soft drink or mineral water

Pre-training snack-

1 slice raisin bread or English muffin or

1 tub low fat yoghurt or

1 piece fruit

water

Post training-

1 banana

protein shake

water

Dinner-

180gm lean meat or skinless poultry or 200gm fish (steamed without added fats, oils)

1 cup steamed brown rice, or 1 large potato, including at least 2 cups green leafy vegies

water