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Cambridge National Level 1 /2 in Sport Science

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Nutritional individual requirements

5 portions of fruit or vegetables a day

An apple, grapes, broccoli, frozen peas, cabbage

2 portions oily fish a week

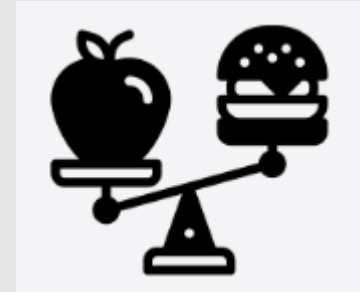
Sardines, salmon, tuna

Starchy carbohydrates one third of daily intake

Potatoes, bread, rice, porridge

Treats in very small amounts

Crisps , chocolates, biscuits



Calories

Unit of energy in food

Balanced energy

Amount of energy eaten equals the amount of energy used

Positive energy balance

Amount of energy eaten is greater than the amount of energy used (**weight gain**)

Negative energy balance

Amount of energy eaten is less than the amount of energy used (**weight loss**)

Year 10

Nutritional individual requirements

Average Male calories	2500 kcal per day
Average female calories	2000kcal per day
Factors affecting calorie intake	Age – decrease in take after 25 Height – taller people need more calories Gender – men usually need more Energy use – individual who exercise more need more calories
BMR – basal metabolic rate	How fast energy is used

Year 10

Nutritional individual requirements – balanced diet

A balanced nutritional plan should include foods from all food groups.

Fruit and vegetables	5 portions a day, provide vitamins and minerals as well as fibre
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Carbohydrate – starchy foods	One third of what people eat daily, good source of energy, fibre, calcium, iron and vitamins. They take longer to digest so feel full for longer
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Dairy products	Good source of protein and vitamins. They contain calcium. Some can contain high levels of fat
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Protein	Good source of protein, vitamins, minerals and fibre
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Fat	Essential in all diets
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Nutritional individual requirements – balanced diet

A balanced nutritional plan should consider the following.

High fibre cereals and wholegrains food prevent constipation and help reduce cholesterol (fatty deposits)

Milk , cheese and eggs provide calcium (a mineral which are good for bone nerve and muscle functions)

Iron –rich food such a liver help the immune system and assists in red blood cell production

Vitamin A for skin and growth are found in diary products

Oily fish, eggs and butter provide vitamin D to help bones as cannot absorb calcium without it

Vitamin c is found in citrus fruit, broccoli and liver and aids the immune system and skin elasticity and blood vessel functions

Vitamin B are found in wholegrains, nuts, eggs and fish to assist with functions in the body

Nutrients should be eaten form a variety of sources

The diet should suit the needs and tastes of the individual

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The role of the nutrients in sports and their sources

Carbohydrates	Main source of energy (glucose) Performer requiring levels of energy very important.	Sugars, fruit, vegetables –simple carbohydrates Bread, rice and potatoes – starchy carbohydrates
Fats	Slower supply of energy and transport some vitamins. Provide more than double energy than carbohydrates. Low intensity exercise jogging and walking	Butter, lard and vegetables oils – bad fats Vegetables, nuts, olive oil salmon – good fats
Proteins	Used for growth of body tissues and repairs muscle damage	Meat , cheese , eggs fish and diary – animal products Pulses, cereals and nuts – non animal products
Fibre	Known as roughage helps with digestion and preventing constipation	Fruits, vegetables, cereals and wholemeal bread

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The role of the nutrients in sports and their sources

Water	Makes up more than half the human body and is essential to keep hydrated to remove waste products and regulates body temperature. The amount of water need varies depending on, environment, temperature and exercise	Water, tea, coffee , juices
Vitamins	Maintain efficient body systems and general health. Organic substance e.g. vitamin D for the immune system	Vegetables and fruits
Minerals	Maintain efficient body systems and general health. Inorganic substances e.g. calcium to strengthen bones	Vegetables and fruits

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Before during and after endurance/aerobic activity

Before	During	After
<p>Hydration Drink water for normal functions and what body will use during exercise. Drinking diluted fruit juice for vitamin C.</p>	<p>Maintain hydration by energy gels and drinks especially for long endurance events</p>	<p>Replenish fluids such as water and after workout drinks to rehydrate the body</p>
<p>Carbohydrate loading Removing carbohydrate out of the body for 3/4 days and then increasing it for last couple of days before the event to have more energy.</p>	<p>Keep drinking water to stay hydrated especially on hot days and when working hard</p>	<p>Replenish carbohydrates and protein to repair muscles in snacks and post workout meals</p>
<p>Pre-exercise meal Avoid spicy and fatty food. Eat plenty of carbs and moderate amount of protein</p>	<p>Maintain carbohydrate levels with sports bars, energy chews and energy drinks</p>	<p>Need to replace muscle glycogen, replace fluid and salts lost in sweat, and repair damage caused by exercise</p>

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Before during and after short intense/anaerobic activities

Before	During	After
<p>Use of carbohydrates – Athletes do not need to carbo-load but do need to ensure carbohydrate is part of the diet as it is the main energy provider.</p>	<p>It is not really needed as the events are too short and will be done pre event. Some athletes might take extra fluid and gels in between throws for example javelin.</p>	<p>Rehydrate immediately with water and energy drinks to replace the fluid and salts lost during sweating</p>
<p>Use of proteins – Protein is needed to repair muscles tissue from little tears caused by exercise. Protein needs to be included in all athletes diet plans</p>		<p>Reload appropriate nutrients by having a small meal 30 minutes after the session. This should include protein and carbohydrates.</p>
<p>Fat should be a minimal part of an athletes diet as it is only used energy during periods of inactivity</p>		

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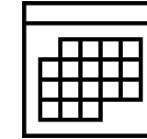
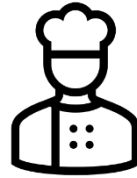
Strength based activities

Before	During	After
<p>High in protein – Need protein to build muscle to increase muscle mass</p> <p>Meal plans are normally 5 to 7 meals a day to get extra calories and protein into the body.</p> <p>Athletes should eat 60-90 minutes before a training session</p>	<p>Do need to consider a hydration plan if exercise is over 60 minutes. Include a sports drink which has water and carbohydrate (sugar) in it.</p> <p>DO not need to intake food during strength based training</p>	<p>Rehydrate immediately with water and energy drinks to replace the fluid and salts lost during sweating</p>
<p>Limit excess body fat – so diet needs little or no fat in it to stay in weight categories also they don't need the energy from fat.</p>	<p>Maintaining hydration keeps blood glucose levels normal and not drain muscle glycogen as quickly.</p>	<p>Post exercise meal consumed as soon as possible after exercise and should reload nutrients such as carbohydrates, proteins and fats, vitamins and minerals.</p>

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How to design and develop a balanced nutrition plan

1. Gather details about a current nutrition plan and any issues that might impact the design of future nutrition plans



Through interviews find out what the performer/client normally eats

Likes?

Dislikes?

Foods they do not eat?

Foods they cannot eat e.g. allergies. Intolerances, cultural beliefs that effect the food eaten

What are their coaching skills like currently?

The nutrition plan must consider the clients current cooking skills and time available to shop for the food and then go on to cook it.

Training schedule

How often does the athlete train?

How long do they train?

What type of training do they undertake?

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How to design and develop a balanced nutrition plan

1. Adapt the nutrition plan to suit a chosen sporting activity



Does the performer want to gain or lose weight?

Portion sizes can be increased or decreased to achieve this.



Add or remove relevant nutrients

Is the performer enough, too little or too much of the main nutrients?



Determine the current intake through a food diary completed by the performer

Measure and record all foods eaten and all fluids drunk



Training times and duration times will effect the time that the performer can eat

This needs to be considered in the new plan



Portion sizes need to be considered – if increasing calorie intake these will need to be bigger
More meals per day may also be needed to achieve this

Others may wish to increase the amount of healthier food e.g. fruit and vegetables eaten

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How to design and develop a balanced nutrition plan

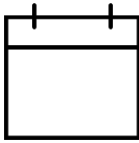
1. Adapt the nutrition plan to suit a chosen sporting activity - Setting goals for the fitness plan

Specific	Measurable	Realistic	Achievable	Time bound
The goals of the nutrition plan need to meet the needs of the individual and their particular needs	Objective data needs to be collected on the training programme to ensure it is successful Has their heart rate changed? Has their weight changed as planned Subjective data from the performer can also be collected Do they feel better in training? Are they training harder?	The goals of the programme must be within the range of the performers capabilities If you were looking to increase the protein intake of the performer and recommended expensive food sources which they could not afford this would not be achievable.	They must be able to achieve the goal E.g. setting a goal to loose 5lbs (2.2kg) per day over the next two weeks actually means they would loose 5 stone (31.75kg) in this time – this is unrealistic	The goal must be achieved in a set period of time This will be the date the nutrition plan aims to finish and then be reviewed

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How to design and develop a balanced nutrition plan

1. Adapt the nutrition plan to suit a chosen sporting activity – Time and duration of the plan



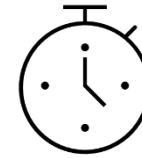
Time of year

Fruit and vegetables are seasonal – they are cheaper at certain times of the year

The training programme – may also be seasonal – training for an event at a particular time of year or different demands for an activity at different times of the year

E.g. the demands on a footballers aerobic fitness will be higher in pre-season

The demands on a track and field athlete will be higher in the spring when the outdoor season starts.



Duration of the plan

When does the plan have to be completed?

Your training programme will be for two weeks – but consideration needs to be made for a longer time period to achieve success while also not being long, boring and unsustainable.

Different training demands will take longer to achieve – weight loss, muscle gain, increases in speed and power – all take time

Year 10

Key factors when considering the success/impact of a nutrition plan

2. Identify the nutritional changes that can be made - Carbohydrate and protein

Nutrient in taken	Why this needs to be considered?
Carbohydrates	<p>Carbohydrates provide energy for the body. Too much and you will gain weight as they are stored as fat, too little and you will not have enough energy for exercise.</p> <p>As a guideline losing 1lb (0.45kg) per week is suitable for a weight loss plan. One pound of fat is equivalent to 3500 calories, which equates to reducing intake by 500 calories per day</p> <p>Simple carbohydrates – includes sugars – good for immediate energy but don't have nutritional value – found in biscuits, chocolate, flavoured yoghurts and fizzy drinks. Also found in natural sugars such as honey, unsweetened fruit, vegetable juice and smoothies</p> <p>Starchy carbohydrates – found in foods coming from plants. They provide the body with a steady slow release of energy e.g. bread, rice, potatoes and pasta</p> <p>Fibre – found in cell walls of foods that come from plants e.g. fruit and vegetables, wholegrain bread, wholewheat pasta and pulses e.g. beans and lentils</p>
Protein	<p>Needed for growth and repair of cell walls and muscle cells needed in exercising.</p> <p>Protein intake depends on a persons weight, age, gender and health.</p> <p>Body cannot store protein so additional protein is needed after exercise for additional growth and repair.</p> <p>Sources – animal or plant based – meat, fish, eggs, dairy products, seeds and nuts and legumes e.g. beans and lentils</p>

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Key factors when considering the success/impact of a nutrition plan

2. Identify the nutritional changes that can be made - Fat, vitamins and minerals

Nutrient in taken	Why this needs to be considered?
Fat	<p>A small amount of fat is important for a healthy, balanced diet as it contains essential fatty acids the body cannot make itself. It also helps the body absorb fat soluble vitamins.</p> <p>Fats are high in energy providing the body with more energy per gram than carbohydrate or protein.</p> <p>Fats and oils contain good and bad fats. Food sources that contain bad fats should be replaced with those that contain good fats.</p> <p>Bad fats – mainly come from animal sources – sausages, pies, butter, cheese, cream, chocolate, biscuits, cakes and pastries - and some plant sources – palm and coconut oil</p> <p>Good fats – mainly found in oil from plants and fish – olive oil, rapeseed oil, Brazil nuts, peanuts and oily fish.</p>
Vitamins and minerals	<p>Sports people need more vitamins and minerals in their diet to allow it to work and recover effectively.</p> <p>Found in fresh fruit and vegetables and should contribute at least a third of the diet each day.</p> <p>At least 5 portions of fruit and vegetables should be eat – can be in any form – fresh, frozen, tinned, dried or juiced.</p>

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Key factors when considering the success/impact of a nutrition plan

2. Suitability and organisation of a nutrition plan – portion sizes and timing of meals



Portion sizes

Important to consider to ensure the performer does not get too much or too little food

Cups and spoons can be used to measure out portion sizes

Other ways of measuring can also be used.

An average-sized fist is the correct amount of raw or cooked vegetables

A tennis ball is the correct size for a portion of pasta, rice or oatmeal

A deck of cards or hand is the correct portion size for meats

The size of a thumb is the correct portion size for peanut butter and Nutella

A postage stamp or tip of the index figure to the first joint is the correct portion size of oils or other fats.

Timing of meals

Exercising on a full stomach is uncomfortable.

Breakfast should be eaten at least an hour before morning exercise.

Eating or drinking carbohydrates before exercise improves performance while not eating makes a performer feel light headed and sluggish.

Large meals must be eaten at least 3-4 hours before exercising

Small meals or snacks should be eaten 1-2 hours before exercise.

Snacks eaten just before exercise - no benefit on performance if the exercise is less than 60

Snacks of energy bars, apples, bananas, yogurt, sports drinks or diluted fruit juice

After exercise meals should be eaten within two hours of finishing exercise and include yoghurt, fruit, low-fat chocolate milk or a fruit smoothie

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Key factors when considering the success/impact of a nutrition plan

2. Suitability and organisation of a nutrition plan – liquid intake and amount of meals



Liquid intake

Adequate fluid intake is needed before, during and after exercise/

Water is the best form of fluid needed to prevent dehydration.

If the exercise is over 60 mins home made sports drinks are better

Sports drinks help to maintain the body's electrolyte and carbohydrate levels.

Amount of meals

The amount of meals needs to be considered – examples include

Three meals and two snacks per day

Two big meals per day

Six to eight small meals per day

The persons schedule and current snacking habit will determine which is best for them.

The time of day they prefer to eat is also important to consider

Some research indicates eating more often speeds up the metabolism – so calories are burnt off quicker.

Year 10

Review the potential success/impact of a nutrition plan

3. On performance and/or training

Training plans need to be reviewed to determine if they have worked

This can be done through gathering objective (number) data or

subjective (opinions) data. From this future nutrition plans can be

adapted

Changes in flexibility of joints, resting and exercising heart rate,

breathing rates and rate of recovery heart rate need to be considered

Fitness test results, weight and the number of and timing of meals each

day need to be recorded.

Questions that could be asked of the performer include:

Does the performer think they have lost or gained weight?

Is the performer finding training harder or easier?

Do they think their stamina has got better or worse?

Do they think their energy levels have increased or decreased?

Are they finding it hard or easy to stick to the diet plan?

Are there any foods in the diet plan that they would like to leave out

or add to a future plan?

The effect of overeating on sports performance

Effect	Explanation	Example
Components of fitness	When overeating it will affect the way someone performs in activities using a range of components.	<p>Limited stamina/cardiovascular endurance – difficulty performing for a long duration.</p> <p>Limited flexibility – difficulty with full range of movement at joints.</p> <p>Limited agility – difficulty to change direction quickly.</p> <p>Limited speed/power – difficulty moving quickly enough or produce force.</p>
Manipulated for certain sports	Sometimes the overeating for selected sports can have useful effect.	Increase in weight may will be beneficial to weight lifter.
Increased nutrients	Provides benefits to the performer especially if it is their nutrition plan and they substitute.	<p>Switching their carbohydrate intake – from simple sugars to starchy carbohydrates.</p> <p>Adding in more fruit and vegetables – increase in calories but more essential vitamins and minerals.</p>
Performance benefits	Most sports have a weight division and categories which require performers to be a certain weight range.	<p>Increased muscle mass – sumo wrestler</p> <p>Increased weight – boxer, rugby player</p>

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The effects of undereating on sports performance

Effect	Explanation
Reduced energy levels	Not eating anything or very little results in limited intake of essential vitamins and minerals. Missing meals or not eating before exercise will result in the body struggling to complete - performers will fatigue quicker than normal.
Reduced concentration	Effects brain function, lack of nutrients will make a performer distracted and result in a decreased performance.
Weight management	<p>Some performers may need to manage weight to prepare for competition. For example boxing/martial arts have weight categories and in gymnastics/diving body shape is important.</p> <p>Dramatic or fast weight loss has a negative effect on performance as it uses up glycogen stores and extreme restrictions on calorie intake limits the consumption of essential nutrients.</p>

The effects of dehydration on sports performance

Effect	Explanation
Overheating	Dehydration has many harmful effects on the body. Increase in body temperature leading to headaches, nausea and eventually heat stroke.
Reduced performance level	Dehydration will then cause blood to become thicker (more viscous) and slows down blood flow. This causes the muscles to fatigue quicker and cause muscle cramps. Less blood to the brain, slower/poorer reactions and negative impacts on decision making and impaired concentration
Reduced bloating	Dehydration will cause the body to conserve water by slowing down bodily functions. Leads to an upset stomach and vomiting if a performer becomes ill during participation, they will have a reduced bloating feeling due to the dehydration.
Reduced water retention	Can be beneficial if there is a need to lose weight in order to achieve a specific weight for competition – boxing/martial arts. Performers must get to know their sweat rate and understand how much they should be drinking.