

The University of Michigan Rugby Football Club
Manuscript on Nutritional Guidance

The aim of this manuscript is to guide The University of Michigan Rugby Football Club players in the correct nutrition of the competitive athlete. Herein you will find a brief overview of the main areas of healthy sports nutrition along with some tips that will help you in achieving your goals.

Sports nutrition used to be equated to eating lots of carbohydrate, mainly pasta. The problem with this is that it was based on research about endurance athletes like cyclists and marathon runners. But if you stand a marathon runner next to an rugby forward, you don't have to be clever to work out their nutritional requirements are hugely different. But worse than this, if you feed your rugby player like a marathon runner they end up getting fat! Getting your nutrition right for you sport is as important as not bothering, since getting it wrong can be worse than not bothering at all.

The main thing with rugby players is they need to lean muscle mass and you can't make muscle out of anything other than protein; certainly not from just platefuls of pasta. They need to eat lean protein sources. This does not mean they do not need any pasta, it is more about obtaining the correct balance for their needs to support their training goals.

Changing from a bad diet to a good one boils down to two things: understanding and willpower. It's really "Skill power" – skills to choose low fat, high fibre, high protein, low sugar options instinctively and to learn to love them!

In nutrition, variety is the spice of life. Choose a wide variety of natural, unprocessed foods from all the food groups. These include carbohydrates (including vegetables, whole grains and fruit), protein and fats. By including a variety of foods in the diet, you increase the likelihood of consuming all the nutrients, vitamins and minerals that you require for a healthy and balanced diet. A variety of foods also ensures that your diet remains interesting and exciting.

1. Hydration

Water is the most important part of your nutrition programme

Adequate hydration is a crucial part of health and performance. Even a small water loss can impair both physical and mental function. As a rugby player you will need to drink about a gallon of water a day. This requirement increases dramatically when you exercise. Thirst is a very poor indicator of how dehydrated you are or have become. By the time you feel thirsty you may have lost 2-3% of your body water. This

will have a very big impact on your performance. If you dehydrate by only **3%** that is **5.4lbs** lost for a **180lb** player, your performance will decrease markedly losing up to **10%** of your **strength** and **8%** of your **speed**. You also increase the possibility of muscle pulls and strains. To ensure you don't become dehydrated you will need to drink water continuously throughout the day. Using a water bottle will allow you to monitor your intake. Being well hydrated improves how you feel and how you perform.

Top tips:

- You need to **drink a minimum of 1 gallon a day** + whatever is required in training. Most people don't come near that. If you're properly hydrated your urine should be pale and clear.
- Start the day with a glass of water.
- Drink **little and often** through the day and more during training
- **Thirst is a poor indicator** of dehydration. If you use thirst as your guide, you can be 50-70% more dehydrated than by following the guidelines above
- **Drink cool fluids** – they are absorbed faster
- **Pre-hydrate** – drink a little extra fluid the night before training
- **The use of isotonic drinks (Powerade and Gatorade have specific brands) during and after training** speeds up fluid replacement and maintains blood sugar levels. They also help you retain more fluid than water alone as they contain electrolytes

2. Fats, the good the bad and the ugly

Contrary to popular belief, not all fats are actually bad for you, far from it, many are not only good, but without them you would die. A zero fat or very low fat diet is harmful to your health. So you need some fats, the question is which ones and how much?

Fats can be separated into three groups.

The "**good**" fats are the polyunsaturated fats. These include the Omega 3 and Omega 6 essential fatty acids (which actually are the vitamins of the fat world) and Omega 9 non-essential fatty acid, which you will know as olive oil. The good fats are liquid at room temperature. Omega 3 fatty acids are found in oily fish such as salmon, trout, sardines, mackerel, herring and tuna. These fish should be included in the diet at least **twice** a week. You obtain the omega 6 fatty acid from vegetable oils. Good sources are *cold pressed* such as flaxseed oil and virgin olive oil. Good sources of both omega 3 and 6 are nuts and seeds.

The "**bad**" are the **saturated** animal fats. They are known to increase the risk of heart disease, some cancers and strokes. Saturated fats are generally solid at room temperature like butter. They are the fats you see in meats and are found in dairy products. Saturated fats if not used as energy will be stored as

body fat and tend to get dropped in your blood vessels leading to furring up of the arteries (atherosclerosis). It is this that increases the risk of cardiovascular diseases when they are eaten.

The “**ugly**” fats are the **hydrogenated** and **Trans-fatty acids** (formed when fats are **fried**). These have been chemically altered and are used in food to improve texture and shelf life. Functionally they tend to act like very sticky saturated fatty acids and should be avoided. You will need to read your food labels.

Top tips:

- **Avoid saturated and trans (fried) fats** whenever possible – fried foods, burgers, butter, etc. They increase cholesterol and decrease membrane fluidity
- **Use cold pressed extra-virgin olive oil** as your main source of fat – very good source of monounsaturated fatty acids
- Eat at least 2 meals per week of **cold water fish** – e.g. salmon, trout, mackerel, sardines - and take capsules of **essential fish oils** such as EPA (omega 3) and GLA (omega 6).
- These foods contain high quantities of **Omega 3 fatty acids** which improve insulin action, reduce muscle degradation and enhance testosterone production
- Try to keep **fat intake down to 15-20%** of your total calories – if you are eating 4000 calories a day that is about 65- 89g of fat per day
- **Avoid deep fried foods**, preferring stir-fried, dry roasted, baked, grilled or steamed
- **Snack on nuts and seeds**
- Dress salads with olive oil and fresh lemon juice or flavoured vinegar

3. Carbohydrates

Carbohydrates provide the major source of energy for high intensity performance. They are the fastest available energy source and are always the limiting fuel in performance.

There are many different types of carbohydrate and these all have different rates of absorption, digestion and utilisation and effect on blood sugar and hence insulin levels. The simplest way to start thinking of them is as refined and unrefined.

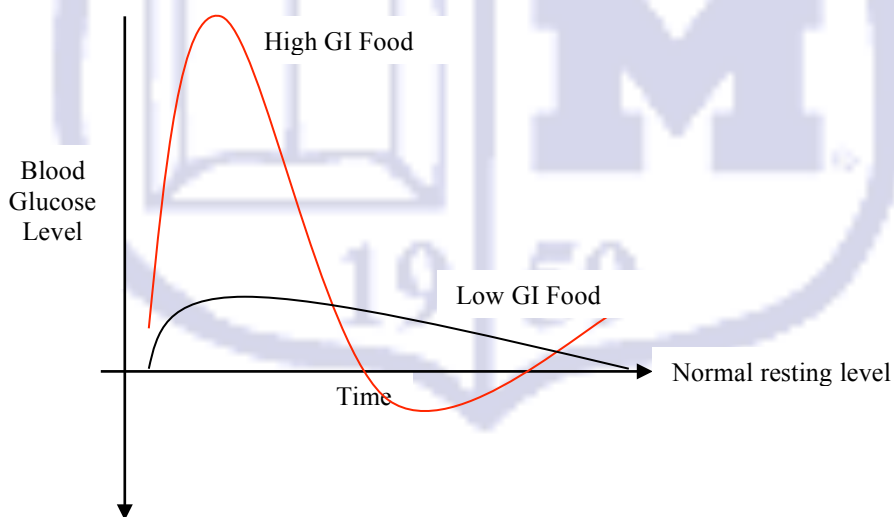
Refined carbohydrates include **white** bread, **white** pasta, **white** rice, **white** sugar or anything to which sugar has been added such as candy, chocolate, cakes and confectionary. Refined means that these products are not as they occurred in nature. Refining takes place in the food industry to improve the shelf life and texture of the products. These refined products are essentially simplified and thus require very little digesting and so the sugars are absorbed extremely quickly.

Unrefined carbohydrates would include **whole** meal breads, pasta, **brown** rice, vegetables and fruits. Unrefined whole grains are made up of all parts of the grain. They also contain important plant compounds called phytochemicals. Phytochemicals together with the vitamins, minerals and dietary fibre found in grains contribute to these whole foods' nutritional content and their numerous health benefits. As whole foods they have to be properly digested and this process slows the rate at which the sugar gets absorbed into the blood from the gut.

The Glycaemic Index

Poor blood glucose control occurs for a number of reasons. The most common and most important reasons are consumption of rapidly absorbed sugars, over stimulation of the pancreas to produce insulin and nutrient deficiencies, which reduce the impact of insulin in the body.

The Glycaemic Index (GI) is a tool that will allow you to practically understand what the sugars in different food will do to your metabolism and is part of the key to a new way of eating. The GI is a number that is given to carbohydrate foods to show **how fast blood glucose will rise**. GI is only relevant to carbohydrates. The **higher the GI the more rapidly** the sugar is **absorbed** and the greater the disruption to blood glucose. The **lower the GI the slower** the food is broken down and the sugar **absorbed**.

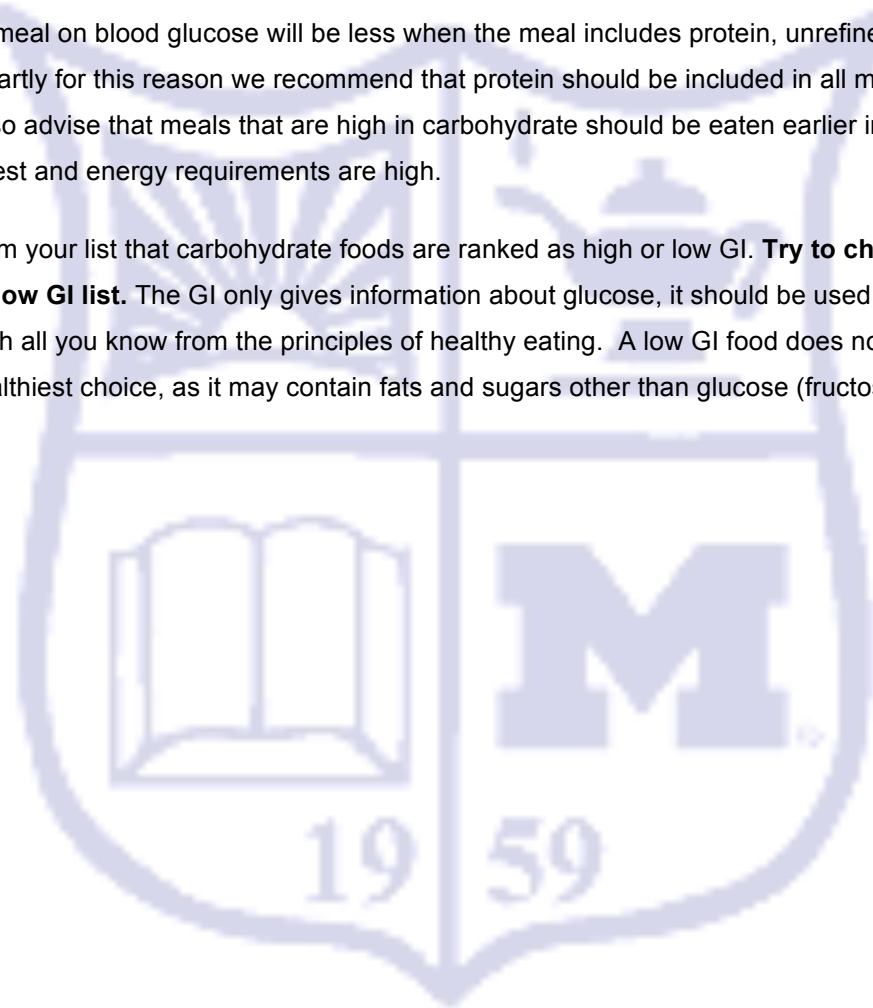


We can therefore use the GI as a guide to which carbohydrate foods to eat when. There are four factors that affect blood glucose levels after a meal.

- The GI of the carbohydrate
- The volume of the carbohydrate
- The presence of protein and fat in the meal, which slows down the rate at which carbohydrate is digested
- The fibre content of the food, which also slows down the rate of absorption of the glucose

The effect of a meal on blood glucose will be less when the meal includes protein, unrefined carbohydrate and fibre. It is partly for this reason we recommend that protein should be included in all meals and snacks. We also advise that meals that are high in carbohydrate should be eaten earlier in the day when activity is greatest and energy requirements are high.

You will see from your list that carbohydrate foods are ranked as high or low GI. **Try to choose most food from the low GI list.** The GI only gives information about glucose, it should be used as a tool in combination with all you know from the principles of healthy eating. A low GI food does not always mean that it is the healthiest choice, as it may contain fats and sugars other than glucose (fructose).



The Glycaemic Index of Foods

Foods that have a high GI are the main problem, so aim for low GI food for your day-to-day intake.

	<i>HIGH</i> (55+)	<i>LOW</i> (0-54)		<i>HIGH</i> (55+)	<i>LOW</i> (0-54)
<i>Sugars</i>			<i>Cereals</i>		
Glucose	100		Puffed rice	90	
Fructose		20	Cornflakes	80	
Honey	87		Crunchy nut cornflakes	72	
Sucrose (sugar)	59		Special K	69	
			Muesli	66	
			Porridge oats		48
			All-Bran		42
<i>Fruit</i>			<i>Pulses</i>		
<i>Watermelon</i>	72		<i>Baked beans</i>		48
	68		Butter beans		36
	55		Chick peas		36
<i>Raisins</i>	57		Black-eye beans		33
Bananas		44	Haricot beans		31
Apricots		40	Kidney beans		30
Grapes		36	Lentils		25
Oranges					
Apple					
<i>Breads</i>			<i>Dairy Products</i>		
<i>French baguette</i>	95		<i>Yoghurt</i>		36
Rice cakes	82		Whole milk		34
White bread	76		Skimmed milk		32
Rye bread	69				
Whole wheat bread	64	54			
Oat cakes		51			
Whole grain bread		41			
<i>Grain Products</i>			<i>Vegetables (cooked)</i>		
<i>Pasta</i>	92		<i>Parsnips</i>	98	
White rice	72		Carrots	92	
Brown rice	60		Mashed potato	80-97	
Pastry	59		New potato	70	
			Beetroot	64	
			Peas		51
			Sweet potato		48
			Sweetcorn		48

High GI = > 50, Low GI = < 50

More GI values can be found at www.mendosa.com

4. Managing your Intake of Carbohydrates

We have now shown that apart from the possibility of immediately post training or playing your carbohydrate intake should come from **unrefined** sources of **whole** foods. These can be further divided up by their energy and fibre content into High fibre carbohydrate, High starch carbohydrates and Starch/Protein carbohydrates:

Unrefined complex carbohydrates

Fibrous Carbs High fibre low energy (PM)	Starchy Carbs High energy low fibre (AM)	Starch + Fibre + Protein Moderate energy, protein and fibre
Asparagus	Yam	Lentils
Green Beans	Swedes	Lima Beans
Broccoli	Parsnips	Black-eyed-beans
Cabbage	Carrots	Peas
Zucchini	Potatoes	Soy beans
Cauliflower	Sweet potatoes	Broad beans
Celery	Oatmeal	Chick peas
Cucumber	Corn	Kidney beans
Egg Plant	Barley	
Lettuce	Popcorn	
Mushrooms	Wholemeal flour	
Peppers	Rice	
Spinach	Pasta	

You should aim to consume about **half your calorie intake from carbohydrates**. But it is also important to match your energy intake with the rate you plan to use energy. So in the morning when you are about to go out to train and consume a lot of energy it is important to take a higher energy source of carbohydrates such as whole meal bread or porridge oats for your breakfast, however in the late evening it is not sensible to consume large amounts of high energy foods, since any additional intake will be stored as body fat. You will however, see within the supplements handbook that mass gainers containing a high caloric dose may be consumed in the evening, this is a tactical decision to gain mass through slow release proteins.

Skipping meals or only eating one or two large meals a day will also result in poor energy levels, poor appetite control, an inability to put on muscle mass and uncontrolled blood glucose. **Aim to eat five smaller meals each day or three meals and two snacks.** Including some protein at each meal (see below) will help you to control your hunger level, mood, blood glucose levels and helps prevent long-term fat storage. Try to eat your last meal before 8 pm, going to bed whilst digesting your dinner is not a recipe for a good night's sleep and encourages the conversion of calories into body fat.

Fruit and Vegetables

The recommendation is that we should consume **five** portions of fruit and vegetables a day. The common translation of this advice is to consume four or five portions of fruit and maybe one of vegetable.

Do not replace all your servings of vegetables with fruit. Aim for four to five servings of vegetables each day and one to two portions of fruit.

More than any other foods they contain essential vitamins and minerals such as vitamin C and potassium for good health and disease prevention.

Balance your vegetable intake between the orange/red and green varieties. The **more colourful** the meal the **healthier** it usually is and as an easy rule the darker and brighter the colour of the vegetable the more vitamins, minerals and fibre it will contain. For example, compare lettuce with the deep dark green of spinach or the bright orange of carrots. They can be eaten raw and cooking most vegetables takes only a few minutes if you steam, stir-fry or microwave them. Fruit and yoghurt or fruit with nuts and seeds makes an excellent and healthy snack. Choose fresh and organic vegetables wherever possible

Top tips:

- Eat **less refined and simple carbohydrates**, e.g. white pasta, rice, potatoes, white bread, carrots, parsnips, simple sugars – glucose etc (reserve for post training)
- Eat **more unrefined, complex** carbohydrates and vegetables, e.g. soybeans, sweet potatoes, lentils, apples, oranges, whole wheat pasta, brown rice, whole wheat bread, oats, fresh vegetables
- Eat **complex carbohydrates approx. 3 hours** before exercise
- An **increased frequency of meals to 5 a day** of moderate and low GI foods leads to better insulin, blood glucose and fatty acid regulation. This gives greater potential for muscle maintenance and growth as well as generally higher energy levels
- Eat **sugary refined carbohydrates post hydration after exercise.** This is when you want to use an 'insulin spike' to get as much carbohydrate into the muscle as possible.

- **Never fast**, reducing food intake dramatically will lead to muscle loss
- **Always eat breakfast**. Skipping breakfast results in low blood sugar for an extended period of time, your symptoms will worsen and compensatory eating will often be excessive, due to hunger
- **Increase the intake of quality protein foods** (i.e. fish, poultry, lean meats, vegetarian proteins like tofu or tempeh). Protein is very effective at controlling appetite and also slows the absorption of sugars when they are eaten together
- **Avoid large carbohydrate meals**, as these will make you sleepy and excess calories will be converted
- **Starchy carbohydrates should be limited in the evening meal where fat loss is a goal**, as the need for an energy source at night is limited
- **Make your own muesli**. It's cheaper and you know exactly what goes into it. Mix oats, quinoa flakes, all bran flakes (and your favourite bran cereal), sesame seeds, sunflower seeds, nuts, assorted chopped dried fruits
- Avoid **sugar coated and processed breakfast cereals**. Half their weight is made up of sugar and the other half is refined carbohydrate! Choose whole grain alternatives
- Home-made **vegetable soup** is ideal! Veggies with little fuss. Add lentils and beans and whole grains like pearl barley and you are on your way to a complete meal. Make a big pot of soup at the weekend and eat it throughout the week. It can also be frozen in portions and used later on
- **Roasted vegetables** are an excellent vegetable accompaniment and can be used as an entrée, pasta sauce or filling. Use cherry tomatoes, onion, eggplant, zucchini, snow peas, red and yellow peppers. Toss with olive oil, balsamic vinegar, garlic, fresh basil and salt and pepper and roast for between 45 minutes and one hour
- **Stir-fries** are a quick and easy way to prepare vegetables. Use a little sesame or peanut oil for flavour and add cashews or crushed peanuts, fresh herbs and a squeeze of fresh lime juice.

5. Promoting Protein Synthesis

Do not get confused – carbohydrate is the energy source for all of your training and playing needs. Protein is required for the development of your **structure**, i.e. it is the building block for new muscle growth. If you are training hard and attempting to grow or just keep your muscle intact, you will need extra protein to assist in repair, growth and development.

Your body can only grow new muscle when it is in a **positive nitrogen balance**. Research has shown repeatedly that athletes with a strong requirement for strength and power who are training hard will need between **1.2g and 1.8g of protein per kg of body weight per day (1lb=0.45kg)** to stay in nitrogen positive balance.

How much protein might you require?

Body Weight	Protein Needed at 1.6g/kg	Example foods
176lbs	128g	4 x egg whites, 2 x chicken breasts, 1 x tuna steak = 112g
198lbs	144g	5 x egg whites, 2 x chicken breasts, 2 x tuna steaks = 138g
220lbs	160g	5 x egg whites, 3 x chicken breasts, 2 x tuna steaks = 182g

Since whole protein sources require a considerable amount of digestion it is important not to try to eat your entire requirement at one sitting. We would recommend that you drip feed in your requirement in **5 or 6 meals a day**. This as we have seen will also assist your glucose absorption.

Protein should be included at every meal; this will help control blood glucose levels, support muscle mass maintenance and growth and improve appetite control.

Choose from a wide variety of protein sources. Eggs are rich in nutrients, portable, cheap and a high quality source of protein. Choose meat and poultry that is lean and avoid prepared meals and processed meats. **Fish is a superb source of protein**, it is low in fat and some fish have the added advantage of being high in Omega 3 fatty acids. **Grill, bake, steam or poach fish in preference to frying**. Try to avoid farmed fish and choose wild and organic fish whenever possible. Avoid pork, as it has the highest fat content of all meats, nearly half the calories in pork come from saturated fat.

Peas and beans (legumes) are excellent sources of vegetarian protein and fibre, especially when combined with whole grains. Most plant proteins do not contain all the essential amino acids you require (animal protein does); combining different sources of plant protein solves this problem. Legumes should be eaten with whole grains, e.g. brown rice and lentils, humus with whole wheat pitta bread. Plant proteins are very low in fat and have a very low glycaemic index (see above), this means that they cause a slow release of glucose into the blood. Baked beans have a low glycaemic index, are cheap, convenient and easy to store. Serve as a filling for baked potatoes or on toast.

Nuts are also a useful protein source but they should be eaten in moderation as they have a high essential fat content. Choose a mixture of almonds, pecans, walnuts, and Brazil nuts, hazelnuts, cashews, pumpkin, sunflower and sesame seeds. Add them to a salad or stir-fry, or eat them as a snack. Avoid nuts that have been roasted in oil or are salted.

Sources of protein:

Animal Source

- Poultry: chicken and turkey
- Eggs (Omega 3 enriched)
- Low-fat dairy produce: cottage cheese, low fat yoghurt, fromage frais, etc.
- Small amounts of reduced fat cheeses

Seafood

- Oily fish (fresh or smoked)
- White fish (not fried/battered/breadcrumbed)
- Oily fish (canned) tuna in water or brine, sardines in tomato sauce not oil
- Shellfish

Plant sources

- Tinned/cooked beans, peas, lentils and chickpeas
- Reduced fat humus
- Baked beans – choose low sugar low salt or organic variety
- Tofu
- Quorn – check fat content of pre-prepared quorn dishes
- Nuts and seeds in moderation – choose raw unsalted good variety, avoid peanuts

Supplemental sources

- Meal replacements
- Whey proteins
- Protein bars

Combining two or more different types of protein at each feeding will maximise the benefit in the body's use of the nutrients.

Protein supplements:

Protein supplements can play a very useful role in delivering a high quality supply of bio-available protein throughout the day. These supplements usually come as drinks and besides assisting you to stay in positive nitrogen balance in your body - essential for muscle growth, are **easy to consume and require much less digestion than whole food**. This allows them to be **absorbed faster** which is particularly useful in the **immediate post training period**. Guides on supplementation can be found in the accompanying handbook.

It is important to remember that you should get proteins from food as well as supplements, and to eat as wide a variety of protein as possible. It is also important to select low fat choices for your protein.

Fat content of a variety of protein sources:

FOOD (100g)	Protein (g/100g)	Fat (g/100g)	Water (g/100g)
Egg whites scrambled	9	0	89
Shrimp – steamed	17	1	81
Tuna (steak = 150g)	24	1	74
Turkey breast (approx. 150g)	23	2	74
Lobster	22	4	73
Chicken breast – skinless roast (about 150g)	26	4	69
Salmon	20	13	66
Watch fat content			
Beef Steak – lean grilled	25	15	57
High fat content (Avoid these !)			
Pork Loin – lean grilled	23	29	46
Fatback bacon	12	70	17
Butter	0.5	82	16

Top tips:

- **Think 'protein'** first for every meal
- Choose **low fat protein** sources
- **Think savoury at breakfast** – if you've got time, have a healthy cooked breakfast, e.g. grilled lean meats, poached, boiled or scrambled eggs
- **Protein snacks** – cottage cheese, hard boiled eggs, low fat houmous
- **Supplement your diet with extra protein** in the form of fat free shakes using protein powders
- When training hard, continue to **take your protein supplements on rest days** as well as training days. The rest period is when your body makes new protein – it needs raw material to do this
- **Organic is generally best**

6. Vitamins and minerals

If carbohydrate is the fuel, protein is the structure then **vitamins** and **minerals** are the **nuts** and **bolts** that help to hold it all together.

You should ideally get all your vitamin and mineral requirements from the food you eat. Unfortunately, we do not live in an ideal world, often far from it. Added to this you are not trying to be normal. Elite rugby players are looking for extraordinary achievements, so it is unlikely that the intake for you will be the same for a couch potato. In recent years there has been increasing evidence that we are becoming more nutritional deficient. Not even achieving the recommended daily allowance for all vitamins and minerals.

Supplementation must be just that, a supplement to an already good and well balanced diet. We typically **advise the use of a simple multi-vitamin/mineral complex** especially whilst making dietary changes to ensure we avoid any deficiencies. Omega-3 essential fatty acids, especially EPA, is the commonest deficiency seen in our players and can be the hardest to correct. This is not uncommonly because they don't like or eat very much of the appropriate fish (see above). Supplementation is not a quick fix – it is an on-going process of support for your training, playing and general well-being.

Top tips:

- Take a basic multi-vitamin and mineral programme daily
- Keep eating a wide range of foods – supplements are not a substitute
- More is not usually better and too much of particularly the fat soluble vitamins can be toxic

7. Graze don't gorge: healthy snacks

Top tips:

- Natural, live yoghurt or soya yoghurt mixed with fresh chopped fruit or a handful of nuts and seeds makes an excellent mid-morning snack
- A hard boiled egg make a good convenient snack
- Make a batch of fruit and nut bran muffins, freeze them and take one to work with you each day. Fresh soup with beans or lentils makes an excellent snack, particularly as a winter warmer. Much fresh soup bought in supermarkets is high in fat and low in protein. Read labels

8. Rest and sleep

'You don't get fit when you train – you get fit when you recover'

Bodily growth and repair **ONLY** happen when you rest or sleep – you must make sure that your sleep is **long enough** and of **good quality**, and that when you get an opportunity to rest – you rest.

Top tips:

- Aim to get **7.5 - 9.5 hours** of sleep every night
- **Prepare for sleep** – clear your mind, relax
- If you train twice a day, try to fit in a **30-60 minute nap** after your first session or after the morning sessions

Rest means rest – sometimes you need to lie on the sofa and watch a film

(Information taken from Nutritional Guidelines for England Players and Coaches, Parents/Partners and Team Administrators - Dave Reddin, Adam Carey, Matt Lovell, RFU)