



YOUR GUIDE TO EATING WELL



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CYTOPLAN
NATURE MEETS SCIENCE

YOUR GUIDE TO EATING WELL

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This guide is not intended as a substitute for medical advice or any treatment that may have been prescribed by your doctor. We would always recommend that you visit your G.P. to obtain a diagnosis for any symptoms or problems you are experiencing. Please discuss any dietary or supplemental concerns or changes you wish to make with your G.P. Medication should never be discontinued or dosage amended without your G.P.'s prior knowledge and agreement.

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INTRODUCTION

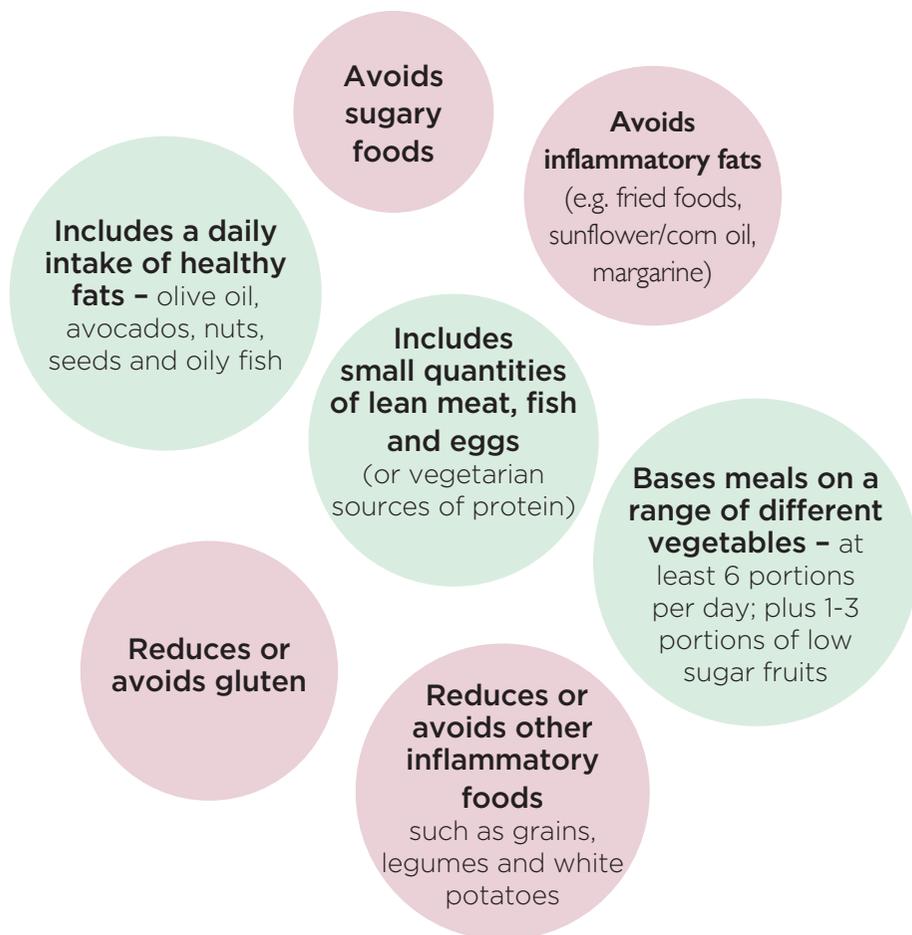
Most people know what is wrong with the Western diet today - the over-reliance on processed foods high in sugar and unhealthy fats that contain low levels of essential vitamins, minerals, phytonutrients and fibre.

The standard Western diet is a significant factor contributing to inflammation in the body, which is a root cause of many chronic diseases. Even so-called 'balanced diets' can be high in hidden sugars, starches and low in essential fatty acids and therefore pro-inflammatory, increasing the likelihood of obesity, diabetes and other health conditions. People who think they are eating a healthy diet may still benefit from dietary improvements.



For those suffering from chronic health conditions, troublesome symptoms, or who want to prevent the development of conditions or symptoms, an anti-inflammatory diet is appropriate.

This is a beneficial way of eating that:



This way of eating will support the development of a beneficial gut microflora. Specific 'prebiotic' foods may also be recommended. Appendices 1-3 provide a summary of the recommendations in this guide and appropriate portion sizes.



SUGAR & CARBOHYDRATES

BACKGROUND

Our traditional diet of 10,000 years ago was very low in concentrated sources of sugar – estimates suggest people ate around 2kg per year, which would have come from sources such as wild honey. Modern day tribes still consume sugar at this level i.e. around 2kg of sugar per person per year. In the UK, sugar consumption is closer to 1kg per person per week.

So where are we eating all this sugar? A lot of the sugar we eat is in processed foods and drinks. For example, there are 9 teaspoons of sugar in a can of coke. Even foods that are considered healthy may have high quantities of added sugar – for example yoghurts, breakfast cereals (including mueslis), fruit juice/smoothies and cereal bars.



When checking food labels be aware that sugar comes under many names and a food may contain many different types! For example, sucrose, glucose, fructose, lactose, malt, malt extract, syrup and honey are all different names for sugar.

TYPES OF CARBOHYDRATES

We can describe carbohydrates as:

Sugary or refined:

These are sugary foods and refined foods, for example cakes, biscuits, and sweets. They usually contain less fibre, vitamins, minerals and phytonutrients than wholefoods. Some refined foods, such as breakfast cereals, are 'fortified' with selected vitamins and minerals – but this does not compensate for the nutrients they are missing.



Complex starchy carbohydrates:

These are unrefined carbohydrates that are rich in fibre e.g. brown rice, wholemeal bread, wholemeal pasta, quinoa, buckwheat, potatoes, sweet potatoes etc. These foods do contain some nutrients but also contain a lot of starch which is broken down by digestive enzymes to sugar. Eating large quantities of these foods can lead to problems.



Complex non-starchy carbohydrates:

These are non-starchy vegetables that are low in carbohydrates and rich in fibre e.g. broccoli, cabbage, spinach, chicory, peppers, mushrooms etc.



Fruit:

Fruit is high in natural sugars and can upset blood sugar if eaten in large quantities. Fruit also contains fibre, vitamins, minerals and phytonutrients. Because it is high in sugar it is best to choose lower sugar options such as berries, plums, apples and pears. Juices and dried fruit are very high in sugar; homemade smoothies are a better option because they include the fruit's natural fibre (some commercial smoothies are high in sugar because they use apple juice as a base).



WHY IS SUGAR AN ISSUE?

The British Medical Journal has stated that:

“Sugar is as dangerous as tobacco [and] should be classified as a hard drug, for it is harmful and addictive”.⁽¹⁾

The government's recommendation is that added sugar should not exceed 30g per day (8.5 teaspoons) for adults, 19g per day (5 teaspoons) for children aged 4 to 6 and 24g per day (6 teaspoons) for children aged 7 to 10 years. This is still a significant quantity of sugar and people suffering chronic health conditions should reduce their consumption below this level. It is pro-inflammatory and inflammation is an important contributory factor to many health conditions.

Sugary and high carbohydrate diets can also lead to many symptoms such as

- Poor memory or concentration
- Mood swings or depression
- Frequent headaches
- Feelings of anxiety, irritability or weakness, especially if a meal is missed
- Tiredness in the afternoon
- Feeling stressed
- Difficulty losing weight

With regard to weight loss, this is one of the reasons that calorie controlled diets often fail – although calories are restricted, sugary foods may still be eaten. These sugary foods cause a rapid increase in blood sugar and high levels of a hormone called insulin. Insulin is a fat storage hormone, so eating sugary (and refined) foods will encourage fat storage. Thus, calorie controlled diets often fail because of the types of food (carbohydrate) being eaten rather than the overall number of calories.

As well as causing those annoying symptoms, too much sugar or too much starchy carbohydrate gets converted to fat and so can result in raised blood triglycerides that are associated with cardiovascular disease. The liver does some of this conversion of glucose to fat and a high carbohydrate diet can also contribute to fatty liver.

Insulin stimulates cholesterol production – so the more insulin you are producing the more cholesterol levels will rise. Therefore, if you have high cholesterol and you eat a low-fat diet but pay no attention to how much sugar and starch you are eating you might not get your cholesterol down.

Sugar damages cellular structures. There is a reaction that occurs called glycation whereby glucose molecules attach to proteins and damage them – this reaction causes ageing of structures and leads to the complications of diabetes. However, you can get these complications without a diagnosis of diabetes – there is a condition called pre-diabetes. According to Diabetes UK⁽²⁾ around 5.5% of the population have diagnosed diabetes; a further 0.7% have undiagnosed diabetes and around 35.5% have pre-diabetes⁽³⁾.

REDUCE SUGARY AND STARCHY CARBOHYDRATE FOODS

For health and to avoid the problems associated with sugar consumption, you may need to reduce the sugar in your diet. The first few days of reducing sugar can be difficult as cravings may be experienced. After this you are likely to have more energy, improved sleep and may notice an improvement in other symptoms.

- **Check food labels** – nutrition information and ingredients lists
- **Avoid all artificial sweeteners and xylitol** – Stevia can be used sparingly if needed but aim to reduce your taste for sugar by eliminating it altogether for a few weeks to balance your blood sugar. Artificial sweeteners have been linked to increased appetite. Sweeteners such as fructose which are marketed as 'natural' can contribute to fatty liver and insulin resistance. Coconut sugar is ok in small amounts and has a beneficial effect on gut bacteria
- **Eat starchy carbohydrates with protein and/or fat** rather than on their own to help keep blood sugar balanced, e.g. apple and some nuts (rather than apple alone)

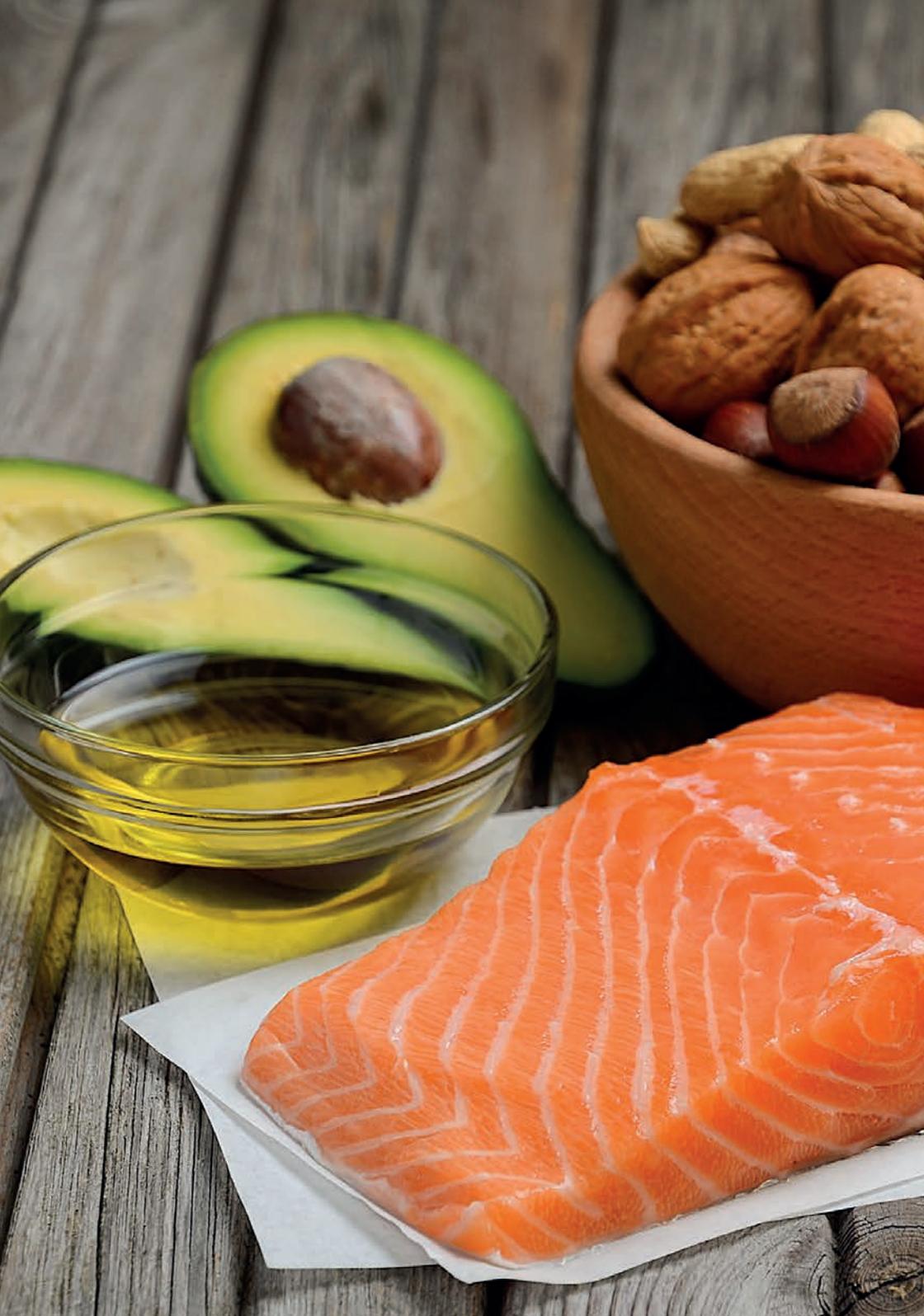
- **Don't rely solely on bread for breakfast, lunch, snacks etc.** – its fast and easy but very starchy (and according to Dr William Davis, author of 'Wheat Belly' two slices of wholemeal bread raise blood sugar faster than two tablespoons of pure sugar)⁽⁴⁾
- **Include unroasted, unsalted nuts (not peanuts)**, especially walnuts and almonds, if snacks are needed (moderate quantities). Avoid snacking if you can
- **Enjoy 70% or 85% dark chocolate**, 20–40 g daily (lower amount if weight loss a goal)



TABLE 1: TYPES OF CARBOHYDRATE FOODS AND HOW MUCH TO EAT

Category	Examples	How much?
Sugary and refined	Fizzy drinks, fruit juice, sweets, biscuits, white flour, white pasta, commercial breakfast cereals (including most mueslis) and most cereal bars	Avoid these foods Dark chocolate – 70% or 85% is ok
Fruit	Berries, apples, plums, pears, etc. Homemade smoothies which use water or non-dairy milk as a base	1-3 portions per day. Choose lower sugar options e.g. berries, apples, pears. Avoid: fruit juice and commercial smoothies; dried fruit; snacking on fruit in between meals
Starchy carbohydrates – grains	Oats, quinoa, Basmati rice and buckwheat flour (wholemeal pasta, wholemeal bread)	Reduce. Ideally to ONE portion per day of ONE of these foods (pasta/bread contain gluten so alternative options are preferable)
Starchy carbohydrates – starchy vegetables	Sweet potatoes, carrots, beets, pumpkin and squash (white potatoes are less desirable)	The brightly coloured starchy vegetables are the best to choose as they contain 'phytonutrients'. 1-2 portions per day. These are preferable to grains as a source of carbohydrate
Complex carbohydrates	Other vegetables – green leafy vegetables (eat these every day), onions, tomatoes, carrots, peppers etc.	Lots 6 – 8 portions per day Half a plate at each main meal. Include with breakfast if possible

Portion sizes: A portion of vegetables or fruit is 80g (roughly a handful), a portion of starchy carbohydrates or grains is 1 to 2 tablespoons – certainly no more than ¼ plate size.



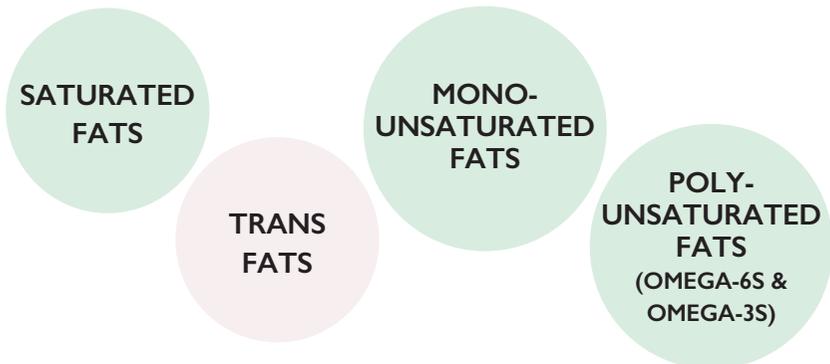
FATS AND OILS

BACKGROUND

Despite the vital roles of fat, many people are fat-phobic as a result of the bad press fat obtained in the 1980s and 1990s. This resulted in the appearance of heavily marketed 'low fat' foods, which are often high in sugar. Since then, the importance of fat in the diet has been appreciated – the emphasis should be on eating appropriate quantities of the right types of good quality fats, rather than seeking to avoid all fat. The low fat diet advice heavily promoted is now recognised to be flawed.

TYPES OF FAT

Fats come in many different forms. The nature of the fat depends on the predominant type of fatty acid it contains. All fats contain both saturated and unsaturated fatty acids (mono-unsaturated and poly-unsaturated) but are sometimes described as saturated or unsaturated according to the proportions of fatty acids present. For example, olive oil is often described as a mono-unsaturated fat because a high proportion of the fatty acids are mono-unsaturated.



Saturated fats are found in animal products (meat, full fat dairy products), coconut oil and palm oil. Some forms of saturated fat, for example the kind in coconut, are very healthy. Animal saturated fats that are solid at room temperature i.e. beef and lamb are not recommended in high quantities.

Trans fats are found at low natural levels in some animal products. Of particular concern are trans fats found in processed foods containing hydrogenated or partially hydrogenated vegetable oils. Consumption of trans fats is linked to heart disease.

Mono-unsaturated fats are found in nuts, olives and avocado. Mono-unsaturated fats are heart-healthy; they lower bad cholesterol (LDL), raise good cholesterol (HDL) and lower blood pressure. Consumption is also linked to reduced risk of cancer and diabetes.

Poly-unsaturated fats (omega-6s and omega-3s) Linoleic acid (omega-6) and alpha-linolenic acid (omega-3) are essential in the diet provided they are the correct ratio. However, most Western diets contain too much omega-6 and not enough omega-3. This is because Western diets include large amounts of sunflower and corn oils (and processed foods containing them), grain-fed meat and margarines. Other important omega-3 fats, DHA (docosahexaenoic acid) and EPA (eicosapentaenoic acid), are found in oily fish like wild salmon and seaweed. The body can make DHA and EPA from alpha-linolenic acid but this pathway doesn't work well in some people (e.g. those with diabetes). That's why it is important to obtain these fats from fish such as wild salmon and sardines. Vegetarians can take an algal based DHA/EPA supplement.

WHY ARE FATS IMPORTANT?

As well as providing energy, fats perform numerous, essential functions in the body. For example, fats are used as structural components in cell membranes. Every human cell has a protective permeable membrane composed of phospholipids (fats), cholesterol and proteins. Omega-6 and omega-3 fats are also used to synthesise hormone-like substances called prostaglandins. Different prostaglandins can act to increase or decrease inflammation in the body. In general, omega-6 fatty acids result in more inflammatory prostaglandins and omega-3 in more anti-inflammatory prostaglandins. Thus, the high proportion of omega-6 in the Western diet is pro-inflammatory.

TABLE 2: FATS TO ENJOY: 3-5 PORTIONS OF GOOD FATS PER DAY

(for example one portion = 20 - 30g of nuts/seeds or 1/2 avocado or 15ml olive oil or one portion of oily fish)

Category	Why and Uses
Extra virgin olive oil (and olives)	High in monounsaturated fats and polyphenols. Uses: Salads, low temperature stir-frying
Virgin or Extra Virgin Coconut oil	Uses: Baking, stir-frying, in smoothies, as a spread – alternative to butter/margarine. Oil is solid at room temperature. Also used for oral hygiene due to anti-microbial properties
Butter (unsalted) Or butter ghee	Minimally processed. Contains short chain fatty acid butyrate which is fuel for gut cells Uses: Spreading, baking, low temperature frying. Eat sparingly

Category	Why and Uses
<p>Hemp seed oil (hemp seeds) or Flaxseed oil (flax seeds)</p>	<p>Flax: High in the omega-3 fatty acid alpha-linolenic acid (ALA). Also contains some omega-6 and omega-9 fatty acids</p> <p>Hemp: Contains both omega-6 and omega-3 fatty acids in a ratio of 3:1</p> <p>Uses: On salads, cooked vegetables, in smoothies</p> <p>Do not heat</p>
<p>Oily fish</p>	<p>High in omega-3 fatty acids provided fish is wild or eating a natural diet. Farm raised fish eat grain and so are low in omega-3 fatty acids (and may be high in dioxins)</p> <p>Choose small fish which should be lower in heavy metals e.g. sardines (if tinned then in olive oil), wild salmon, mackerel (tinned or fresh), herring (tinned or fresh).</p> <p>Avoid: tinned fish in brine or sunflower oil; fresh tuna, swordfish and other large oily fish which may be contaminated with mercury</p>
<p>Avocados</p>	<p>High in monounsaturated fat. Rich in vitamin E</p> <p>Uses: In salads, guacamole dips, smoothies, works well mashed with sardines/tuna and served using chicory leaves; eat whole as an instant meal</p>
<p>Nuts and seeds (unroasted, unsalted – walnuts, almonds, hazelnuts, pistachio, pumpkin seeds and sunflower seeds)</p>	<p>High in monounsaturated fats and fibre. Source of vitamins, minerals and phytonutrients</p> <p>Uses: In salads, smoothies, as a snack. One handful of nuts daily (approx 20 - 30g) as a snack or to add protein to a meal</p> <p>Store in fridge or freezer (they won't freeze) to maintain freshness</p>

TABLE 3: FATS TO LIMIT

Avoid completely or eat only very occasionally

What	What
Deep fried food	Very high fat. Usually cooked in oils high in omega-6 e.g. sunflower, corn oils. High temperatures may damage oil resulting in altered fats
Meat pies, sausages, pastry, cakes and biscuits	These foods are high in processed fat (also often salt or sugar) and low in other nutrients
Margarine	Highly processed and production may have resulted in damaged fats. Made from sunflower, corn or soya so high in omega-6. (Avoid also those claiming to be high in omega-3 – they are heavily processed)
Sunflower and corn oil	High in inflammatory omega-6 fats



PURCHASE AND STORAGE OF HEALTHY FATS AND OILS

The nutritional value of a fat or oil depends on its fatty acid composition, other nutrients present (e.g. vitamins, minerals, phytonutrients etc.), its processing and how it is stored. Extra-virgin oils are unrefined – this has the benefit of conserving the vitamins, antioxidants and other nutrients but has the disadvantage of lowering their smoke point on heating (i.e. lowers the temperature at which they can be used before damaging ‘free radicals’ are created).



Oils deteriorate on exposure to light, heat and air. Rancid oils are not good for health. Where possible, choose oils in dark, glass bottles and keep them in a dark, cool cupboard. To optimise quality, buy small amounts of oil regularly rather than buying in bulk.

MANAGEMENT OF HIGH CHOLESTEROL

Cholesterol performs many useful functions in the body but high levels of certain types of cholesterol (particularly when oxidised) have been linked to cardiovascular disease. Historically the advice has been to eat a low-fat diet. However, fat is vital for good health so more important than avoiding fat altogether is eating the right types of fat i.e. healthy fats.

For cholesterol management:

- **choose low sugar / low starchy carbohydrates.** Sugar and starchy carbohydrates alter blood lipid profiles by stimulating the production of insulin which increases the liver's production of triglycerides and cholesterol. Most cholesterol is made in the body in response to eating carbohydrates;
- **eat a diet high in fibre.** When cholesterol has performed its useful functions in the body it is excreted via the bile into the bowel from where it is eliminated in stools. If constipated the cholesterol may be reabsorbed from the bowel back into the circulation – contributing to high levels. Thus, fibre helps remove cholesterol from the body by increasing bowel regularity and preventing constipation;
- **eat foods high in monounsaturated fats** (avocado, nuts, olives, olive oil) which have a positive effect on cholesterol levels;
- **include plenty of vegetables** (and some fruit) which are high in antioxidants and vitamin C – this protects cholesterol from being oxidised and causing damage.



VEGETABLES AND FRUIT

BACKGROUND

Most people are not achieving the UK Food Standards Agency recommended intake of 5 portions of vegetables and fruit per day. The average intake is 3 portions per day, this compares to 10 that the Victorians ate. Eating large quantities of fruit is not a substitute for vegetables; while fruit has health benefits, including providing fibre and antioxidants, it is also high in sugar.

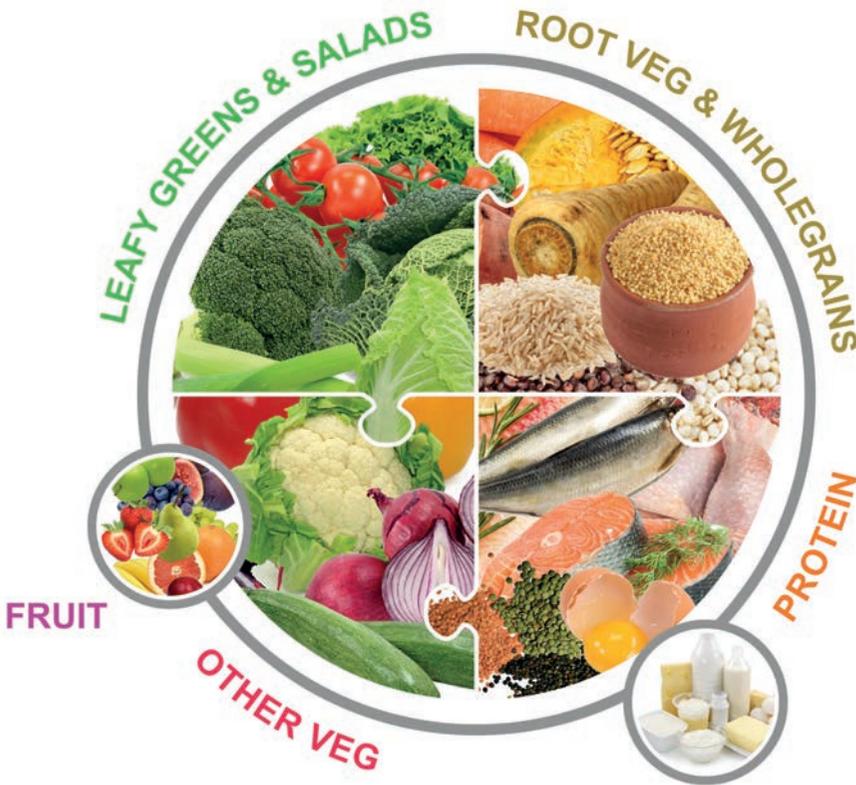
The UK 5-a-day target should be seen as a minimum – research is showing the benefits of eating a much higher amount e.g. 7 or more portions of vegetables and fruit⁽⁵⁾ per day. Other countries have higher targets – the Danes aim for 6, the French 10, and Canadians are urged to get through between 5 and 10.

WHY ARE VEGETABLES AND FRUIT IMPORTANT FOR HEALTH?

Vegetables and fruit contain essential vitamins and minerals as well as fibre (important for healthy bowels) and phytonutrients. Research is accumulating showing that vegetables play an important role in preventing chronic diseases. For example, the phytonutrients in vegetables can reduce inflammation. Inflammation is a critical factor in virtually every degenerative disease from heart disease to diabetes, arthritis, obesity, periodontal disease and Alzheimer's Disease.

HOW MANY PORTIONS PER DAY?

Increase vegetables until you have achieved the 'half-plate rule' i.e. half of your plate is vegetables (excluding potatoes) at both lunchtime and suppertime. If this is too much initially you can work on gradually increasing the number of vegetables over a period of weeks. Half a plate at both lunch and supper will provide approximately 6 portions of vegetables per day. In addition, 1-3 portions of fruit per day (1 portion if weight management is a concern). The best fruits to choose are berries, apples, pears and plums which are lower in sugar.



Source: BANT 2017 Wellbeing Guidelines
<http://bant.org.uk/about-nutritional-therapy/bant-wellbeing-guidelines/>

Some ways to increase vegetable consumption:

- Don't rely on your evening meal for all your vegetable intake
- E.g. 1 portion at lunch and 2 at supper or even better 3 at lunch and 3 at supper
- Include a variety of different vegetables at each meal
- Take a tupperware to work with raw vegetables to have with lunch
- Always order a side order of extra vegetables in restaurants
- Make extra vegetables in the evening and eat them cold for lunch with an olive oil / lemon juice and garlic dressing – add some raw vegetables as well
- Eat plant sources of protein e.g. nuts and seeds
- Have a green smoothie for breakfast or for a snack
- Be persistent with fussy eaters – encourage them to try at least 10 times! Tastes can be changed / trained
- Make vegetable soups e.g. pea and broccoli is very quick to make and can be portioned and stored in fridge or freezer



GLUTEN

BACKGROUND

Wheat is a staple carbohydrate in Western diets, often being consumed in some form at every meal and snack. It contains a protein called gluten. Other grains that contain gluten are barley and rye; oats (unless gluten-free) may be contaminated with gluten. Gluten is ubiquitous in our food – bread, pasta, cous cous, beer, flour products – all contain gluten. Less obvious sources include soy sauce, Worcestershire sauce, gravies, sushi and fried foods in restaurants (including chips).

WHY DOES GLUTEN CAUSE A PROBLEM FOR SOME PEOPLE?

The protein gluten cannot be digested by humans and increases gut permeability (i.e. leaky gut) for a while after it is eaten. This happens to some degree in everyone every time foods containing gluten are eaten. This can lead to an immune response and be a contributory factor in inflammation. A healthy body will 'mop up' the inflammation and repair the leakiness of the gut until gluten is eaten again, and the process starts again. However, because gluten containing foods are often eaten at every meal and snacks in between – the body's capacity to 'repair' the gut after eating these foods may be exceeded, and this can increase the likelihood of developing a sensitivity to gluten – a condition referred to as 'non-coeliac gluten sensitivity' (NCGS), which is linked to many conditions and symptoms can include gut, anxiety, depression, skin eruptions and more.

AUTOIMMUNE ILLNESSES AND LINK TO GLUTEN

There are over 70 diagnosed autoimmune conditions including well known conditions such as rheumatoid arthritis and type I diabetes. Autoimmunity is where the body's immune system attacks certain cells in the body – so in rheumatoid arthritis the joints are affected, in type I diabetes the pancreas etc. For autoimmunity to develop 3 factors are recognised as important:

- i) An environmental trigger – gluten can be such a trigger. Others include toxins, undesirable gut bacteria, other foods
- ii) Increased intestinal permeability (or leaky gut) – gluten contributes to increased intestinal permeability and
- iii) Genetic susceptibility to autoimmune conditions

Coeliac disease is an autoimmune condition of the intestine that results in the small intestine losing its ability to absorb nutrients and sufferers may have many gut and non-gut related symptoms. Coeliac disease is estimated to affect approximately 1%⁽⁶⁾ of the population. But as has been explained, gluten can affect people without coeliac disease and manifest with both gut and non-gut related symptoms.

HOW MUCH GLUTEN-CONTAINING FOODS CAN I EAT?

Firstly, those eating gluten containing foods should limit to maximum one portion per day – this will reduce the likelihood of developing NCGS. It is easy to choose alternative breakfast options and avoid at supper. Lunch 'on the go' is where people find they rely on a 'sandwich'. Good alternatives to gluten containing foods are quinoa, rice, oats and sweet potatoes; commercially produced 'gluten-free' foods are low in nutrients and should only be eaten minimally.

However, people with symptoms that indicate the possibility of NCGS should carry out a trial elimination of gluten from their diet (see Appendix 4 for guidance on how to do this). All sources of gluten should be eliminated – a small bite can trigger inflammation lasting several weeks or more. Remove all sources for at least 1 month (3 months for autoimmune conditions). Symptoms should be monitored and recorded prior to the elimination, during the elimination and on reintroduction of gluten (N.B. – some people may choose not to undertake a trial reintroduction of gluten foods if they have noticed a dramatic improvement in symptoms during the elimination).

If you are avoiding foods containing gluten you will need to check labels carefully and make enquiries when eating out. Food labelling laws mean that restaurants are required to provide information on allergens in their foods.

FOODS TO AVOID ON A GLUTEN-FREE DIET

Bread – wheat, rye, spelt and kamut	Semolina
Wheat pasta	Batter
Cous cous	Rusk
Tabbouleh	Wheat / spelt / rye / barley flour
Pearl barley	Commercial gravies
Semolina	Worcester sauce (gluten free available)
Beer / lager	Soy sauce (Tamari soy is gluten free)
Breadcrumb coatings	Baking powder (gluten free is available)

In restaurants – check ingredients. Beware soups, sauces and gravies (where flour might be used to thicken, even in tomato-based sauces). Chips may be coated with flour before frying to help crispiness. Avoid deep fried food as the oil will be contaminated with batter unless a separate fryer is used.

GLUTEN FREE ALTERNATIVES

There are many gluten free products on the market – bread, pasta, flour etc. These tend to be highly refined, high in sugar, starch and unhealthy fats and low in nutrients so are best used minimally or not at all (if avoiding all grains).

Please note that removing wheat from your diet can result in a significant reduction in fibre intake. Wheat provides >70% of the fibre in the UK diet. Ensure you increase other sources of fibre at the same time e.g. vegetables, fruit, nuts and seeds.

MOST POPULAR GLUTEN-FREE ALTERNATIVES

Gluten free buckwheat flour	<p>Available in health food stores. Choose gluten free varieties as buckwheat can be contaminated with gluten.</p> <p>Flour makes nice pancakes / crumble topping</p> <p>Groats make nice porridge – hot or cold</p>
Quinoa	<p>Similar to cous cous in texture and appearance. Care should be taken to rinse thoroughly before cooking to remove the saponin coating which may be mildly toxic</p>
Basmati rice	<p>Rice can accumulate arsenic from the soil so wash it before use. Cook in a larger volume of water than the 2-3x traditionally used; so that the water is not all absorbed during cooking and drain before use</p>
Gluten free oats	<p>Oats can be contaminated with gluten so choose brands that state they are gluten free</p>
Coconut flour*	<p>Can be used in combination with ground almonds or almond flour to make muffins/ coconut loaf</p>
Gram Flour*	<p>Made from chickpeas. Can be used to make flatbreads</p>
Cornflour	<p>For gravy thickening if needed. Corn is highly allergenic and may not be tolerated by some people</p>
Sweet potatoes*	<p>As well as being baked or mashed, sweet potatoes can be used to make a loaf in combination with ground almonds, eggs and other ingredients</p>
Butternut squash, beetroot and carrots*	<p>With main meals baked or mashed</p>

*These are all grain free.

NON-GLUTEN GRAINS

Rice, oats and corn are grains that do not contain gluten. Quinoa and buckwheat are regarded as 'pseudo-grains' i.e. strictly speaking they are not grains but have similar properties. Grains that do not contain gluten may cause a problem for some people. This is because non-gluten grains can have 'cross-reactivity'. This means they can cause similar reactions to eating gluten. Grains also contain substances called lectins which can damage the gut lining. It is relatively recently in our history that we started eating grains and they have been linked to many health problems in some people. This is why Stone-Age, Caveman or Paleo style diets do not include any grains (see Appendix 5 for more details on Paleo ways of eating).



GUT HEALTH

BACKGROUND

The gut has many functions and is central to health.

Digestion – this begins in the mouth and continues in the stomach and small intestine

Absorption – It is often said you are ‘what you eat’ but in fact you are ‘what you absorb’

Barrier – the gut provides a barrier between the outside world and the body. If this function is disrupted and the gut becomes ‘leaky’, this can contribute to autoimmunity

Immunity – around 70% of the immune system is located in the gut! So if you suffer frequent illness and infections, consider what may be going on in your gut!

Detoxification – the gut cells contain enzyme systems to detoxify internally produced (i.e. endogenous) and externally produced (i.e. exogenous) toxins

Elimination – The gut provides a route for elimination of wastes and toxins from the body. This includes excretion of excess cholesterol, sex hormones and other toxins that the liver may have excreted into the bile

DIGESTIVE DISORDERS

Few people today have perfect digestion and gut health. In fact, digestive disorders are one of the most common complaints in people visiting their GP. Bloating, heartburn, diarrhoea, constipation (i.e. less than once per day) and abdominal pain are some of the symptoms. Stool weight in many Western countries is low - 80-120g compared to up to 450g per day in societies eating an unprocessed high fibre diet!

Many factors of modern living adversely affect gut health including antibiotics, gut infections (e.g. when travelling), lack of vegetables and fibre in the diet, excessive alcohol and sugar, lectins (from grains and legumes), gluten from some grains and constant snacking.

Poor digestion increases systemic inflammation, which is one of the predisposing features of many chronic diseases.

The importance of the gut as central to health was recognised as far back as 400 BC. Hippocrates said:

“All diseases begin in the gut.”
“Death sits in the bowel”; and
“A bad digestion is the root of all evil.”

He said this around 2,000 years ago and there is now a lot of scientific evidence linking the health of the gut to most health conditions.

If you are experiencing gut symptoms then you might like to consider a trial elimination diet - see Appendix 4. In addition be sure to include lots of gut supportive foods such as vegetables and healthy fats. Vegetables may need to be lightly steamed rather than eaten raw initially. Increase gradually. Avoid sugar and alcohol.

APPENDIX 1:

SUMMARY OF RECOMMENDATIONS

Foods to Enjoy	
<p>Fish – white fish and oily fish. Choose small, wild fish e.g. wild salmon, sardines (fresh or tinned in olive oil). Avoid farmed fish and fresh tuna, swordfish</p>	<p>Fruit – especially berries (frozen ok). Also apples, plums, pears</p>
<p>Eggs and small amounts of lean meats – beef, lamb, chicken, preferably organic</p>	<p>Vegetables – dark green leafy vegetables, cucumber, avocado, green beans, dark salad leaves add brightly coloured root vegetables. Tomatoes, peppers and aubergine in moderation.</p>
<p>Nuts – almonds, walnuts (in smoothies), Brazil nuts</p> <p>Pulses – beans and lentils</p>	<p>Starchy carbohydrates – Sweet potatoes, oats, Basmati rice, quinoa, buckwheat (makes nice pancakes). White potatoes in moderation (or avoid).</p>
<p>Seeds – pumpkin, sunflower, Chia, flaxseed</p>	<p>Fats and oils – Extra virgin olive oil, extra virgin coconut oil, butter (in moderation)</p>
<p>Non-dairy milks such as coconut milk, almond milk. (Occasional sheep's milk yoghurt if dairy tolerated)</p>	<p>70% or 85% dark chocolate (after a meal)</p>

Foods to Avoid or Reduce

Sugary foods – cakes, biscuits, sweets, fizzy drinks, fruit juice, jam, dried fruit

Wheat, barley, rye – pasta, bread, cous cous, beer, flour products, sausages, also check food labels added to e.g. sushi

Sweeteners – aspartame, sucralose, xylitol, stevia (occasional use of stevia is ok if needed), fructose

Gluten-free products – eat these in small amounts only. They are very refined and low in micronutrients.

Fats and oils – Corn oil, sunflower oil, margarine, fried foods, processed foods

Large amounts of dairy.

Large quantities of soya* and quom products

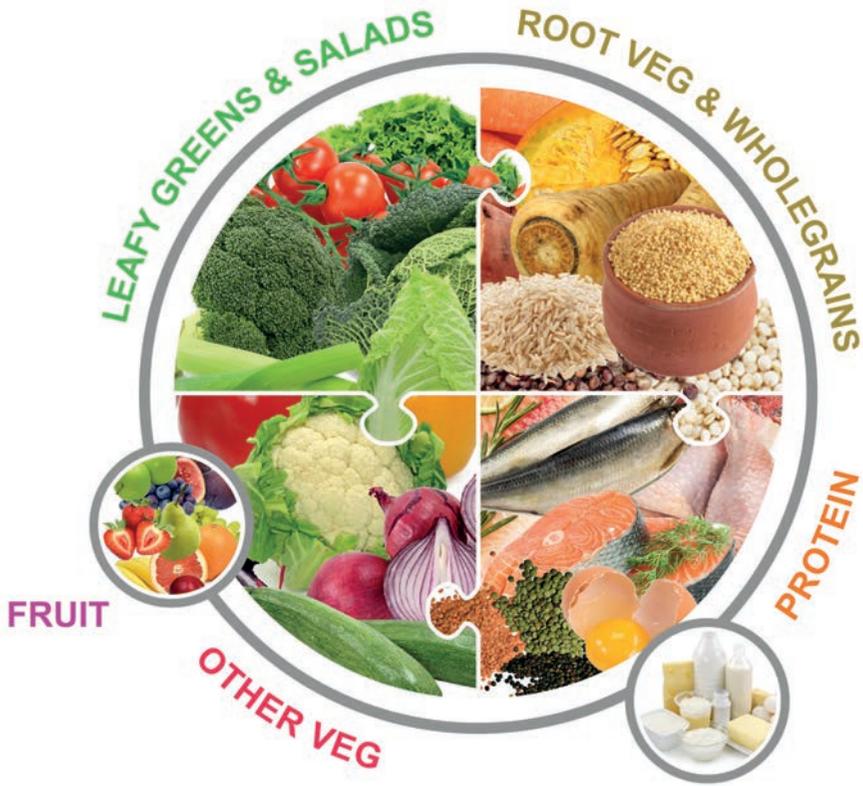
*Soy products are often highly processed (e.g. soy milk, yoghurt etc.). It is ok to enjoy small amounts of fermented soy products, as they do in Japan, e.g. natto and tempeh as well as tofu (most tofu is not fermented)



Foods to enjoy

APPENDIX 2: PORTION SIZES

HALF PLATE RULE



Source: BANT 2017 Wellbeing Guidelines

<http://bant.org.uk/about-nutritional-therapy/bant-wellbeing-guidelines/>

Healthy Fats:

Eat THREE to FIVE portions per day (THREE portions if managing weight)

One portion is:

- 15ml olive oil
- Half an avocado
- One portion of oily fish
- 20 - 30g of nuts or seeds

Vegetables and Fruit:

At least SIX portions of vegetables plus ONE to THREE of fruit; ONE portion if managing weight

- One portion is 80g of fruit or vegetables

Starchy carbohydrates:

ONE to THREE portions per day (ONE portion if trying to manage weight, TWO portions for most people, THREE portions may be needed if undertaking endurance exercise)

One portion is:

- A small / medium sweet potato
- 2 tablespoons of cooked basmati rice / quinoa / oats
- 2 small new potatoes
- 1 slice wholemeal or rye bread (other items on the list are more desirable than bread)

A note on salt

Salt intake is high in a typical Western, processed food diet (bread, cheese, ready meals, stock cubes etc.). A 'wholefood diet' will contain minimal or no added salt, especially if bread and cheese are not eaten. In this case use a good quality rock or sea salt eg Himalayan salt, Sel de Guerande or Fleur de Sel or similar. A good pinch daily should suffice.

APPENDIX 3: BASIC SHOPPING LIST

Vegetables

Avocado
Beetroot (raw or cooked)
Broccoli
Cabbage (green, red) + Brussels
Carrots
Celeriac
Celery
Courgettes
Corn, baby cobs or kernels
Garlic
Green beans
Kale
Lettuce – dark green leaves
Leeks
Mangetout/sugar snap peas
Mushrooms
Onions, yellow and red
Peas, frozen
Peppers – red, yellow, green
Red chillies (fresh)
Rocket
Spinach
Spring onions
Sweet potato
Other vegetables (potatoes don't count as a vegetable but can be eaten)

Fruit

Apples
Oranges
Limes
Lemons
Berries – e.g. frozen blueberries, raspberries
Plums
Pears
Bananas (occasionally, higher in sugar)

Oils & Store cupboard

Extra virgin olive oil
Virgin coconut oil
Balsamic, apple cider, red wine vinegar
Olives
Tomatoes, canned or passata
Organic stock cubes, gluten free
Tamari (light soy sauce, gluten free)
Harissa paste
Coconut flour
Ground almonds
70% or 85% dark chocolate

Pulses

Cannellini beans
Chick peas
Kidney beans
Puy lentils
Red split lentils

Herbs & Spices

Fresh coriander
Fresh and dried basil
Dried oregano
Fresh and dried rosemary
Fresh mint
Cinnamon
Fresh ginger
Ground cumin
Turmeric

Dairy & alternatives

Plain natural Sheep's yoghurt
(if dairy tolerated)
Unsweetened almond milk
(fortified)
KoKo coconut milk and yoghurt
(fortified)
Butter (if dairy tolerated)

Nuts and seeds (not peanuts, unroasted and unsalted)

Walnuts
Almonds
Pistachio
Hazelnuts
Brazil
Pumpkin seeds
Sunflower seeds
Flaxseed*
Chia*

*Need to be soaked or ground

Meat and fish (un-smoked)

Chicken - organic
Lamb / beef – 1-2x per week -
organic
Mackerel – counts as oily
Wild salmon – oily
White fish fillets (cod, haddock)
Fresh sardines – oily
Tinned sardines in olive oil – oily
Tuna (tinned in spring water,
however does not count as oily
fish). Avoid fresh tuna due to
mercury content

Eggs

Organic (or at least free range)

APPENDIX 4:

ELIMINATION DIET

An 'elimination diet' is a short-term eating plan that removes foods suspected of triggering symptoms, for between 3 weeks and 3 months. Eliminated foods are then reintroduced back into your diet one at a time. Symptoms are monitored before and during the elimination and after the re-introduction.

HOW DOES IT WORK?

There are various levels of elimination – which we are referring to as 'Basic', 'Comprehensive', 'Autoimmune' and 'FODMAPs'.

1. Basic Elimination would consist of eliminating gluten, and perhaps dairy, which are commonly found to be problematic for many people. This can be a good starting point for people as, with planning, it is possible to find alternatives to these foods. It is important to ensure removal of all sources and gluten is often found hidden in many foods including rice sushi, soups, restaurant chips and some types of soy sauce.

2. Comprehensive Elimination would include removing gluten, dairy, soy and eggs, citrus and possibly other grains (such as oats, rice) and pseudograins (such as buckwheat and quinoa).

3. Autoimmune Elimination would involve removing gluten, all other grains, dairy, soy, eggs, other beans/pulses, nuts and seeds and nightshade vegetables (potatoes, tomatoes, aubergines, peppers, chillies).

4. FODMAPs – fructo-, oligo-, di-, monosaccharides and polyols. These are types of carbohydrates found in some fruit, vegetables, cereal grains and dairy. They can ferment in the gut and be a cause of bloating and IBS.

This is not a comprehensive list of types of elimination diet – any food that is suspected of causing a problem could be eliminated for a short while and then reintroduced.

FOODS TO INCLUDE AND EXCLUDE DURING AN ELIMINATION DIET

Whichever exclusion you choose to do – also exclude sugary foods, alcohol and processed vegetable oils including margarines.

If conducting a gluten-free elimination, avoid over-consuming commercial 'gluten free' foods. These foods can be useful for convenience but are often highly processed and lacking in essential nutrients. If eliminating all grains then gluten-free breads etc. would also need to be eliminated.

Most elimination diets last for around 3-6 weeks as the antibodies (proteins your immune system makes when it negatively reacts to foods) take around three weeks to clear, although sometimes it is recommended that foods are removed for up to 3 months to see the full benefit.

During the elimination, you should begin to see an improvement in your symptoms.

ELIMINATION METHODOLOGY

- In the week before you begin the elimination diet, monitor and record your symptoms while eating your usual daily diet
- During the period of elimination eat ONLY the foods on the 'allowed' lists – (see table on page 45 for foods included and excluded depending on the type of elimination you are doing). It is important that the elimination is 100% to get the best results – so check all food labels
- When eliminating foods focus on the foods you can eat, rather than those you cannot
- Be prepared - plan your diet for the elimination period – all meals and snacks
- Carry a sheet of foods you can eat with you, as a reminder
- Monitor and record your symptoms during the elimination phase and compare them to before you started.

In addition to the foods listed in the table on page 45, avoid eating sugary foods and alcohol during the elimination period.

A FODMAPs or Autoimmune Elimination Diet are best planned with advice from a Nutritional Therapist. Foods to eliminate on a FODMAP diet are not included in this booklet.

Type of Elimination Diet	Foods to Include	Foods to Exclude
Basic – Dairy and Gluten	All vegetables and fruit, nuts/seeds, meat, fish, eggs, olive oil, coconut milk, coconut yoghurt, oats, rice, buckwheat, (gluten free breads etc. in moderation*)	Dairy – milk, yoghurt, butter, cheese, whey. Check food labels. Gluten – wheat, barley, rye – bread, pasta, cous cous, some soy sauce, Worcester sauce, some rice sushi, pub chips, flour products, beer. Check ingredients. Ask in restaurants.
Comprehensive Elimination	All vegetables and most fruits, nuts/seeds, meat, fish, olive oil, coconut milk, coconut yoghurt, sweet potatoes	Gluten, dairy, soy (soy milk, cheese, yoghurt etc.), eggs, citrus and possibly other grains (<i>oats, rice, corn</i>) and pseudograins (<i>buckwheat, quinoa</i>)
Autoimmune Elimination	Most vegetables (except nightshade) Sweet potatoes Most fruit Meat Fish Olive oil Coconut products (<i>check some coconut milks contain rice</i>) Herbal tea Green or black tea Coconut milk kefir Herbs and spices (<i>not chilli</i>)	Dairy Gluten Eggs Soy Citrus All Grains All Pseudograins Nightshade vegetables (<i>potatoes, tomatoes, aubergines, peppers, chillies</i>) Nuts/seeds, beans/pulses Alcohol Coffee

*If conducting a gluten-free elimination, avoid over-consuming commercial 'gluten free' foods. These foods can be useful for convenience but are often highly processed and lacking in essential nutrients. If eliminating all grains then gluten-free breads etc. would also need to be eliminated.

Most elimination diets last for around 3-6 weeks as the antibodies (proteins your immune system makes when it negatively reacts to foods) take around three weeks to clear, although sometimes it is recommended that foods are removed for up to 3 months to see the full benefit.

CHALLENGE / REINTRODUCTION PHASE

After your chosen time-period of eliminating these foods, you need to reintroduce foods, one at a time and watch for reactions. If you have removed a lot of foods this may take some time. Leave gluten, grains and dairy until last. Other than that, reintroduce foods from each food group one at a time. E.g. nuts would be one food group, beans another food group. NB – it is possible to react to certain nut types (the same goes for other food groups), if you are highly reactive you will need to reintroduce 'one food' rather than 'one food group' at a time.

It is important to note that this is a process that should not be rushed – in order for your elimination diet to be successful, patience and close monitoring of symptoms and bodily reactions, is essential.

If when you reintroduce a food you notice a reaction, make a note of it and wait until all symptoms have disappeared before reintroducing another food. If you react to a food it may be worth retesting it at a later date to check the reaction was not a coincidence.

- Continue to eat all the foods on the allowed list.
- Do only one challenge at a time i.e. foods from one group e.g. nuts
- On the day of the challenge, eat a small portion of the food.
- If you feel unwell during the challenge, return to the elimination diet and try the challenge again when you are feeling well again (it could be coincidence that you felt unwell, so recheck the result)
- Always allow at least 3 days on the elimination diet between each new food challenge, longer if you suffered constipation or if the challenge phase provoked symptoms.
- When you are ready, and feeling well, select and carry out the next challenge.

Leave grains, gluten and dairy until last as these are foods that most often cause a reaction. Other than that, the order of the challenges doesn't matter.

Record everything – what you ate during the challenges (including portion sizes) and any symptoms.

If you don't react to a food challenge within 3 days then that reduces the likelihood you have a problem with that food group – however keep it out of your diet until all the challenges have been completed. This is because with some foods there may be a cumulative effect and symptoms only become apparent after several days of eating it – so this could affect the results of other challenges.

EVALUATE YOUR RESULTS

If particular foods are a problem for you, you should now have an idea which foods trigger certain symptoms. Continue to avoid these foods.

HEALING THE GUT

Once you have conducted an elimination and challenge diet it is important to carry out some gut healing – ask us for advice on this. Otherwise there is the possibility of further food sensitivities developing and you may find more and more foods trigger symptoms.

NUTRIENT DEFICIENCIES DURING AN ELIMINATION

The risk of missing out on important nutrients, whilst conducting an elimination diet, partly depends on what foods are being eliminated and how long the elimination is being carried out. During the elimination ensure you are eating as many different types of food as possible from the allowed foods list.

An autoimmune elimination diet without grains and nuts could be low in certain B vitamins (especially B6).

Calcium might be another concern if dairy and nuts are eliminated. Other good sources of calcium are dark green leafy vegetables, sardines with the bones mashed in and fortified coconut milk (available in cartons in the long-life section).

A good all-round multivitamin/mineral would be important to include during an elimination diet. In any case, we recommend everyone takes a good all-round multi to bridge the 'nutrition gap'.

BENEFITS OF AN ELIMINATION DIET

Identifying and removing food sensitivities / allergies can improve many conditions as these examples show:

IBS – A study at the University of Kansas medical centre monitored 20 patients with irritable bowel syndrome (IBS) all of whom underwent elimination diets as part of a 2006 study – 100 percent of these patients experienced significant improvements in digestive symptoms⁽⁷⁾.

“These data demonstrate that identifying and appropriately addressing food sensitivity in IBS patients not previously responding to standard therapy results in a sustained clinical response and impacts on overall well-being and quality of life in this challenging entity.”

Eosinophilic Oesophagitis – 52 patients cut out four major food-allergen groups for a six-month period: dairy products, wheat, eggs and legumes. The results indicated that a four-food group elimination diet achieves remission in over half of adult patients with EoE.

“Milk was identified as an EoE trigger in 11 patients (50%), egg in 8 (36%), wheat in 7 (31%), and legumes in 4 (18%). All patients had just 1 or 2 food triggers, with milk being the only causative food in 27% of the patients.”

The patients had no idea that they were reacting to any of the above foods – so, many trips to the local GP were wasted as there was no way of getting to the cause of the problem. A simple elimination diet pinpointed the problem directly, and through elimination of these foods the patients in the study are no longer experiencing symptoms⁽⁸⁾.

Skin irritations such as eczema and acne have also been linked to undiagnosed food allergies as research suggests:

“We have evaluated the relationship between eczema and food by using elimination diet and subsequently open and double-blind challenge test in 15 patients. The clinical manifestations of 14 subjects were improved by elimination diet. Challenge test was positive in 10 patients. Nuts, tomatoes, milk, eggs and cereals were most frequently involved. Six patients suffered from food allergy (F.A.), 4 patients from food intolerance (F.I.) and 4 patients from suspected F.I. With the use of dietary elimination procedure, the symptoms completely disappeared. The results obtained for the treatment of eczema with this procedure may be very encouraging.”⁽⁹⁾

CONCLUSION

As you can see identifying food sensitivities and allergies is a little like forensics! When properly planned though, it can pay dividends in terms of improving symptoms and pinpointing an exact issue – in which case the time and effort will all feel worthwhile.

As explained, the aim is to reintroduce non-problematic foods – not remain on a very restricted diet for ever.

It is also important to carry out some 'gut healing' work, otherwise further food sensitivities may develop.

If you suffer from serious allergies or a medical condition we suggest that you check with your G.P. and Nutritional Therapist before starting an elimination diet.



APPENDIX 5: THE PALEO DIET

The Paleolithic diet, (abbreviated Paleo diet), also popularly referred to as the caveman diet, Stone Age diet and hunter-gatherer diet, is a nutritional plan based on the ancient diet of wild plants and animals that various human species habitually consumed during the Paleolithic era – a period of about 2.5 million years duration that ended around 10,000 years ago with the development of agriculture. Centred on commonly available modern foods, the "contemporary" Paleolithic diet consists mainly of grass-fed pasture raised meats, fish, vegetables, fruit, roots, and nuts, and excludes all grains, legumes, dairy products, salt, refined sugar, and processed oils.

A wealth of research now supports the premise that the evolutionary collision of our ancient genome with the nutritional qualities of recently introduced foods may underlie many of the chronic diseases of Western civilisation. There is now also a substantial body of evidence that illustrates many disease conditions can be improved by a return to the diet of our ancestors. This is the diet with which our physiology evolved, and is still designed to need for health.



The following outlines the foods that are still available today that formed the main part of the diet of Paleolithic man.

- Lean meat and fish, ideally organic meat and wild (not farmed) fish
- A wide variety of leafy vegetables with no exclusions
- Root vegetables – excluding potatoes
- Fruits - primarily berries and fruits native to the country of residence
- Nuts (not peanuts as these are legumes and not nuts); and
- Free range eggs from chickens that forage the land

Additionally, anything that can safely be eaten in its raw state – this does not mean you cannot cook it but that it should be capable of being eaten raw (i.e. edible flowers, herbs etc.).

You will notice there is no inclusion of grains, dairy products, processed foods, beans, pulses or seeds.

Grains were not consumed by Paleolithic man as they carried aflatoxins which would have killed the consumer, and the staple grains of today like wheat, rye, oats and barley were not abundant at that time. Moreover, the grain heads were much smaller. So even if they were eaten in their raw and young grass state, when not diseased, the level of inclusion would have been very low. Hence, we are not adapted to eating grains. Moreover, there is evidence of damaging effects in some people. The protein content, considered novel by a non-adapted immune system, can cause immune system reactions in sensitive individuals.

Some people seem to tolerate processed grains better than others and it might be that some newer gene pools are more able to use grains to a beneficial metabolic fate. Certainly, a review of the diets of healthy people in the mid-Victorian period suggests this.

Our conclusion would be that if you are healthy and eat whole grains without problem there is no reason to change. But if you are unhealthy, particularly with inflammatory or auto immune conditions and regularly consume grains you would be advised to try eliminating them from your diet, at least for a period of time to see if your symptoms improve.

Dairy: No mammal consumes its mother's milk for more than a fraction of its life. Humans lose the ability to produce lactase at around 18 months old so this suggests that milk would not have been drunk after that age. There are a few gene pools which have evolved in recent years where people now produce lactase throughout life, but most humans still lose this ability early in life. Even if one can digest lactose there is still casein to consider. Casein is a milk protein that is indigestible by humans and is implicated in atherosclerosis by virtue of its ability to pass undigested into the blood stream. So, the best advice has to be to consume minimum dairy proteins or avoid totally.

Beans, Legumes and Pulses are novel foods when considered in relation to the diet of our ancestors. There is little evidence of their presence in diets before quite recent days. All contain high levels of anti-nutrient factors such as tannins, phytic acid, trypsin inhibitors and lectins. Cooking reduces the first three to enable them to be used as foods but lectins are not destroyed by cooking. Research has highlighted a problem with lectins in that they bind to glyconutrients and appear to upset satiety and glucose tolerance mechanisms. They may also damage the gut lining contributing to leaky gut.

This would indicate that they are best avoided by people with type 2 diabetes or metabolic syndrome and probably should only be included infrequently by others.

Potatoes were not eaten by ancient man. Their first presence in diets appears around 10,000 years ago. Potatoes contain solanine which is highly toxic and in highest levels in green potatoes. This knowledge permits us to avoid using green potatoes today but would not have been available to early man. Who knows maybe they were tried and caused illness and discarded on this basis?

PROCESSED FOODS

On this we conclude with a statement from a book by Staffan Lindeberg MD PhD "Food and Western Disease"⁽¹⁰⁾:

"Dietary advice to prevent and treat common western diseases should be designed in accordance with human's biological heritage as much as possible. Foods that have been part of the human staple diet for less than 10,000 years should be critically examined before they are recommended as staple food. Even the risks with foods that were available during the Paleolithic era (approximately 2.5 million – 10,000 years ago), but which may contain anti-nutritional substances, should be carefully examined, in particular foods that are consumed in large quantities on a daily basis".

So, if you are suffering from Western Disease, or seeking to prevent it there does seem to be a good body of evidence in support of the Paleolithic diet. But if you are unwell please do consult with your doctor before making radical dietary changes.

APPENDIX 6: THE NUTRITION GAP

For many years now at Cytoplan we have presented the rationale that there is a nutrition gap in the diets of most people. The nutrition gap describes the difference between the levels of nutrients the average person, eating a reasonable Western diet, is obtaining from food, and those nutrient levels identified by research as being needed for optimal health in the population.

Nutrient shortfalls are caused by a number of different factors, including dietary intake, and this means that most people are not getting the level of essential nutrients needed for health and protection on a daily basis. This deficit impacts adversely on both immediate and long-term health. The nutritional status of our bodies is dependent on six factors:

- Our food choices
- Food growing, processing and preparation methods
- The nutrient content of the food we eat
- The ability of our bodies to assimilate these nutrients
- Lifestyle factors such as smoking, stress, alcohol intake, medications etc. – which give rise to extra nutrient needs; and
- Our level of activity (energy-expenditure)

If you are eating a typical Western diet, all of the above are relevant to the nutrition gap in your life. However, even if you are adhering to what we would consider an optimal human dietary regime such as the 'Paleolithic Diet', there are still two factors that can create nutrient shortfalls. These are a) the level of nutrients in the fresh foods you are eating and b) your level of activity.

SUB-OPTIMAL LEVELS OF ESSENTIAL NUTRIENTS

In every instance, the average Western diet is leaving us short of metabolically essential nutrients. As a specific example, let us take selenium, a mineral essential for the health and integrity of every cell membrane in the human body, providing antiviral, antioxidant and protective properties and a precursor for production of glutathione peroxidase (an important antioxidant). Yet in the main only those people taking a multivitamin-mineral supplement are getting sufficient selenium for optimal health.

Why is this the case? Selenium naturally occurs in the soil and should be contained in all the soil, everywhere on Earth. In a natural and healthy cycle the mineral is taken up from the selenium-rich soil by growing plant crops.

Subsequently, the mineral content of these plants nourishes the people and animals that eat them. Meat-eaters gain the benefit of the minerals in the animals eaten too. So why isn't this naturally beneficial cycle happening today?

The early forms of agriculture were 'sustainable' as plants were grown in soil to which excess plant waste from the animals (who had also consumed the plants) were returned. This process naturally re-mineralised and replenished the ground for the next crop. Early ploughing techniques also helped to evenly distribute the plentiful and natural fertiliser "mycorrhiza". Mycorrhiza is a ground fungus that 'biotransforms' inorganic minerals into an organic form that makes the minerals readily useable by plants, thus ensuring good mineral uptake. This biosystem is often termed 'sustainable agriculture'.

However, with modern farming techniques (that have been in use for decades), the grown plants are harvested and shipped all over the world and deep ploughing destroys the mycorrhiza. In addition, the standard use of 'NPK' fertiliser (containing nitrogen, phosphorus and potassium) deprives the soil of all the remaining sixty plus nutrients that would normally be present.

So what do these dramatic changes in farming mean to the selenium content of our soils?

If selenium in the soil is taken up by growing plants but not returned, the mineral levels gradually reduce in quantity to give the situation we have today, where the world's soils are 80% depleted of selenium. This essential mineral, once so abundantly rich in our soils, is now in a cycle of dwindling levels due to modern farming techniques. Sadly, there are only a couple of small pockets of land (e.g. Norfolk in the UK and Senegal in Africa) where the ground is still selenium rich⁽¹¹⁾.

McCance and Widdowson published data⁽¹²⁾ on the nutrient content in foods in 1936 and again in the 1960s and 1980s. Overall, across a broad range of nutrients, nutrition content was around 50% higher in 1936 than in 1987. For example:

- Comparing carrots in 1936 with carrots in 1987: 92% more calcium, 4x more magnesium and 88% more iron in the 1936 carrots
- Comparing potatoes in 1936 with potatoes in 1987: 55% more calcium, 43% more magnesium and 85% more iron in the 1936 potatoes



APPENDIX 7:

GLOSSARY

Antioxidants – molecules that quench 'free radicals' and protect cellular structures from oxidation. Oxidation can lead to chain reactions that may damage cells and create 'oxidative stress' in the body. This in turn can lead to ongoing inflammation; chronic inflammation is now being recognised as a core contributor to chronic diseases. Some vitamins and minerals have antioxidant action e.g. vitamins C and E; zinc and selenium. Phytonutrients found in vegetables and fruit also have antioxidant action

Blood sugar – blood sugar is the level of glucose in the bloodstream. Glucose is a type of sugar that body cells use for energy and it is the primary fuel for the brain. The body, and especially the brain, functions best with blood glucose at an optimum level

Essential fatty acids – certain omega-3 and omega-6 fatty acids are essential i.e. they must be obtained from the diet. These are alpha linolenic acid (omega-3) and linoleic acid (omega-6). From these 'parent' essential fatty acids the body can make the long-chain omega-3 acids EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid) and omega-6 fatty acid GLA (gamma linoleic acid)

Free radicals – are formed when oxygen interacts with certain molecules i.e. via oxidation reactions. They are highly reactive due to the fact they have an unpaired number of electrons; free radicals seek stability by gaining an electron from other molecules in the body, destabilising them in the process. Thus they can cause damage to molecular structures. Antioxidants can quench free radicals.

Glycation – the uncontrolled bonding of glucose molecules to cellular structures e.g. proteins, lipids, DNA which can lead to damage. Excess glycation can be caused by high blood sugar

Insulin – a hormone that helps glucose (from blood) enter cells where it is used to produce energy

Insulin resistance – a condition in which the body produces insulin but does not use it effectively. When people have insulin resistance, glucose builds up in the blood instead of being absorbed into the cells which can eventually lead to type 2 diabetes. Insulin resistance is also associated with other conditions such as polycystic ovary syndrome (PCOS).

Leaky Gut – the gut provides a barrier between the outside world and the body. Some substances are allowed through the barrier e.g. digested food. In other words, the barrier is permeable to certain molecules. Sometimes the gut can become too permeable – this is referred to as increased intestinal permeability or 'leaky gut', whereby damage to the gut wall allows the entry of larger food particles, bacterial metabolites and other molecules into the systemic circulation (i.e. the body). The barrier function can become damaged by alcohol, stress, non-steroidal anti-inflammatories (e.g. aspirin, ibuprofen), poor nutrition, food sensitivities, undigested food, unfavourable bacteria, toxins etc. This reduced barrier function can lead to inflammation in the body and the development of associated conditions such as arthritis, cardiovascular disease, autoimmune disease and many more

Triglycerides – are the main component of body fat – so they are a stored form of fat that the body can use for energy. They are also present in the blood but high blood levels are undesirable

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About Cytoplan

As leaders in food-based supplementation for over 30 years, Cytoplan has maintained the belief that nature holds the key to health, creating products that work in harmony with the body to optimise health. We are dedicated to improving the health of the nation, both ethically and sustainably.

Combining nature with science, we pioneered Wholefood & Food State supplements to create our market-leading supplement range. Our products are grounded in science, proven by results and designed to improve health, safely and effectively.

We are an independent British company, wholly owned by a charitable foundation and invest widely in health and nutritional projects across the UK and address issues such as community wellbeing and mental health. Every product purchased is helping us to help others.

Trusted by our practitioners and customers alike, we offer sound information about supplements and health to encourage self-empowerment and growth, helping customers to make their own informed decisions on their approach to nutrition and wellbeing.



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