

**Taking low starch and sugar, high
fat, fibre and salt diets to the streets**



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List of acronyms

ACT Acceptance and commitment therapy

HbA1c Haemoglobin A1c

HDL High density lipoprotein

LDL Low density lipoprotein

RCT Randomised controlled trial

U. S. United States of America

USB Universal serial bus

Chapter 1

A Brief history of nutrition and weight loss

1.1 A brief introduction to macronutrients

Although we all eat food in varying quantities every day, many of us are unfamiliar with the basic classification of the constituents of food and drink. Food consists of three basic subtypes (macronutrients), in addition to vitamins and minerals. These three categories are fat, protein and carbohydrate. Carbohydrate is further divided into starch, sugar and fibre.

The basic building block of carbohydrate is the single sugar (monosaccharide). Most commonly this is glucose, but also consists of fructose, galactose and maltose, for example. The term *sugar* may be confusing since it technically refers to a range of single unit molecules, yet what is commonly understood as *sugar* is table sugar. Table sugar is a crystalline white substance commonly added to tea, coffee and a wide range of manufactured foods. It consists of one glucose and one fructose molecule chemically joined to form a disaccharide. While glucose is found in abundance in starch, fructose is rarer, otherwise only present in fruit, honey, some root vegetables (kumara and potato) and some

sugar substitutes. Sugars of all kinds are digestible and are rapidly available to the body for use as energy, or converted to fat for storage.

Starch is made up of long chemical chains of glucose, which are readily digestible. It is present in high concentrations in wheat based foods such as bread and pasta, and also in rice, potatoes, taro and kumara. Most starch is digestible, although there are some which are less so (resistant starch).

Fibre consists of the plant cell wall, and largely passes through the human intestine without being absorbed. Squashes (pumpkin and butternut), brassicas (cabbage, broccoli and cauliflower), salad vegetables (lettuce and spinach) and marrows are concentrated sources of fibre. Unprocessed foods are also more likely to contain fibre.

Protein consists of long chains of amino acids, and is present in meat, legumes (beans), egg white, dairy products, soy products and to a lesser extent in flour. Protein is used to make essential structures in the body, such as collagen, albumin, cell structures and immunoglobulins. Protein may also be converted to sugar, and used for energy.

Fat is often divided into saturated and unsaturated varieties. Saturated fat is more likely to be a solid at room temperature, is generally found in higher quantities in meat derived from land animals. Dairy products and coconut oil are also rich sources of saturated fat. Unsaturated fats are further divided into polyunsaturated, and monounsaturated forms, and are common sources are seed oils, such as canola (mainly polyunsaturated) and olive (mainly monounsaturated).

1.2 Weight loss techniques

1.2.1 Fat restriction: limiting total energy intake

Weight loss techniques have been traditionally shaped on the concepts of energy density and avoidance of fat, and saturated fat. This method is based on the idea that if an individual eats too much (energy in) and does not exer-

cise enough (energy out), then weight gain will result (energy storage). Under this paradigm, **foods with high concentrations of energy (fats - since this macronutrient is twice as energy dense as either carbohydrate or protein) should be avoided altogether**. It was also believed, and still is in many traditional nutrition circles, that animal fats cause cardiovascular disease [28] (see section 2.1 on page 10). If fat is the problem, then carbohydrates are considered the saviour of macronutrients. This nutrition message originated in the U.S. in the 1960s, and has taken root in many English speaking countries, including New Zealand [32].

At its most extreme, these diets involve estimating the total energy in all food eaten throughout the day ('counting calories'), and trying to restrict this total so that it does not exceed a set limit. **Limiting total food intake** is, therefore, an important part of these interventions.

1.2.2 Starch and sugar restriction: controlling hunger rather than energy

In parallel to the traditional nutrition paradigm has been an alternative, which promotes fundamentally the contrary dietary message. Unlike the restriction of total energy, this method seeks to:

- improve satiety (control hunger and appetite)
- limit the intake of addictive carbohydrate, and
- encourage the body to use fat for energy, over carbohydrate.

The principal dietary strategy is to avoid the intake of starch and sugar and replace these substances with fat.

Satiety

Under the low starch and sugar paradigm, the primary problem is increased appetite and hunger, which is stimulated by digestible carbohydrate. These

components of food fail to satiate, drive hunger, which in turn leads to further energy intake. By avoiding starch and sugar, and increasing fat and fibre, hunger is brought under control, and weight loss is achieved. Contrary to fat which promotes a feeling of fullness when eaten via the release of satiety hormones from the gut, digestible carbohydrate has a lesser satisfying effect. Although intake of fibre is not known to stimulate satiety hormones, these 'resistant carbohydrates' are likely to improve satiety.

Under this restricted digestible carbohydrate regime, **the focus is not to restrict the total amount of food eaten.** Rather, by avoiding starch and sugar, hunger is controlled and this, in turn, limits overall food intake. Eating vegetables and certain fruits which are high in fat or fibre content are encouraged. In this sense, the often used term '*low carbohydrate*' can be misleading, since fibre is a carbohydrate, yet in this approach, fibre intake is encouraged.

Digestible carbohydrate is commonly found as starch, in such staples as bread, rice, pasta, potatoes, kumara, noodles, corn and bakery products. Anything made out of wheat or rice flour has a high density of starch.

Similarly, sugar, or sucrose, contains high concentrations of the monosaccharide fructose. Sugary foods taste sweet, and are likely to be even more important than starchy foods when it comes to stimulating appetite. Although it, at first, seems obvious which foods contain sugar (cakes, biscuits, sweets, soft drinks, ice cream, desserts), many foods contain high concentrations of sugar without consumers being aware of them. These foods include breakfast cereals, spreads, sauces, snack bars, flavoured waters and milks. It is useful to read nutrition panels on the back of packaged foods to check their sugar concentration or for the presence of sugar (or one of its synonyms, such as 'sucrose' or 'invert sugar') in the first few ingredients of the item.

Fruit may also contain high levels of sugars and starch, and can play a role in promoting weight gain and limiting weight loss. Although fruit has high levels of fibre and is, in general, healthier than packaged food items, in order to lower sugar and starch intake, fruit intake should be limited. At this stage,

this list of restricted foods might sound draconian, but in later sections we discuss the surprisingly wide range of foods that are encouraged, due to their low concentrations of sugar and starch (section 3.3 on page 16).

Carbohydrate addiction

It is commonly believed in nutrition circles that eating behaviour involves nothing more than simply making rational choices, and that eating behaviour may be easily influenced by providing information. This belief is challenged by observations that sugary foods are most palatable, and seem to be the most difficult to resist (figure 1.1 on page 6). Animal and human research also provides evidence that sugar is a strong driver of brain reward pathways that are implicated in addiction [3, 32].

Emerging evidence suggests the presence of a starch and sugar withdrawal syndrome, when people try and reduce their intake of these substances [31]. These symptoms include: irritability, craving, responding to cues to consume, depression, muscle and abdominal aches and depressed mood. The symptoms are likely to peak in the first few days after abstinence from sugar and starch, and settle after one to two months of continued abstinence. In the low carb community, these symptoms are often labelled as the *low carb flu*. Sugary and carbohydrate rich food quenches these symptoms quickly, and we think that this is one reason that dietary behaviour is so difficult to change. In support of the idea of sugar and starch addiction is the observation of parents that their children prefer some foods (often sugary) over others (figure 1.1 on page 6).

In the low starch and sugar paradigm, hunger need not be restrained completely. Hunger pangs can be dealt with by consuming items exempt from appetite-stimulating starch or sugar. Tolerance or hunger for digestible carbohydrate will reduce as the patient continues to abstain. This process is thought to be similar to the withdrawal symptoms that occur, when, for example, a smoker abstains from cigarettes. At first, the quitting smoker experiences severe cravings and urges to continue to smoke, but with continued abstinence,

these feelings slowly subside and the smoker's tolerance and desire to smoke fades.

In contrast to starch, intake of indigestible carbohydrate, or fibre, is encouraged, and is unlikely to promote tolerance.



Figure 1.1: Parents know that kids find some foods more desirable than others.

The body's preference for using starch and sugar as a fuel over fat

Insulin, a hormone released by the pancreas, is excreted after high sugar and starch content meals, and to a lesser extent in response to protein. The hormone signals to muscle and liver cells to store and break down glucose. Simultaneously, insulin release blocks the use of fat for energy.

Fatty food intake, in contrast, does not promote insulin release. Low starch intake, coupled with higher levels of fat, therefore, promote weight loss by limiting insulin release, which then allows the body to burn a higher proportion of fat for energy. A product of fat metabolism are ketone bodies. Low starch and sugar diets are often referred to as *ketogenic*. The presence of ketones in the blood stream leads to a faint acetone smell on the breath.

These ketones may be monitored. A ketone breath tester (the ketonix) provides a low cost (about US\$100) means of giving biofeedback to those who are serious about losing weight, and want some objective evidence that they in a fat burning metabolic phase. The device is USB powered, and can be run from a personal computer or plug-in or battery USB power supply. If you are not succeeding with low digestible carbohydrate approaches, gathering some objective evidence of entering ketosis, such as through a capillary testing device or breath tester is likely to be useful.

As well as limiting sugar and starch, it is important to limit protein intake. Protein can stimulate insulin release and block ketone production.

1.3 A brief history of low starch and sugar diets

These diets have been around for many years. After the 19th century Victorian William Banting promoted the diet, Dr Robert Atkins, a U. S. cardiologist, introduced it to modern audiences in the 1950s and 60s [2]. The idea was to limit the intake of *starch* and *sugar* (to less than 50g per day, which is about two and a half slices of bread), thereby reducing insulin release and promoting fat burning and weight loss. The diet has now changed into several different forms such as:

- Paleo lifestyle
- New Atkins diet
- Low carb high fat

These diets have some differences and similarities. Paleo approaches focus on eating whole foods, and often incorporate exercise into the lifestyle. Paleo diets also tend to exclude dairy products, some of which would be encouraged in strictly low carbohydrate diets (cheese, butter, high fat yoghurt, cream, cream cheese). Honey is an acceptable part of some paleo programmes, which is discouraged in a strictly low carbohydrate approach, due to honey's high fructose

content. Despite the differences, Paleo cookbooks can be a very useful source of low carb recipes. The Atkins diet was initially promoted as a low carb, high protein diet, but in recent years, substitution of carbohydrate with increased quantities of fat is recommended instead, to limit the adverse effects associated with protein-stimulated insulin release.

Randomised trial evidence now supports the use of low carb approaches. Over the long term, they have been found more effective for effecting weight loss than low energy diets [24].

1.3.1 Some variations of carbohydrate restricting diets

There are varying types of digestible carbohydrate restricting diets. At the least restrictive end are diets based on glycaemic index. Glycaemic index refers to the spike in glucose concentration after a meal, standardised by the weight of carbohydrate it contains. Technically, it is the area-under-the-curve of serum glucose concentration during the one hour after the meal is eaten. These diets emphasise the replacement of refined carbohydrates, such as white flour (used to make white bread) with less refined carbohydrate types, such as those which contain whole grains. Diets based on glycaemic index would, for example, counsel people to select whole grain breads over white varieties. Apart from the carbohydrate content, the acidity of the food, the fat and protein content also delay gastric emptying, so that fermented foods, such as sour dough breads, tend to have low glycaemic index.

Some evidence suggests that diets which restrict glycaemic index lower chronic disease risk, although the efficacy of the diet as a weight loss tool is limited. Evidence suggests that people with diabetes have an exaggerated insulin release to lentils and oats, over and above that which would be predicted from the patient's post-meal glucose levels [17].

Glycaemic index has some flaws, particularly when the method is applied to sugary food. Perhaps the strongest of all epidemiological evidence of harm from any dietary component is that from table sugar or sucrose [16]. Sucrose

is a disaccharide made of one molecule of fructose and one of glucose, chemically joined. **The fructose part of sugar, however, has an extremely low glycaemic index.** Fructose does not affect glucose concentrations immediately after meals, and this property of the fruit sugar lead the scientific community to believe that sugar was safe. This property of fructose was particularly influential in conditions in which control of post-prandial blood glucose is important, such as diabetes. Despite this lack of acute effect on post-prandial blood glucose, strong epidemiological and laboratory study evidence suggests that long term high sugar intake leads to dysglycaemia and the onset of diabetes [14].

Sugar itself, in isolation of other carbohydrates, has become a target to reduce dietary intake to effect weight loss and reduce chronic disease risk. This has largely been justified through epidemiological evidence linking soft drink intake with a variety of indices of cardiovascular risk (diabetes, dyslipidaemia, hyperuricaemia, hypertriglyceridaemia, hypertension, dental decay, non-alcoholic fatty liver disease) and the disease itself [32]. In support of this evidence is animal based and short term human cross-over trials showing short term metabolic dysregulation induced by eating high concentrations of fructose, with starch or glucose serving as the comparator.

Apart from these metabolic effects, sugary food and drink is uniquely destructive to teeth, leading to dental decay [26]. Scientific studies show that dental decay, diabetes and cardiovascular disease are linked [30].

Few long term trials of sugar restriction have been undertaken, but several randomised controlled trials now show that among soft drink drinkers, replacing these drinks with low energy alternatives ('diet' or 'zero' drinks) leads to the maintenance of long term weight loss [10]. Linked to these results is a study showing that replacement of sugary drinks with low energy replacements leads to equivalent ratings of satiety (feeling full). This addresses some concerns that replacing sugary drinks with low energy alternatives is likely to lead to replacement of energy from other sources [9].

Chapter 2

Challenging some dietary myths

The authors notice that the message of increasing fat intake contradicts received wisdom of how to go about weight loss, but also of how to prevent the onset of cardiovascular disease (strokes and heart attacks). It is likely that the ideas presented in the earlier sections will contradict the nutrition viewpoints of traditional authorities on the subject. We will now explore some of what we consider to be false beliefs related to diet and disease prevention.

2.1 Saturated fat causes cardiovascular disease

The 5th edition of the Oxford Textbook of Medicine (2010) [18] asserts

“... Foods that increase the risk of coronary heart disease when consumed in large amounts ... are rich in saturated or trans-unsaturated fatty acids, and dietary cholesterol.”

This conclusion is, however, at odds with with the statistical evidence of studies which have compared people who eat high and low quantities of saturated fat. A number of meta-analyses have now concluded that the evidence



Figure 2.1: Nutrition is a very confused space with many competing ideas.
Source: www.freedigitalphotos.net

that saturated fat causes cardiovascular disease is tenuous, since the dietary exposure and disease are not statistically associated, let alone likely to be causal [19].

Now, increasing evidence links sugar intake with the onset of cardiovascular disease (heart disease and stroke), with several cohort studies linking the exposure with the disease, with relatively strong associations reported when the top and bottom fifths of reported intake were compared in a surveyed population from the United States [35]. In fact, statistical evidence supports limiting sugar intake to improve a whole range of risk factors for cardiovascular disease [32].

2.2 Lowering low density lipoprotein (LDL) cholesterol is the key to achieving metabolic health

This belief is linked to the previous section about saturated fat. An element of the diet-heart hypothesis is that feeding studies showed that higher intake of saturated fat increased LDL-cholesterol concentrations. LDL-cholesterol is measured in the blood, and is statistically linked to risk of suffering a heart attack or stroke. This evidence continues to justify dietary advice to lower saturated fat intake, and encourages an obsession about the LDL cholesterol levels. The observation that statins lower LDL and also, in some studies [29], reduce CVD incidence seems to support this theory.

Against this theory, however, is some contrary evidence. Dietary trials which compare saturated fat lowering with usual care find little evidence of preventing CVD events [19], or prolonging survival [19]. Similarly, other drugs which have large effects on reducing the concentration of LDL cholesterol, such as hormone replacement therapy, actually increased the incidence of CVD events [11]. Fibrates are another disappointing example of a drug which lowers LDL cholesterol, yet has no effect on overall survival [23]. The relatively small purported beneficial effects of statins on CVD incidence are likely to be independent of their effect on LDL cholesterol concentration, since no relationship is seen between study baseline LDL concentration and statin effect from meta-regression studies [22].

LDL cholesterol concentration is itself only weakly associated with CVD incidence in observational studies [1]. In our opinion, this marker, should not be used as a central marker of a patient's metabolic health. Serum urate and triglycerides are instead favoured.

2.3 Salt in the diet must be limited

Studies show that increased salt intake leads to slight increases in blood pressure; however, it is still unclear whether restricting salt improves survival. Only one randomised study has been completed in humans, and it showed, that in patients with heart failure, salt restriction lead to an almost three fold increase risk of death, compared to usual care [21]. Unless there are compelling reasons, such as kidney failure, the evidence for reducing salt in the diet is thin.

In fact, Volek and Finney [33] allege that the low starch and sugar state is associated with loss of sodium that should be replaced at the rate of about two and a half teaspoons of salt per day. The reduction in insulin release, and increase in glucagon, which accompanies eating less starch and sugar leads to salt (sodium chloride) loss by the kidney. Salt depletion can lead, in turn, to dehydration, stimulation of the hormone aldosterone, and loss of the mineral potassium. Volek and Finney [33] counsel people eating less than 60g of carbohydrate per day to supplement their salt intake. Miso soup is a salt rich Asian soy based soup which may help to supplement salt while following the low starch and sugar diet. In any case, liberal application of salt is recommended, when restricting digestible carbohydrate.



Figure 2.2: Salt: not the evil we once thought it was. In fact, supplementation is recommended when following a low sugar and starch diet. Source: www.freedigitalphotos.net

Chapter 3

How do I get started with eating low carb high fat?

3.1 Medical considerations

There are few contraindications to a low carb high fat diet. People taking anti-hypertensive, insulin and oral hypoglycaemic drugs should be monitored, however, since their glycaemic control and high blood pressure may improve, as they reduce their sugar and starch intake. The only absolute contra-indications include individuals with rare genetic disorders, such as pyruvate carboxylase deficiency, porphyria, or disorders associated with fat metabolism.

While some people can stay thin and metabolically healthy eating high carbohydrate diets, once weight gain and metabolic disease, such as gout or diabetes, have set in, scientific evidence supports the use of low starch and sugar regimens to help people recover [34, 25].

3.2 Unstocking the pantry

Moving to a low starch and sugar, and high fat diet involves a different mindset. It generally requires paying more attention to food than usual, as most ready to eat food is at the other end of the nutritional spectrum (high starch and sugar; low fat).

Common dietary misperceptions are that breakfast cereals are healthy. These are usually 10 to 30% sugar, and very high in starch content. Fruit juice, which is high in sugar content, is often falsely believed to be healthy.

Since eating is largely an automatic behaviour [7], people embarking on such a diet should seek to control their food environment, particularly at home. If possible, involve the whole family, and change dietary practices together, otherwise the easy availability of sugary and starchy food is likely to undo good intentions. A *clear out day*, before undertaking dietary change is recommended.

3.3 What should the pantry be restocked with?

Eggs and fatty dairy products are a staple of the low starch and sugar approach. Eggs, cheese (in all its varieties), full-fat Greek yoghurt, cream and butter are staple foods. Fatty cuts of meat are encouraged, such as roasts, pork belly, ham, salami, bacon and fatty sausages. Fish and poultry are also fair game. Canned sardines are a particularly handy and cost-effective low starch snack. Yoghurt and cream can be used as a base to make smoothies.

Tasty omelettes, made with some fresh herbs, salami and cheese are a good, low starch, breakfast.

Nuts are great low carb snacks. Macadamias are particularly high in fat content, although all varieties are low in starch.

Salad greens along with fibrous vegetables such as cauliflower, broccoli and cabbage are unrestricted, and useful as potato substitutes. Pumpkin and other squashes (butternut or buttercup, for example) are also useful potato and ku-

mara substitutes. Squashes contain about 5% carbohydrate and are high in fibre. They can be easily cut in small chunks and roasted to provide a substitute for oven fries. Avocados are also low in carbohydrate, and high in fat. Eggplant and beetroot are other low starch vegetables. Kale is another popular fibrous leafy vegetable, which may be roasted in olive oil to make chips, as a potato chip substitute.

Stevia and other sweeteners can be used to substitute for sugar. LSA (linseed, sunflower and almond) meal can be used as a flour substitute, along with ground almonds, when baking. Fruit can contain high amounts of sugar, and fruits which are encouraged include ones which have lower concentrations in sugar, such as berries, watermelon, peaches and nectarines. Cocoa, in its various forms, may also be used to prepare low starch desserts.



Figure 3.1: Pumpkin is a good substitute for potato and kumara. These squashes contain only about 5% starch, less than a third that of the root vegetables. Eggplant is another great low starch vegetable.

Bread is a difficult food to substitute, and in our opinion, best avoided. If you have to eat it, in general, whole grain versions and sour dough versions are better than white. Wraps can also provide a lower total starch load than

bread. Coconut bread can be found in some health food stores. This type of bread still contains starch, but has a much higher concentration of fat than usual breads.

3.4 How to get started?

Since eating is such a deeply ingrained behaviour, working on change can take some time. One approach is to keep a food diary in a notebook, or taking photos of food, either using a digital camera or a mobile phone. You can then review your dietary choices with your GP or practice nurse. The health professional may then discuss the nutrient composition of some of these foods and suggest alternatives.

When people attempt to limit starch and sugar intake, withdrawal symptoms are common, such as craving for sugary food, irritability, head aches, and difficulty concentrating. Despite the intense craving for carbohydrate rich foods in the first few days to weeks of eating low starch and sugar, these feelings will subside if they persist. It is useful to plan what to do when these symptoms hit. Having a good, readily available supply of low starch and sugar snacks is useful.

3.4.1 Some suggested replacement foods

Here are some examples of foods that are relatively high in starch and sugar, with some of the replacements we recommend.

3.4.2 Dietary advice

Main meals

In general, some simple solutions can be egg based foods for breakfast, such as omelettes, fried, boiled or scrambled eggs. Lunch can be difficult, however more cafés offer low carb options, and cooking a bit more egg for breakfast or

Table 3.1: Some commonly consumed unhealthy foods and drinks, with suggested replacements.

Food item	Suggested replacement	Level of evidence
Sugary soft drink, cordial or fruit juice	Diet drink (with low energy sweetener), milk	RCT [10]
Mashed potato, kumara, rice, pasta	Cauliflower or broccoli mash	RCT [24]
Potato chips (oven fries)	Pumpkin or courgette fries	RCT [24]
Cakes, biscuits, lollies	Nuts, cheese, celery sticks, berries	Meta-analysis of RCTs [13]
Sugar in tea or coffee	Stevia, other artificial sweetener	Meta-analysis of RCTs [13]
Milky coffee (flat white, latte)	Long black with cream	RCT
Breakfast cereal (usually 10 to 40% sugar)	Eggs (scrambled, fried, boiled, poached), omelette Sausages or porridge (fortified with desiccated coconut)	Meta-analysis of RCTs [13]
Milk chocolate	Dark chocolate ($\geq 80\%$ cocoa, if possible)	Meta-analysis of RCTs [13]
Bread	Wrap, wholegrain variety	RCT [24]

RCT: randomised controlled trial.

dinner can be saved for lunch. Existing dinners can be adapted to a low carb lifestyle by substituting finely chopped cauliflower in place of rice, roasting courgette or pumpkin chips. Pumpkin is a useful potato substitute. Websites, such as www.lowcarbcooking.com (and others at the back of this book: see page 44) are also useful.

An invaluable low carb cookbook is *Low carb revolution* by Annie Bell [5]. Some of the UK ingredients can be substituted for New Zealand ones, such as cream cheese for quark, for example.

Sugar substitutes, such as stevia (a natural sweetener; figure 3.2), and sugar alcohols should be encouraged, particularly in the early stages, if you have a sweet tooth. Be warned, however, that overuse of these products can result in diarrhoea.



Figure 3.2: Stevia, a natural sweetener, derived from a plant, is a good sugar substitute. Source: www.natvia.co.nz

For alcohol, dry red wine has the lowest carbohydrate content, followed by dry white and beer (relatively high in dissolved glucose). Spirits and liqueurs have a relatively high sugar content.

As mentioned earlier, restriction of digestible carbohydrate leads to salt loss and possible electrolyte disturbance [33]. Supplementing the diet with about two level teaspoons of extra salt per day is recommended. Symptoms of headache, dizziness and general unwellness while following a low starch diet may be alleviated with salt supplementation.

Many desserts which are commonly consumed in New Zealand are high in sugar content, such as ice-cream, crumbles, cakes and biscuits. In their place, we recommend blending berries with whipped cream. Some low carb cheese cake recipes and almond flour based recipes for cakes and biscuits can be found.

Snacks

Recommended items include:

- raw vegetables (for example: celery, cucumber)
- boiled eggs
- olives (these have a very favourable fat to protein and carbohydrate ratio)
- nuts (cashews, macadamias, and brazil nuts have particularly high fat content)
- butter (yes, a slab of butter on its own!)
- cheese
- jerky
- salami
- fish, such as smoked salmon or sardines

- ham
- fried coconut chips
- dark chocolate (at least 80% cocoa if possible)
- a shot of cream
- low carb smoothies



Figure 3.3: source: www.freedigitalphotos.net

3.5 What if I am still hungry and not losing weight?

Some don't succeed right away when trying a low starch and sugar approach. Generally, this is related to either not reducing their intake enough (less than

50g/day is recommended) or not increasing their fat intake. One revelation in the recent past is that low starch approaches are probably not enough, increasing fat intake is also important, and high fat foods reduce appetite. It is probably useful to check serum urate and HbA1c, as well as using some form of ketone monitoring to gather some objective evidence of adherence to the diet. Again, reviewing the diet, through taking a dietary diary or review of photos of food eaten with a low carb-sympathetic health professional may be useful.

You may not want to go the whole nine yards, and restrict all starch and sugar. Some people will lose weight simply by limiting sugar intake. If they still have trouble losing weight, then low carb approaches are recommended. In fact, a step-wise approach to a low-sugar and starch may be useful to consider. We recommend starting by limiting sugary food and drink, then fruit and honey. Some people will make remarkable progress with this simple approach. If weight is not coming off, then progression to further restriction of starch is recommended (figure 3.4), starting with the most concentrated forms of starch and moving to lesser concentrated forms if progress is slow.

3.6 Some further suggestions to help change eating behaviour

3.6.1 Mindful eating

Some ideas which may be explored, which encourage taking time and savouring the experience of eating are:

- sharing a meal with friends and intentionally enriching the meal by eating with others (eating in front of a screen is the antithesis of this)
- savouring the taste and quality of the food
- deliberately slowing the eating of the meal, allowing satiety to develop

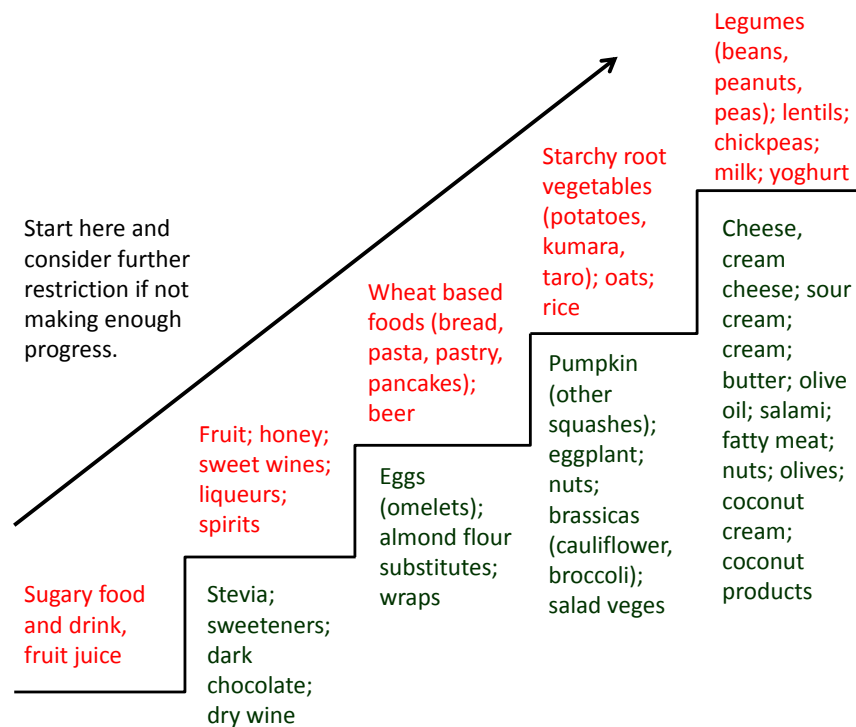


Figure 3.4: A stepwise approach to restricting sugar and starch, starting with those that are most likely to stimulate hunger and cause metabolic harm. Underneath the foods to avoid (red font) are some suggested replacements (dark green).

3.6.2 Managing hunger urges

When urges to consume starch or sugar arise, we have two options: act on them or refrain. Family doctor Russ Harris explains in his book *The Happiness Trap* [12] a series of steps to take when these urges arise:

1. observe the urge or craving in your body
2. acknowledge the presence of the urge
3. make room for the urge by taking some deep breaths
4. rate the urge on a scale from 1 to 10, with 1 being the mildest urge and 10 the most severe

5. consider your values and overall long term goals. Answer the question,
“What should I do now that will help me achieve my long term goals?”

Planning ahead for these urges, and having alternative options, such as healthy low carb snacks on hand may be incorporated into this process.

This type of strategy may help you prepare for a variety of other problems which might involve suppression of unwanted thoughts and behaviour.

Appendix A

A physiological view of macronutrient metabolism and regulation

The biological regulation and metabolism of macronutrients is complex and understanding is limited. We have tried to summarise what we consider to be the main mechanisms at work in figure A.1.

A.1 Protein

In a nutshell, protein is metabolised in the liver for energy or used to make protein in the body. Excess protein may be stored as glycogen and intake of protein stimulates insulin secretion. Protein intake leads to the release of gut satiety hormones (cholecystokinin and glucagon-like peptides). These hormones are thought to lead to a feeling of fullness or satiety. Fat intake does not stimulate insulin, but does stimulate some gut satiety hormones, helping us to feel 'full'. Fatty acids may be metabolised throughout the body, either in the liver, fat cells or muscle fibres.

A.2 Digestible carbohydrate

Carbohydrate intake, for simplicity, is divided into glucose and fructose, although they often enter the body together as sucrose (table sugar). Starch is broken down, through digestion in the gut, into constituent glucose units. Glucose stimulates insulin release. Insulin is the key metabolic hormone, signalling to muscle and liver cells to store and break down glucose. Simultaneously, insulin release blocks fat metabolism and ketogenesis [27]. Fructose, on the other hand, has little to no acute effect on insulin after a meal, but does lead to insulin insensitivity and hyperglycaemia with prolonged high intake of the pentose sugar [15]. Fructose is almost exclusively metabolised in the liver, and it does not trigger the release of any satiety hormones [15].

To summarise, starch and sugar are the main drivers of hunger, and also block the body using fat as fuel. To switch the body into fat burning, it is necessary to deprive the body of starch and sugar.

Conversely, evidence suggests, that starch and sugar are the main dietary drivers of the brain reward pathway, also linked to drugs of abuse, which in turn stimulate appetite and hunger [8]. Fructose intake is thought to be the principal influence of serum urate and serum triglyceride concentrations. Excess fructose intake is also likely to inhibit production of high density lipoprotein cholesterol (HDL) [4].

Just to make things even more complicated, some glucose (or hydrolysed starch) is also converted to fructose, by an intrinsic liver biochemical process, called the polyol pathway [20]. There is some debate about how important this mechanism is in mediating the health effects of starch and glucose.

A.3 Fibre

Dietary fibre, present in many fruits, vegetables, seeds and nuts, does not stimulate satiety hormones and is largely excreted in the stool unchanged. It is likely, however, to have a beneficial effect on satiety, although it is not known

exactly how this is mediated [6].

The diagram illustrates the way starch and sugar, and to a lesser extent, excess protein act through the action of the hormone insulin to inhibit fat burning (ketogenesis). To increase fat burning, it seems logical to reduce insulin release by avoiding starch and sugar, and maximising ketosis, by increasing fat intake, to promote the use of fat as a fuel, leading to weight loss.

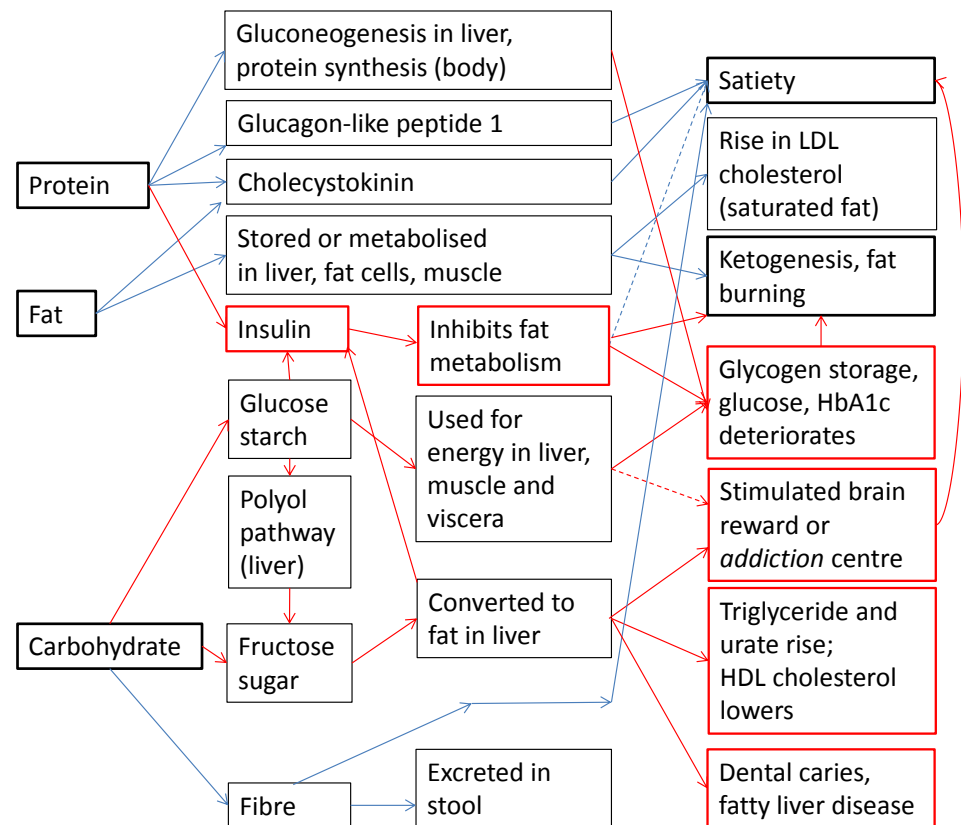


Figure A.1: The main physiological pathways, hormones and biological effects associated with macronutrient intake. Adverse health influences are coloured in red.

Appendix B

Some favourite low carb meal ideas

Yes, sometimes eating eggs for breakfast can be a chore, and some good recipes can break up the boredom. I use spices, such as paprika, and condiments such as soy sauce and balsamic vinegar to break up the bland taste of eggs. Cooking eggs in lightly burned butter can also give the fried eggs a subtle hazelnut flavour.

This section is not intended to be exhaustive, but to simply give you some ideas as a place to start. Here, we've emphasised recipes which are relatively simple. To take things further, I recommend Annie Bell's '*Low carb revolution*', and Daniel Green's '*The paleo diet*' (both published by Kyle books).

B.1 Breakfasts

B.1.1 Omelettes

Fried eggs are a staple in our house hold. Omelettes are easy to make and provide scope for variation. The trick to cooking a good *omelette* is using only three eggs at a time, whisking them, and cooking on medium heat. You can

scramble the eggs a bit until they are cooked through. The free kindle book *'The egg and I'* has many variations (see appendix C on page 44, such as cream cheese and ham, which are added immediately before serving. Other combinations are cheddar and bacon; tomato, parsley and cheese; pepperoni and tomato; asparagus and cheddar cheese; and cheese and capsicum. There are an infinite toppings that can be put onto the base omelette to cover breakfast.

B.1.2 Scrambles

These are like omelettes, but a bit less fussy, you cook the ingredients that need heating and throw the eggs straight in.

Country scramble

- 1 tablespoon butter
 - 1/4 cup diced cooked ham
 - 1/4 cup diced green capsicum
 - 2 tablespoons diced onion
 - 3 eggs, beaten
 - Salt and pepper
1. Melt the butter in a skillet over medium heat. Add the ham, capsicum and onion. Sauté for a few minutes until the onion softens.
 2. Pour in the eggs, and scramble until set. Add salt and pepper, then serve.

You can experiment with different variations on this theme. Try adding some chopped tomato. Other variations include adding garlic and a tablespoon of Parmesan cheese for an Italian flavour.

Greek scramble

- 2 tablespoons olive oil
- 2 tablespoons chopped onion
- 6 black olives, chopped
- 3 eggs, beaten
- 1/4 cup crumbled feta cheese

1. Heat the oil in a heavy skillet over medium heat. Sauté for a few minutes until the onion softens, then add the olives and sauté for a minute more.
2. Pour in the eggs, and add the feta. Scramble until set, and serve.

B.1.3 Paleo porridge

This recipe is taken from Daniel Green's *The paleo diet*. It can be a nice alternative to egg based breakfasts.

- 2 tablespoons shredded coconut
- 1 tablespoon almond flour
- 1 teaspoon pumpkin seeds
- 1 teaspoon ground cinnamon
- 15g walnuts, plus a few extras.
- 240mL boiling water
- half a banana, sliced
- Stevia, for taste.

1. Place all the ingredients except the water and banana in a food processor and blend into a fine powder.

2. Pour the boiling water over the mix and stir.
3. Serve with crushed walnuts and sliced banana.

B.1.4 Dealing with children

Sometimes kids can be difficult to please with low sugar and starch fare. I now have discovered that you can turn traditional high starch foods into more healthy versions, simply by altering the recipe a little. I used to make the kids crepes every Saturday morning, as a treat to start the weekend. The recipe involved three eggs and 200g of white flour, with 500g of milk, vanilla essence, butter and salt topping it off. I now make a similar dish, but reduce the flour quantity to about a third, add dried coconut and replace some of the milk with cream to increase the fat content. I use six eggs instead of the usual three. The kids still think they are getting a pancake, but really it is an omelette in disguise!

Similarly, the kids are still attached to eating porridge with rolled oats. Occasionally, I give in and cook it for them. However, I cook it with cream, rather than milk or water, so the kids go out the door satiated, with a good glob of fat in their stomachs. Usually, they don't notice the difference.

B.2 Lunch and Dinner

Frittatas are a common dish served for lunch in the Thornley household. Again, the free kindle book *'The egg and I'*, contains a number of useful recipes. Some recipes include pre-cooked potato. This can be replaced with microwaved pumpkin to lower the starch content.

A favourite is shepherd's pie which is a dish made from mince, assorted vegetables and crushed tomatoes. Rather than using potato as the topping, replace it with puréed steamed cauliflower and leek (with some cream, butter and salt). Otherwise it is prepared in exactly the same way as a traditional cottage pie.

B.2.1 Beef mince recipes

Cottage pie with leek and cauliflower mash

This recipe is adapted from Annie Bell's excellent book [5]. You can interchange the veges used in the mince part with what you have left over in your fridge. This recipe serves about six and is great to store for next day's lunch if there are leftovers. For the *mince*:

- 50g butter
- 3 tablespoons of olive oil
- 2 carrots, peeled and thinly sliced
- 2 sticks of celery, trimmed and thinly sliced
- 1 onion, peeled and finely chopped
- 2 tablespoons fresh oregano or marjoram leaves (use half quantity if using dried)
- 1kg beef (cheaper, fattier stuff is best!)
- 200ml red wine
- a dash of balsamic vinegar
- 2 tablespoons of tomato purée or tomato paste
- 2 teaspoons Worcestershire sauce (Lea and Perrins)
- salt and pepper

For the *mash*:

- 50g butter
- half cup cream (optional)
- 600g leeks (trimmed and thickly sliced)

- 600g cauliflower florets
- a dash of nutmeg
- a spring onion
- 150g small cherry tomatoes, halved

1. Preheat the oven to 180 degrees Celsius.
2. Heat the butter with a tablespoon of olive oil in a frying pan at medium heat. Add the sliced and chopped vegetables and herbs for the *mince*. Fry for five minutes to lightly brown. Add the meat, turn the heat up and fry until it browns.
3. Add the red wine, chopped tomatoes, purée, sauce, vinegar and seasoning. Simmer for about 30 minutes stirring occasionally until most of the juices have disappeared.
4. As the mince cooks, cook the leek and cauliflower in 150mL water with 50g of butter. Add a further tablespoon of olive oil and a good level teaspoon of salt. Cover and simmer the vegetables over a low heat for about 15 minutes until soft.
5. Tip the cooked leek and cauliflower mixture into a food processor and purée. Taste the topping and add more salt or nutmeg if necessary. Depending on the size of your food processor, you might have to do this in a couple of batches. I sometimes add extra butter or cream, depending on taste preference. I find it often needs quite a bit of salt.
6. Transfer the cooked mince mixture into a medium sized roasting pan (about 20cm x 30cm), pressing it in.
7. Spread the mash over the top. Toss over the chopped cherry tomatoes and spring onions.
8. Bake until the vegetables on top are golden (30 to 45 minutes).

This dish can also be made with leek and broccoli topping.



Figure B.1: A version of the low starch cottage pie, this one without the cherry tomatoes on top.

B.2.2 Starch replacement

Mainstays to replace starch are steamed cauliflower, blended with butter, cream and salt added. Broccoli and leek can be prepared in a similar way. Pumpkin and courgette chips, roasted in a bit of olive oil also work well. Pumpkin chips make a frequent replacement for potato, pasta and rice in our household. It simply involves cutting pumpkin into chunks, placing them in a roasting pan and sprinkling on a couple of tablespoons of olive oil and salt. After 20 minutes roasting at 200 degrees Celsius, they are done.

If you want to get a bit fancier, here are some ideas. This recipe is adapted from *Cooking in 10, 20, 30 and 40 minutes*, published by the Australian Women's Weekly.

Fried cauliflower

- 2 eggs
- 1/2 (100g) cup almond flour
- 1/2 cup water
- 1/2 cup finely chopped fresh coriander
- vegetable oil for deep frying
- 1 small cauliflower (1kg), cut into small florets.
- 1 cup (250g) of greek-style yoghurt

1. Beat eggs, almond flour and water in a small, shallow bowl until smooth.
Stir in half the coriander.
2. Heat oil in a wok. Dip cauliflower in batter and drain excess. Deep fry in batches, until light brown.
3. Combine remaining coriander and yoghurt, mix and season.
4. Serve cauliflower with yoghurt mixture

Steamed gai lun in oyster sauce

Gai lun is a leafy Chinese vegetable which is a great accompaniment to many dishes.

- 1kg gai lun, halved
- 1 tablespoon vegetable oil
- 2 tablespoons oyster sauce
- 1 tablespoon soy sauce

1. Boil or steam the gai lun until tender, then drain.
2. Heat oil in a wok and stir-fry gai lun with sauces for 2 minutes. Season.

B.2.3 Salads

Of course, most salads are low in starch and sugar, and high in fibre, and generally need little modification. Here is a simple idea to get you started. This recipe is again adapted from *Cooking in 10, 20, 30 and 40 minutes*, published by the Australian Women's Weekly.

Tomato and herb salad

- 5 tomatoes (about 750g), chopped roughly
 - 1/4 cup roughly chopped fresh Italian parsley
 - 2 tablespoons each of coarsely chopped fresh mint and dill
 - 2 cloves garlic, crushed
 - 2 tablespoons lemon juice
 - 1 tablespoon olive oil
 - 2 tablespoons white vinegar
1. Combine tomatoes and herbs
 2. Combine garlic, juice, oil and vinegar in a small bowl and whisk vigorously. Season.
 3. Drizzle dressing over salad.

B.2.4 Chicken

Garlicky lemon chicken

- 6 chicken thighs, halved
- 2 tablespoons coarsely chopped italian parsley
- 3 cloves garlic, crushed

- 2 teaspoons finely grated lemon rind
 - 2 tablespoons lemon juice
 - 1 tablespoon water
1. Fry chicken in heated oil in a large frying pan. Add parsley, garlic, rind, juice and water to pan. Turn chicken to coat it in the herb mixture and season to taste.

B.2.5 Fish

Teriyaki Salmon

- 4 salmon fillets with skin on
 - 2 tablespoons soy sauce
 - 2 tablespoons mirin (available at Asian grocery stores)
 - 1 green onion, sliced thinly
1. Heat oiled large frying pan on medium-high and cook salmon skin side down for about 5 minutes.
 2. Turn the salmon and add the sauces to the pan. Simmer uncovered until the salmon is cooked (5 minutes).
 3. Serve salmon topped with spring onion, and top with pan juice.

B.2.6 Steak

Steak with mushroom gravy

- 4 beef steaks suitable for frying (eye, scotch, sirloin, t-bone, rump)
- 250g button mushrooms, sliced thinly
- 1 tablespoon plain flour

- 1 1/4 cups beef stock

1. Season beef and cook over medium to high heat in an oiled fry pan. Remove and set aside.
2. Cook mushrooms in same pan, stirring until tender. Add flour, cook for 1 minute. Stir in stock until gravy boils and thickens.
3. Serve beef with gravy.

B.2.7 Sausage recipes

Good quality sausages can be a very handy tool on the road to a healthy diet. They can be cooked with eggs for breakfast, or they can form the base for an evening meal. One little handy tip to speed up the cooking process is to cover the frying pan. Sausages take some time to cook through so use a medium heat when frying.

Provençal sausages

We often base our dinners around sausages - a very affordable base for a meal. Make sure you get good quality ones. A simple one dish dinner is *Provençal sausages*. The dish requires:

- 1 red onion
- 2 large courgettes cut into 2.5cm thick slices
- 2 garlic cloves
- 4 tbsp olive oil
- 1 tsp finely chopped thyme leaves
- 1/2 tsp chopped rosemary leaves
- 1 bay leaf
- 2 tbsp balsamic vinegar

- 400g pork sausages
 - 400g cherry tomatoes
 - teaspoon of dried basil, or quarter cup of fresh basil.
1. Preheat the oven to 200 degrees Celsius.
 2. Put the onion, courgette and garlic in a large roasting tray. Add the oil, thyme, rosemary, bay leaf and balsamic vinegar. Mix well.
 3. Arrange the sausages on top, drizzle over a little more oil, and season with salt and pepper.
 4. Place in the preheated oven and bake for fifteen to twenty minutes, turning once or twice.
 5. Add the cherry tomatoes, then tear the basil leaves and sprinkle them on top. Return to the oven for 5 minutes more. Serve immediately.

Sausage parmigiano

This recipe is based around the fibrous vegetable eggplant.

- 8 tbsp olive oil
- 2 garlic cloves, crushed
- 450g beef or pork sausage, skin removed.
- 400g tin of chopped tomatoes
- 2 tbsp tomato purée
- 1 tsp coarsely chopped oregano
- 1 tbsp coarsely chopped basil leaves
- 2 large eggplants, cut into 1cm slices
- butter for greasing

- 250g of mozzarella cheese
 - 2 tbsp finely grated Parmesan cheese
1. Preheat the oven to 180 degrees Celsius.
 2. Heat the oil in a pan over a medium heat. Add the onion, garlic and sausage and cook for about 5 minutes, stirring until the onion has softened. Break the sausage up with a fork.
 3. Add the tomatoes, purée, oregano and basil, increase the heat and bring to the boil.
 4. Reduce the heat and simmer for 15 - 20 minutes until the sauce thickens. Season.
 5. While cooking the tomato mixture, fry the eggplant slices, turning regularly until golden.
 6. Lightly grease a 23cm x 23cm oven-proof dish. Layer alternately the sausage mixture and eggplant to build up layers in the dish, until all has been used up.
 7. Arrange the mozzarella and Parmesan on top. Cook for 20 to 25 minutes, or until the top is golden.

B.3 Desserts

B.3.1 Berries and mascarpone

One of our favourite desserts is frozen berries blended with mascarpone. Use about 200g of mascarpone and 300g of frozen berries, mix in a bowl and blend with a food processor. Done. A very simple low carb dessert. If mascarpone is unavailable, unsweetened Greek style yoghurt can also be used.



Figure B.2: Sausage parmigiano.

B.3.2 Paleo ice-cream

This is so simple, but delicious.

- 400mL coconut cream
- 100g ground almonds
- 1-2 teaspoons of stevia
- pinch of salt
- quarter teaspoon of vanilla essence.

1. Combine and mix well all ingredients.
2. Divide the mixture into serving sized portions and freeze for at least two hours.
3. Serve once frozen.

B.3.3 Smoothies

Smoothies can be very useful easy desserts and breakfasts. A good quality blender can be a valuable asset on the low sugar and starch road.

Berry smoothies

- Half cup of frozen berries (strawberries, blueberries or raspberries)
- Half cup of cream
- Half cup of full-fat Greek yoghurt
- Cup of ice
- Quarter teaspoon of vanilla essence.

Blend and serve.

I experiment with smoothies using a variety of ingredients, including cacao, cinnamon, vanilla essence to give different tastes. Almond flour and dessicated coconut can add some body. Spinach can be added to smoothies and, believe it or not, it is hard to taste, but provides the smoothie with some texture.

Appendix C

Useful websites and books

C.1 Websites

- <http://www.lowcarbcooking.co.nz>
- <http://www.livinlavidalowcarb.com>
- <http://www.sarahwilson.com>
- <http://www.ketogenic-diet-resource.com>

C.2 Books

- Weaver D. The egg and I: How to Make Incredible Omelettes and Frittatas. Amazon Digital Services, Inc. 2014. A free e-book available on Amazon which has many good simple omelet recipes.
- Taubes G. The diet delusion. Vermilion. 2009. A thorough tome on the subject of how nutrition policy was formed, the history of nutrition science and a persuasive argument in favour of restricting starch and sugar.
- Volek J, Finney S. The Art and Science of Low Carbohydrate Living: An

Expert Guide to Making the Life-Saving Benefits of Carbohydrate Restriction Sustainable and Enjoyable. Beyond Obesity LLC. 2011.

- Teicholz N. The Big Fat Surprise: Why Butter, Meat and Cheese Belong in a Healthy Diet. Simon & Schuster. 2014. A complementary book to Taubes 'Good calories, bad calories'.
- Bell A. Low Carb Revolution: Comfort Eating for Good Health. Kyle Books. 2014. A recommended low carb cookbook. Practical and uses easy to source ingredients.
- Green, D. The Paleo Diet: Food Your Body is Designed to Eat. Kyle Books. 2014. Another very good low starch and sugar cook book.

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