



Ketogenic diets

brainstrust information sheet

Know Hows are published by *brainstrust* to help people living with a brain tumour to understand current topics. They are produced with input from relevant scientific and clinical experts and are written in a way that should help you to understand often complicated topics.

If you have an idea for a Know How, then please let us know.

If you have any queries, don't forget you can talk to one of our support specialists on **01983 292 405**, or email **hello@brainstrust.org.uk**.

Why do we need this Know How?

We are often asked by our community for information about the ketogenic diet. Certain diets and nutritional approaches are often spoken about in the media and elsewhere as being potentially helpful for people living with a brain tumour diagnosis, which may have caused you to wonder whether you should be thinking about particular nutritional approaches for your health.

Ketogenic diets have become increasingly interesting to the brain tumour community as an adjuvant therapy (Martin-McGill et al., 2018). Based on the thinking that cancer cells may not be able to metabolise ketones as efficiently as normal brain cells, some case studies and animal models have shown that this diet may be effective in controlling the progression of some gliomas (Schwartz et al., 2015 and 2018).

This Know How offers an overview of the ketogenic diet in order to help you decide whether or not this is something that you wish to consider for yourself.

What is the biological science behind the ketogenic diet?

Carbohydrates are usually the primary source of energy production within our bodies. The ketogenic diet is very low in carbohydrates and high in fats, which encourages your body to utilise fat for energy production, rather than glucose.

The reduced intake of carbohydrates causes your body to enter a metabolic state called ketosis, providing energy via ketogenesis (making ketones) and gluconeogenesis (making new glucose). When this happens, it lowers blood sugar and insulin levels, and your body becomes incredibly efficient at burning fat for energy.

The brain cannot use fat as fuel but can use ketones, which are produced in the liver when levels of glucose and insulin drop. Ketones are produced when the intake of carbohydrates is lower than 50 grams per day, and it is the energy from the formation of ketones that will provide most of the energy the brain requires.

As long as the body is deprived of carbohydrates, metabolism remains in the ketotic state, called ketosis. Ketosis is a normal, healthy metabolic function and is considered quite safe (Masood, 2020). It is not the same as ketoacidosis, which can be fatal.

What does this mean for me?

1. The rationale in following the ketogenic diet in order to reduce tumour progression is to reduce circulating glucose levels and induce ketosis. Cancer cells are then starved of energy, while normal cells adapt their metabolism to use ketone bodies and survive (Weber et al., 2018).
2. Research studies have shown ketogenic diets can be helpful to reduce epilepsy (especially in children) and may reduce the progression of tumour growth in brain tumours (Schwartz et al., 2018 and 2015; Weber et al., 2018).
3. It is important to check with your healthcare professional that this diet will be suitable for you, because other health complications may make this type of diet unsuitable for you.
4. You should find a good integrative doctor or health practitioner to supervise you through the start of this diet process.

The ketogenic diet – the basics

What to eat

Protein-rich foods

- Grass-fed and organic (where possible) meats – beef, chicken, lamb, pork and turkey.
- Wild and organic (where possible) fish – salmon, trout, sardines, mackerel, herring.
- Free-range and organic (where possible) eggs.

Nuts and seeds

Almonds, Brazil nuts, pecans, walnuts, flaxseeds, chia seeds, pumpkin seeds, sunflower seeds.

Fats and oils

Extra virgin cold pressed olive oil, organic butter (not large amounts), coconut oil, avocado oil (not for cooking), flaxseed oil (not for cooking), avocados, coconut cream (not sweetened), coconut block.

Low-carbohydrate vegetables

Asparagus, broccoli, pak choi, Brussels sprouts, cabbage, cauliflower, courgettes, celery, cucumber, garlic, leeks, tomatoes, mushrooms, onions, peppers.

Herbs

Coriander, marjoram, oregano, parsley, rosemary, thyme, all herbs when using the leaves and seeds – dried or fresh.

Salts and pepper

All kinds. However, the healthiest will be freshly ground peppercorns and sea or rock salt.

Spices

Turmeric, chilli, cumin, etc. – dried or fresh.

What not to eat

Any foods high in carbohydrates

All grains and starchy foods, like bread, cereals, potatoes, pasta, rice, biscuits.

Sugary foods and foods that contain sugar derivatives

Fizzy drinks with sugars, soft drinks and squashes, fruit juices, smoothies made with fruits, cakes, ice cream, desserts, sweets.

Fruits

All fruits except a few berries (a small handful). Raspberries are the best.

Beans or legumes

Peas, chickpeas, kidney beans, lentils, baked beans, adzuki beans, etc.

Root vegetables and starchy vegetables

Potatoes, sweet potatoes, carrots, parsnips, beetroots, pumpkins, squashes, corn.

Alcohol

Spirits are the best choice if drinking alcohol, because beers and wines mostly contain a higher sugar content.

Highly processed foods

- Diet foods and low-fat versions – look at the labels, because many have added sugars and carbs.
- Shop-bought sauces – look at the labels, because many contain sugars and unhealthy fats (trans fats and ultra-processed fats), mayonnaises, salad creams, jar sauces such as curry sauce and bolognese.
- ‘Sugar-free’ diet foods – these are mostly highly processed and therefore not a healthy choice, and also, they often contain sugar alcohols that can affect ketosis.

Quick Reference

- Aim for 20–50 grams of carbohydrates daily.
- You will need to weigh the food to work out the carbohydrate amount.
- Most animal protein foods contain zero carbohydrates.
- To measure Ketosis, blood is the most accurate – blood measure of ketosis is 1.5–3.0 mmol/L (15–300 mg/dL).
- Urine test strips can be used for quick ketone checks but are less accurate than blood due to the variability of hydration. Test at a specific time of the day, and the darker the colour, the higher your ketone levels. Check against the reference values on the test strip information.

What are the potential side effects to following a ketogenic diet?

Side effects are different for different people, and most do not last very long. Your body has to get used to processing foods for energy in a completely different way, and for some people whose diet has been high in carbohydrates, the body will need time to adjust and optimise this process.

For those with a pre-existing health condition, this may affect the type of side effects experienced, and therefore, **before embarking on a ketogenic diet, you should consult your doctor, CNS or other healthcare professional.**

You should also consult your healthcare professional about any symptoms of concern that occur after starting the diet.

- Raised cholesterol and triglycerides – this usually reduces after a few weeks.
- Kidney stones – not very common and can be managed by using a supplement to reduce the acidity generated by a higher protein intake.
- Constipation – this is due to the lack of fibre from carbohydrates, and it often regulates after a few weeks due to the high fat content, which can soften the stools. Adding in a tablespoon of fibre from natural sources, such as milled flaxseed, chia seeds or psyllium husks, with an increased water intake (two litres daily) can resolve this. Contact your health provider if this continues.
- Headaches, tiredness, fatigue, light-headedness – the body has to work harder to generate the energy it needs, and in the first few weeks, these symptoms are common. The way bodies work is very dependent on habit, and this will resolve with persistence. Give the diet time, and these side effects will diminish.
- Low electrolytes – this is due to the very low carbohydrate and (possibly) salt intake, and this can make a difference to fluid management within the body. To resolve this, ensure you drink at least two litres of water outside meals, and add ¼ tsp (1–2 grams) of sea or rock salt to a drink, and sip it throughout the day. A good sports hydration salt solution could be used. Ask your healthcare professional to advise on supplementing sodium, potassium and magnesium to ensure there is no conflict with your condition or medication.

- Insomnia – very low carbohydrate diets can initially affect sleep quality and the ability to sleep. However, this generally does not last. Some studies suggest this is due to the effect of low carbohydrate levels on the production of serotonin and melatonin. Supporting the electrolyte balance may also be relevant, as suggested above. Consult a healthcare professional if this becomes a significant problem.
- Halitosis (bad breath) – the elevated ketone levels, and particularly a ketone known as acetone, cause the breath and the urine to smell. This usually goes away after two to three weeks. However, consult your health provider if you have any concerns about this.
- Weight loss – the ketogenic diet has been shown to be very effective for weight loss (Wasood, 2020).

Ask yourself

- What do I hope to achieve by following a ketogenic diet? Bear in mind that there is no evidence that this is a cure, and there is little evidence that it slows the progression of a brain tumour.
- Do I have people in my team who can support me to plan a diet programme that may be challenging to adhere to?
- Will following a restrictive diet adversely affect my quality of life? Think about potential impact on family meal times or eating out, for example.
- Food is a source of pleasure for many. Will following a strict diet reduce the positive effect that food has for me?
- Have I carefully considered the potential negative impact of side effects?
- Have I consulted my healthcare team about this decision?

Contact

Talk to *brainstrust*. We can help. You can call, write, type, text. Email for help and support: hello@brainstrust.org.uk. Telephone: **01983 292 405**.

Other helpful information

Quick Reference

This Know How is based on expert information provided to *brainstrust* by Jane Rose-Land, a qualified nutritionist with a degree in Nutritional Medicine and a qualification in Applying Functional Medicine in Clinical Practice™.

The passion that drives Jane's work is helping people living with a brain tumour to feel well again and helping them to lead healthier, happier and more fulfilled lives, and to that end, she has led many workshops and webinars on various aspects of nutrition for *brainstrust*.

For more information on Jane Rose-Land, or to access her services, please visit www.nutritioninnorfolk.co.uk.

Matthew's Friends is a UK charity that specialises in ketogenic dietary therapies. You can find information and recipes on their website: www.matthewsfriends.org.

Further reading:

Dr Josh Axe, *The Keto Diet* (ISBN: 9781409187110)

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