

## Ketogenic Diet Therapy for Epilepsy

### What is ketogenic diet for epilepsy?

Ketogenic diet is one of the oldest forms of medical treatment for epilepsy. It is a high fat, adequate protein, low carbohydrate diet. There are different versions of the ketogenic diet available but the basic principles are the same. Ketogenic diet therapy may be adapted for cultural diversity, allergies and tube feeding.

This diet is not without its side effects, so it is very important to become well informed when considering ketogenic diet therapy. **Do not attempt** the ketogenic diet without medical supervision from a properly trained ketogenic diet team especially if you are taking anti-seizure medications.

Ketogenic diet therapy can be a difficult treatment choice for families from a practical and emotional standpoint. The first few weeks of starting ketogenic diet therapy can be stressful, and it is important that your family has a good support network.

You will need to learn how to prepare meals differently, which takes time and effort. There also may be some difficulty adapting to the new meals. However, with creative meal planning and sensitivity to your difficulties, some of these obstacles can be overcome. Many families cope well with the challenges and would agree that the hard work is worth it if the diet gets rid of or significantly reduces the seizures.

### How does the ketogenic diet control seizures?

Fasting has long been associated with reduced seizure frequency. Ketones are produced during extended periods of fasting. When a fast is broken with foods that contain carbohydrates or protein, seizures return. Of course, fasting is not sustainable.

The ketogenic diet that is consistently reduced in carbohydrates, adequate in protein, and high in fat will mimic this fasting state and also produce ketones. Ketones are an indicator of an important

metabolic change but alone cannot explain the anti-seizure effect. Researchers are studying additional mechanisms of action to better explain why this diet reduces seizures.



### Are there different types of Diet Therapy for Epilepsy?

Yes, this is an evolving area. Classical (traditional) ketogenic diet, MCT oil based ketogenic diet, modified Atkins diet, low glycemic index diet and modified ketogenic diet are currently used worldwide. The amount and type of fat, protein, and carbohydrate characterizes the difference between these diet types. Your ketogenic diet trained medical team will help you determine which type of diet is best suited for you or your child. Each patient should be treated as an individual and every ketogenic diet should be tailored to meet their particular needs.

### What type of seizures respond well to the ketogenic diet therapy?

The ketogenic diet has been described to be effective for different types of seizures.

### How effective is the ketogenic diet in controlling seizures?

The ketogenic diet can be effective in treating individuals with drug resistant epilepsy from infancy to adulthood. Up to 60% of children who try a supervised ketogenic diet experience 50% or greater reduction in seizure frequency. In 40-50% of adults who try a supervised ketogenic diet, a 50% or greater reduction in seizure frequency can be experienced.

## **How can I begin the ketogenic diet?**

Under trained medical supervision, the ketogenic diet will be initiated by removing the regular diet and replacing with the higher fat, adequate protein, lower carbohydrate diet.

The ketogenic diet can be initiated from your home (outpatient) or in the hospital (inpatient). Institutions will differ in how to begin the ketogenic diet.

The initiation can also differ in how quickly the ketogenic diet is phased in and adjusted.

## **How soon after starting the diet do you see reduction in seizures?**

Seizure reduction can occur very soon after the ketogenic diet is initiated or it may take several months. Commitment to consistency in diet intake is important to determine effectiveness of the therapy in controlling seizures.

## **What kind of foods will be included on the ketogenic diet?**

There are 3 food groups that are required:

- Fats such as cream, butter, margarine, oils, mayonnaise, salad dressings, nuts, nut butters, avocado
- Protein such as poultry, red meat, fish, cheese, eggs, milk, nuts
- Carbohydrates such as bread, pasta, rice, potato, fruit, vegetables, juice

In a regular diet we eat primarily carbohydrates and protein with small amount of fat. In a ketogenic diet you will eat more fat, enough protein to grow and/or maintain your muscle stores and reduce the carbohydrates significantly from what is usual.

The amount of fat, protein and carbohydrate adjustment should be fine tuned for the person. Some people will achieve acceptable seizure control on a more liberal ketogenic diet whereas others will require something more restrictive.

## **How are meals prepared while on the ketogenic diet?**

Consistency of meal preparation and consumption is necessary to see optimal effective seizure control. You should receive training on the proper principles of ketogenic meal preparation. Your medical team may require that you weigh foods on a scale. Portioning foods using household measures can also be effective.

Ketogenic diet menus can be calculated by your registered dietitian or your team may train you to calculate your own menus. It is important to discuss with your team your food preferences and new meal ideas to support acceptability of this new lifestyle.

## **Will anti-seizure medications be reduced once starting the ketogenic diet?**

This is always the hope. Once the diet is well established, your ketogenic diet medical team may suggest to begin the weaning of a seizure medication.

## **What are the common side effects of the ketogenic diet?**

The most common side effects are constipation, which can be supported with some dietary adjustments and laxatives. Other side effects that may occur that are relatively minor and transient include: kidney stones, low sugars, vomiting, diarrhea, sleepiness. There are some reports of longer term side effects that may include higher cholesterol, reduced bone health, slower linear growth velocity, and abnormal heart rhythm.

## **Are there tests that are needed before and during the ketogenic diet?**

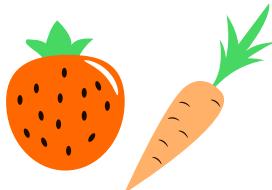
There will be blood tests and other suggested tests that your ketogenic medical team will suggest for you. These tests are needed to determine if it is safe for you to start the diet and also used to monitor tolerance to this treatment.

## **How long would someone stay on the ketogenic diet?**

This will need to be discussed with your medical team. Routine monitoring tests will be requested by your team while you are on the ketogenic diet. The results of these tests will also help guide how long this therapy should be required.

### **Is the ketogenic diet nutritionally complete?**

No. The diet is low in some vitamins and minerals. Your team will recommend particular vitamin and mineral supplements that you will be required to take routinely.



## If I am interested in trying the ketogenic diet, what should I do?

The ketogenic diet should never be attempted on your own. It should only be attempted with the support of a trained medical team.

If you are interested in trying this treatment option, ask for a referral to a neurologist that works within a centre offering ketogenic diet treatment.

There are pediatric ketogenic diet programs at the following hospitals in Ontario: **Children's Hospital London Health Sciences Centre** (London), McMaster Children's Hospital (Hamilton), Hospital for Sick Children (Toronto), Children's Hospital of Eastern Ontario (Ottawa), and Hotel Dieu Hospital (Kingston).

Discuss this treatment option with your neurologist. If your neurologist feels that the ketogenic diet is a possible option, then bloodwork tests and other investigations may be required to determine if the ketogenic diet can be safely implemented. You may then meet members of the ketogenic diet team such as a registered dietitian, nurse, nurse practitioner, social worker, child life specialist and pharmacist who may offer their assessment on how best to plan for the ketogenic diet.

If you or your child is considered to be a possible candidate, you may be added to the wait list.

Establishing regular meal and snack times while reducing candies, chocolates and sweets is the best way to prepare for starting the ketogenic diet.

## Recommended Resources

### Websites

Matthew's Friends Website: [www.matthewsfriends.org](http://www.matthewsfriends.org)

Charlie Foundation Website: [www.charliefoundation.org](http://www.charliefoundation.org)

### Books

Ketogenic Diets: Treatments for Epilepsy and Other Disorders. 5th Edition (2011)

Authors: Eric Kossoff, John M Freeman, Zahava Turner, James E. Rubenstein

The Keto Cookbook: Innovative Delicious Meals for Staying on The Ketogenic Diet (2011).

Authors: Dawn Martenz

## References

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