

THE KETOGENIC DIET CLINIC



CONTINUUM *of* CARE PROJECT  
UNIVERSITY OF NEW MEXICO  
HEALTH SCIENCES CENTER  
SCHOOL OF MEDICINE



THE UNIVERSITY OF NEW MEXICO ♦ HEALTH SCIENCES CENTER  
**SCHOOL OF MEDICINE**

## **What Is the Ketogenic Diet?**

The ketogenic diet is a high fat diet which appears to benefit some people with epilepsy, especially children. It is an alternative to the various anti-epileptic medications currently available. The diet switches the body's main fuel source from carbohydrates to fats. It is highly restrictive, and all foods must be weighed out to a tenth of a gram during meal preparation. Participants must not eat anything which is not prescribed by the dietitian.

A typical meal under the Ketogenic diet might include some type of meat with green vegetables cooked with a mayonnaise sauce or a lot of butter. Heavy cream might be included on the side for drinking. Meals usually consist of meats, cheeses and vegetables approved by the dietitian. A very high ratio of fats to carbohydrates must be maintained with a low total calorie intake for the diet to be successful.

### **History**

The Ketogenic diet is derived from the long-recognized fact that when people with epilepsy fast, their seizures generally stop. The first scientific study done on fasting for the treatment of epilepsy, which was conducted in 1910, showed that seizures stopped during absolute fasting. Since nobody can fast indefinitely, a doctor at the

Mayo Clinic tried a Ketogenic diet in 1921 to treat epilepsy. By 1924, the diet was in regular use at the Mayo Clinic, and the treatment became widely used in the 1930s. Excellent seizure control under the Ketogenic diet was also reported during a Johns Hopkins study conducted after World War II. But the introduction of new effective anti-seizure medications resulted in a decline in interest in the Ketogenic diet.

Interest in the diet was revived at Johns Hopkins at the end of the 1980s, and a 1992 study showed that the diet produced complete seizure control in 30% of children with previously uncontrolled seizures.

### **How It Works**

Ketosis is produced by eating foods that are ketogenic (fats) and avoiding foods that are anti-ketogenic (carbohydrates and proteins). Dieticians calculate how many calories and how much protein a child needs for energy and minimal growth.

Carbohydrates, fats, and proteins all undergo the same type of chemical reaction with the oxygen we breathe to produce energy for the body, and waste products including carbon dioxide and water. Although all three of the body's fuels are metabolized in the same way, carbohydrates are used preferentially, followed by fats then proteins.

Carbohydrates are used preferentially because they are

usually readily available in most people, and the body can metabolize them quickly for energy. Typically carbohydrates will be used within a few hours after they are eaten, which is one reason why we eat so frequently. Unused carbohydrates are stored in the liver in the form of glycogen, or converted to fat.

In contrast, the primary role of fats is to store energy. Animals fatten up to prepare for winter. The body normally stores the fats we eat but, if there isn't enough carbohydrate available, the body will break down the fat stores to use as fuel. Fats are metabolized much more slowly and typically will take a day or so for the fat content of a meal to be used. This is why people feel fuller after a fatty meal as opposed to a low carbohydrate meal.

The Ketogenic diet mimics a starvation or fasting state, by denying the body the carbohydrates it requires to function normally, and forcing it to metabolize fat.

### **Who Can Use the Diet?**

The diet has mostly been used for children between the ages of one and six years. The diet can be used in adolescents and adults, but is more difficult to maintain in older age groups because of social factors, and the tendency to cheat.

### **What Is a Person Allowed to Eat on the Ketogenic Diet?**

The standard Ketogenic diet is calculated at a 4:1 ratio. In other words, it contains four times as much fat by weight as carbohydrate and protein combined.

In addition, the total calorie intake is restricted to about three quarters of normal, making the volume appear even less. Calculations for each day's means are based on a participant's age, height, weight, and activity level. The calculations and menu plans for the Ketogenic diet require the expertise of a registered dietician who is familiar with the diet, and should never be attempted by an unlicensed individual. The dietician makes every attempt to design the menus so that the types of food resemble those that the participant normally eats and likes.

The Ketogenic diet alone is deficient in vitamins and calcium. Participants are, with few exceptions, prescribed a calcium and vitamin supplement which they will need to take while they remain on the Ketogenic diet.

### **How Is a Person Begun on the Ketogenic Diet?**

The diet is normally begun during a 3 to 5 day hospitalization. On the morning of admission, the participant is asked to skip breakfast, and begin the "Day 1 Ketogenic Diet Egg Nog or Formula." The "Day 1 Egg Nog Formula" is at one-third of the recommended fat calorie in-

take targeted. On Day 2, the individual will be given the “Day 2 Egg Nog or Formula,” which contains two-thirds of the recommended fat calorie intake. On the morning of Day 3, the family or caretakers will be instructed on meal preparation. If the individual is tolerating the diet, they will be provided solid, Ketogenic meals for breakfast and lunch. On the morning of Day 3, the participant should be on the full Ketogenic diet meal or formula. For individuals who are bottle or G-tube fed, the parent, guardian, or direct care staff member will be instructed on how to mix the Ketogenic diet formula on the first day of hospital admission. They will be discharged around lunchtime of the third day if they continue to do well. They will remain on the Ketogenic diet for approximately two years– TAKE this sentence out.

### **Once the Ketogenic Diet Is Started, How Long Does It Take to Work?**

The effectiveness of the Ketogenic diet is variable from person to person. In some people, the response is immediate once ketosis develops. In others, the full effect may not be seen for up to three months or later. In most individuals, the diet’s effectiveness can be predicted after a month or two.

### **How long will the individual remain on the diet?**

The participant is kept on the full Ketogenic diet pre-

scription for two years. During the third year, the dietary ratio is gradually changed back to a normal diet.

**When will the medications be stopped?**

No changes are made in the medications for the first month on the diet. This allows some time to see if the diet is going to be helpful for the participant, and gives the care provider the chance to develop a routine and become comfortable with preparing the meals. The entire group (MD, dietician, family, and participant) determines whether the diet should be continued, and if it is continued, then decreasing the medications is discussed.

**What Kind of Follow-up and Support Is Necessary?**

The diet should be used by clinicians and dieticians familiar with devising palatable meal plans for a child. Phone consultation may be frequent at the onset of the diet with the Ketogenic diet team and the child should be seen in the clinic within a month after beginning the diet for the first few –take out month then about every 3 months thereafter. Follow-up will be less frequent as the family and the child adjust to the diet. One of the most important support elements is contact with other experienced parents. Parents with children of similar ages and food preferences can share ways of making the diet attractive and tasty. Access to these resources is essential.

## **What Are Potential Side-Effects of the Diet?**

Potential side effects of the Ketogenic diet include the following:

- Constipation
- Hypoglycemia (low blood sugar)
- High Cholesterol
- Hyperacidosis (large amount of blood acid in blood)
- Osteoporosis (low bone mineral density)
- Kidney stones
- Pancreatitis

## **What Are the Ketogenic Diet food Groups?**

The Ketogenic diet uses foods that are grouped together in the lists below based on their similarity in the amount of carbohydrates, protein, fat, and calories.

PROTEIN: Meat, fish, poultry, eggs, vegetables

CARBOHYDRATE: Fruits and vegetables

FAT: Butter, oil, margarine, mayonnaise, or 36% or 40% whipping cream

## **Helpful Hints to a Successful Diet**

Treat the diet as you would medication:

- Be accurate in measurements
- Only use the foods allowed

- Schedule food to be served at about the same time every day. This is important because the food is what gives your child the fuel that he/she needs throughout the day
- Do not skip meals
- Prepare meals in advance if you plan to be away from home

Educate:

- Share all information with anyone who is in contact with your child
- Help is available to explain the diet in schools, to family members and caretakers

Relax:

This is a stressful time for you and your family. Find meals that you are comfortable with and that your child enjoys. Use those meals in the beginning. When you are more confident with measuring and cooking, try using the exchange lists. Some children eat the same meal for breakfast, lunch, and dinner for weeks at a time.

### **Items That Are Helpful to Have at Home**

1. A large collection of small containers for food, screw top beverage containers, small rubber spatulas for plate cleaners
2. Pyrex custard dishes for microwaving and

freezing meals

3. Popsicle molds for sugar-free Kool-Aid or Crystal Light frozen treats
4. Straws, masking tape for labeling food, Dixie cups for measuring
5. Diet caffeine-free soda
6. Liquid sweetener, such as Sweet-N-Low, Splenda or Equal
7. Pure extract flavorings
8. Unsweetened baking chocolate
9. Spices (without dextrose, sucrose)
10. Non-stick cooking spray
11. Heavy whipping cream

**Foods that are not allowed on Ketogenic Diet**

Anything high in sugar:

- Sugar
- Candy bars
- Desserts
- Sodas

Anything high in carbohydrates:

- Pastas
- Milk

## Items Needed Prior to Beginning of Diet



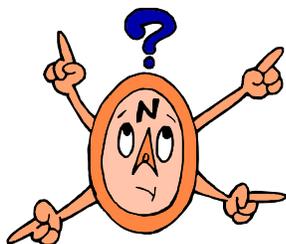
Ohaus CS 2000 digital electric gram scale (pictured above).

The scale can be purchased at the Dively Scale Company, Inc., 1607 4th Street, NW, Albuquerque. The cost of the scale is approximately \$100 plus tax. Let them know you are with the UNM Ketogenic Diet Program.

The scale can also be purchased online at Ebay, Amazon, [www.DiscountScales.com](http://www.DiscountScales.com), or 1-800-737-2253, for approximately \$85.50 plus shipping.

You will also need a 9-volt battery for the scale, as well as a 120-volt adapter (available at many stores, including Wal-Mart and Target).

Please feel free to call Carla Fedor, RN, with any questions about the ketogenic diet, at 505-925-2350.



More Information

**Ketogenic Diet**

[www.charlifoundation.org](http://www.charlifoundation.org)

[www.epilepsyfoundation.org](http://www.epilepsyfoundation.org)

[www.mathewsfriends.org](http://www.mathewsfriends.org)

**Modified Atkins Diet**

[www.atkinsforseizures.com](http://www.atkinsforseizures.com)

[www.epilepsy.com/epilepsy/  
treatment\\_atkins\\_diet](http://www.epilepsy.com/epilepsy/treatment_atkins_diet)

If you need more  
copies of this booklet, please contact



*Continuum of Care*

2350 Alamo Ave. SE Suite 160

Albuquerque, NM 87106

505-925-2350