Ketogenic Diet for Seizures

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All photos compliments of
The Charlie Foundation.

Ketogenic Diet – Historical background

- High fat diet used to treat seizures
- Ancient Greece: treating the disease by altering their patients’ diet
- Hippocrates “On the sacred disease” 400BC “dietary therapy have rational and physical basis”
- Hippocratic Corpus “Epidemics”- case of a man whose seizures disappeared after taking a way his food and drink

Ketogenic Diet

Wilder, 1921-first introduced a diet that mimics starvation
50% improvement of his patients with epilepsy (Mayo Clinic)

Keto diet founded in 1994 after 20 month old Charlie Abrahams was cured of Epilepsy by Ketogenic diet @ John Hopkins Hospital

Now over 150 hospitals world wide with ketogenic programs

Ketogenic Diet – What is it?

- 90% fat, minimal carbohydrates
- Heavy cream, butter & oils provide needed fat
- Sweets are completely eliminated
- Small amounts of other carbs may be added if diet liberalizes over time (bread, potatoes, rice, cereal)

Ketogenic Diet

3 Biological Fuels:
- Carbohydrate ---- glucose
- Protein ---- amino acids ---- glucose
- Fat ---- TG ---- Fatty Acids ---- ketones

When your body uses fat as energy instead of glucose, the end result is ketosis.
**Diet Comparisons – Typical 12 y/o**

<table>
<thead>
<tr>
<th>Diet Type</th>
<th>Classic Keto</th>
<th>Modified Atkins</th>
<th>LGIT</th>
<th>Standard Healthy Diet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grams of Carb</td>
<td>5-10 gms</td>
<td>20-30 gms</td>
<td>40-60 gms</td>
<td>225 gms</td>
</tr>
<tr>
<td>% Fat</td>
<td>90% Fat</td>
<td>75-85%</td>
<td>50% Fat</td>
<td>30% Fat</td>
</tr>
<tr>
<td>Monitor Ketones</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

**Diet ratio of Fat: Pro + Carbs**

- 4:1
- 3:1
- 2:1
- 1:1

Highest ratio → → → → → → Lowest ratio

(Classic Keto Diet) (Modified Atkins Diet)

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**Typical Keto Day:**

**Breakfast:** scrambled eggs, orange slices, butter, heavy whipping cream

**Lunch:** hot dog + mayo, watermelon, whipping cream

**Dinner:** keto nuggets + mayo, carrots, keto ice cream

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**Keto Meal (3-5 year old)**

- 40 g 36% Heavy cream
- 15 g blueberries
- 8 g lettuce
- 24 g Avocado – Hass
- 5 g mayonnaise

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**Ketogenic Cereal**

Keto Cereal: Fiber One Cereal, Macadamia nuts, Pecans, Coconut, Almond Breeze, 36% Heavy Cream

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**Keto Mac-n-Cheese**

Keto Mac-N-Cheese w/ shiratake noodles
Keto Pancakes

Keto Pancakes:
macadamia nuts, oil, and eggs

Pre-admission Education

- Explain high fat/low carb
- Small amounts of food
- Vitamins/minerals
- Possible adverse effects: constipation, kidney stones, high lipid levels
- What to bring to the hospital
- Child’s food preferences

Diet Initiation: Day of Admit

- Nothing by mouth past midnight night before (Varies among institutions)
- Encourage sugar free fluids
- Bring own gram scale

Diet Initiation: varies among institutions

DAY 1: Start at 1:1 Ratio
DAY 2: Begin 2:1 Ratio
DAY 3: Begin 3:1 Ratio
(all as tolerated, may need to adjust via follow up)

Things we Monitor During Hospital Stay

- Check all medications and supplements for carbohydrate (CHO) content
- Initial lab values
- Check urine ketones AM and PM
- Check blood sugars every 6 hours (every 2 hours if <1 year old)

Things We Monitor During Hospital Stay

- Treatment of emesis/excess ketosis
- Separate meals from med administration if medication causes nausea
- Prevention of dehydration – encourage fluids, may need IV
KD Training Schedule

Day 1: Fluids, Ketone monitoring

Day 2: Food preparation/practice scale use, Vitamins/minerals

Day 3: Trouble shooting, Sick Days, Over the counter meds, menu ideas

Diet behavior Guidelines

- Ignore “picky” behavior
- Encourage positive meal time environment
- Limit mealtime to 20 minutes
- Don’t eat in front of child during initiation
- Be consistent with mealtime rules

Diet Behavior Guidelines

- If child not eating 100% of meals…
  1. "Eat around the plate"
  2. Call the Dietitian!

KD Discharge Protocol

- Child must eat & tolerate 3 full strength meals
- Normal blood sugars (>50)
- Parents comfortable with preparing the diet
- Recipes for home given

My Keto Patients

- 4/6 patients with significant seizure reduction: seizure free at times
- Seizures can re-occur, typically 1-2/day associated with illness or constipation
- 1/6 diet weaned due to no improvement in seizures (seizures actually worsened)
- 1/6 family dropped out due to difficulties with diet initiation
- 80% call me every 1-2 weeks!!

Our Story

The Charlie Foundation was established in 1994 in order to raise awareness about the ketogenic diet as a treatment for childhood epilepsy.

The Epilepsy Foundation of America reports, "When carefully managed by a medical team familiar with its use, the diet helps two out of three children who are treated on it and may prevent seizures in one out of three children."