Is Fat Healthy for Me? Benefits & Course Corrections During a Year of Ketosis

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Quantified Self 2015
June 18, 2015, San Francisco
Why Did You Change Your Diet? Weren’t You Healthy Before?

McCarter Family, Chicago, 2012

@JPMcCarter
Carbs Result in a Glucose & Insulin Roller Coaster
(Post-breakfast munchies, Post-lunch food coma)

Dr. Jeff Volek, The Many Facets of Keto-Adaptation
“The high-carb diet I put you on 20 years ago gave you diabetes, high blood pressure, and heart disease. Oops.”
What Have I Tracked While Reducing Carbs?

Daily
- Work, Sleep, Mood
- Exercise, Steps & Stairs
- Weight
- Heart rate & blood pressure
- Food log & photos
- Blood glucose
- **Blood ketones (BOHB)**

Periodically
- Exhaled ketones
- Body fat & bone density (DEXA)
- Blood Pressure (via cuff)
- Blood Chemistry Panels
- NMR Lipoprofile
- Gut Microbiome

![Fitness Tracker](Image)
![Blood Glucose Meter](Image)

- LIPOSCIENCE
- µBiome
What is Nutritional Ketosis and Why is it Desirable?

- Ketone bodies are natural products of fatty acid metabolism
- Nutritional ketosis is the production of ketone bodies from stored or dietary fat
- Ketone bodies increase when fasting or when dietary carbohydrates are limited
- During fasting, ketones provide 60% of brain energy needs

Benefits of nutritional ketosis include
- Reduced oxidative stress & inflammation
- Decreased blood pressure
- Decreased triglycerides & increased HDL
- Decreased hunger & easier weight loss
- *Increased endurance* – by accessing 80,000 calories of fat instead of 2,000 calories of glycogen
### Benefits & Challenges I’ve Experienced with Ketosis

#### Benefits
1. Achieved desired weight & body composition
2. No longer hungry or tired after meals
3. Athletic stamina supports sustained high intensity
4. No longer have symptoms of inflammation
5. No longer get cold & flu symptoms
6. Blood pressure is down
7. Resting heart rate is down
8. Triglyceride is down
9. HDL cholesterol is up
10. LDL cholesterol subclass is favorable pattern A

#### Challenges
1. Cholesterol is higher (likely benign)
2. Muscle cramps
3. Longer warm-up time for workouts
4. Sensitivity to cold temperature increased
From A Standard American Diet to Nutritional Ketosis

Caloric Intake By Macronutrient

U.S. Average Diet (2006 ¹)

<table>
<thead>
<tr>
<th>Macronutrient</th>
<th>USDA Advised</th>
<th>US Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbs</td>
<td>45-65</td>
<td>48.7</td>
</tr>
<tr>
<td>Protein</td>
<td>10-35</td>
<td>15.7</td>
</tr>
<tr>
<td>Fat</td>
<td>20-35</td>
<td>33.7</td>
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</tbody>
</table>

My Ketogenic Diet (estimated)

<table>
<thead>
<tr>
<th>Macronutrient</th>
<th>LCHF</th>
<th>Ketogenic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbs</td>
<td>7-14</td>
<td>3</td>
</tr>
<tr>
<td>Protein</td>
<td>13-21</td>
<td>13-21</td>
</tr>
<tr>
<td>Fat</td>
<td>69-76</td>
<td>80</td>
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</tbody>
</table>

LCHF = Low Carb High Fat

US Averages follow USDA guidelines

What I Eat in Nutritional Ketosis

(Challenges – Too Much Protein)
Tracking Ketosis With Daily Blood BOHB

mmol/L Beta-hydroxybutyrate
Points – days, Line – 7 day moving average

AM fasting 2.0±0.9
PM post-meal 0.9±0.6

<0.1 carb-rich diet
>0.5 ketosis cut-off
Ketosis is Disrupted by Carbohydrates at Restaurants and During Travel
Benefits – Achieved Desired Weight & Body Composition

- **Caloric Restriction**
- **LCHF Reduced Hunger**

**Date**
- Nov 2001: 191 lbs
- Feb 2015: 166 lbs

**% Fat**
- ~21-2
  - 4
  - DEXA
- 12

**Fat (lbs)**
- ~40-4
  - 6
- 19.9

**BMI**
- 23.9
- 20.7

**Waist (inches)**
- ~34
- 31
Athletic Stamina for Sustained High Intensity by Tapping Fat as Fuel

Running & Swimming – Able to sustain near sprint pace for long distances

From Dr. Jeff Volek, The Many Facets of Keto-Adaptation
Reduction in Inflammation Indicated by Resolved Joint Pain & Verified by Low CRP

- Hip Pain During Long Runs Resolved
- Shoulder Pain During Swims Resolved
- Verified with C-Reactive Protein Test (3/10/15)

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<table>
<thead>
<tr>
<th>Mg/L HS CRP</th>
<th>Risk Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1.0</td>
<td>Low Risk</td>
</tr>
<tr>
<td>1-3</td>
<td>Average Risk</td>
</tr>
<tr>
<td>&gt;3.0</td>
<td>High Risk</td>
</tr>
<tr>
<td>&gt;10.0</td>
<td>Active Infection</td>
</tr>
</tbody>
</table>

0.4
10th percentile

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Blood Pressure is Down Substantially

BP at Physical Down from High of **136/90** in 2009 to **112/71** in 2014-15

Twice Daily Scanadu Scout Blood Pressures Averaging **113/71**
Triglyceride is Down
HDL “Good” Cholesterol is Up

Prior Diet (estimated 300-400g carb)

LCHF (<50g carb)

Ketosis (<20g carb)

Prior Diet

HDL
TG

Prior Diet (estimated 300-400g carb)

“TG <150 is desirable”

“HDL >60 is considered protective of heart disease”

Mg/dL

January 2010 April 2013 July 2014 March 2015

46 75 41 94

78 99

94

85
Higher LDL But Favorable “Pattern A”
Benign Large Buoyant Particles

Large Buoyant LDL (Pattern A) Is Associated with Lower Cardiovascular Disease Risk
Other Challenges –
Cramps, Slow Warm-ups, & Cold Sensitivity

- Muscle Cramps - especially calf muscles overnight
- Longer warm-up time for workouts – first 15-20 min of a run
- Sensitivity to cold temperatures – especially hands in winter

All Are Symptoms of Electrolyte Imbalance

Kidney Function
- High Carb Diet = Sodium Retention
- Low Carb Diet = Sodium Excretion

Cures for Electrolyte (Na, K, Mg) Imbalance
- Bouillon cubes for sodium replacement
- Slow release magnesium
Water is Cold. Salt Keeps Me Warm.
Optimal Sodium for Cardiovascular Health May Be 4-6 Grams Daily

Study of Over 100,000 People in 17 Countries Found Lowest Risk at Estimated Sodium Intake of 4-6 grams

Conclusions. Yes, Fat is Healthy for Me.

- Benefits of ketosis are substantial but with room for improvement
  - Getting enough fat and salt is a challenge
  - Blood ketones levels provide daily feedback