

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

Jim McCarter, MD, PhD

Adjunct Professor of Genetics, Washington University in St. Louis  
Entrepreneur in Residence, BioGenerator

Quantified Self 2015

June 18, 2015, San Francisco

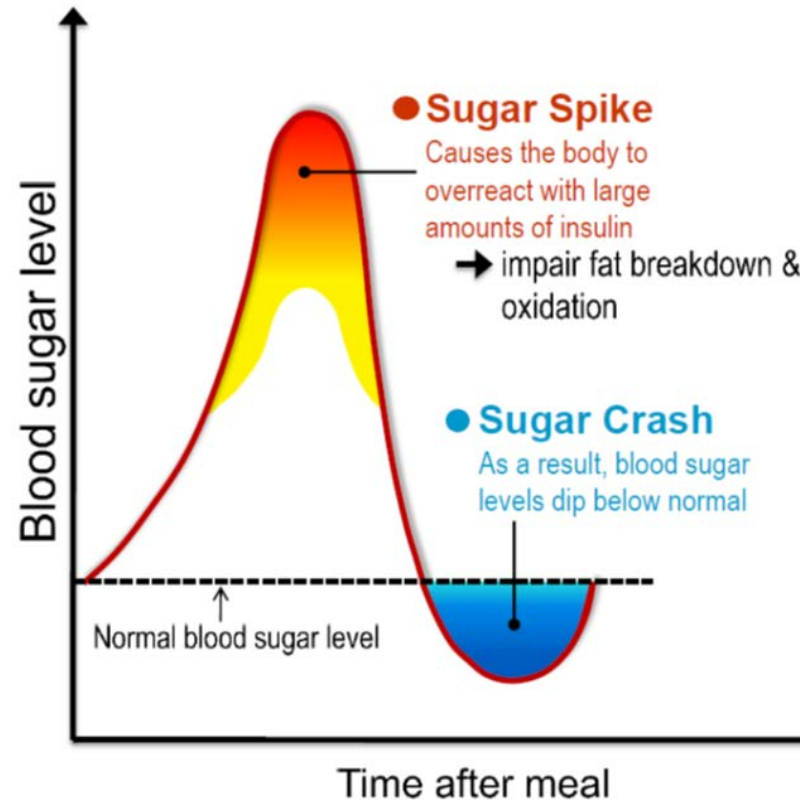
# Why Did You Change Your Diet? Weren't You Healthy Before?



McCarter Family, Chicago, 2012

# 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



LIPOSCIENCE



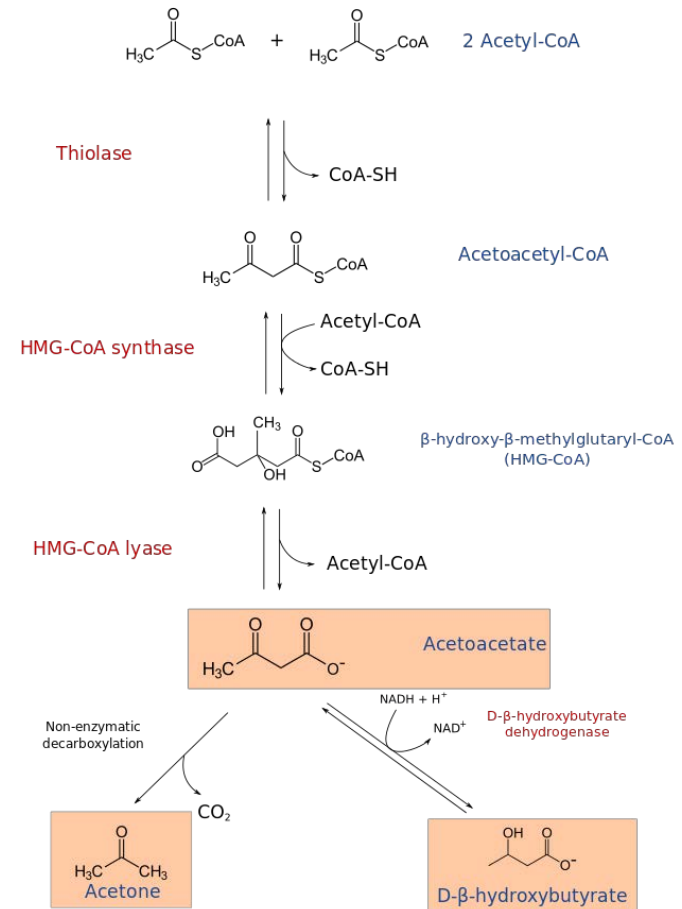


# What is Nutritional Ketosis and Why is it Desirable?

- 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*



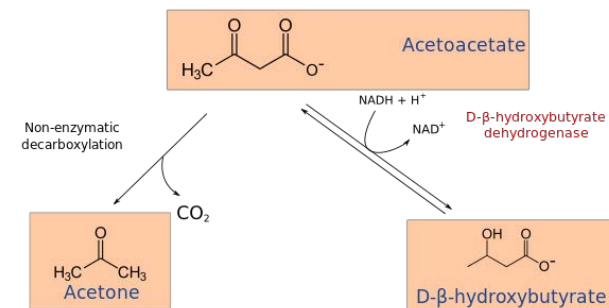
# Benefits & Challenges I've Experienced with Ketosis

## 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

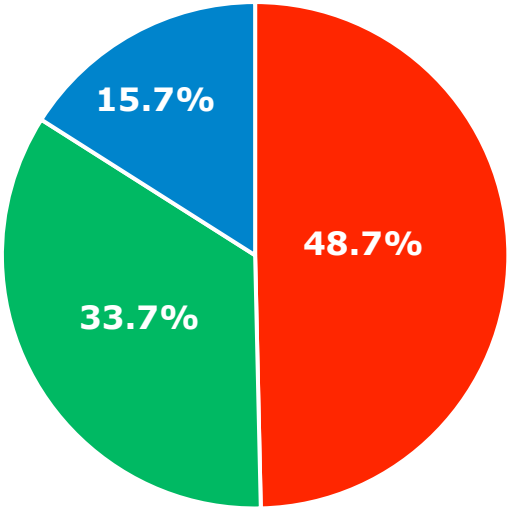
1. Cholesterol is higher (likely benign)
2. Muscle cramps
3. Longer warm-up time for workouts
4. Sensitivity to cold temperature increased



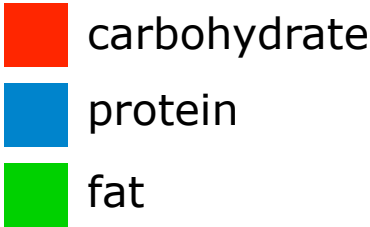
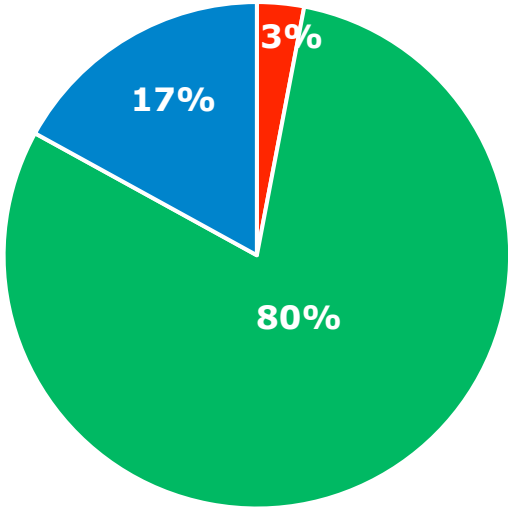
# From A Standard American Diet to Nutritional Ketosis

## Caloric Intake By Macronutrient

U.S. Average Diet (2006 <sup>1</sup>)



My Ketogenic Diet (estimated)



	USDA Advised	US Average
Carbs	45-65	48.7
Protein	10-35	15.7
Fat	20-35	33.7

	LCHF	Ketogenic
Carbs	7-14	3
Protein	13-21	13-21
Fat	69-76	80

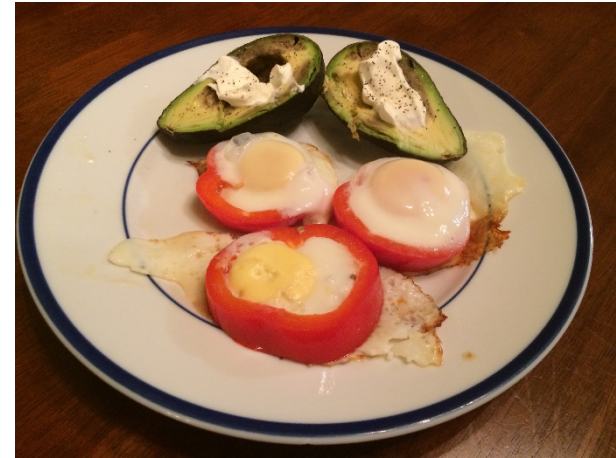
LCHF = Low Carb High Fat

US Averages follow USDA guidelines

<sup>1</sup> Austin et al. Am J Clin Nutr 2011. 93:836.



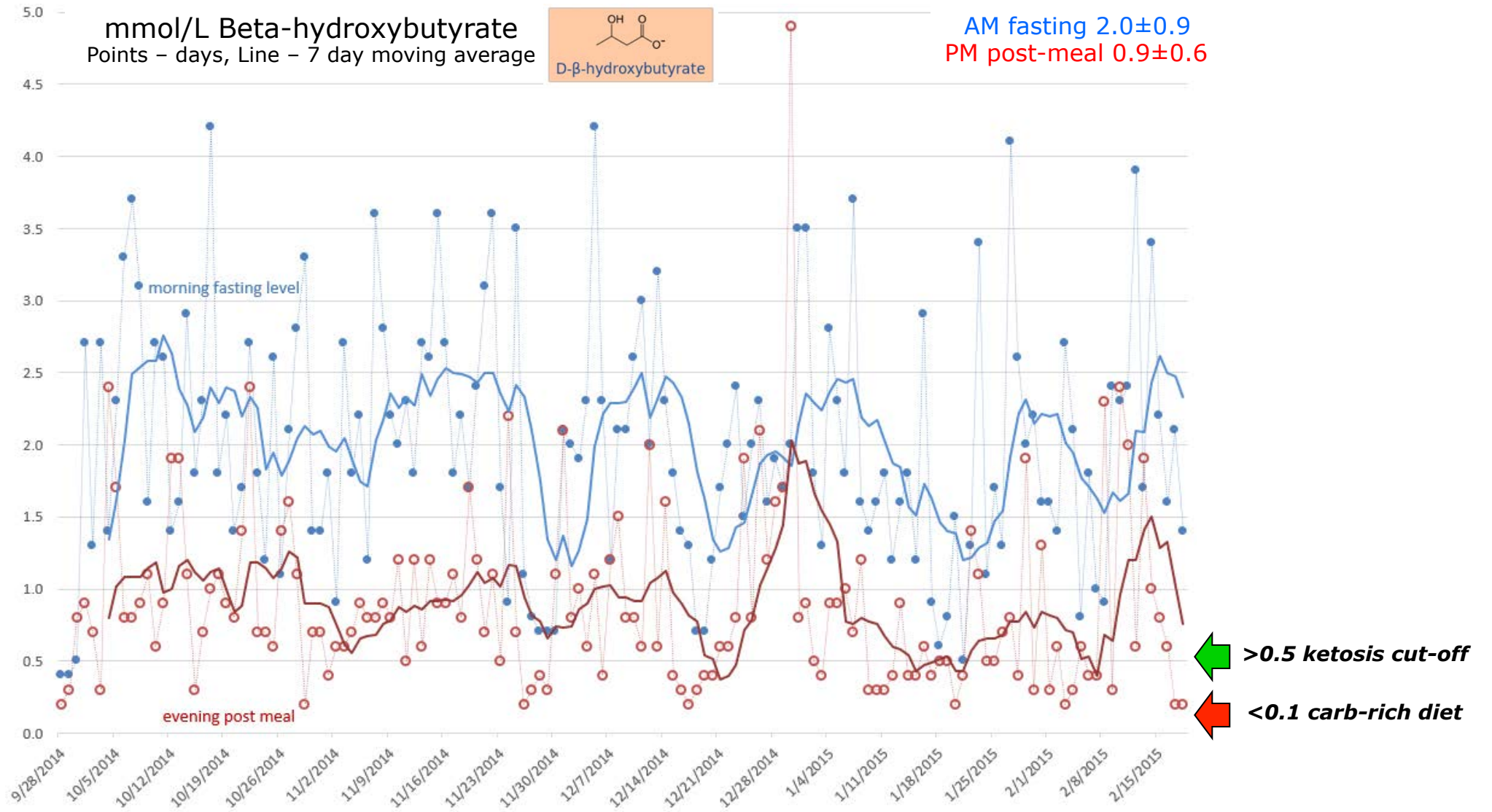
# What I Eat in Nutritional Ketosis



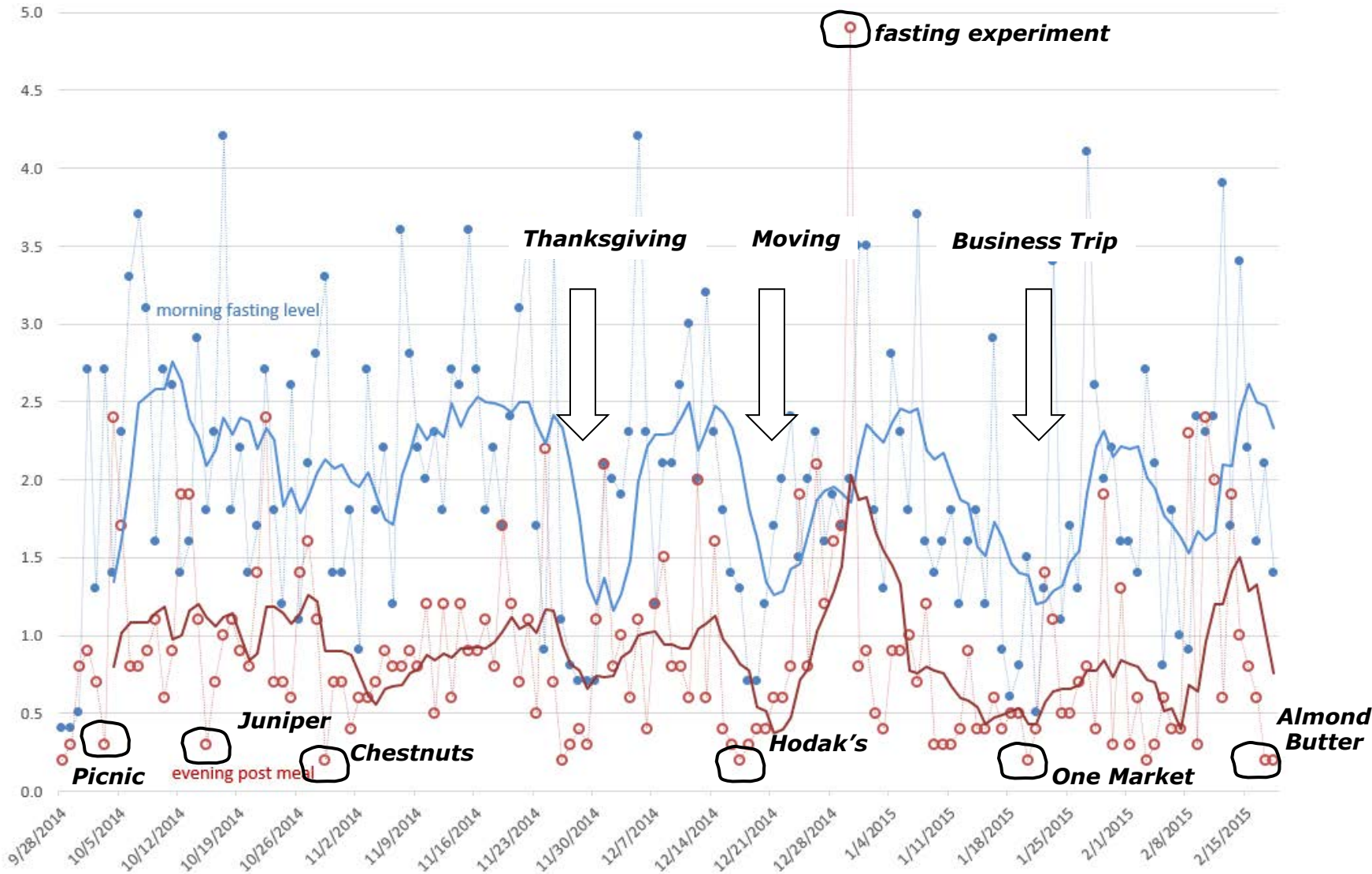
(Challenges – Too Much Protein)



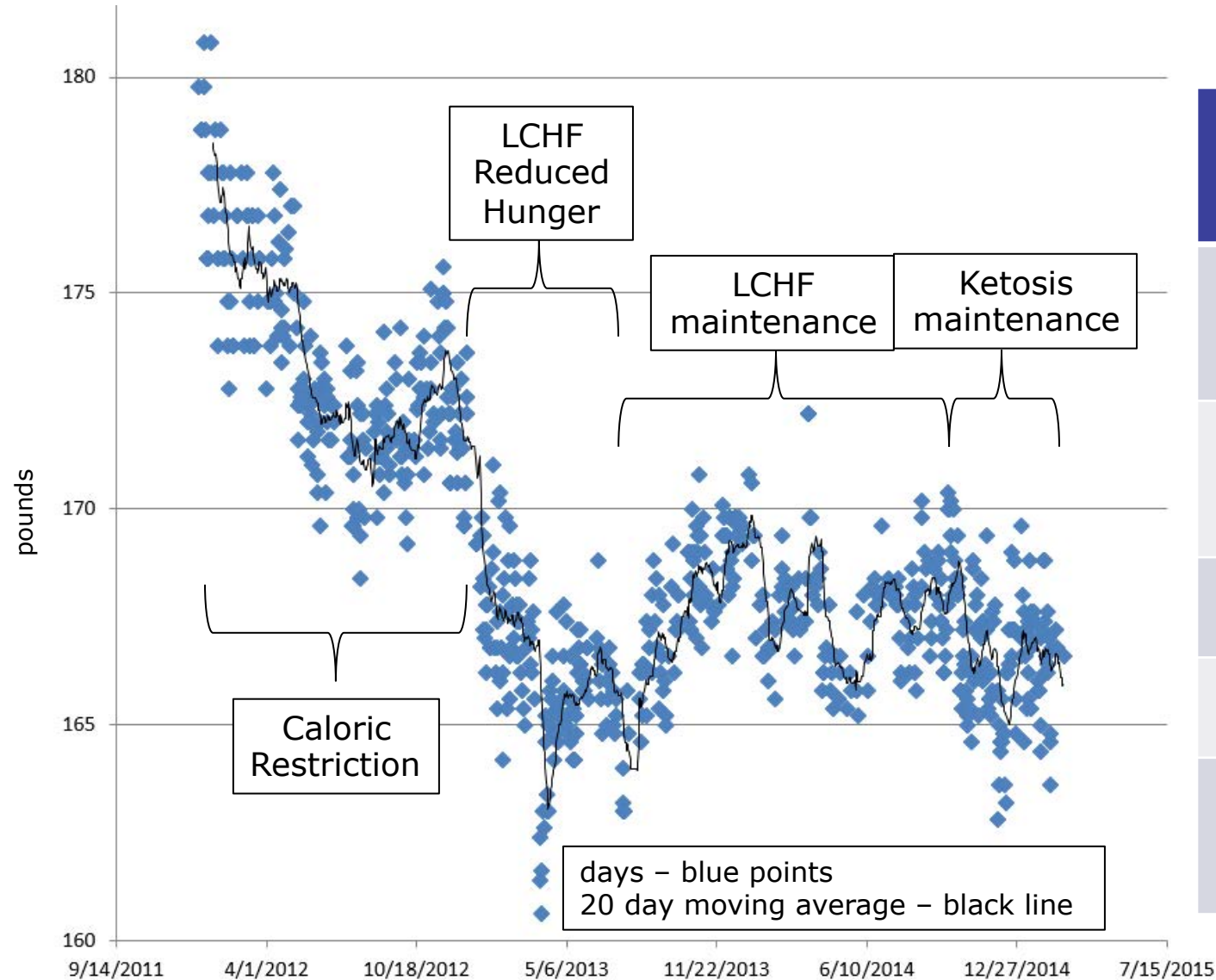
# Tracking Ketosis With Daily Blood BOHB



# Ketosis is Disrupted by Carbohydrates at Restaurants and During Travel



# Benefits – Achieved Desired Weight & Body Composition



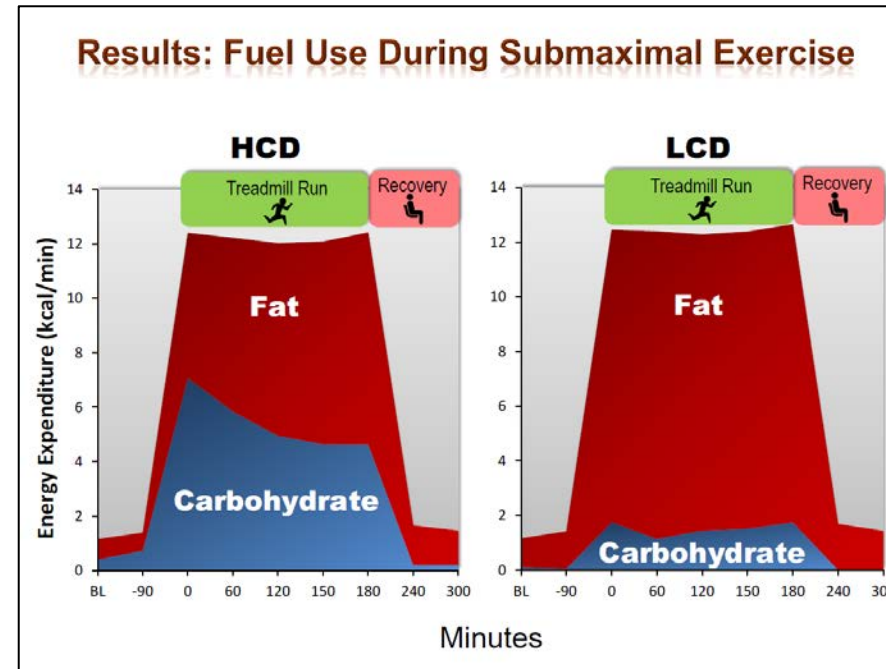
Date	Nov 2001	Feb 2015
Weight (lbs)	191	166
% Fat	~21-24	12 DEXA
Fat (lbs)	~40-46	19.9
BMI	23.9	20.7
Waist (inches)	~34	31



# Athletic Stamina for Sustained High Intensity by Tapping Fat as Fuel



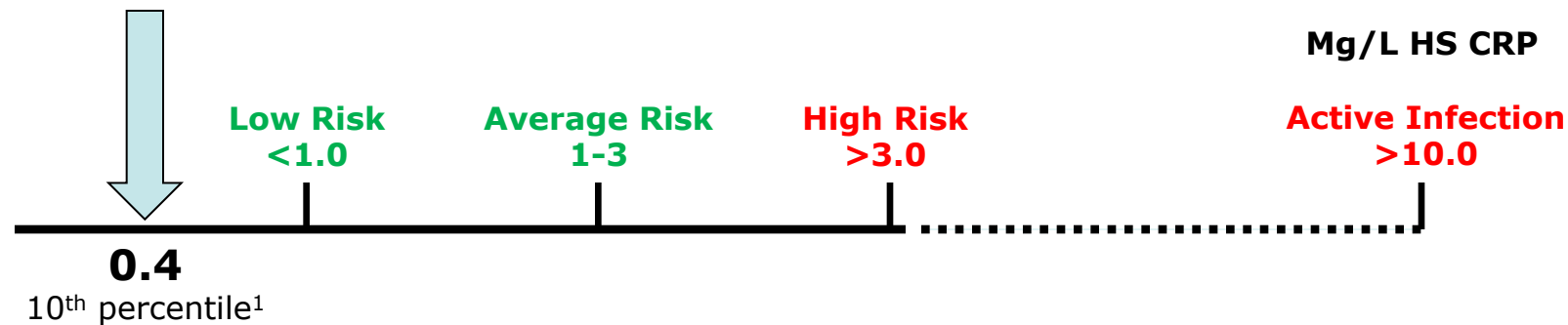
Running & Swimming – Able to sustain near sprint pace for long distances



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)

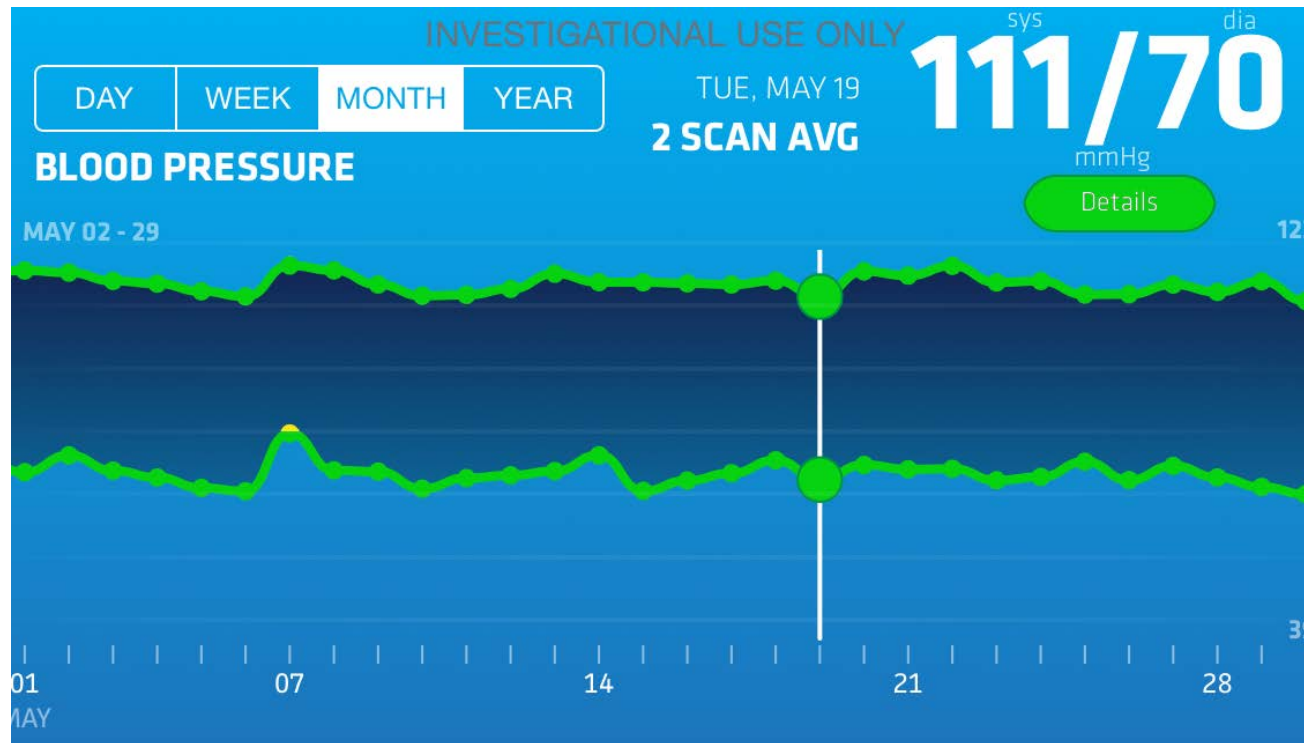


<sup>1</sup> Rifai and Ridker. 2003. Population Distributions of C-Reactive Protein in Apparently Health Men and Women in the U.S.: Implication for Clinical Interpretation. Clinical Chemistry, 49:666-669.



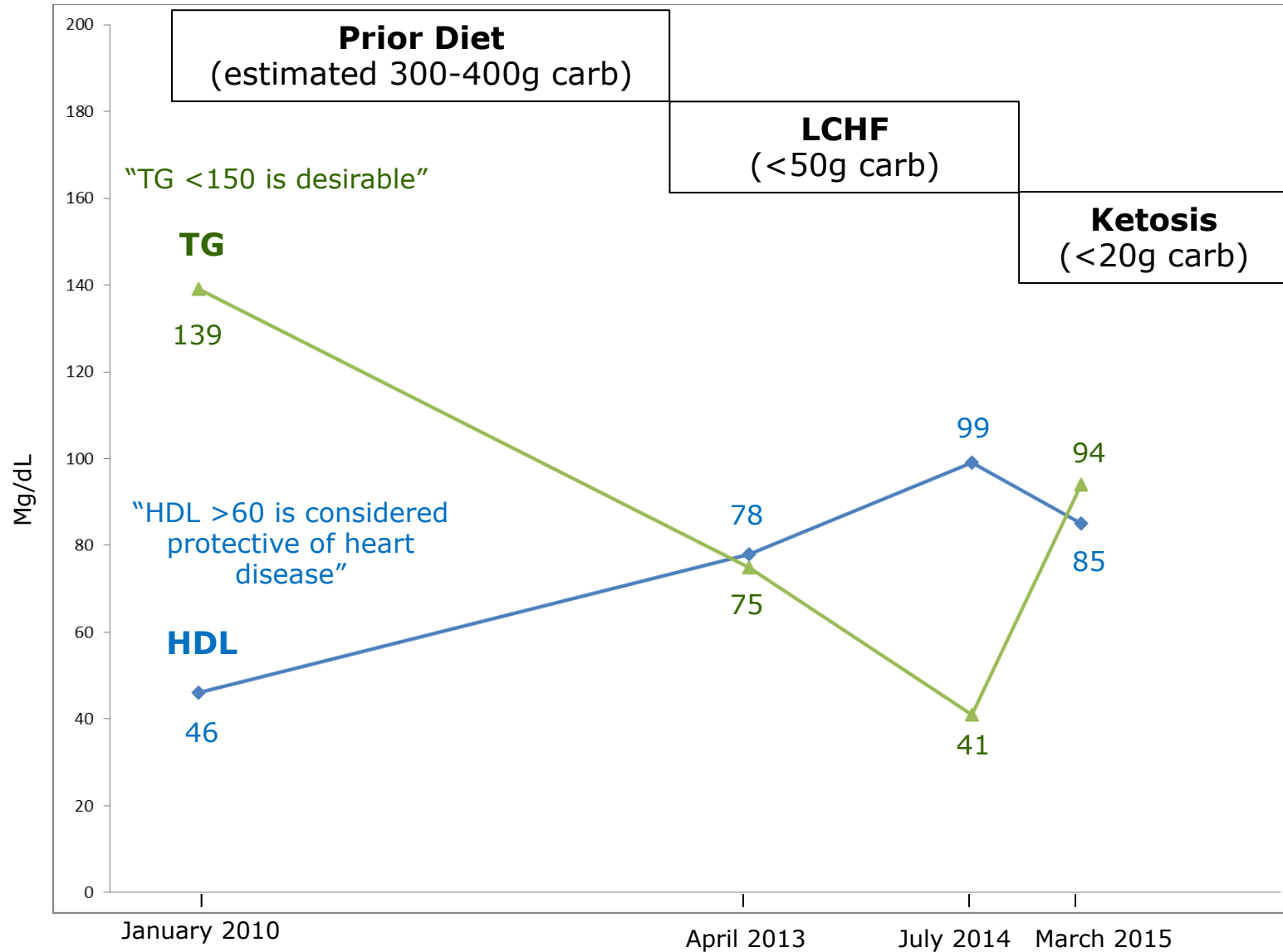
# Blood Pressure is Down Substantially

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

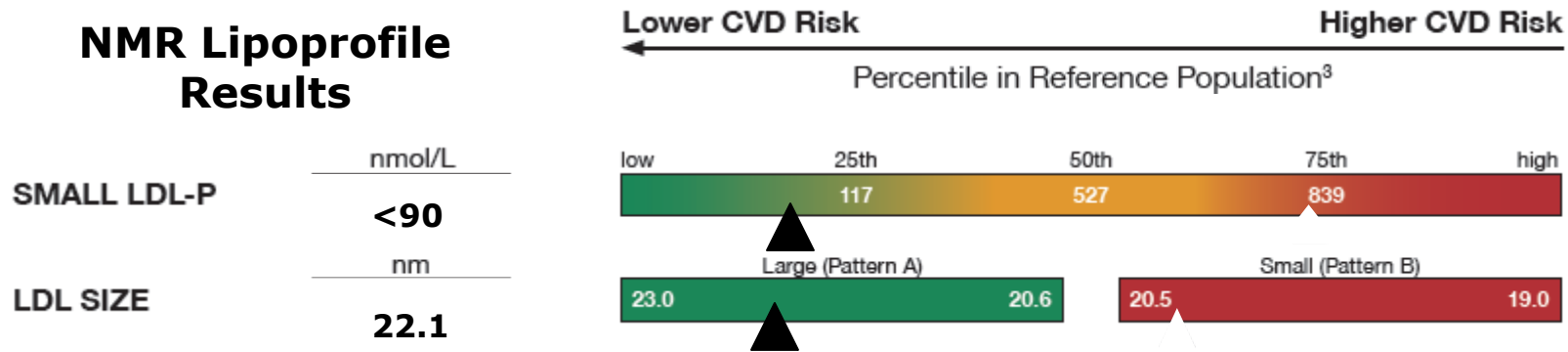


*Twice Daily Scanadu Scout Blood Pressures Averaging **113/71***

# Triglyceride is Down HDL "Good" Cholesterol is Up



# Higher LDL But Favorable "Pattern A" Benign Large Buoyant Particles



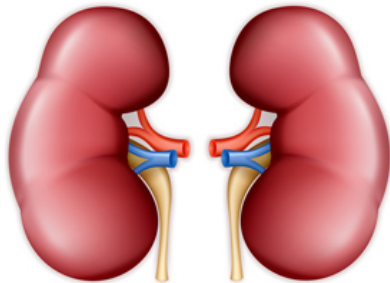
*Large Buoyant LDL (Pattern A) Is Associated  
with Lower Cardiovascular Disease Risk*

## 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*

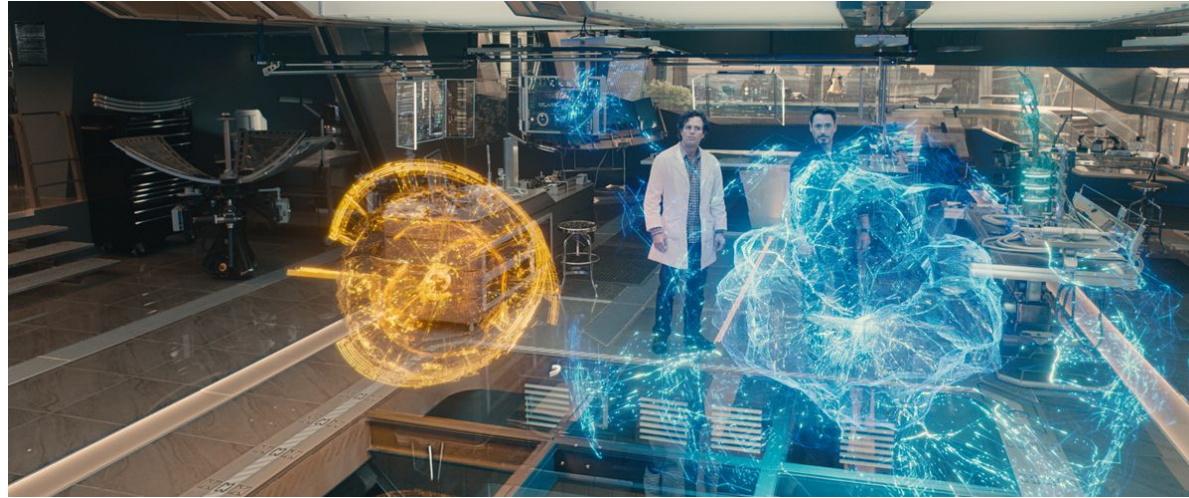


### Cures for Electrolyte (Na, K, Mg) Imbalance

- *Bouillon cubes for sodium replacement*
- *Slow release magnesium*

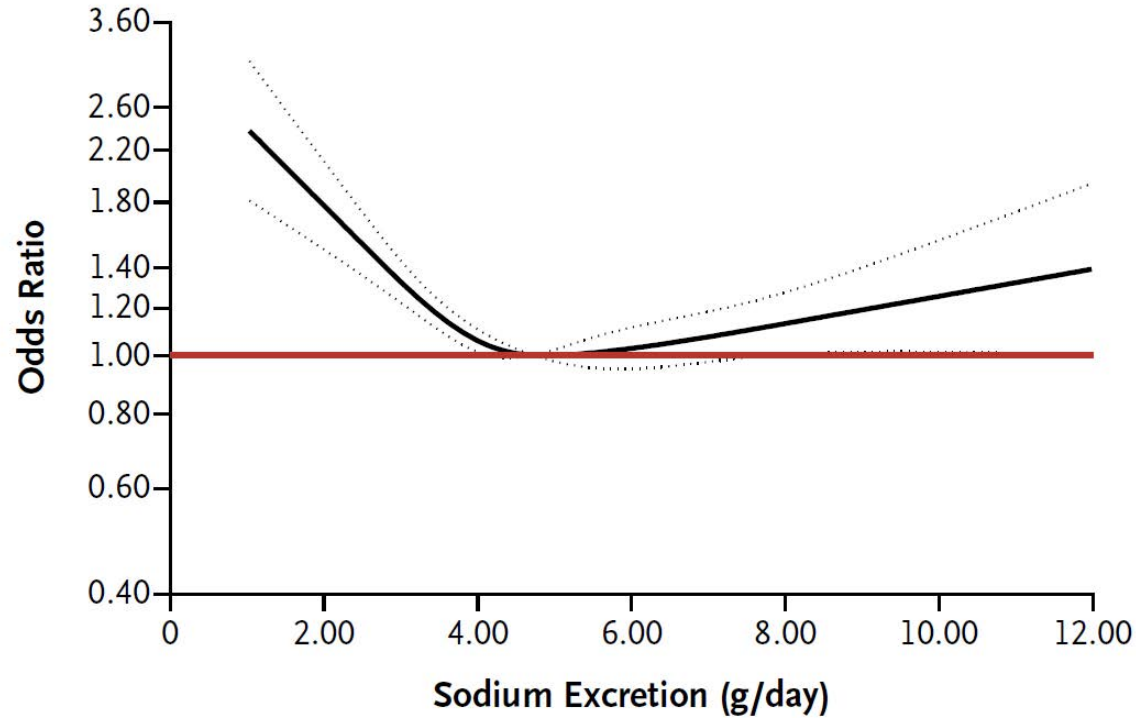


# Water is Cold. Salt Keeps Me Warm.



# Optimal Sodium for Cardiovascular Health May Be 4-6 Grams Daily

Estimated Sodium Excretion and Risk of Death from Any Cause



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

O'Donnell et al. "Urinary Sodium and Potassium Excretion, Mortality, and Cardiovascular Events," NEJM, 371:610, 2014.



# 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

