

Ketosis: The Biology and Health Implications

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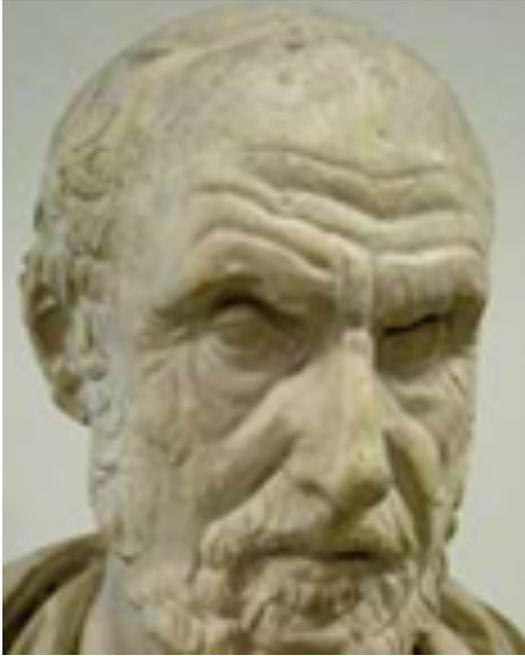
- Objectives: Participant will identify
 - Historical Medical applications for Ketogenic meal plans
 - Biology of ketosis with risks, benefits, and medical supervision basics
 - Evolution of the Atkins ketogenic meal plan
 - Review of key studies on the efficacy and safety of ketosis
 - The Art and Science for successful weight loss with ketosis meal plans

The Art and Science of Medicine

“Expert practitioners create new insights and treatment options by merging natural biology, scientific evidence from many specialties and creative innovation for the patient’s highest good. “ Liz Winet

The treatment should never be worse than the original problem.

First do no harm.



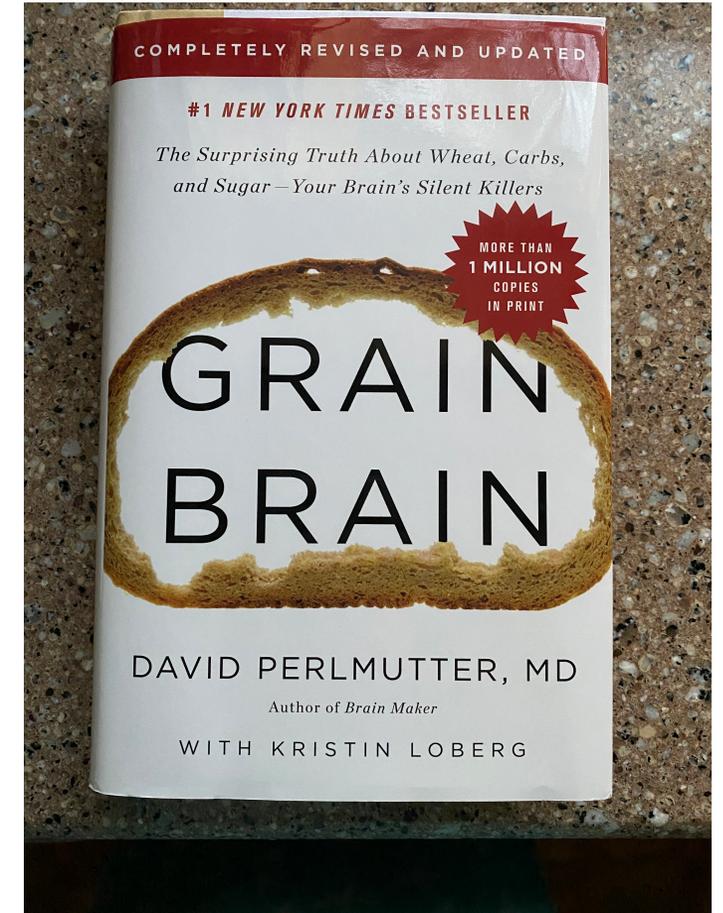
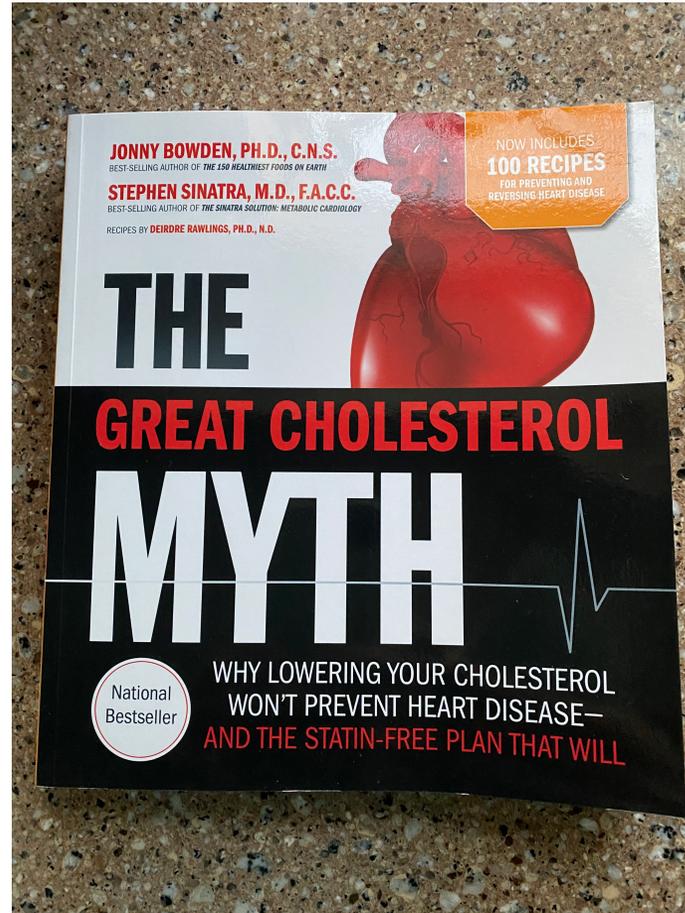
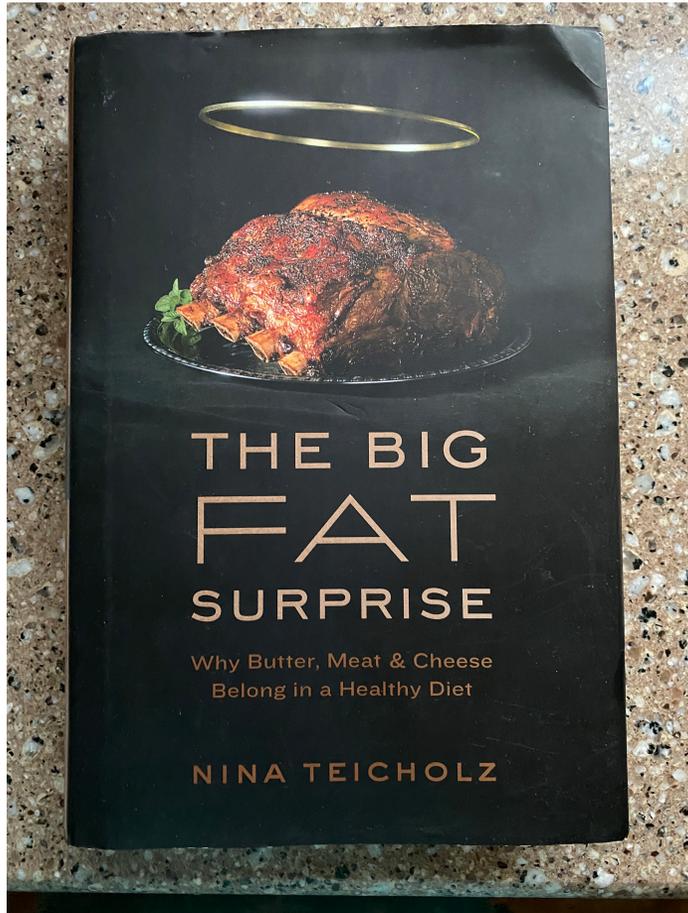
“Let food be your
medicine, and medicine
be your food.”

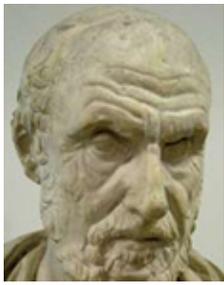
Hippocrates Greek physician (460-
377BC) Father of [Modern] Medicine.

Believed in the natural healing process of **rest, a good diet, fresh air and cleanliness**. He held the belief that the body must be treated as a whole and not just a series of parts.

He noted that there were individual differences in the severity of disease symptoms and that some individuals were better able to cope with disease and illness.

Outstanding History, Science, Health Applications





History of the ketogenic diet (KD)

Source: Epilepsia 2008 Nov.;49 Suppl 8:3-5 author James W. Wheless

- Since the 1990s, there has been an explosion in the use, and scientific interest in the KD. Benefits of fasting and the KD were first documented as **one of the most effective treatments for childhood epilepsy.**
- Since at least **500 BC** fasting has been used to treat epilepsy. **Fasting** is the only therapeutic measure against epilepsy recorded in the Hippocratic collection.
- In the **1920s** to mimic the metabolism of fasting, the ketogenic diet (KD) was introduced by modern physicians as a treatment for epilepsy. KD was the widely used therapy for two decades, until it was replaced with the modern era of pharmaceutical treatments.

Development of the Ketogenic Diet

- In 1921, two pivotal observations were made. Woodyatt noted that acetone and beta-hydroxybutyric acid appear in a normal subject by **starvation or a diet containing too low a proportion of carbohydrate and too high a proportion of fat.**
- **1921 Dr. Wilder at the Mayo Clinic proposed that** High fat diet could be as effective as fasting and be maintained for a much longer period of time. **Wilder coined term “ketogenic diet.”**
- Peterman also documented the need for **individualization of the diet, and close follow-up.**
- **OUTCOMES:** In his 1972 textbook, Livingston, at Johns Hopkins Hospital, reported on the results of the diet in over 1,000 children with epilepsy that he had followed over the prior decades. Findings:
 - **52% had complete control of the seizures**
 - **Additional 27% had improved control.**

National Media Brings Attention back to KD

- NBC-TV's *Dateline* aired a program on the treatment.
- Television program: true story of Charlie, a 2-year-old boy with intractable generalized seizures, treated at Johns Hopkins Hospital for treatment by Dr. Freeman and Ms. Millicent Kelly RD (Livingston) and initiated the KD. He quickly became seizure-free.
- **1994 The Charlie Foundation** was formed by his father.
 - informational videos for parents
 - **instructional videos for physicians and dietitians about the KD.**
 - Supported publication: *The Epilepsy Diet Treatment: The Introduction to the Ketogenic Diet.*
- **Now The Charlie foundation for Ketogenic Therapies: cancer, autism, ALS, Parkinson's Disease, type-2 diabetes, and traumatic brain injury**
- *Charlie's father later directed the film "First Do No Harm" starring Meryl Streep which aired on national TV.*

Keto diet designed in 1923 by Dr. Russell Wilder at Mayo Clinic for TX epilepsy

- All Keto diets are high in fat, adequate protein **low in carbs**
- Changes body energy; converting fat into fatty acids and ketones in the liver. [ketones elevate = ketosis health benefits]
- Frequency of eating matters with periods of fasting and smaller amounts carbs /meal.
- **NOTE by Liz: for weight loss the fat is from YOU not from food!**
- Classic Keto (most restrictive) 90% fat 6% protein 4% carb
 - Calorie Ratios parts fat : protein and carb macronutrient
 - Calories per gram: fat 9 / protein 4 / carbs 4

5 Medical Variations of Ketogenic Diets

Macronutrients and percent Total Calories

<u>Macronutrient ratio</u>	<u>Fat</u>	<u>Protein</u>	<u>Carbohydrates</u>
<u>Classic Keto (4:1)</u>	90%	6%	4%
<u>Modified Keto (3:1)</u>	87%	10%	3%
<u>Modified Keto (2:1)</u>	82%	12%	6%
<u>Modified Keto (1:1)</u>	70%	15%	15%
<u>MCT Oil (1.9:1)</u>	*50%/21%	19%	10%
<u>LGIT (2:3)</u>	60%	28%	12%
<u>MAD (0.8:1)</u>	65%	29-32%	3-6%
• *50% MCT :21%LCT [LGI = low glycemic index]			

Ketogenic Diet and Cancer Treatments

- **In 1924, Dr. Otto Warburg, a Nobel Prize winning biochemist** proposed the hypothesis that cancer is a metabolic disease. Dr. Warburg showed in his studies that cancer cells exhibited a preference for the utilization of sugar (glucose) as a fuel
- “Cancer, above all other diseases, has countless secondary causes. But, even for cancer, there is only one prime cause ... the replacement of the respiration of oxygen in normal body cells by a fermentation of sugar.”
- **Dr. Warburg’s hypothesis has been largely ignored** by the oncology world who has a preference for chemotherapeutic pharmaceutical agents.
- **Cancer as a Metabolic Disease: On the Origin, Management, and Prevention of Cancer by Dr. Thomas Seyfried published in 2013 [Great resource]**
 - Warburg was correct. The genetic markers on which the cancer research community has so fiercely focused are actually just downstream effects of the defective metabolism of cancer cells.

Which Cancers are Most Vulnerable to Ketogenic Diet?

- Those which are easily imaged using **FDG-PET scans**. FDG stands for 18F-2-fluoro-2-deoxyglucose, a substance used to detect cancers.
 - The compound is a metabolically neutral glucose analog
- **In general, the higher the uptake of glucose that a particular type of cancer exhibits, the more likely that a ketogenic diet will put metabolic pressure on it and slow or stop its growth.**

Medical Use of Ketosis Continues to Grow

[benefits both from ketosis and pro-inflammatory foods eliminated]

- Children & Adults with epilepsy
- Glucose dependent cancers
- Research Support that ketogenic diets helped:
 - **Lower CVD risk**
 - Metabolic Syndrome
 - Obesity
 - Insulin resistance
 - Type 2 diabetes
 - non-alcoholic fatty liver disease (NAFLD)
- Possible benefits for
 - Acne
 - Polycystic Ovarian Syndrome
- Nervous system diseases possible benefits:
 - Parkinson's
 - Lou Gehrig's disease
 - Multiple Sclerosis
 - Alzheimer's Disease
 - Head trauma
 - Autism
 - Migraine headaches,
 - Stroke,
 - Depression / mood disorders.
- Clear Outlook additional benefits for:
 - **Lipedema / Lymphedema**
 - Inflammatory diseases, joint pain
 - Depression, Foggy thinking, Anxiety
 - Irritable bowel / GERD
 - Symptoms from Grain allergies or sensitivities

Inflammation is major risk factor in CVD, cancer & DM
KD is itself anti inflammatory and it eliminates many proinflammatory foods like wheat and excess carbs

- **Diabetes incremental improvements:**

- First less carbs from meals so less insulin needed
- Shifting from glucose to ketone metabolism gives the pancreas a vacation
 - [gut flora change to reduce insulin resistance]
- Decrease in weight/visceral fat [epigenetics] reduces insulin resistance
- As able to be more active: 20-30 minutes of brisk activity reduces insulin resistance by 40% for 2 days
- **At goal: Eat for your beta cells and stop beating them up!**

Lowering Risk of CVD? But what about FAT?

- Major risk factors for CVD are chronically elevated glucose and elevated insulin leading to inflammation and damage to vessels.
 - “Oxidized” LDL is a problem for CVD. People with DM and DysMetSyn are at higher risk CVD.
- Ketosis lowers glucose, insulin, inflammation and thereby CVD risk. Higher SFA increases HDL. Lower carbs decrease Triglycerides.

Functions of Cholesterol

- **Hormone Manufacturing:** stored in adrenal glands, ovaries, testes and converted into steroid hormones. Without we malfunction with weight, sex hormones, digestion, bone health and mental health.
- **Digestion:** create bile in the liver to digest food especially fats. If fat is undigested we can't absorb fat soluble vitamins like Vitamin A, D, E, K
- **Building blocks:** structural component of every cell in the body, protective barrier, metabolize and produce energy,

Mayo Clinic publication in Journal of
Alzheimer's Disease

- Diets rich in carbohydrates have 89% increase risk for dementia
- **Diets high in fats have a 44% reduced risk.**
- Beneficial fats to your body and brain
 - **Organic grass-fed raw butter, clarified butter (ghee), olives, virgin olive oil, coconut oil, nuts, free-range eggs, wild Alaskan salmon, avocado.**

The Big FAT Surprise by Nina Teicholz,
investigative journalist

- Provides the astonishingly unscientific history of past **60 years** of the fat & cholesterol recommendations driven by **“selected” expert opinion, with exaggerated, over reaching conclusions of studies, government over reach and omission of evidence to the contrary.**

Evidence from randomized controlled trials did not support the introduction of dietary fat guidelines in 1977 and 1983: a systemic review and meta-analysis

- “The study attacks two dietary dogmas. One that sets up saturated fat as a bogeyman when it is not. And the second is that lowering cholesterol by any means, especially by a dietary intervention that lowers saturated fat, is going to lead to a reduction in hard end points, which we did not observe.”
- DiNicolantonio

Book The Great Cholesterol Myth

by Jonny Bowden, PH.D., C.N.S, and Stephen Sinatra, M.D. F.A.C.C.

- “They point out the true culprits of heart disease- inflammation, **sugar, and high-carb diets full of processed foods-** and show the research.”
- “Dissenting voices were drowned out by the cholesterol chorus ...**backing of the pharmaceutical, ... regulatory & medical organizations, established medical journals**”
 - The Lyon Diet Heart Study
- “Cholesterols ability to fight toxins may be one reason why it’s found at the site of arterial injuries caused by inflammation. **But blaming cholesterol for those injuries is a little like blaming firemen for the fire.**”

What is Ketosis?

- The body's search for glucose for energy = hunger
- If not enough carbs for glucose in diet the body can use stores as glycogen in liver and muscles
- When used up can use muscle or fat for energy (innate biology of survival) [1-4 days]
- "Adequate" protein diet spares muscle (1gm/kg) [INBODY]
- Fat is then the primary source of energy (ketogenesis) by liver
- A fat breakdown product is Ketones
- Ketosis used for weight loss:
 - The brain stops hunger message
 - Natural diuretic effect
 - Natural anti-inflammatory effect
 - Fast fat burning (weight loss if not enough fat in diet)

Ketogenic diets benefits in fighting cancer

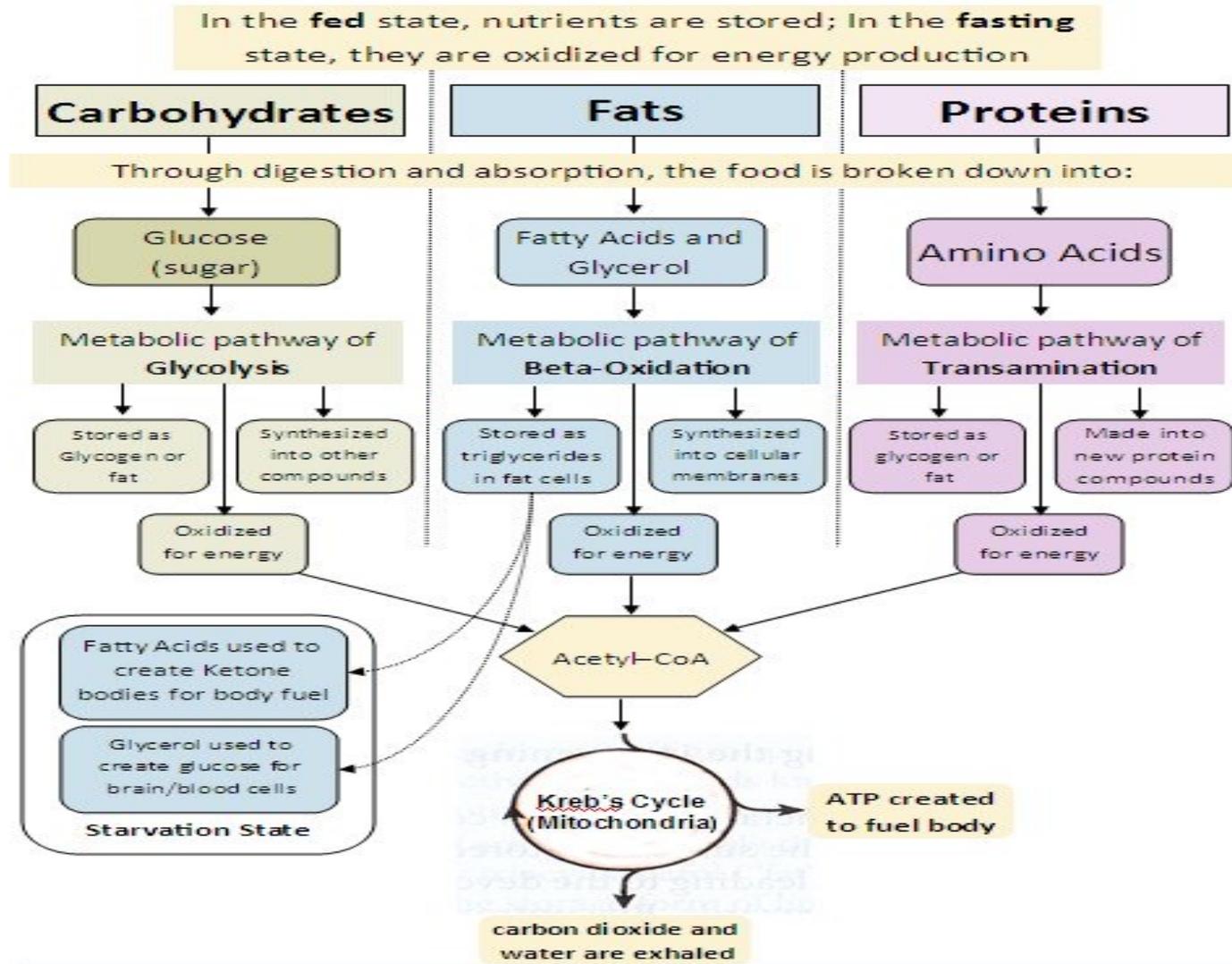
- Cancer cells are glucose gluttons!
- In Ketosis circulating blood glucose and insulin levels decrease, while ketone levels increase.
 - Biochemically, excess blood glucose results in higher circulating insulin levels.
 - High levels of insulin interfere with ketone production, and are associated with higher levels of insulin-like growth factor 1 (IGF-1). IGF-1 is a powerful natural activator of cell growth and proliferation, and a strong inhibitor of programmed cell death (apoptosis), both of which promote cancer progression.
 - Cancer cells have defective mitochondria, low glucose supplies starve them.
- Benefits of elevated ketones
 - Ketone bodies help protect normal cells due to lower rates of oxidative damage.
 - High circulating ketone bodies help the individual tolerate low glucose levels and prevent hypoglycemic symptoms since cells get their energy from ketones
- Requires effective carbohydrate, protein and total calorie restriction to minimize post meal glucose and insulin spike which fuel cancer

Body In Starvation Mode: Innate metabolic option

- After about 3 days of fasting:
 - **Early food delay: Glucagon is produced in the pancreas and it causes the liver to release stored glucose called glycogen.**
 - Stored glycogen in the liver and muscles is exhausted [**glycolosis**]
 - Insulin levels drop and the body ramps up its access to stored fat.
 - Muscle and fat used to create glucose in the liver [**gluconeogenesis**]
 - As fatty acids flow into the blood stream, the liver takes the excess fats to create more ketone bodies [pyruvate and Acetyl-CoA] through **ketogenesis**.
 - Muscles continue to burn fatty acids, but also use ketones.
 - Brain starts to oxidize ketone bodies build up in the blood stream for fuel.
 - As the brain uses the ketones, it needs less glucose, so the liver decreases the rate of gluconeogenesis.
 - preserves muscle tissue

Keto Diet

<https://www.anatomy2medicine.com/neetpg/biochemistry/a-amino-acid-metabolism>



Frequently Relieved Pre-Existing Symptoms with Ketosis

- Blood Pressure lowers
- Increase in HDL
- Lower Triglycerides
- Blood glucose reduces
- Base-line insulin reduces
- Lower levels of inflammation symptoms
- More energy
- Less Stiffness and joint pain
 - Impact of grain based foods
 - 10 # off body = 40# to joints
- Clearer thinking
- Improved Moods
- Reduced inappropriate hunger
- Heartburn relief
- Improved gut health, digestion

Possible Symptoms of Ketosis

[Medical Management]

■ Less common:

- Dizziness
- Fatigue
- Headaches
- Leg cramps
- Fruity breath
- Menstrual delays
- Dry skin
- Temporary hair loss (stress)
- Sensitivity to cold
- Diarrhea
- Constipation

■ Very rare:

- Cardiac rhythm disturbances secondary to electrolyte disturbances
- Foot drop
- Any weight loss increases risk of gallstones
- Being obese also increases risk of gallstones

Medical oversight to prevent side effects associated with ketosis and adjust medications as improvements are realized

- **You are in Ketosis when:** You are not hungry, Urinating more, Losing weight, More comfortable for many (anti-inflammatory impact)
- **Medication monitoring and adjusting**
 - Anti-hypertensive medications, Diuretics, Diabetic medications, Electrolytes
 - Bowel health: constipation / diarrhea, GERD medications often no longer needed
- **Prevention of complications primarily from diuretic impact of ketosis**
 - Electrolytes with magnesium, CMP, Uric acid, (lipids), TSH, CBC

Ketogenic state vs Diabetic ketoacidosis

(a condition in which insulin is unavailable:
(severe acid condition))

<u>Condition</u>	<u>Ketone level</u>
• After a meal	0.1 mmol/L
• Over Night	0.3 mmol/L
• Ketogenic diet	1-8 mmol/L
• Over 20 days fasting	< 10 mmol/L
• Diabetic Ketoacidosis	>10-15 mmol/L

BBC Magazine April 17, 2013 Atkins and the never-ending battle over carbs By Vanessa Barford BBC News Magazine
Ten years after Robert Atkins's death in New York, his famous diet plan is still the source of unending controversy.

- If Dr Robert Atkins #1 one message: **"Carbs make you fat."**
- That's because the Atkins diet, first devised in 1972 but **made famous by his second book, Dr Atkins' New Diet Revolution, in 2002**, advocated a drastically reduced carbohydrate intake.
- **"Diet is never going to be like any other area of science. Whatever we've read, whatever the competing theories, whatever the weight of opinion, every individual is effectively conducting their own solo pseudo-scientific experiment in eating."**

Atkins™ Weight Loss Plans

- Today, losing weight with Atkins has never been easier. Because now, being ‘on Atkins’ blends classic knowledge, modern food science, and wholesome, fresh ingredients to create meals and menus that will have you losing weight without losing the taste and satisfaction of great food. So, pick your weight loss plan.
- **Many options are NOT ketogenic.**

Atkins Meal Plan Options

- Atkins 20: **Starting point** 20g of net carbs per day
 - **Weight Loss Goal** Perfect for those who have over 40 pounds to lose, have a waist size of over 35 (women) or 40 (men), are pre-diabetic, or diabetic.
- Atkins 40: **Starting point** 40g of net carbs per day
 - **Weight Loss Goal** Perfect for those who have less than 40 pounds to lose, need a wider variety of food choices in the beginning or are breastfeeding with goal to lose weight.
- Atkins 100: **Starting point** 100g of net carbs per day
 - **Goal** Perfect for those who want to maintain their current weight, need the widest variety of food choices in the beginning, are breastfeeding with goal to maintain weight or are pregnant.
- **Some of these options are not ketogenic.**

Atkins History Source: Atkins Web site

- **1955-1960 Treatment of Hunger as a Symptom** Dr. Robert C. Atkins received his M.D. from Cornell University Medical School in 1955 and after finishing three cardiology-focused residencies, opened a private practice in New York City. Throughout his residencies, Dr. Atkins became increasingly concerned by the practice of prescribing medications such as amphetamines to patients as appetite suppressants. Weight loss methods that needed medication to treat hunger just didn't seem right. There had to be a better way.
- **1963-1972 Finding a Better Way** Starting in 1963, Dr. Atkins immersed himself in medical research on nutrition and found studies that showed carbohydrate restriction, as opposed to calorie restriction, provided weight loss results, without significant hunger. After, Dr. Atkins experimented with a low-carb diet himself and then with 65 executives.

Atkins History from Atkins web page

- **1972 *Dr. Atkins' Diet Revolution* is published** In 1972 Dr. Atkins published his first book, *Dr. Atkins' Diet Revolution*, to explain his findings on low-carb dieting. The book's publication kicked off decades of research and debate within the medical community to determine whether a diet low in sugar and carbohydrates was better for the body than a diet low in fats and protein. After all that time, we now know Dr. Atkins was right; from Harvard Medical School to the American Heart Association, over 100 scientific publications have shown the benefits of an Atkins lifestyle.
- **1977 *Dr. Atkins' Super Energy Diet* about the effects of unstable blood sugar is published**
- **1988 *Dr. Atkins' Health Revolution* about nutrition and complementary medicine is published** Dr. Atkins hosts first radio show on WOR in New York City, called "Design for Living."

Atkins History

- **1989 Providing Trustworthy Products** Recognizing the need for trustworthy and convenient nutrition at home, Dr. Atkins established Complementary Formulations which became Atkins Nutritionals, Inc
- **1990 Dr. Atkins receives the World Organization of Alternative Medicine Recognition of Achievement Award**
- **1992 *Dr. Atkins' New Diet Revolution* is published** Dr. Atkins released an updated version of the original Atkins diet plan in *Dr. Atkins' New Diet Revolution*. In 1997 *Dr. Atkins' New Diet Revolution* became a *New York Times* bestseller and remained a bestseller for five years.
- **1996 Hello, World!** Atkins online is launched at www.atkins.com.
- **1997 *Dr. Atkins' Quick and Easy New Diet Revolution Cookbook* is published and The Original Atkins Bar**
- **1998 Atkins Nutritionals, Inc. expanding product line.**
- **1999 Dr. Atkins establishes Robert C. Atkins Foundation – to fund research and education chairs at universities Nationwide.**

Atkins History

- 2002 Gary Taubes publishes New York Times Magazine Article, “What If It’s All Been a Big Fat Lie?” launching the momentum of the Low-Carb Movement. Dr. Atkins’ New Carbohydrate Gram Counter is published, and remains one of the most useful Atkins tools to this day.
- 2002 *Dr. Atkins’ New Diet Revolution* is published The concept of “net carb” was first introduced in 2002 when research demonstrated fiber had a minimal impact on blood sugar in the book *Dr. Atkins’ New Diet Revolution* which remained on the bestseller list for 285 weeks, becoming the #1 Bestselling Avon paperback of all time. More vegetables were permitted on Atkins once the net carb concept was introduced.
- 2003 *Atkins for Life* is published *The Illustrated Atkins New Diet Cookbook*
- 2004 *Dr. Atkins Quick & Easy New Diet Cookbook* is published / *The Atkins Essentials* is published / *Atkins Diabetes Revolution* is published

Atkins History

- 2007 *The All-New Atkins Advantage* is published. The Journal of the American Medical Association (JAMA) publishes “Comparison of Weight Loss Diets,” concluding weight loss was greater for women in the Atkins diet group compared with the other diet groups at 12 months, and mean 12-month weight loss was significantly different between the Atkins and Zone diets.
- 2010 *The New Atkins for a New You* is published New York Times Best Seller
- **2010 Atkins used in a study that found Low-Carb Diets improved heart health as reported in Annals of Internal Medicine**
- Conducted by Temple University’s Center for Obesity Research and Education and published in the August 3, 2010, issue of Annals of Internal Medicine. The study concludes that a low-carbohydrate diet is associated with *favorable* changes in weight loss and cardiovascular disease risk factors. The Temple University researchers used the 2002 version of the Atkins Diet described in “Dr. Atkins’ New Diet Revolution” as the model for the low-carbohydrate diet used in the study.

Atkins History

- 2011 ***The New Atkins for a New You Cookbook* is published** Atkins publishes *The New Atkins for a New You Cookbook* by nutritionist Colette Heimowitz, providing a new resource for low-carbers looking to cook healthy, homemade meals.
- 2012 **Atkins Nutritionals, Inc. Launches First Carb Tracking Mobile App**
- **Atkins Introduces Deliciously Different Low-Carb Meals to the Freezer Aisle**
- 2013 ***The New Atkins Made Easy* is published** Atkins publishes *The New Atkins Made Easy* by nutritionist Colette Heimowitz.
- **Kim Kardashian Reveals Her Secret to Losing Weight - Atkins!**
- **New Research Demonstrates a Diet Rich in Healthy Fats Is Good for Your Heart, Beating Out Low-Fat Diets** A study published in the *New England Journal of Medicine* (2008), written by lead author Iris Shai, RD, PhD, showed that a low-carbohydrate diet like Atkins had a more favorable effect on blood lipid levels than both the Mediterranean diet or a low-fat diet. More recently, a 2013 study showed that low-carb diets are just as effective as Mediterranean diets in improving cardiovascular risk factors in people with diabetes.

New Meta-Analysis Demonstrates the Benefits of a Low-Carb Diet, like the Atkins Diet, in the Management of Type 2 DM

- 2013 Meta-analysis in the *American Journal of Clinical Nutrition* reviewed 20 randomized control trials on the effect of various diets on glycemic control, lipids and weight loss in individuals with type 2 diabetes. The results found that a low-carb diet, like Atkins, showed greater improvements in glycemic control biomarkers for type 2 diabetics and should be considered in the overall strategy of diabetes management.
- 2014 **You Can Have Pizza On Atkins?** In 2014, Atkins released their first low-carb frozen pizza.
- 2014 **Superior Weight Loss and Cardiovascular Risk Factor Reduction with Atkins-Type Low-Carb Diet Vs. Low-Fat Diet** *The Annals of Internal Medicine* publishes results of a National Institutes of Health (NIH) trial titled “Effects of low-carbohydrate and low-fat diets,” in which a low-carbohydrate diet was found to be more effective both for weight loss and cardiovascular risk factor reduction than the low-fat diet.

Atkins History

- **2015 Atkins launches Change.org Petition to Demand that Quality Science Help Determine the 2015 Dietary Guidelines** The petition received 22,962 signatures supporting the cause.
- **Atkins Carb Tracker Ranked Top 10 Diet Apps on iOS in the 2014 HealthTap AppRx Awards!**
- **2015 Alyssa Milano Starts Her Journey with Atkins, Becoming Third Official Spokesperson** Looking to reach her happy weight and improve her health, Alyssa Milano partnered with Atkins. After following the Atkins lifestyle for a few years, by 2017 Alyssa had reached her happy weight and enjoyed the positive impact Atkins had on her life, from cooking family dinners to having the energy to keep up with her kids with her busy lifestyle.
- **Atkins Introduces the New and Improved Mobile App and Online Community**

Atkins History

- **2016 Kim Kardashian Announces Losing 60 pounds on Atkins**
- **Sugar Industry Research Scandal** Researchers at the University of California, San Francisco revealed that the sugar industry's influence on research studies down played the effect of sugar on heart disease. From the 60s onward, Big Sugar's influence caused health officials to recommend a diet low in saturated fats, but not low in sugars. Recent research now widely shows that refined carbohydrates and sugars are risk factors for heart disease. Dr. Atkins first wrote about the dangers of a carb-rich diet in 1972. The New York Times writes about How the Sugar Industry Shifted Blame to Fat.

Atkins History

- **2016 Atkins Launches First Line of Meal Kits** Atkins Meal Kits cover a week's worth of food and tools, with three different options to choose from for one's needs and lifestyle. All Meal Kits are offered exclusively at [Atkins.com](https://www.atkins.com)
- **Atkins Partners with Chef'd to Launch Low-Carb Meal Solution for Health-Conscious Consumers**
- Atkins and Chef'd teamed up to create a meal kit, home delivery service for fresh ingredients and low-carb recipes. Frozen or fresh, Atkins continues to search for new ways to make healthy eating an easy, everyday habit
- **2017 Atkins Introduces Atkins 100™, an all-new, flexible and personalized plan for those who want to live a healthy lifestyle and maintain their current weight.**
- **Atkins Makes Impact on National Review Process on Dietary Guidelines** As a result of the advocacy efforts by Atkins, The National Academies of Sciences, Engineering & Medicine announced the formation of an ad hoc committee tasked with reviewing the Dietary Guideline for Americans scientific review process.
- 2018 Harvard study that shows that a low carb diet may help you burn more calories and maintain your weight after losing weight compared to a high carb diet.

MCTs History and use in Ketosis

- MCTs initially used in medicine since they are absorbed very rapidly and provide calories for people with trouble digesting fat. In keto diets they increase the liver's production of ketones.
- MCTs are a saturated fat and liquid at room temperature, where most are solid. Research has demonstrated that only a few of MCTs are able to raise blood ketone levels – C8 or C10 MCTs.
- Studies on MCTs have demonstrated that they are not efficiently stored in the body, so after being consumed they make their way to the liver. MCTs either need to be directly burned for energy, or turned into ketones. Normally, the liver only produces ketones when carbohydrate intake is very low, however with MCTs, ketones can still be produced. The long-term health effects of being able to stimulate ketone production while insulin and blood glucose is still high remain unclear.
- Important to note in order to sufficiently elevate blood ketones into the “nutritional ketosis” range (0.5mmol/L) for 2-3 hours, a person needs to consume at least 14g of MCTs in a sitting. And in order to continue to keep ketone levels elevated they would need to keep consuming MCTs every 2-3 hours, which seems pretty unreasonable.
- Research has not shown any strong correlation between ketone levels and weight-loss. Consuming MCTs to increase blood ketone levels is not a guaranteed method for speeding weight loss.
- MCTs are known to be irritating on the gastrointestinal system, often causing stomach cramps or diarrhea.

2014 Superior Weight Loss and Cardiovascular Risk Factor Reduction with Atkins-Type Low-Carb Diet Vs. Low-Fat Diet *The Annals of Internal Medicine* publishes results of a National Institutes of Health (NIH) trial titled “Effects of low-carbohydrate and low-fat diets,” in which a low-carbohydrate diet was found to be more effective both for weight loss and cardiovascular risk factor reduction than the low-fat diet.

- Findings: low-carbohydrate diet was found to be more effective both for weight loss and cardiovascular risk factor reduction than the low-fat diet.
- Participants: assigned to one of two groups: low carbohydrate and low fat.
 - low carbohydrate: instructed to count “net carbs” of less than 40 grams/day, similar to the Atkins Diet™. digestible carbohydrate -- total carbohydrate minus total fiber. No strict calorie limit, no exercise regimen.
 - Results: the low-carbohydrate group saw greater improvements in measures of body composition, good cholesterol, cholesterol ratio, triglycerides and overall reduction in cardiovascular risk using 10-year CHD Framingham Risk Score (significant reduction in score at 6 and more at 12 month)

New Research Demonstrates a Diet Rich in Healthy Fats Is Good for Your Heart, Beating Out Low-Fat Diets

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- **2010 Atkins used in a study that found Low-Carb Diets improved heart health as reported in Annals of Internal Medicine**
- Conducted by Temple University's Center for Obesity Research and Education and published in the August 3, 2010, issue of Annals of Internal Medicine. The study concludes that a low-carbohydrate diet is associated with *favorable* changes in weight loss and cardiovascular disease risk factors. The Temple University researchers used the 2002 version of the Atkins Diet described in "Dr. Atkins' New Diet Revolution" as the model for the low-carbohydrate diet used in the study.
- **2007 The Journal of the American Medical Association (JAMA) publishes "Comparison of Weight Loss Diets," concluding weight loss was greater for women in the Atkins diet group compared with the other diet groups at 12 months, and mean 12-month weight loss was significantly different between the Atkins and Zone diets.**
- **New Research Demonstrates a Diet Rich in Healthy Fats Is Good for Your Heart, Beating Out Low-Fat Diets**
A study published in the New England Journal of Medicine (2008), written by lead author Iris Shai, RD, PhD, showed that a low-carbohydrate diet like Atkins had a more favorable effect on blood lipid levels than both the Mediterranean diet or a low-fat diet. More recently, a 2013 study showed that low-carb diets are just as effective as Mediterranean diets in improving cardiovascular risk factors in people with diabetes.
- **2002 Gary Taubes publishes New York Times Magazine Article, "What If It's All Been a Big Fat Lie?" launching the momentum of the Low-Carb Movement. Dr. Atkins' New Carbohydrate Gram Counter is published, and remains one of the most useful Atkins tools to this day.**

Ketones as fuel(beta-hydroxybutyrate) bet- HBA as superior fuel for brain

- G.H. Cahill and R. L. . Veech Jr. “Ketoacids? Good Medicine!” Transactions of the American Clinical and Climatological Association 114(2003):149-61
 - Harvard Medical School professor George F.Cahill “Recent studies have shown that beta-hydroxybutyrate, the principal ketone, is not just a fuel, but a super fuel, more efficiently producing ATP energy than glucose. It has also protected neuronal cells in tissue cultures against exposure to toxins associated with Alzheimer’s or Parkinson’s.”
 - “Beta-HBA easily obtainable in coconut oil improves antioxidant function, increases number of mitochondria, and stimulates growth of new brain cells.” David Peerlmutter, MD grain Brain pg 203

Health-providing and Brain-enhancing genetic pathways activated by fasting as is longevity and delay in onset diseases like dementia and cancer

- [Grain Brain] Mark Bittman, “is Alzheimer’s Type 3 Diabetes” Opinionator (blog) NY Times Sept 25, 2012 & American Diabetes Association, “Statistics About Diabetes, updated March 22 2018
- Fasting shifts from using glucose as fuel to using ketones manufactured by the liver. **Fasting turns on genes for BDNF and MRF2 pathway for detoxification, reduced inflammation, increased production of brain protective antioxidants and reduces apoptosis (cell suicide) and turns on mitochondrial genes.**
- All equals better brain function and mental clarity.
- **Diet of low carbohydrate and rich in healthy fat and protein = healthy brain.** Ketosis accomplishes this naturally. Ketosis liver mobilizes body fat as fuel.
- **“Both the heart and brain run more efficiently on ketones than blood sugar, by up to 25 percent.”**

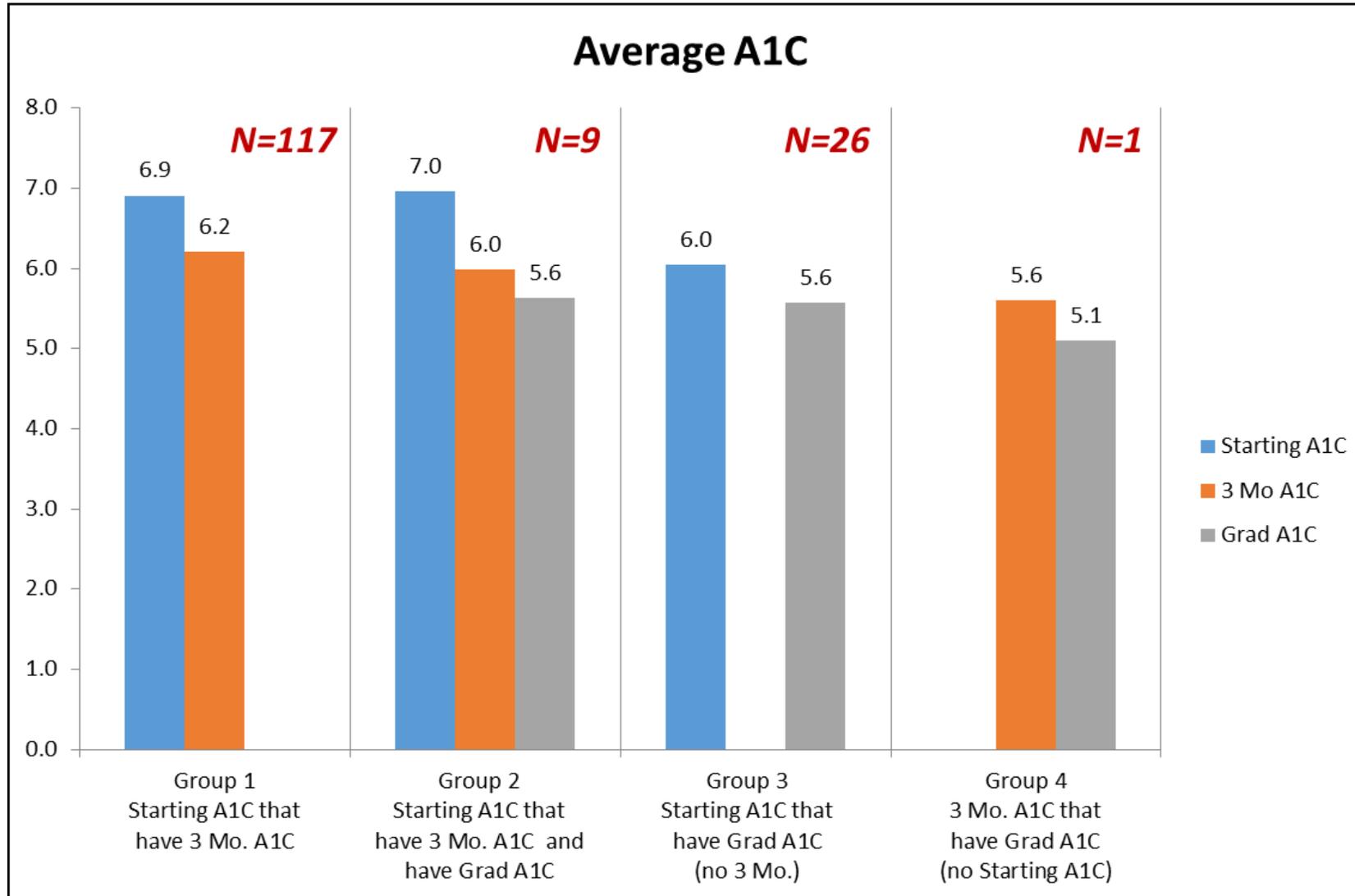
Land Mark Diabetes Study: S.J. Hallberg, et al, Effectiveness and Safety of a Novel Care Model for the Management of Type 2 Diabetes at 1 Year.” an Open-Label, Non-Randomized, Controlled Study “ Diabetes Therapy 9, no 2(2018)583-612 also 2015 TED talk: Reversing Type 2 Diabetes Starts with Ignoring the Guidelines”

- 349 participants with DM2 one year standard care vs ketogenic diet **30gm carbs/day adjusted to keep in ketosis**
- **Close contact with coach / physicians and monitored blood sugar, A1c, blood ketones, weight and medications.**

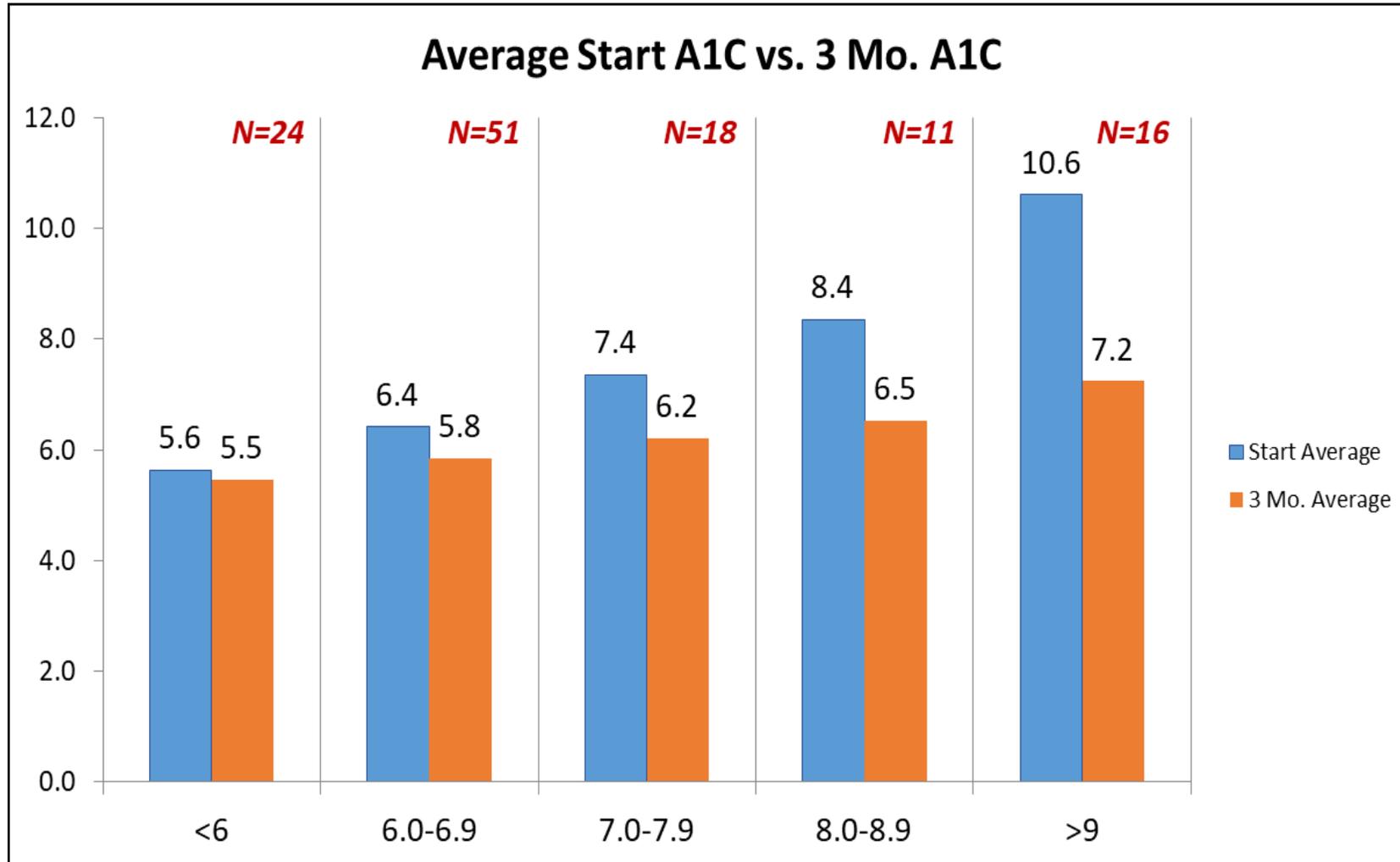
Effectiveness and Safety of a Novel Care Model for the Management of Type 2 Diabetes at 1 Year.” Findings:

- **Keto Diet Group**
- 12 % body wt. reduction
- A1c from 7.6 to 6.3
- 94% on insulin reduced or stopped it
- All stopped sulfonylureas meds
- **Ketogenic Diet is the most effective treatment ever found for DM2**
- **TED Talk: Reversing Type 2 Diabetes strts with ignoring the Guidelines”**
- **Traditional Physician care Group**
- No changes in A1c
- No change in weight
- No change in medications

Clear Outlook™, LLC Outcomes 2013-2019



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Comparison of the Atkins, Zone, Ornish, and LEARN diets for change in weight and related risk factors among overweight premenopausal women: the A TO Z Weight Loss Study: a randomized trial. Gardner CD¹, Kiazand A, Alhassan S, Kim S, Stafford RS, Balise RR, Kraemer HC, King AC. JAMA. 2007 Jul 11;298(2):178.

- **Abstract**

- ***CONTEXT:***

- Popular diets, particularly those low in carbohydrates, have challenged current recommendations advising a low-fat, high-carbohydrate diet for weight loss. Potential benefits and risks have not been tested adequately.

- ***OBJECTIVE:***

- To compare 4 weight-loss diets representing a spectrum of low to high carbohydrate intake for effects on weight loss and related metabolic variables.

- ***DESIGN, SETTING, AND PARTICIPANTS:***

- Twelve-month randomized trial conducted in the United States from February 2003 to October 2005 among 311 free-living, overweight/obese (body mass index, 27-40) nondiabetic, premenopausal women.

Comparison of the Atkins, Zone, Ornish, and LEARN diets cont.

- ***INTERVENTION:***

- Participants were randomly assigned to follow the Atkins (n = 77), Zone (n = 79), LEARN (n = 79), or Ornish (n = 76) diets and received weekly instruction for 2 months, then an additional 10-month follow-up.

- ***MAIN OUTCOME MEASURES:***

- **Weight loss at 12 months was the primary outcome. Secondary outcomes included lipid profile (low-density lipoprotein, high-density lipoprotein, and non-high-density lipoprotein cholesterol, and triglyceride levels), percentage of body fat, waist-hip ratio, fasting insulin and glucose levels, and blood pressure.** Outcomes were assessed at months 0, 2, 6, and 12. The Tukey studentized range test was used to adjust for multiple testing.

Comparison of the Atkins, Zone, Ornish, and LEARN diets

- **RESULTS:**

- Weight loss was greater for women in the Atkins diet group compared with the other diet groups at 12 months, and mean 12-month weight loss was significantly different between the Atkins and Zone diets ($P < .05$). Mean 12-month weight loss was as follows: **Atkins, -4.7 kg** (95% confidence interval [CI], -6.3 to -3.1 kg), **Zone, -1.6 kg** (95% CI, -2.8 to -0.4 kg), **LEARN, -2.6 kg** (-3.8 to -1.3 kg), and **Ornish, -2.2 kg** (-3.6 to -0.8 kg). Weight loss was not statistically different among the Zone, LEARN, and Ornish groups. At 12 months, secondary outcomes for the Atkins group were comparable with or more favorable than the other diet groups.

- **CONCLUSIONS:**

- In this study, premenopausal overweight and obese women assigned to follow the Atkins diet, which had the lowest carbohydrate intake, lost more weight at 12 months than women assigned to follow the Zone diet, and had experienced comparable or more favorable metabolic effects than those assigned to the Zone, Ornish, or LEARN diets [corrected] While questions remain about long-term effects and mechanisms, a low-carbohydrate, high-protein, high-fat diet may be considered a feasible alternative recommendation for weight loss.