REDUCE YOUR HBA1C AND AVOID DIABETIC COMPLICATIONS

THE KETOGENIC DIET FOR TYPE 1 DIABETES

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Introduction

This book is designed to introduce to you an underutilized but well-researched form of treatment for diabetes, the ketogenic diet. This is not a new "fad" diet. It was first devised by Dr. John Rollo in 1797. Clinical studies of its use were published in 1921, prior to the discovery of insulin that same year.[1] The discovery of insulin in 1921 was considered "the cure" for diabetes, and dietary changes were no longer promoted.

Our goal is to help you understand why current methods of diabetes treatment, which use a high-carbohydrate diet and insulin, are ineffective by comparison. The ketogenic diet, combined with insulin, is a powerful tool for normalizing blood sugar (blood glucose). This combination can minimize costly and disabling long-term complications of diabetes while simultaneously minimizing hypoglycemia (low blood sugar). As a bonus, following the diet can reduce insulin and medication requirements, which not only reduces the cost of caring for diabetes but also reduces the potential for side effects.

In working with your physician and learning how to manage diabetes with a ketogenic diet, you will be able to control your blood sugar more effectively with less insulin. In addition, your success in improving blood-sugar control and minimizing hypoglycemia may convince your physician to share this highly effective treatment with their other diabetic patients.

As with any diabetes treatment, the ketogenic diet needs to be combined with close monitoring of blood sugar. Urine and/or blood ketones may also require monitoring at times, and insulin dosages and other medications may need to be adjusted to maintain normal blood-glucose levels. Better blood-sugar control, fewer episodes of hypoglycemia, and a reduction in the complications of diabetes are the rewards for those who are willing to faithfully follow a ketogenic diet.

As a type 1 diabetic and a physician specializing in internal medicine, Dr. Runyan draws from both his personal experience and his

clinical experience with the ketogenic diet in the treatment of diabetes in adults. He has personally witnessed many patients realize a drastic reduction in their insulin requirements after putting them on the diet.

We are aware that the ketogenic diet goes against conventional wisdom. Should you decide to adopt this lifestyle, you may receive cautionary warnings from your friends, your family, or even your doctor—warnings like "All that fat will clog your arteries," or "You need 130 grams of carbohydrate per day to fuel your brain," or "Your cholesterol will increase, and that's bad for your heart." You get the picture. We will attempt to dispel these and other myths regarding a ketogenic diet.

The stakes are high. Never underestimate the adverse consequences of elevated blood sugars and frequent or severe low blood sugars. Dr. Runyan has spent a career treating diabetic complications, including end-stage kidney failure as a result of diabetic nephropathy. He has also seen patients in a permanent comatose state from anoxic brain injury due to prolonged severe hypoglycemia. Equally sad, he knows of two young resident physicians with type 1 diabetes who died of hypoglycemia while on duty at the hospital. Thousands of people suffer tragic diabetic events in the United States each year[2]. Many of these events are avoidable if people have the knowledge and the will to carefully follow the suggestions contained in this book under their physician's supervision.

Finally, we acknowledge that the ketogenic diet is not necessarily the best nor the optimal diet for all people. If, after consultation with your physician or other professional advisors knowledgeable in the ketogenic diet, you are not realizing improvements or find that the ketogenic lifestyle is not enjoyable or otherwise not right for you, please adjust the diet or find another approach to treating your diabetes. Where there's a will, there's a way—you just need to find yours.

Part 1

Setting the Stage

1

Power of the Ketogenic Diet: Personal Stories

We think real results are of great interest to all. Here are a few accounts of people who have used a ketogenic diet to improve their type 1 or type 2 diabetic health outcomes in powerful ways.

These stories highlight several important points. First, they show how dietary changes can have powerful effects on diabetic health outcomes–an improvement over relying solely on diabetic drugs. And second, even though there are many well-designed studies that show that a ketogenic diet is the most effective method for lowering blood sugar, many physicians still don't know about it, and the American Diabetes Association still does not endorse it. We find this puzzling and frustrating, to say the least, and it's part of the reason for creating this book.

Keith R. Runyan, MS, MD

In 1998, at the age of thirty-eight, I was diagnosed with type 1 diabetes, also called latent autoimmune diabetes in adults (LADA). Once the diagnosis was made, I treated my diabetes with multiple insulin injections and frequent blood-sugar monitoring with the advice of endocrinologists along the way. Neither I nor my endocrinologists gave any thought to a change in diet since I was already following a

"healthy" dietary regimen as recommended by the American Diabetes Association (ADA). We were pleased that my hemoglobin A1c (HbA1c) tests were hovering between 6.5% and 7% most of the time. Although my HbA1c values were in the ADA-recommended range for diabetics (6.5%–7%), they were certainly not in the normal range for nondiabetics (which is something closer to 4.2%–5.6%). With those values, there was no assurance that I would not develop long-term diabetic complications at some point.

I was having two to five hypoglycemic episodes each week, which I thought were just part of having fairly well-controlled diabetes. My hypoglycemic symptoms ranged from clothes-soaking sweats, rapid and pounding heartbeats, blurred or double vision, transient numbness of skin, and many other symptoms that varied from episode to episode. The most bothersome were the mental symptoms of hypoglycemia. These included an inability to recognize that I was hypoglycemic—therefore, I was not aware that I needed to treat it. This also manifested itself as being argumentative with my family when they told me to take sugar when I felt I did not need any.

Hypoglycemia was an embarrassing event since it meant a lack of control, and it was worsened by the fact that I am a physician and should have all the resources and knowledge to avoid it. More importantly, hypoglycemia can be life-threatening, and although I never lost consciousness, had a seizure, needed assistance, or had to be hospitalized, there was no assurance that any of those things would not happen while I was treating my diabetes using conventional therapy.

I was constantly thinking about how I was feeling and if how I felt could be yet another symptom of hypoglycemia. While lying down to sleep, I wondered whether I would wake up in the night in a sweat from yet another episode of low blood sugar—or not wake up at all! There was a three- to four-month period when my glucose meter was unknowingly reading falsely high. This caused me to overdose insulin, which resulted in nightmarish hypoglycemic episodes so severe that I felt I might die. Fortunately, I was able to manage them myself without

needing assistance. I finally purchased a new glucose meter, which put an end to the death-defying episodes. After those experiences, I checked the meter reading against laboratory glucose results, purchased new meters on a more regular basis, and sought out the most accurate meters to purchase.

What I didn't know then was that controlling diabetes with the ADA's high-carbohydrate diet without having recurrent hypoglycemia is impossible. After all, who would have imagined that respected diabetes experts would recommend an impossible task? Do you think I'm still angry? You bet. Having recurrent symptomatic hypoglycemia is certainly not a good way to go through life, especially since it can be avoided!

In August 2007, at the age of forty-seven, I decided to start exercising; I knew I had a chronic disease that might be helped by regular exercise. I decided to start training regularly to complete a sprint triathlon: a 0.9-mile swim, a 10-mile bike, and a 3.1-mile run. Having a goal provided additional motivation for me. I completed my first sprint-distance triathlon in December 2007. After a few years of increasing the distance of the triathlon events, I contemplated doing the full ironman distance triathlon. I started looking into how to keep my body fueled and my blood sugars near normal for the duration of the event, particularly since sugar is the primary fuel used by most athletes during a long-distance triathlon. I was consuming sugar in order to prevent hypoglycemia to the point that I was having hyperglycemia (high blood sugars) more often than not. My HbA1c, a test of average blood sugar over time, had increased to as high as 7.9% as a result, and I feared that it would reverse any benefit of exercise.

In 2011, I signed up to enter an ironman distance triathlon that consisted of a 2.4-mile swim, a 112-mile bike ride, and a 26.2-mile marathon run. Due to my frequent hyperglycemia while consuming sugar, and the constant threat of hypoglycemia, I felt I needed a new approach. That same year, I was listening to a triathlon podcast, IM Talk, hosted by John Newsom and Bevan James Eyles, in which they

interviewed Loren Cordain, PhD. That interview introduced me to the concept of diseases of Western civilization. Briefly stated, people who have never been exposed to foods created by agriculture and technology (mainly highly refined sugars and starches, including sweets, flour, white rice, and fruit preserves) rarely develop chronic diseases like dental caries, diabetes, hypertension, heart disease, obesity, dementia, cancer, appendicitis, and peptic ulcers. As a physician, this came as quite a shock to me. One would think that physicians who spend their entire careers treating these chronic diseases would have been taught this in medical school. Soon after, I heard Jimmy Moore's Livin' la Vida Low Carb podcast interview with Dr. Richard K. Bernstein, a diabetes specialist in New York who also had type 1 diabetes. After obtaining one of the first blood-glucose meters available, he discovered by trial and error that carbohydrates had the greatest influence on his blood sugars and that a ketogenic diet containing less than 30 grams carbohydrate per day normalized his blood-sugar levels with a much reduced insulin dosage.

From the tenets of *The Paleo Diet*, as described by Dr. Cordain, I placed more emphasis on using real whole foods and paid more attention to the source of foods. I added grass-fed beef; free-range, pastured chicken; pork; liver; and wild fish to my diet. One can have success with conventionally sourced foods, but I appreciated some of the significant differences that grass-fed and pastured foods had to offer.

Still skeptical that conventional medicine could possibly be so wrong, I was on a mission to both verify what Dr. Cordain was saying and to learn more about how nutrition affects health and disease. I read Gary Taubes's book *Good Calories, Bad Calories* on the history of diseases of Western civilization, the origin of the low-fat diet, lipid-heart and carbohydrate hypotheses, and the evidence supporting the role of dietary refined carbohydrates and sugar in the causation of chronic diseases. I read Dr. Bernstein's *Diabetes Solution*, which described his method of using the ketogenic diet to treat diabetes, and many other books and articles, including many cited in this book. I

wanted to make sure that the information I was obtaining was accurate since I was changing my own treatment in opposition to current medical convention.

I also utilized information from *The Art and Science of Low Carbohydrate Living* and *The Art and Science of Low Carbohydrate Performance* by Stephen Phinney, MD, PhD, and Jeff Volek, PhD, RD. When I learned that their information was accurate, I became angry. Why had I not taken the initiative to find this out for myself sooner? Why didn't the world's leading diabetes experts and organizations find this out or mention it as an option? Why didn't the research-funding organizations support studies to test the carbohydrate hypothesis? How could so many scientists and physicians come to believe that a diet with six to eleven daily servings of bread, cereal, rice, and pasta was a "healthy" diet, especially for people with diabetes? After all, those people are the most intolerant of high-carbohydrate foods. In addition, the practice of consuming large amounts of refined foods never existed on the planet until a few hundred years ago. How could humans adapt to them in such a short time on the evolutionary time scale?

So, on February 8, 2012, I started my new lifestyle: a ketogenic diet added to the resistance training, swimming, biking, and running that I had started in 2007. From what I learned reading *The Paleo Diet*, I had already eliminated milk, grains, sugar, starchy legumes, and all processed foods in November 2011.

Following *The Paleo Diet* plan led to a 45% reduction in my mealtime insulin dose but no improvement in my average blood sugar, nor any reduction in hypoglycemic episodes. I needed carbohydrate restriction added to the mix. In order to reduce my carbohydrate intake to 25 to 35 grams per day, I eliminated potatoes and fruit except for a few occasional strawberries or blueberries. To replace calories from the carbohydrates that I eliminated, I increased my dietary fat using small amounts of coconut and olive oils and butter. I simultaneously reduced my insulin doses (both long-acting and short-acting insulins) from about fifty-four units a day to about thirty-five units a day over

the next month or so, but I continued to adjust the insulin dose based on my blood-sugar readings and exercise. The variables I tracked included insulin doses, exercise type and duration, and fat intake based on appetite and energy expenditure. The constants I sought to maintain included the ketogenic diet with moderate protein and low-carbohydrate intake, keeping my blood sugar as close to normal as I could safely accomplish, i.e., avoiding hypoglycemia.

Once I adapted to the ketogenic diet, I was able to increase my training distances without needing to eat significant amounts of sugar. I developed the habit of carrying both insulin and glucose tablets with me, just in case, but I rarely needed either of them. I no longer feared hypoglycemia, even while exercising, and my hyperglycemia improved markedly.

On October 20th, 2012, I completed the Great Floridian Triathlon, an ironman distance event, in fifteen and a half hours with no need for any glucose, sugar, or food, using only my body-fat reserves for energy. I had no hypoglycemia, but I did have mild hyperglycemia that I did not treat with insulin because I was expecting my blood sugar to fall at some point during the event. My blood sugar at the end of the event was 156 mg/dL.

My HbA1c improved gradually, from 6.5% on average before the ketogenic diet to 5.6% in the first year on the ketogenic diet. In 2013, it remained at 5.6% and, in 2014, came down to 5.1% with an average blood glucose of 85 mg/dL. This resulted in more hypoglycemia, albeit without symptoms (more on that later); subsequently, I have accepted a near-normal blood glucose—around 95 mg/dL—in exchange for fewer hypoglycemic episodes.

My blood tests have improved in the manner typically seen on a ketogenic diet. Triglycerides decreased from an average of 76 to 65 mg/dL; HDL cholesterol increased from an average of 61 to 90 mg/dL; the triglyceride/HDL ratio decreased from 1.31 to 0.72; and the calculated LDL cholesterol increased from an average of 103 to 162 mg/dL but later came down to 132 mg/dL. The hs-CRP (high-sensitivity

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About the Authors

Ellen Davis has a Master's degree in Applied Clinical Nutrition from New York Chiropractic College. She created Ketogenic-Diet-Resource.com, a website showcasing the research on the positive health effects of ketogenic diets. Ellen has written articles for Well Being Journal, Terry's Naturally magazine and Healthy Living magazine, and authored several other books, including her book *Conquer Type 2 Diabetes with a Ketogenic Diet,* also coauthored with Keith Runyan, MD. In addition, her book *Fight Cancer with a Ketogenic Diet* is helping cancer patients utilize a ketogenic diet as therapy in over 70 countries.

Keith Runyan is medical doctor who has practiced clinical medicine in the areas of emergency medicine, internal medicine, nephrology, and obesity medicine. In 1998, he was diagnosed with type 1 diabetes and subsequently followed the conventional advice to treat his condition for the next 14 years. Although his glycemic control was at "recommended levels" of HbA1c of 6.5-7%, he was disturbed by frequent hypoglycemic episodes. After starting regular exercise to train for triathlons in 2007, his glycemic control actually worsened from taking sports gels to prevent hypoglycemia. When he contemplated doing an ironman distance triathlon in 2011, he sought a better method to control his diabetes. He came across the ketogenic diet in 2012 and experienced a rapid and remarkable improvement not only in glycemic control, but also in preventing hypoglycemia and its symptoms. He completed the ironman distance triathlon in 2012 without sugar, food, or hypoglycemia while in nutritional ketosis. He is now an advocate for the use of the ketogenic diet for management of diabetes and has authored books explaining its use and benefits for diabetes. He documents his results on his blog at ketogenic-diabeticathlete.wordpress.com.

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for more information on managing type 1 diabetes.

The Sensible Way to Control Blood Sugar

Before the invention of insulin, type 1 diabetic (T1D) patients were advised to avoid sugar and starch (carbohydrate) and to eat a very low carb, ketogenic diet to control blood sugar.

In contrast, modern advice is to eat carbohydrates and treat the resulting high blood sugar with large doses of insulin. This "eat carb and take more insulin" method increases the cost of diabetic care and does nothing to protect the patient from symptoms and complications. Worse, it exposes T1D patients to the real danger of a fatally low blood-sugar episode (hypoglycemia).

The logical solution is to reduce both carb intake and insulin dosage. Avoiding carbs while enjoying foods rich in healthy fats and protein stabilizes blood sugar and reduces medication costs and the risk of long-term complications.

The Ketogenic Diet for Type 1 Diabetes provides the tools and information you need to successfully take control of your diabetes. In addition to clear explanations of the science, you'll find personal success stories, lists of the foods to eat and to avoid, cooking tips, how to get started and personalize the diet, adapting basal and bolus insulin doses, and special considerations for children with T1D.

Keith Runyan, MD is a physician and author who uses ketogenic diets to treat diabetes. Fourteen years after his own diagnosis of T1D, he adopted the ketogenic diet and now enjoys an average blood glucose of 95 mg/dl and almost total freedom from the symptoms of hypoglycemia. He shares his methods and his results on his blog at ketogenicdiabeticathlete.wordpress.com.

Ellen Davis, MS, is an expert on ketogenic nutrition and passionate about sharing information that empowers others to help themselves. Her website, Ketogenic Diet Resource, offers information and books on how to treat diabetes, cancer and other diseases with a ketogenic diet.

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