AUBURN FAMILY MEDICINE

LIVING HEALTHIER TOGETHER

Guide to the Low Carb Lifestyle

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Introduction: “Don’t Leave the Path”

‘’‘Goodbye’! Gandalf said to Thorin. Goodbye! Straight through the forest is your way now. Don’t stray off the track!-if you do, it is a thousand to one you will never find it again and never get out of Mirkwood; and then I don’t suppose I, or anyone else, will ever see you again.’’

This book is about an epidemic that is no less frightening than the COVID-19 epidemic that reared its ugly head in 2020. The approximately 300 diseases that result from this epidemic causes far more deaths than the current pandemic that is currently in the news. As of November 2020, COVID-19 has claimed 180,000 lives in the United States. However, since it is part of our everyday life, we don’t recognize it for what it is. The biggest killer of lives in the history of the world. As a matter of fact, most of the deaths that occur today are a result of it. For example, heart disease causes almost 650,000 deaths per year, cancer 600,000 deaths, stroke 146,000 deaths per year, Alzheimer’s disease 121,000 deaths per year and diabetes 84,000 deaths per year.[i] All of these diseases are related to an entity called ‘insulin resistance’.

It wasn’t always like this. Ancestral peoples, like the native American did not succumb to the diseases of modernity such as diabetes, hypertension and heart disease. That is, until they were exposed to the Standard American Diet (SAD).

Abraham Lincoln and the people of his time did not eat like we do today. There were no fast food establishments like Krispy Kreme, Domino's Pizza, McDonald's or Dairy Queen. Before the 20th Century, the American diet was different. "Food was less processed, refined and contained less carbohydrate. Whole foods were consumed such as meat, vegetables and fruit when it was in season. The primary cooking oils were butter, lard and beef tallow.

The insulin resistance epidemic can be explained by increased sugar and refined carbohydrate consumption as well as unhealthy fats in the diet.

One result of insulin resistance is obesity. The increase in obesity is illustrated quite well by CDC charts. Decade by decade, especially since the 1950s, the percent of the population that is overweight or obese has steadily increased. Today, 32% of our population is overweight, 38% are obese and 8% are extremely obese.[1]

The Standard American Diet, or "SAD" diet is a relatively recent phenomenon. It emphasizes eating a low-fat diet, presumably to prevent heart disease. But it has had the opposite effect. The low fat, high carb lifestyle has actually made us sicker not healthier.

Insulin resistance, and all the diseases that result from it, is caused by our diet. A diet high in carbohydrates over time, causes an excess of insulin. Excess insulin is needed, among other things, to keep the blood sugar level within normal limits. This chronic excess of insulin is something we call a hyper-insulinemic state. The increases in insulin promote changes in the body that propel us through three different stages of hyperinsulinemia toward the development of diabetes. We go from a normal state where we are sensitive to insulin, towards an abnormal state called insulin resistance. Then, we progress from insulin

[1] https://www.cdc.gov/nchs/data/hestat/obesity_adult_13_14/obesity_adult_13_14.htm

resistance to a state called prediabetes. And finally, we progress from prediabetes to full blown diabetes itself. We'll talk more about this in the next chapter.

And along the way, from the insulin resistant state to diabetes, many other diseases rear their ugly heads. These conditions are often called comorbid conditions. Comorbid conditions are those that typically accompany one another. These are conditions such as hypertension, erectile dysfunction, gallstones, kidney stones and 100s of other diseases. In fact, Alzheimer's disease is frequently nicknamed "type 3 diabetes".

The good news is, with dietary changes, these hyper-insulinemic states can be reversed. Individuals can move from having diabetes, to having pre-diabetes, to having insulin resistance and ultimately to becoming fully insulin sensitive again.

Unfortunately, we have been misled by well-meaning scientists who influenced government policy makers and the food industry to concoct a toxic diet that we are all paying for. We have been down a very dangerous path. This book is about encouraging the reader to get on the low carb path and not to leave it. In JRR Tolkien's book The Hobbit, Gandalf's exhorts Bilbo Baggins and his dwarf companions, that if they want to reach their goal of taking back the treasure that once was theirs from a dragon named Smaug, they need to 'stick to the path' through the dangers found in Mirkwood Forest. In a similar way, it is hoped that the reader will "stick to the path" and not leave it for the gauntlet of fast-food restaurants lining the streets of their cities or the plethora of processed foods lining their grocery store shelves. If they "stick to the path" it is hoped that the reader will instead reach their goal of taking back the health that was once theirs. By working towards a diet progressively lower and lower in carbohydrate content that contains more nutritious whole foods and healthy fats, we can lose weight, feel better, improve our health and decrease our reliance on medications.

Chapter 1: The Macronutrients

The foods that we eat are broken down into macronutrients, vitamins and minerals. There are just three macronutrients, carbohydrates, proteins and fat. All three are typically made up of smaller molecules (see figure 1). Carbohydrates are made up of sugars, proteins are made of up amino acids and fats are made up of fatty acids.

You can of course eat sugar it in its pure form. Many people put table sugar in her coffee or brown sugar on their oatmeal. Typically, carbohydrates are eaten and broken down by digestion into sugars. The majority of the carbohydrates we take in eating the SAD or "Standard American Diet" are grains, potatoes and sugar itself. They are digested and either used for energy immediately or metabolized and stored as fat.

Most people don't realize how much of their dietary intake is composed of carbohydrates. An English physician, Dr. David Unwin, illustrates for his patients how much carbohydrate they eat by having them visualize teaspoons of sugar after the carbohydrates are broken down into simple sugars (see figure 2). For example, A piece of bread is mostly made up of carbohydrates and has the equivalent of 8 teaspoons of sugar in it. A cup of rice, 12 teaspoons. The incredible thing is, at any one time there is approximately just 1.5 teaspoons of sugar circulating in the blood stream.

Protein, another macronutrient, is made up of amino acids. Proteins can likewise be used for energy if metabolized. They can also be used for many other things. Protein can be used for structural elements like hair and nails. They can be used for metabolic uses like enzymes or hemoglobin, the molecule that carries oxygen around the body inside of our red blood cells. We need approximately .8 g to 1.2 g of protein per kilogram of lean body mass each day. Most people eat significantly more protein than they actually need. Unlike carbohydrates, which the

body can make anytime if it needs to, there are a few types of amino acids which are considered "essential." That is, we must take them in through dietary sources because our bodies can't make them. Without these essential amino acids, we would get sick.

Fats are made up of fatty acids. Like proteins, we cannot make all the different types of fatty acids we need. Two fatty acids are "essential". They are omega-3 and omega-6 fatty acids.

It is important to understand the concept of an essential nutrient. Again, this is a nutrient that the body can't make itself but must ingest it in order to maintain good health. For example, in the case of proteins there are a total of 22 different amino acids. Four of these amino acids are essential. The body can't make them so we need to acquire them by including them in our diet.

Likewise, there are two fatty acids, omega-3 and omega-6 fatty acids, that the human body can't make. Therefore, like the essential amino acids, we must include them in our diet. Carbohydrates are different. There is no such thing as an essential carbohydrate. We don't need to include any carbs in our diet. Our bodies can make all the sugars, or carbs, that it needs any of the macronutrients, carbohydrates, proteins and fats.

Obesity can be thought of as a hormonal problem. And that problematic hormone is insulin. Insulin has many different functions. Among the most important is supplying the body's immediate energy needs. It is the "key" that unlocks the door and allows glucose to enter cells. There, sugars are broken down and utilized for energy. Sugars also have other uses as well. Sugars that are not used immediately for energy are stored for future energy needs. Another function of insulin is storing excess calories as fat. It also inhibits the breakdown of fat. Thus, when carbs are being eaten, and insulin is stimulated, no fat can be burned. There's no need to. The immediate energy needs will be met by the circulating blood sugar.

Of the 3 macronutrients, it is primarily carbohydrates that cause a spike, or increase, in insulin after a meal. Protein can cause insulin levels to rise a little, and fat hardly at all. It is insulin's job to keep the amount of glucose in the blood steady. Interestingly, only 1.5 teaspoons at any one time. If there is too much sugar coming into the blood stream by digestion, insulin levels increase to eliminate the excess by storing them as fat.

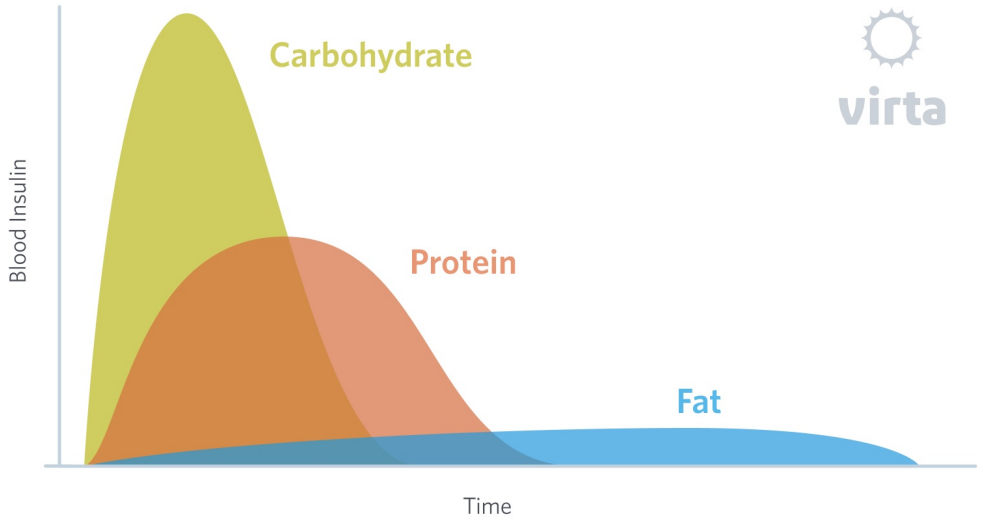

Figure 1. Macronutrient Effect on Insulin

For those in a habit of eating an excessive amount of carbohydrates, which is the majority of Americans, much more insulin needs to be secreted from the pancreas because the body becomes less "sensitive" to it. Overtime this insulin insensitivity, or insulin resistance, gets worse. More and more insulin needs to be produced by the body to keep the blood glucose levels steady and within normal limits. When this happens, insulin is circulating at above normal levels. When

insulin levels are high, fat cannot be broken down and used for energy and we get fatter and fatter by storing more and more carbs as fat.

To reverse this chronic insulin resistance, we must reduce our carbohydrate intake. The human body is much like a hybrid car. In the case of a hybrid car, it can run on either gas or electricity. Similarly, our bodies can run on either of two different fuels, carbohydrates or fats. Thus, the primary reason for eating a low-carb carb diet is to force our bodies from being a carb burner to being a fat burner.

There's an old saying, "where you can measure you can manage". With the low carb approach, we won't be counting calories so much as the number of grams of each of the three macronutrients. You can calculate this fairly easily by looking at food labels. Food labels will have the number of grams of carbohydrates, proteins and fat on them. Unfortunately, real whole foods like meats, vegetables and fruit don't carry labels.

Although you will find a government mandated food label on processed foods such as a box of cereal, you won't find them on broccoli, asparagus or lettuce. For that, you will need a small book that has such things in it, search online for a website with such information, or, simply use a smart phone app. Apps like MyFitnessPal, LoseIt, CarbMaster or CarboKing make the job fairly easy. You simply utilize the search function of one of these apps. For example, if you searched for 1/2 cup of white rice it might state that it has 24 grams of carbohydrates. As you enter more foods, it would keep a tally for you and tell you how many total grams of carbohydrates you have eaten that day.

Many apps are able to also keep track of calories burned by exercise. The diet recommended by the United States USDA has 20% fat, 30% protein and 50% carbs. That's way too many carbs!

We must do better. A modified Mediterranean diet has 40% fat, 30% protein and 30% carbs. The ketogenic diet is one that is considered high fat, moderate in protein and low in carbs. It is made up of approximately 70% fat, 20% protein and 10% carbs. Most people eating a ketogenic diet eat less the 30 grams of carbs per day. The standard American diet has over 20 times that!

Chapter Summary

- The foods that we eat are broken down into macronutrients, vitamins and minerals.
- There are just three macronutrients, carbohydrates, proteins and fat. All three are typically made up of smaller molecules (see figure 1).
- Carbohydrates are made up of sugars, proteins are made of up amino acids and fats are made up of fatty acids.
- Carbohydrates are used primarily for energy.
- Proteins are used for such things as energy production, metabolic processes such as enzymes and structural elements such as hair, nails, and bone.
- Fats are used for such things as energy production, cell walls and nervous tissue.
- An essential nutrient is a nutrient that the body can't make but must have been order to maintain good health.

- Unlike protein and fat, we don't need to include any carbs in our diet. Our bodies can make all the carbs (sugar) that it needs out of the other two macronutrients.
- Obesity is a hormonal problem. And that problematic hormone is insulin. Insulin has a number of different functions. First, it is important for supplying the body's immediate energy needs.
- Other functions of insulin are storing excess sugars as fat and preventing the breakdown of fat.
- Of the 3 macronutrients, it is primarily carbohydrates that cause a spike, or increase, in insulin after a meal. Protein can cause insulin levels to rise a little, and fat hardly at all.
- For those in a habit of eating an excessive amount of carbohydrates, much more insulin needs to be secreted from the pancreas because the body becomes less "sensitive" to it
- When insulin levels are high, fat cannot be broken down and used for energy and we get heavier and heavier by storing more and more carbs as fat.
- To reverse chronic insulin resistance, we must reduce our carbohydrate intake.
- Healthy, whole foods like meats, vegetables and fruit don't carry food labels.
- Smart phone apps can help us track macronutrients and calories consumed and burned

Chapter 2: The Four Insulin States and the Diabetes Progression

As I see it, there are four insulin states (Figure 1). An individual can exhibit normal insulin sensitivity, insulin resistance, prediabetes or full-blown diabetes. Each of these states can be diagnosed with laboratory studies. There are 3 laboratory tests that can easily help us to distinguish between these various insulin states.

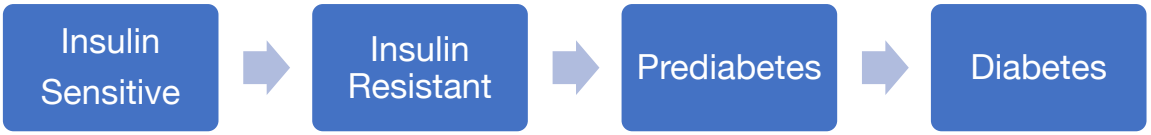

Figure 2. The Four Insulin States

We can simply obtain a fasting glucose. A value between 110 mg/dL and 126 mg/dL indicates prediabetes. A fasting blood glucose 126 or greater clinches the diagnosis of diabetes. Anyone with a random glucose level greater than 200 mg/dL can also be considered to have diabetes.

Although a lot more cumbersome, an oral glucose tolerance test, or GGT, can diagnose prediabetes or diabetes. It is typically performed by giving a drink with 75 g of glucose to a fasting individual. Glucose levels are drawn initially before the glucose load is consumed and 1, 2, 3 and up to 4 hours afterwards. This test can be used to distinguish between a person without prediabetes or diabetes from an individual with one of these conditions. This test cannot distinguish between an individual with normal insulin sensitivity or one with insulin resistance. After the 2

hour mark, a GGT value of between 140 mg/dL and 199 mg/dL indicates prediabetes. Those with values greater than 200 mg/dL are considered to have diabetes.

Now we get to a very important point. The only test that can definitively distinguish between an individual with normal insulin sensitivity from an individual with insulin resistance is a fasting insulin level! To reiterate, a fasting insulin level is crucial! Values < 8.4 indicate normal insulin sensitivity and those individuals with a value > 8.4 or higher are considered to have insulin resistance if not prediabetes or diabetes.

Insulin resistance is sometimes calculated by using a formula called HOMA-IR. This stands for Homeostatic Model Assessment of Insulin Resistance. It uses a fasting glucose level and a fasting insulin level to provide a number, the HOMA-IR. According to the website The Blood Code, a value of 1.9 indicates mild insulin resistance. A value about 2.9 indicates significant insulin resistance.[ii]

Individuals with normal insulin sensitivity and insulin resistance can have normal hemoglobin A1c values, that is, <5.7%. An individual with prediabetes has a hemoglobin A1c of between 5.7% and 6.4%. Individuals with diabetes have a hemoglobin A1c >6.4%. Hemoglobin A1c values are typically used to monitor how well controlled a person with diabetes is. Generally, an individual with diabetes is thought to be well controlled if his hemoglobin A1c is <7%.

The Four Insulin States				
Lab tests used to diagnose the 4 insulin states	Insulin Sensitive	Insulin Resistant	Prediabetes	Diabetes
Fasting glucose	<110 mg/dL	<110 mg/dL	110 to 126 mg/dL	>126 mg/dL
Fasting insulin	<8.4	8.4 or higher	8.4 or higher	8.4 or higher
Hemoglobin A1c	<5.7%	<5.7%	5.7 to 6.4%	>6.4%
Random glucose				>200 mg/dL
OGGT: 2 hours after glucose administration	<140 mg/dL	<140 mg/dL	140 to 199 mg/dL	>200 mg/dL

Table 1. Laboratory Tests to Distinguish the Four Insulin States

The good news is that insulin resistance can be identified years or decades before an individual has an elevated fasting glucose, abnormal glucose tolerance test or an elevated

hemoglobin A1c diagnostic of prediabetes or diabetes. Armed with this knowledge, patients with insulin resistance take steps to correct corrected and thereby avoid progressing to prediabetes or diabetes. A number of strategies can be used including eating a diet lower in carbohydrates and eating less frequently.

Chapter Summary

- There are 4 insulin states. These are normal insulin insensitivity, insulin resistance, prediabetes and diabetes.
- The insulin sensitive state and insulin resistant state have normal blood glucose levels and normal hemoglobin A1c levels.
- The insulin sensitive state and insulin resistant state can be distinguished from one another by obtaining a fasting insulin level.
- Prediabetes and diabetes are distinguished by fasting glucose level, hemoglobin A1c level or a glucose tolerance test.
- Abnormal insulin states can be reversed in most cases by decreasing the amount of carbohydrates in the diet and eating less frequently.

Resources

Chapter 3: The Diet-Heart Hypothesis Debunked

Contrary to popular belief “cholesterol” is not bad. But, over the years it has been made a thing to be feared. Actually, cholesterol is a natural and important part of our bodies. It is either made by the liver or enters our body by eating plant or animal products like meat, eggs and dairy products. It is used by the body to make cell membranes, bile (used to digest fats), sex hormones and vitamin D. It has been given a bad rap because it is also found in coronary artery plaques. The coronary arteries are arteries that supply blood flow to the heart. Early researchers assumed that since plaques contain a lot of cholesterol, eating cholesterol must be bad. These coronary artery plaques when they get large enough, can block blood flow to the heart either today or mass or by their inflammatory proclivity to form blood clots which subsequently can cause a heart attack. However, dietary cholesterol is not the cause of plaque formation and heart attacks. Rather, by a series of unfortunate events, cholesterol has been villainized and removed from our diets. As a result, it has caused even more plaque formation and heart attacks as well as many other chronic diseases. Today, according to the US government’s dietary guidelines we are encouraged to eat lean meats, fruits, vegetables, and whole grains. We are told to avoid the saturated fats found in animals and to choose “healthier” fats from vegetable oils instead. But since these guidelines were first promoted in 1977, the US population has grown fatter and sicker.

How did this happen? The short answer is our “SAD” or Standard American Diet includes much more sugar, processed carbohydrates and unhealthy, artificial fats.

After the turn of the last century our diets changed. Sugar became cheaper and more plentiful. Healthy fats, primarily from animal sources, were replaced with processed vegetable and seed oils such as corn, cottonseed, soy bean and others.

And, after World War II, to address the increasing incidence in deaths due to heart attacks, our diets changed even more. An unproven, diet low in fat and higher in carbohydrates became institutionalized. It is thought that Ansel Keys, a nutrition researcher, is primarily responsible. His passionate biased views led to what has been called "The Diet Health Hypothesis". This theory says that a diet low in saturated fat and cholesterol improves blood cholesterol levels and prevents heart disease. He was able to convince many fellow researchers by selectively picking data that was favorable to the theory and glossing over or ignoring facts that countered the theory. And by so doing, made a pretty good case for the theory.

As time went on, his reputation grew. He served on an influential nutrition committee of the American Heart Association. In this position he was able to encourage research favoring his theory of health policies. Ultimately a congressional committee in 1977 adopted The Diet Health Hypothesis as scientific truth and it became the basis of a set of national dietary guidelines that our country, and the rest of the world began to follow. We are following these same guidelines even today.

These guidelines, now institutionalized by researchers, medical societies and the US government has been used by the food industry over the years. This industry was responsible for funding most of the nutritional research since the 1950s and perpetuates the erroneous "Diet Health Hypothesis" theory. As a result, many lucrative but unhealthy products had been manufactured and consumed by an unwary public.

Unfortunately, “The Diet Health Hypothesis” has not been proven by science to be true. By following the low-fat high carbohydrate diet, obesity rates and chronic diseases resulting from insulin resistance have increased by the decade. Today it is estimated that two thirds of us are either overweight or obese. Three fourths of Americans are thought to be insulin resistant.

For a detailed history of the Diet Heart Hypothesis checkout Nina Teicholz’s book, The Big Fat Surprise. She summarizes the whole Diet Heart Hypothesis fiasco as follows; “Scientists responding to the skyrocketing number of heart disease cases, which had gone from a mere handful in 1900 to being the leading cause of death by 1950, hypothesized that dietary fat, especially of the saturated kind (due to its effect on cholesterol), was to blame. This hypothesis became accepted as truth before it was properly tested. Public health bureaucracies adopted and enshrined this unproven dogma. The hypothesis became memorialized in the mammoth institutions of public health. And normally self-correcting mechanism of science, which involves constantly challenging one’s own beliefs, was disabled. While good science should be ruled by skepticism and self-doubt, the field of nutrition has instead been shaped by passions verging on zealotry and the whole system by which ideas are canonized as fact seems to have failed us.”[iii]

The Cholesterol (Lipid) Panel

So, what do we really know about cholesterol? Cholesterol generally comes from 2 sources, the liver and our diet. The liver generally takes care of about 80% of our

needs and dietary cholesterol makes up the remaining 20%. Dietary sources come primarily from animal sources such as meat, dairy products, and eggs.

The standard cholesterol panel, which is typically measured in the fasting state, contains the following: Total cholesterol, high density cholesterol (HDL), low density cholesterol is (LDL), very low-density cholesterol (VLDL) and triglycerides. Total cholesterol, as the names suggests, is a total amount of cholesterol in the blood, that is HDL, LDL and VLDL.

HDL is generally thought of as the "good" cholesterol." And, it is true that higher levels are associated with lower heart disease risk. But its role is probably better used in one of two ratios that are better markers of heart disease risk. These ratios are the total cholesterol/HDL ratio and the triglyceride/HDL ratio. But even these two ratios are dependent on individual's insulin sensitivity. Thus, those with insulin resistance, or even worse, prediabetes or diabetes, have worse total cholesterol/HDL ratios and triglyceride/HDL ratios. So, to decrease your heart disease risk we need to decrease insulin and improved insulin sensitivity. We do this by limiting carbohydrates, mostly sugar and processed carbs, and eating healthy fats.

LDL is considered the "bad" cholesterol. However, that is not necessarily true. It is actually the quality of the LDL that is more important. Determining LDL quality takes a more sophisticated test than the usual cholesterol panel typically ordered by healthcare providers. These tests measure how many particles of LDL there are as well as their size. However, this test is really not necessary if you are addressing insulin levels and insulin insensitivity.

VLDL is another type of “bad” cholesterol. It is not of much use in predicting heart disease risk. It is mentioned here because it is sometimes included in some cholesterol panels.

Triglycerides are the result of digested fats. When you eat a meal, your food is broken down into smaller parts so it can be absorbed by the body. A process called digestion. The portion of the meal that is made up of fat, is broken down into smaller fats, predominantly cholesterol and triglycerides. People with insulin resistance, have higher average amounts of triglycerides. Triglycerides that are not used for energy are stored in fat cells called adipocytes for later use.

It is important to have a baseline laboratory workup that includes a cholesterol panel, especially if you are overweight or obese. An initial laboratory workup will help determine where you are with regard to insulin sensitivity. Subsequent tests will mark your progress in restoring your body back to an insulin sensitive state. On a diet that is lower in carbs and higher in healthy fats, one can expect improvements in our cholesterol panel: HDL level (higher), triglycerides (lower), total cholesterol/HDL ratio (lower) and triglyceride/HDL ratio (lower). We don’t typically pay much attention to the LDL level. There should also be improvements in your fasting blood sugar, fasting insulin level and hemoglobin A1c.

Depending upon your individual situation there may be other improvements as well. For example, if you have a condition called “fatty liver disease”, you may see a decrease in liver enzymes. Fatty liver disease is caused when a liver has to handle too much sugar and ends up trying to store it in the form of fat inside the liver itself. Tests

of inflammation such as C-reactive protein (CRP), ferritin and homocysteine can also be expected to improve.

Typically, doctors obtain a cholesterol panel and using the total cholesterol/HDL ratio along with the presence of high blood pressure and diabetes “guess” at your risk of developing heart disease over the ensuing 10 years. If you’re risk exceeds a certain threshold, say 10%, you are encouraged to begin a cholesterol lowering medicine called a “statin”. These drugs are effective at decreasing cholesterol levels. However, we don’t really know if they prevent heart attacks or death. And unfortunately, they are associated with a number of troublesome side effects including muscle aches and pains, fatigue and dementia.

However, there is a better way. Rather than guessing at your risk of developing heart disease over the following 10 years, why not be more certain? The American Heart Association, 2018 guidelines, recommends a coronary calcium score to those of intermediate risk. Those with intermediate risk are individuals over the age of 40 who have no previously diagnosed coronary artery disease and have cholesterol levels that are abnormal.

The coronary calcium score test is inexpensive and involves getting a CT scan of the arteries of your heart. It then determines whether you have any calcium in your coronary arteries, and if so, how much. Calcium is a very good indicator of the presence of plaque. The test is scored from 0 to over 1000. It is said that if you’re score is 0, it is much akin to having a “10-year warranty” of good heart health.

If you are found to have significant calcium in your coronary arteries, then, that issue can be addressed. Some of the latest research indicates that the progression of these

coronary artery plaques can not only be stopped, but even reversed. This is accomplished by making lifestyle changes like eating a low carb diet, including healthy fats and the use of supplements (vitamin D, vitamin K2, magnesium and fish oil). Although not typically covered by health insurance companies, the coronary calcium score test generally costs less than $100. It involves a minimal amount of radiation.

Chapter Summary

- The obesity and diabetes epidemics have occurred primarily by changes in our diet since 1900.
- These changes have resulted in the increase of sugar, processed carbohydrates and the introduction of processed oils and unhealthy fats.
- Cholesterol is not bad. It is a natural substance made by our livers and obtained from dietary sources. It has many functions including making up most of the brain, nerves, cell membranes and hormones.
- Total cholesterol and LDL are poor markers for heart disease and general health.
- With a diet that is lower in carbs and higher in healthy fats one can expect improvements in the HDL and triglycerides levels, and the total cholesterol/HDL and triglyceride/HDL ratios.
- A low carb diet can improve many other chronic medical conditions such as diabetes, high blood pressure, joint pain and fatty liver disease by decreasing insulin resistance.
- There may be improvements in inflammatory markers as well such as C-reactive protein (CRP) and ferritin.

- The coronary calcium score, a CT scan of the heart's coronary arteries, is an excellent way to determine whether you are at risk of having a coronary event. This test measures calcium, an indicator of plaque in your coronary arteries.

Resources

Resources:

The Big Fat Surprise, Nina Teicholz, New York, Simon & Schuster, 2015

Chapter 4: The Low Carb Progression

There are probably as many ways to begin a low carb lifestyle as there are people. Some people make an immediate and complete change. They go to their cupboards and refrigerators and pitch everything that is not" keto friendly". Perhaps a light goes off in their heads and they see the wisdom of the lifestyle. Or, perhaps they are beset by a number of serious medical problems and realize that drastic change needs to be made to save life or limb. Others are more reluctant. They prefer to tiptoe into the lifestyle, like a timid swimmer trying to get into a cold swimming pool, a bit at a time. So, to help those who wish to introduce the low carb lifestyle by incremental steps, I suggest trying to implement one or more of the following suggestions. Choose your own speed. Select one or two of the suggestions you are comfortable with an think he will be able to realistically achieve. Live with the changes for a while. Once you are used to 'the temperature', to use the timid swimmer analogy, you can choose to implement one or more other, perhaps more difficult suggestions.

When I tell patients the kinds of things they need to cut out of their diet, I often hear the complaint "Oh Doc, you're taking away all the good stuff". My response is generally "you're looking at it all wrong". How can these things be good if they're causing you to put on weight and are bad for health? How can they be good if you're having to take three medications for your diabetes, two more for your blood pressure and one for your cholesterol? I then explain that we need to start thinking like a healthy person.

If the patient is a nonsmoker, I often use the following example: If I went to your house and put an unopened pack of cigarettes on your kitchen counter, how long could I

expect them to stay there untouched? I usually get a response something like "forever". Then I respond "exactly!" That's because you're thinking like a nonsmoker. We need to be able to walk by a plate of chocolate chip cookies and have the same reaction that a pack of cigarettes would to a nonsmoker. We need to be able to say to ourselves something like "Those things are nasty. They're unhealthy. Those things will kill me."

So, without further ado let's consider one or more of the following suggestions to decrease carbohydrates from your diet:

1. **Stop drinking calories**. This may be one of the easier ways to decrease carbs. Granted it can be difficult to do for some. Some people never imagined having to give up their sweet tea or their favorite soft drink. But it is likely the reason they're in their current predicament. Many individuals will begin to lose a significant amount of weight just by switching from sugary sodas to drinks that have no calories such as water or sparkling water, unsweet coffee or tea. Half-and-half for heavy whipping cream are fine for hot coffee or tea. Lemon may he used for cold iced tea. Many individuals don't realize just how many calories such sugary drinks have. Other sources that may cause problems are fruit juices, fruit smoothies, specialty coffee drinks and energy drinks. From a nutritional standpoint, the simple truth is that adults don't need to drink any calories.
2. **Stop eating sugar.** Cutting out candy, pastries, ice cream and most other desserts can be a problem for many. These are predominantly carbohydrates that are as bad as sugary soft drinks.

3. **Eliminate diet soda and artificial sweeteners.** Artificial sweeteners, although they do not contain calories, can contribute to higher insulin levels. And, since insulin is the hormone we want to keep to a minimum, we need to eliminate as many artificial sweeteners as we can. The best artificial sweeteners are xylitol and Stevia. They should be used sparingly. Perhaps, in a special recipe rather than a drink consumed at every meal.
4. **Processed flour.** Processed, enriched flour is commonplace these days. It is found in breads, pastries, cakes, pies, crackers, and cereals to name a few. For many, this product is found in every meal and snack that they eat. They may have cereal, pancakes or waffles for breakfast. Crackers for a midmorning snack. At lunchtime they may have a sandwich, a wrap or a burrito of one kind or another. 4 their mid afternoon snack, they might have a cookie. With dinner they have garlic bread, yeast rolls or pita bread. And then for dessert, they may have a slice of cake, a slice of pie or cookies.
5. **Pasta.** Okay, this is processed flour too. But many people don't think of it as such. Included in this suggestion are noodles. Many people don't consider it bread-like but it is. It too will break down into sugar. Instead of pasta, consider substituting a shredded vegetable like zucchini or spaghetti squash in your pasta dish.
6. **Starchy vegetables.** The starchy vegetables are primarily those vegetables that grow below the ground. It includes potatoes, sweet potatoes, carrots, rutabaga, beets, radishes, etc.

7. **Fruit.** Fruits are nature-s candy. They contains sugar! Although we typically think of fruit as being healthy, to an individual who is overweight or battling diabetes, it is part of the problem. The only approved fruit on a very low carb diet are the berries: Strawberries, blueberries, blackberries and raspberries. These are used sparingly and not eaten by the pint. Some berries in whole milk plain yogurt make for a nice breakfast parfait.
8. **Eliminating most if not all grains.** This is probably the most difficult one of all. Grains, even if whole grains are used, are digested into carbohydrates. This includes oats found in such things as oatmeal, granola bars and breakfast cereals. It includes corn as found in corn on the cob, cornbread, grits, corn flakes, tortilla chips and corn chips. It includes wheat found in breads of all kinds, pastas and the processed foods mentioned above. And, it includes rice which is included on the plates at our favorite Chinese or Mexican restaurants. Other grains include quinoa and buckwheat. For those who enjoy baking, coconut flour and almond flour are healthy alternatives. There are an unlimited number of recipes available that use these low carb flours.
9. **Unhealthy fats and oils.** Unhealthy fats and oils should likewise be eliminated. They are manufactured through elaborate process that is unnatural. They are made “under pressure, and deodorized. They cause metabolic damage by creating an unhealthy ratio of Omega 6 fatty acids to Omega 3 fatty acids. A healthy ratio of Omega 6 to omega-3 is on the order of 3 to 1 or 2 to 1. These processed oils have ratios of 20 to 1. It is thought that they are not good antioxidants. Many problems are linked with these unfavorable ratios. Instead,

oils should be cold pressed oils such as olive oil, avocado oil or coconut oil. Butter and ghee can be used for cooking and adding flavor to food as well.

Chapter Summary

- Not everybody is comfortable plunging into the low carb lifestyle. The best low carb diet, is one that you can adhere to.
- Some people do better by introducing small changes and getting used to them before introducing other changes.
- Incremental changes that can be implemented include:
    - Eliminating any drink that has calories
    - Eliminating diet drinks, eliminating sweets
    - Eliminating diet sodas and artificial sweeteners
    - Eliminating processed flour
    - Eliminating pasta
    - Eliminating starchy vegetables
    - Eliminating fruit
    - Introducing healthy fats and oils into salad dressings and cooking.
    - Eliminating all grains such as oats, corn, wheat, rice and others.

Chapter 5: The Modified Mediterranean Diet

The Mediterranean diet (figure 1), which is generally thought of to be heart healthy, consists of lean meats, fruits and vegetables of all kinds, whole grain bread products and a limited amount of oil and fat. It does not include sodas or a lot of sugar. This diet is a big improvement to the standard American (SAD) diet.

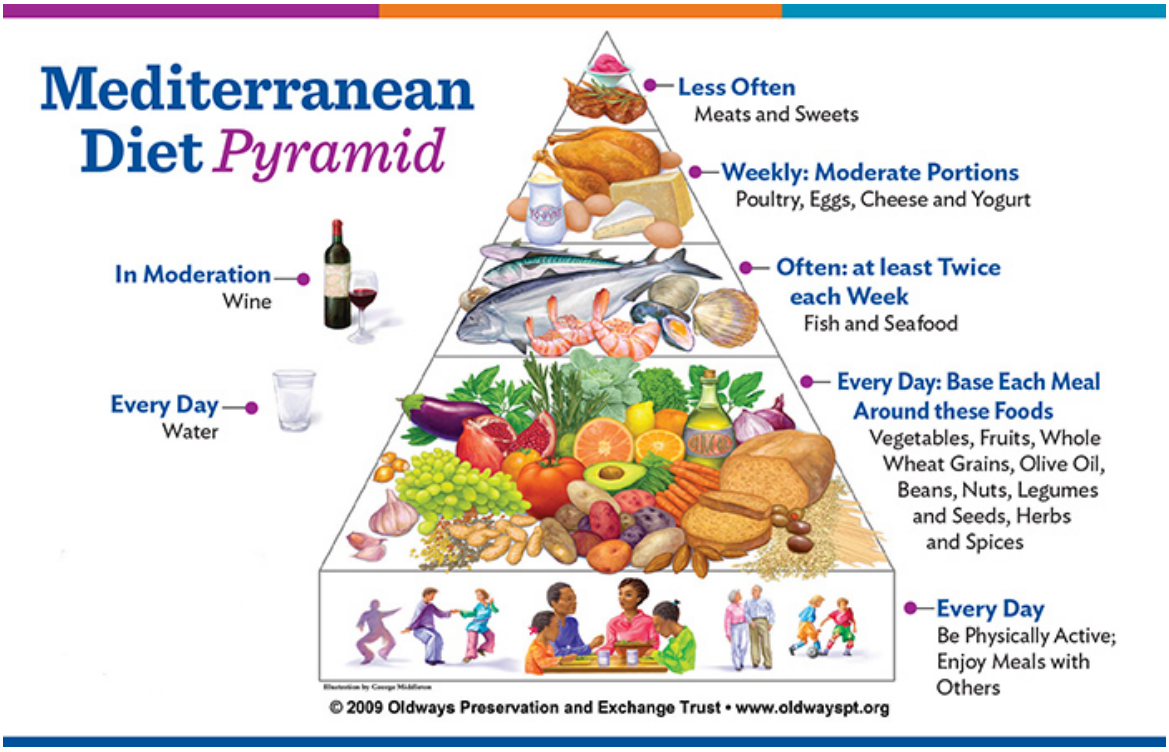

Figure 3. The Mediterranean Diet Pyramid

The Mediterranean diet is perfectly fine for individuals who are not overweight, obese or insulin resistant see chapter 2). However, for the two thirds of Americans who have

insulin resistance, whether they are aware of it are not, it is not adequate. Further carbohydrates restriction is needed.

A modified Mediterranean, that is the standard Mediterranean diet that is lower carbohydrates, may be more prudent for the very healthy and helpful for those with mild insulin resistance and to lose weight. Such a modified Mediterranean diet looks like the following:

Meats: There is no restriction to just eating lean meats such as chicken breasts and fish. Any meat can be consumed without excluding fattier cuts. As a matter of fact, fattier cuts of meat are encouraged!

Vegetables: All types of vegetables are okay with this diet. There is no distinction between those vegetables which grow above the ground and those which grow a below the ground. As long as the vegetables are not processed. Potatoes, sweet potatoes, carrots and other vegetables are okay.

Fruits: Fruits of all kinds may be eaten. There are no restrictions based on their sugar content. Though, eating more than one serving at one sitting should be discouraged.

Dairy: There are no restrictions on fat content, those containing higher fat content are encouraged. One can eat sour cream, unprocessed cheeses, whole milk and heavy whipping cream.

Fats and oils: Natural fats are preferred. Natural fats may be eaten without limits or other restrictions. Olive oil, coconut oil, avocado oil, butter and ghee are favored. Artificial fats such as margarine, corn oil, soy bean oil, sunflower oil, peanut oil and canola oil are discouraged.

Sugar: Sugar in all forms is discouraged. Sweets should be a rare treat and not a regular part of anyone's diet, for example, 3 scoops of ice cream each night while watching TV.

Drink: Adults really do not need to drink calories of any kind. So, water, sparkling water, coffee and tea are ideal. However, fruit juices, vegetable juices, smoothies made with fruit and vegetables can be included on an occasional but not on a regular basis.

If excluding sugary sodas, fruit juices, pastries, candy and other unhealthy treats and eating a modified Mediterranean diet is not enough, further carbohydrate restriction may be necessary.

Chapter 6: The Ketogenic Diet

The ketogenic diet is based on just a few principles. First, carbohydrates need to be kept to an absolute minimum in an effort to keep insulin low. Second, in order to maintain healthy muscle mass, a moderate amount of protein need to be included. However, protein is limited because of its tendency to increase insulin levels if the eaten in excess. Third, the rest of the calories come from healthy fats. The percentages of each of the macronutrients in a ketogenic diet are approximately 60-70% fats, 20-30% protein and 5-10% carbs. As a result, we describe the ketogenic diet as being high in fat, moderate in protein and low in carbohydrates (see figure 2).

Figure

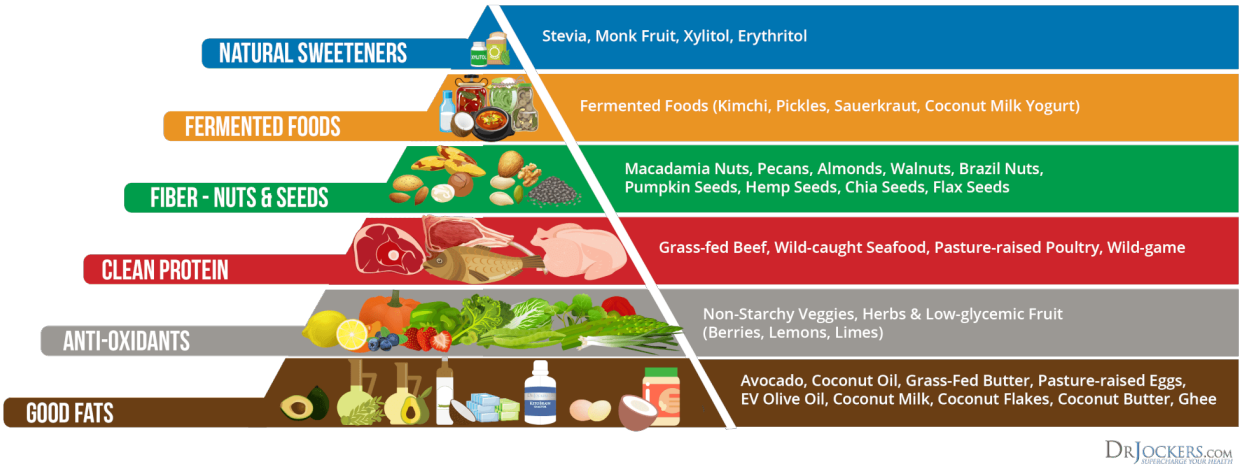

Figure 4. The Ketogenic Diet Pyramid

Perhaps the simplest way to describe this diet is that one needs to avoid “GPS”. In this case, GPS does not mean “global positioning satellite”. It means avoiding grains, potatoes and sugar. Grains include oats as in oatmeal, granola bars and cereals. Corn

as in corn on the cob, corn off the cob, cornbread, grits, corn flakes and tortilla chips. Wheat as in bread, pasta, pastries and many other processed foods that include gluten and other wheat components. And rice that is found in cereals, crackers, processed foods of all kinds and as a side in many ethnic dishes. There are many other grains as well (quinoa, buckwheat, etc.). But oats, corn, wheat and rice are the most prolific.

The ketogenic diet includes the following:

Meats: All kinds of unprocessed meats are included such as beef, pork, poultry etc. The fattier cuts are preferred.

Seafood: All types of seafood are included. But again, the fattier cuts are preferred such as salmon.

Eggs: Eggs are an ideal, keto friendly food. They have healthy fats and high-quality protein.

Vegetables: Those vegetables that grow above the ground are on the list. This includes vegetables like broccoli, asparagus, green beans and just about anything you would put on top of a salad. Legumes are not included. Legumes include various beans (kidney beans, navy beans, black-eyed peas, garbanzo beans, and peanuts). Root vegetables such as potatoes, sweet potatoes, carrots, rutabaga, beets are not included because of their high carbohydrate content.

Dairy: High, or full fat dairy products are included. This list would include full fat sour cream, cream cheese, heavy whipping cream and full fat cheeses. Milk and various lower fat versions of milk are excluded because of their sugar content.

Nuts: Tree nuts can be used as a snack. Almonds, pecans, walnuts and macadamia nuts are on the list. Cashews are on the list too, but they have a higher carb content than most.

Fruit: Fruit is nature's candy. They contain a lot of sugars. However, berries such as strawberries, blueberries, raspberries and blackberries maybe eaten in limited quantities.

Drink: No calorie drinks such as water, sparkling water, flavored water without sugar or artificial sweeteners, coffee and tea are permitted. Lemon and lime maybe use to flavore water or iced tea.

Snacks: Keto friendly snacks include cheeses, pepperoni, cold cuts such as salami, bacon, berries, tree nuts, pork rinds and jerky of various kinds.

A number of people say that eating out is too hard. I disagree. Instead of going through McDonald's ordering The Big Breakfast. What so hard about ordering only scrambled eggs and bacon? Another simple breakfast alternative is whole milk plain yogurt with berries.

For lunch, you can go through the drive through and order a bacon cheeseburger without the bun. Still hungry? Order a side salad. You can drink ice water or unsweet tea with or without lemon. Would you rather have BBQ? Instead of having a BBQ sandwich and a side of beans and potatoe salad, order a BBQ plate without the bread. Include greens or cold slaw as a low carb side dish. What about grilled chicken fingers? Rather have pizza? Many pizza establishments are including cauliflower pizza

on their menu. Some establishments have what is called and “pizza bowl”. This is basically pizza toppings without the crust.

The evening meal is pretty standard fare. Have your favorite meat, the fattier the cut the better. Include a low-carb vegetable or two. Include a salad if you wish with a high fat dressing made from healthy oils.

Eating out at a restaurant can be a bit of a challenge. At the steakhouse you will want to avoid the pre-meal bread set in front of you. At the Mexican restaurant you will want to avoid the ubiquitous pre-meal tortilla chips. You can eat fajitas without the tortillas. A chili relleno might be a good choice. You will want to avoid the beans and rice.

Eating Chinese is a bit easier. Choosing an non-breaded meat with vegetables should be no problem. Try and avoid the sweet sauces. And, of course, avoid the rice. At the Italian restaurant you will want to avoid the pasta. However, eggplant Parmesan would be a pretty good choice. Italian restaurants often have a number of chicken, seafood and veal entrées. Feel free load up on the salad.

Chapter 7: Other Low-Carb Lifestyles

Perhaps the best low-carb diet is one that you can stick to. There are a number of popular low-carb diets including The Atkins, the carnivore diet, the South Beach diet, and the whole 30 diet to name a few. Some have phases you need to follow. Others, have no phases and are thought of as a lifestyle. Below is a brief description of some of the more popular low-carb diets.

Atkins diet: The Atkins diet has 4 phases. The Atkins diet is generally composed of high-protein, moderate fat and low carb. It includes meats, dairy, nuts and seeds, oils, both non-starchy and starchy vegetables, both low glycemic foods and high glycemic foods, grains, legumes, soy and alcohol.

Carnivore diet: The carnivore diet is made solely of meats> That's it! No vegetables.

The Paleo diet: The paleo diet includes, nuts and seeds, both low glycemic and high glycemic foods and alcohol. It does not include, grains, legumes or soy.

South Beach diet: The South Beach diet has 3 phases. The South Beach diet includes meats, dairy, nuts and seeds, oils, non-starchy vegetables, low glycemic foods, grains, legumes, soy and alcohol. It does not include starchy vegetables or high glycemic foods.

Whole 30 diet: The whole 30 diet is touted to 'reset' your metabolism. It includes meats, nuts and seeds, oils, non-starchy vegetables and low glycemic foods. It does not include dairy products, starchy vegetables, high glycemic foods, grains, legumes, soy or alcohol.

Diet	Atkins	Eco-Atkins	Bulletproof	Dukan	Keto	Scandinavian LCHF	Paleo	Slow Carb	South Beach	Whole 30	Zero Carb	Zone
Energy source	Fat	Fat	Fat	Protein	Fat	Fat	Fat	Fat	Protein	Fat	Fat	Protein
Approach	4 phases	3 phases	Lifestyle	4 phases	Lifestyle	Lifestyle	Lifestyle	Lifestyle	3 phases	Reset	Lifestyle	Lifestyle
Net Carbs	20-150g	130g	-	-	30g	-	-	-	-	-	>20g	-
Meats	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Dairy	✓	✓	✓	✓	✓	✓	✗	✗	✓	✗	✗	✓
Nuts & seeds	✓	✓	✗	✗	✓	✓	✓	✓	✓	✓	✗	✓
Oils	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Non-starchy veggies	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Starchy veggies	✓	✓	✓	✓	✗	✗	✓	✗	✗	✗	✗	✗
Low-glycemic fruits	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓
High-glycemic fruits	✓	✓	✓	✓	✗	✗	✓	✗	✗	✗	✗	✗
Grains	✓	✓	✓	✓	✗	✗	✗	✗	✓	✗	✗	✓
Legumes	✓	✓	✗	✗	✗	✗	✗	✓	✓	✗	✗	✓
Soy	✓	✓	✗	✓	✗	✗	✗	✓	✓	✗	✗	✓
Alcohol	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓

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Figure 5. 12 Low-Carb Diets Compared

Chapter 8: How Do You Know If Low Carb Is Working?

Physical Changes

Body weight: One of the simplest ways to track the progress of your new low carb lifestyle is your weight. Initially most experience weight loss within the first week or two. Most of this initial weight loss is due to the loss of water. This is because 'water follows carbs'. When one eliminates carbs, one eliminates the water that hangs around with it. This is one of the reasons why those eating a low carb diet are encouraged to drink plenty of water. Replacing electrolytes by getting plenty of sodium and potassium is important as well. Ways to replace salt include adding extra table salt to your food. Or, even better, adding Lite-Salt to your food. Lite-salt can be found in the grocery store in a light blue container. Lite-Salt contains both sodium and potassium.

Use of a scale is recommended. The frequency is left up to the individual but it should be at least monthly. Daily weight checks can be a bit confusing due to the ebb and flow of the normal variation caused by such things as sodium intake and water retention.

Body mass index (BMI): BMI, or body mass index, is another measure that can be tracked. It is a measure of weight divided by height squared. By using an online calculator or a smart phone app, you can input your height and weight into the BMI calculator. A normal BMI is between 18.5 and 25. If you are starting with a BMI greater than 30, a normal BMI is not the best goal to shoot for initially. Rather, shoot for a more modest goal, say a 5% loss of body weight. For example, if you weigh 300 pounds,

10% of that weight is 30 pounds and 5%, half of 10%, is 15 pounds. This is a more realistic goal. A loss of 5% may not seem like much to you, but it is likely that most of the metabolic markers we follow (fasting glucose, fasting insulin, triglycerides, lipid ratios,

simple measure of progress. Measure your waist at the level of the belly button with a tape measure. Recording one's waist circumference on a monthly basis is often enough. If you're losing weight, you're also likely noticing the loosening of your old clothes.

Biometric Changes

Blood pressure: If you have a history of high blood pressure or hypertension, you should have a blood pressure monitor. Taking your blood pressure every other day is a good idea. It's expected that your blood pressure will decrease as you experience weight loss. One of the most satisfying feelings is having your medication reduced or even discontinued. When the medication is discontinued it is called deprescribing. It is one of the most satisfying things this doctor can do.

Laboratory Changes

Blood sugars: If you have prediabetes or diabetes, you should have a blood glucose monitor. If you're decreasing your carbs significantly, you should see significant improvement in your blood glucose measurements. For those individuals who are on

insulin, they may be instructed to cut their dose. Check with your doctor first regarding reducing or eliminating some of your medications. It is essential that those on insulin and certain oral diabetic medications follow their blood sugars carefully. This is to prevent hypoglycemia, or low blood sugar, which can be very dangerous.

You are encouraged to check your blood sugars every day. For those not on insulin, it is still important to monitor your blood sugars frequently at the beginning of your low-carb adventure until you're comfortable of where your blood sugar values are. A continuous glucose monitor is ideal.

After you have a sense of how your blood sugars are behaving, it is preferable that you obtain glucose measurements at different times of the day. For example, on day 1 measure your blood sugar before breakfast, on day 2 before lunch, on day 3 before your evening meal and on day 4 before bed. Then begin the process all over again (see Table 1). Over time you should be able to see a trend. The average blood sugar at each time should be decreasing.

Table 2. Form to Record Blood Sugar Measurements

Date	Before Breakfast	Before Lunch	Before Dinner	Before Bed

Table 1. Form to record blood sugar measurements

With decreasing weight and increasing physical activity, you're likely to be in a healthier condition. One would expect the heart rate, or pulse at rest, to decrease. You can also expect your maximal heart rate with exercise also likely to decrease a bit. These are both measures that are signaling you're headed in the right direction.

Chapter Summary

- Individuals who begin a low carb lifestyle will notice a number of physical changes.
- There will be improvement in weight, body mass index, waist circumference, blood pressure and blood sugar levels.
- To prevent hypoglycemia, an abnormally low blood sugar that can be quite dangerous, it is crucial that individuals using insulin have their dose adjusted according to their healthcare provider's instructions.
- It is crucial to monitor their blood sugars very carefully with the initiation of a low carb diet. After stabilizing, blood sugars may be obtained less frequently. For example, blood sugars may be obtained once a day. Rotating the time daily blood sugars are obtained such as before breakfast, before lunch, before dinner and at bedtim is a good idea.
- Blood sugar measurements should be recorded and brought to their healthcare provider's appointments to be evaluated.

Resources

Chapter 9: Lifestyle

Most people who embark on a low, ketogenic diet notice a number of improvements.

1. Energy: About 2-3 weeks into a ketogenic diet most individuals report an increase in energy. Some of this may have to do with the fact that after eating a meal laden with carbs, insulin level rises dramatically to clear the glucose in the blood. Sometimes the insulin overshoots the mark and there are moments of low blood sugar or hypoglycemia.
2. Mental clarity: Mental clarity is commonly reported in those who are on a ketogenic diet.
3. Joint pain: The ketogenic diet is anti-inflammatory. As a result, joint pain is decreased. It is not uncommon for those who stray from the ketogenic diet, say to have a pepperoni pizza, to report an increase in their joint pain on the day following their dietary indiscretion.
4. Improvement of skin conditions: Many skin conditions are due to autoimmune and inflammatory conditions. The ketogenic diet is anti-inflammatory and improves such skin conditions such as rosacea, acne, eczema, psoriasis, skin tags and acanthosis nigricans.
5. Sleep: Back in the 1930s, one of the first uses of a ketogenic diet was in the treatment of children with seizure disorders. The ketones that circulate calm and soothes the irritable brain. Even today a ketogenic diet is recommended in cases where the seizures are difficult to control. They calming effect of ketone

bodies on the brain is noticed by many without a history of seizure disorders. Most people report an improvement in their sleep.

Chapter Summary

- Improvements in those following a low carb, ketogenic diet include increased energy, improved mental clarity, decreased joint pain and improved sleep.

Resources

- Keto Cure

Chapter 10: Laboratory Assessment

A number of laboratory studies are used to monitor the progress of individuals as they reverse insulin resistance, prediabetes and diabetes.

Urine tests

Urine glucose: In those individuals with uncontrolled diabetes urine glucose test strips can be used to monitor those with sugar in their urine. This finding is called glucosuria. However, diabetes control is more accurately monitored with blood glucose levels and is the standard of care.

Urine ketones: For those who want to verify that they are in nutritional ketosis, urine ketone test strips can be purchased to test the urine for ketones. This is probably a good way to verify whether you are correctly eating a ketogenic diet during the early stages. You simply urinate on one of the test strips while sitting on the toilet and then match the color of the test strip to the picture on the bottle. These are rather inexpensive and can be purchased online.

Blood Tests

Blood ketone test strips: These test strips use a drop of blood pricked from the finger and are read by a small meter, much like a glucometer use by diabetics. It is utilized to measure the degree of nutritional ketosis the user is in. They are more accurate than urine ketone test strips.

Fasting glucose: This test can be performed by using either a test strip that utilizes a drop of blood from a finger prick or venous blood that is sent to a commercial lab. It is capable of distinguishing between an individual with normal glucose control (that is an

individual with normal insulin insensitivity or one with mild insulin resistance from those with severe insulin resistance such as those with prediabetes and diabetes.

Fasting insulin: This test uses venous blood and is sent to a commercial laboratory. It helps distinguish between an individual with no insulin abnormalities and from those with insulin resistance, prediabetes or diabetes.

HOMA-IR (Homeostatic Model Assessment Have Insulin Resistance): Insulin resistance can be thought of as pre-prediabetes. The Homa-IR is calculated using the fasting glucose and fasting insulin levels. This calculator can be found at thebloodcode.com. A healthy range is 0.5-1.4. Levels above 1.9 indicate early insulin resistance. About 2.9 indicate significant insulin resistance.

Hemoglobin A1c: This test uses venous blood and is sent to a commercial laboratory. You do not have to be fasting for this test. It measures the amount of sugar that accumulates on red blood cells as they age. The higher the level, the higher your average blood glucose is. It can distinguish between those individuals with prediabetes and diabetes from those who don't have these conditions

Liver enzymes: These test use venous blood and are sent to a commercial laboratory. You don't have to be fasting for this test. Elevated liver enzymes. There is some sort of inflammation of the liver. Although there are many reasons for the elevation of liver enzymes such as medications, viral infection and toxic substances, one of the more common reasons that we are interested in is the development of fatty liver disease, a result of prolonged exposure to high carb diets with resultant insulin dysfunction. Fatty liver disease can result in the development of cirrhosis and liver cancer. Fatty liver disease can be reversed with a low carb diet.

Fasting Lipid panel:

Total cholesterol: This is a measure of all the different types of cholesterol totaled together in the blood.

HDL: This is generally considered to be the good cholesterol

Triglycerides: Triglycerides are typically the result of fats digested in a meal or fats mobilized from our bodies.

LDL: This is generally considered to be the bad cholesterol.

Total cholesterol/HDL ratio: More important than either component itself, is the total cholesterol/HDL ratio. The lower it is the better. The lower it is the lower your risk of heart disease. Less than 5 is considered normal.

Triglycerides/HDL ratio: Like the total cholesterol/HDL ratio, this ratio is more important than either component itself. And, like the total cholesterol/HDL ratio, the lower the ratio the less likely you have insulin resistance.

Thyroid panel:

Free T3: Free T3 is the active thyroid hormone. It is the free 4 hormone with a single iodine molecule removed.

Free T4: Free T4 is the T3 prohormone. It is the storage form of the thyroid hormone.

TSH (thyroid-stimulating hormone): It is the thyroid secreted by the pituitary gland. It is the hormone we monitor to determine whether we have an underactive or overactive thyroid. It is used to monitor those on thyroid medications to make sure they get the proper amount.

Thyroglobulin antibody: This is an antibody targeting thyroglobulin, the storage form of thyroid hormone. Its presence indicates inflammation of the thyroid.

Thyroid peroxidase antibody: This is an antibody targeting an enzyme of the thyroid gland. This enzyme, thyroid peroxidase enzyme is responsible adding iodine to a molecule called thyroglobulin. Its presence, like thyroglobulin antibody, indicates inflammation of the thyroid.

Chapter 11: The Fasting Progression

One of the most important functions of insulin is to act as a key which unlocks cells and allows the entry of glucose. This allows the glucose level, which is typically elevated following a meal, to be brought down to normal levels. The glucose that enters the cell is frequently used for energy. Any glucose that is not immediately used can be stored away either as glycogen, a storage form of glucose and tissues such as the liver and muscle. Any excess of glucose can be transformed and stored as fat by a process called lipogenesis.

The body's need for energy is constant. And, in the fasted state, the opposite occurs of what is described above. That is the glycogen and fat that were made by an excess amount of glucose, are broken down and used as energy sources. This is because there is not enough glucose circulating to meet the all of the body's energy needs. The process of breaking down fat is called lipolysis. Fat is broken down into its component parts, namely fatty acids. Fatty acids can be used to make glucose, or, can be used as an energy source itself. Thus, the fat stores of the body are best mobilized during the fasted state. In other words, the fewer carbs you eat and the less frequently you eat them, the more likely insulin levels will be low, and fat stores can be used as energy.

So, let's talk about the different ways of fasting.

1. **Avoiding snacks:** Decreasing insulin is paramount to losing weight. Not only the actual levels of insulin circulating in the bloodstream, but how many times per day it is secreted. One of the first things that you will want to do on your

weight loss journey is to avoid snacking. Every time you eat your body responds by secreting insulin. Though it is popular to eat snacks between meals and before bed, it works contrary to our efforts to burn fat and lose weight. By avoiding snacks, you limit eating to 3 meals a day. Therefore, you limit insulin secretion to 3 times per day. Note in the figure below that by avoiding snacks, insulin spikes in between meals are eliminated. That not only allows the body to burn fat in between meals, it makes the fasting while sleeping more profound. This increases fat burning during the night even more.

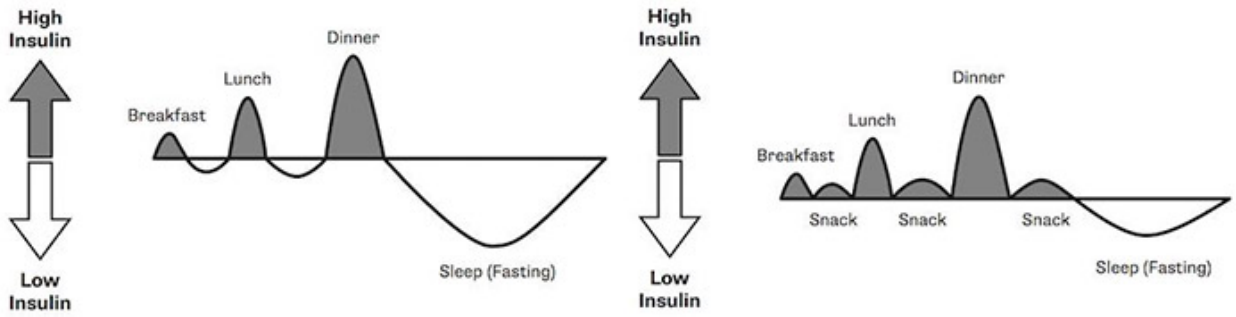

Figure 6. Fast Between Meals by Eliminating Snacks

2. **Intermittent fasting (time restricted feeding):** Even better than eating 3 meals a day, is eating just 2 meals a day. By eating 2 meals within 8 hours of each of, it allows the body to fast for 16 or more hours. This is the body more time to burn fat without insulin around to prevent it.
3. **Eating 1 meal a day:** Believe it or not, after eating a ketogenic diet for a while, you may actually get so involved in something that you are doing that you forget to eat a meal. Once you are regularly just eating 2 meals within the space of 8 hours, it is not a big deal to try eating just one meal a day 2 or 3 times a week.

This provides a creative stress for the body and allows you to breakthrough certain “set points”. This is particularly helpful if you are experiencing a weight loss stall.

4. **Multiday fast:** Individuals with particularly serious medical conditions such as extreme obesity, insulin-dependent diabetes, multiple conditions together such as obesity, hypertension, diabetes and hyperlipidemia may want to consider fasting for longer periods of time.

Chapter Summary

- Insulin is secreted after a meal that contains carbohydrates, and to a lesser extent protein.
- The presence of insulin following a meal prevents the breakdown of fat as an energy source.
- Since insulin levels are low during the fasting state.
- Fasting allows the body to burn more fat.
- The fasting progression includes avoiding snacks, intermittent fasting, eating just one meal a day and multi-day fasts.
- Intermittent fasting and eating just one meal a day can assist you in bursting through a weight loss stall.

Resources

1. The Ultimate Guide to Fasting, Jason Fung

Chapter 12: Exercise

1. **Exercise:** Exercising is not required to lose weight. Diet place far greater role in weight loss. This is not to say that exercise has no benefits. Exercise is good for developing and maintaining muscle mass. It is good for cardiopulmonary deconditioning. It reduces the risk of progression of hypertension, diabetes and dementia. It reduces the risk of many cancers such as breast, colorectal and prostate cancer. It is good for decreasing stress, anxiety and depression. However, it is a rather inefficient method to lose weight. For example, a Krispy Kreme glazed doughnut may have 300 cal. It would take exercising about an hour to burn off an equivalent number of calories. A far better way of achieving weight loss is with the quality of the food we eat and the frequency with which we eat them. In other words, a low carb diet with intermittent fasting is a much better approach to weight loss.
2. **Resistance exercise:** This form of exercise is said to be the best at building and maintaining muscle mass. Especially if using high intensity interval training (HIIT). Using this method, instead of performing several circuits of exercise with lighter weights and a larger number of repetitions, you perform each exercise with a heavier weight and fewer number of repetitions. Body weight exercises work well to. In either case, you perform each exercise to the point of exhaustion.
3. **Aerobic exercise:** Aerobic exercises are good for our heart and lungs. High intensity interval training (HIIT) can also be used with this form of exercise. To

accomplish this you will sprint for short periods of time, say 30 seconds to a minute, as you run, bike or stairstep. Try to get close to the maximum effort you're capable of. Then, after sprinting, you drop back down to a more comfortable pace in order to recover. Then, you repeat the process. Instead of jogging for 5 or 10 miles, you run 2 miles interspersed with these short bursts or sprints. You will get just as much benefit running in this manner, but in a fraction of thetime.

4. **Walking:** If you are unable to perform the exercises as described above because of your age or medical condition, take heart, movement of any kind has beneficial health effects. Even a walk will do. Walking with your children, grandchildren or the family pooch is still great exercise.
5. **Exercise is additive.** Don't have time to exercise for 30 minutes at a single go? Research shows that breaking up the exercise into shorter periods of time is beneficial as well. For example, you might exercise for 10 minutes 3 times a day. It is just as beneficial. Try to fit in exercise when you can.

Chapter Summary

- Although exercise has many benefits, it is not the most efficient way to lose weight.
- Resistance training is perhaps the best form of exercise but most experts recommend a bit of both resistance training and aerobic conditioning..
- High intensity interval training is used for both forms of exercise.
- If unable to perform vigorous exercise because of your age or medical condition, even a walk will do.

- Exercising for shorter periods of time with greater frequency works just as well as one prolonged workout.

Resources

- The Lean Look

Chapter 13: What's Between the Ears

Much of this book discusses the importance of what we eat. That is afterall, one of the most important principles for weight loss and prevention of over 300 diseases ! However, if weight loss was so easy everyone would be of normal weight and free of chronic disease. We all know that it doesn't work that way. What goes on inside our heads is, in most cases more important. This chapter will discuss some resources and approaches one can use explore your own particular situation.

I often use the following example when speaking to a nonsmoker. If I left a pack of cigarettes on your kitchen counter at home, how long could I expect that they would stay there untouched? I often get the answer "forever" or "I'd throw them into the trash can". In other words, a nonsmoker does not think, behave, or is motivated to have a cigarette like a smoker. In the same way, we need to relearn the way we think about food. Let me repeat this for emphasis "WE NEED TO RELEARN THE WAY WE THINK ABOUT FOOD!"

When I show someone the list of foods to avoid on a low carb diet, I'll often get the comment "Aw Doc, you taking away all the good stuff". Then I reminded the patient that "we need to relearn the way we think about food. We need to get ourselves to the point when passing a plate of chocolate chip cookies in the break room at work we think to ourselves "I'm not going anywhere near those, they are not healthy for me and besides I like the way my new clothes are fitting. Thank you very much."

Binge Eating

Binge eating is a disorder where individuals can't help themselves. When they are stressed, for whatever reasons, they tend to overeat and then feel ashamed of themselves. There are books that can be read to address this. There is counseling that may be appropriate to address traumatic issues in an individual's past, and, there is an FDA approved medication, Vyvanse, that can be prescribed as well that may help.

Bulemia

Bulimia is an eating disorder associated with altered self image. These individuals almost certainly need counseling to address this issue. One variety of bulimia is characterized by binging (eating) and purging (making oneself throw up the previously eaten food). Physical signs include erosion of the enamel of teeth due to the frequent contact of stomach acid and scarring of the fingers from induced vomiting by poking the fingers into the back of the throat and making oneself gag.

Resources that take different approaches that may be helpful include the following:

- Six Factors to Fit, Robert Kushner - This is probably the book I recommend the most. If you go chapter 2 (or go to the author's website) there is a quiz. When you complete the quiz your score will place you in one of 6 food personality types. I generally recommend that if you think the quiz characterizes your weight issues the best, then buy book and read the chapter on your food personality type and tried to

implement the suggestions. The book uses a number of cognitive behavioral techniques and suggests practical tips to improve the home environment.

- The Anderson Method by William Anderson. The Anderson method is quite practical. And while it does suggest some cognitive behavioral therapy techniques, it suggests ways to make healthier food choices and a way to have opportunities to "cheat". It is perhaps in the simplest read as well.
- The Beck Diet Solution by Judith Beck, Ph.D. This book is perhaps the most detailed in regard to cognitive behavioral therapy. It requires a good bit of homework on the part of the reader. But if details are your thing and you want a lot of suggestions, this book deserves a look.
- The Pegan Diet by Mark Hyman, M.D.
- End Your Carb Confusion: A Simple Guide to CustomizeYour Carb Intake for Opyimal Health by Eric Westman, M.D.

Chapter 14: Stress Management

Stress can have a very negative affect on our metabolism. Stress induces the production of stress hormones. This, in turn, increases insulin. It is hope that by reading the rest of this book you will implement healthy habits which will decrease your stress. However it is perhaps a good idea to talk about stress specifically and in a little more detail.

Although, addressing mental illness is beyond the scope of this book, It may be useful to delve into it just a bit. There are any number of online scales or surveys you can take to identify whether you suffer from mental illnesses such as anxiety, depression, attention deficit disorder or bipolar disorder. For depression try the Beck Inventory or the PHQ-9. For anxiety try the Sheehan Anxiety Scale. For ADD try the Amen ADD scale and for bipolar disorder try the mood disorder questionnaire.

This book is all about promoting non-drug treatments for mood disorders such as anxiety and depression. In the book, How to Make Disease Disappear by Rangan Chatterjee, he talks of 4 pillars that are essential for a healthy, balanced life. Essentially, these for pillars are eating healthy, nutrient dense whole foods, the importance of physical activity, the necessity of good quality sleep and stress management, which is the subjective this chapter.

Although it is not the purpose of this chapter to delve into mental illness such as anxiety, depression, ADD, and bipolar disorder, nonetheless it may be worth mentioning a few Words about cognitive behavioral therapy or CBT.

The premise of cognitive behavioral therapy is that if we don't feel like we are in a good state mentally, then we can change that. By changing the way we think, we can change the way we feel. And if we can change the way we feel, we can change the way we behave. Part of this process is to identify how we talk to ourselves.

How we talk to ourselves can have a large bearing on how much stress we feel. Many of us talk to ourselves in unhealthy ways. If we can identify those unhealthy ways of talking to ourselves, we may be able to feel better about ourselves and improve our anxiety or depression.

A number of Unhealthy thinking patterns are generally recognized. These unhealthy patterns include catastrophizing, black and white thinking, using the word 'must' too much, at Cetera

Catastrophizing - Catastrophizing is when we feel that we attribute a lot more danger to a particular situation than actually exists.

Black and white thinking -

Avoiding using the word 'must -

There are practical steps that have been recognized to assist individuals to decrease stress. The mayo clinic came up with the four A's to decrease stress. They'll have to do with how you deal with situations you find stressful. The four A's are avoid, alter, adapt and except. Let's look at each of these and give a few examples.

Avoid the situation,

Alter the situation:

Adapt to the situation:

Except the situation:

Finally I need to make the point that we need to be nice to ourselves. We need to cut ourselves some slack, give ourselves a break. Below are some practical steps to be nice to ourselves. Basically what I am asking you to do is make a little me time every day below are some practical tips:

Exercise:

Pick up your old hobby:

Read a book or magazine:

Have some quiet time while enjoying a cup of hot coffee or tea:

Soak in a tub or hot tub if you have one:

Listen to some music: try “feeling groovy“ by Simon and Garfunkel.

With moderate or severe forms of the above mentioned mental illnesses you would likely benefit by collaborating with a professional therapist, psychologist or psychiatrist. Drug treatment may be helpful. Although, for a alternative way of thinking about the drugs used to treat mental illness consider reading a book on the subject.

Resources

The Complete Idiots Guide to Cognitive Behavioral Therapy

DARE

How to Make Disease Disappear by Rangan Chatterjee.

Chapter 15: Sleep

Sleep is one of the most important aspects of living a healthy life. Going through life sleep deprived is dangerous to our health. Lack of sleep causes a chronic elevation of stress hormones. The stress hormones, primarily cortisol, increase insulin and therefore turned off fat burning. The stress hormones, namely cortisol, also result in insulin resistance and all the problems that go with it. If you feel like you do not sleep well, that you don't feel refreshed upon awakening, that you are tired during the day, you need to have this checked out.

One of the most common reasons for lack of good sleep in those with a weight issue is obstructive sleep apnea syndrome. This is when the soft tissues in the neck collapse during sleep and don't allow for adequate oxygenation. The decreased oxygenation causes one part of the brain to have a tug-of-war with another part of the brain. One part of your brain wants you to wake up and take deeper breaths, another part of your brain wants you to continue sleeping. As a result, you wake up just enough to take deeper breaths to supply the needed oxygen. This however, prevents you from being able fall into the deepest, stage IV sleep.

Untreated sleep apnea itself causes a number of serious medical conditions including anxiety, depression, heart disease, dementia and sexual dysfunction to name a few.

The Epworth sleep scale

(https://www.merckmanuals.com/professional/multimedia/clinical-

calculator/Epworth%20Sleepiness%20Scale%20ESS) is used to assess up person's risk of having obstructive sleep apnea. This scale measures how likely you are to nod off while engaged in certain activities such as sitting, reading, watching TV, as a passenger in a car or in the car while stopped for a few minutes at a traffic light. (see figure1).

Sleep apnea is typically diagnosed with a sleep study. The study can be performed at home in one's own bed or in the sleep clinic. The home sleep study is unable to diagnose other sleep disorders such as restless leg syndrome and narcolepsy. Parameters monitored during the sleep study include oxygenation levels, degree of snoring, and the number of times a person stops breathing called apneic episodes. Sleep apnea is treated with CPAP, surgery or an pharyngeal implant.

Presuming you do not have a sleep disorder such as sleep apnea or restless leg syndrome, and you are having difficulty falling or staying asleep, the following tips are considered part of a process called sleep hygiene. Sleep hygiene are ways to get herself ready for a good night's sleep. These methods have been developed with the help of sleep research.

- The principles of sleep hygiene (https://www.sleepfoundation.org/sleep-hygiene)
    - Maintain a regular schedule. This is perhaps the most important principal. Going to bed and getting up the same time each day. Children aren't the only ones that do better with a regular schedule. We all do. Waking at the same time, eating at the same time and

beginning our presleep routine and going to bed at the same time promote sleep.

- Upon awakening, expose yourself to his much morning light as possible. Getting 30 minutes of sunlight each morning can reset your circadian rhythm and suppress melatonin.
- Limit caffeine to the first 16 hours of the day. Afternoon caffeine intake can linger into the night preventing sleep.
- Limit alcohol 4 hours before bed. It should be said that moderate drinking is generally accepted to be one drink for a woman and 2 drinks for man.
- Keep the bedroom cool 68°F or less. Cooler temperatures promotes better sleep.
- Don't eat 2 hours before bedtime. Not eating 3-4 hours before bedtime is even better. This prevents the gastric contents from symptoms of reflux which includes irritation of the esophagus as well as causing a cough from acidic fumes
- Limit the drinking of liquids during the evening. This test to things. It decreases the likelihood reflux of the stomach contents and will minimize the number of times she have to get up and use the bathroom
- Turn off all electronic devices 2 hours before bed . The blue light admitted from such devices, much like the morning light you are encouraged to partake in, activates the brain and suppress his sleep.

There are glasses available to wear during the evening to prevent your eyes taking in the blue light. There are smart phone apps which measure the amount of blue light admitted. Another reason is you may view items which will get you to worrying or thinking about things that are not conducive to sleep.

- It is said that taking a hot bath or shower right before bed relaxes the body and promote sleep.
- Keep the bedroom dark. This means doing without nightlights. Installing blackout blinds. Again, this is to avoid the light activation of the brain and signal that it is time for sleep.
- Consider ear plugs if you living in a noisy environment such as in the middle of a city with high-traffic noise.
- White/pink noise. Some people have the opposite problem. Perhaps the bedroom is too quiet. They start thinking about things. Some individuals do better with a little noise in the background. This could be a ceiling fan, a box fan or a white noise machine, admission specifically designed to admit low volume benign noises such as Ocean noises.
- Develop a regular bedtime ritual. Using the suggestions listed in his chapter and developing your own, unique bedtime ritual is important.
- The bed is for sleeping and intimacy. It is suggested that it not be used for snacking, homework or binging on Netflix. You want to condition yourself to associate the bed with sleeping and intimacy.

- If for some reason you don't fall asleep in 20 minutes get up! Go into another room and read something that is not too stimulating and wait to feel drowsy before giving it another ago. Avoid stimulating activities like turning on your electronic device or TV.

Supplements are often used to help promote sleep and include melatonin, GABA and magnesium. For details please see Chapter 19.

Chapter Summary

- Sleep is one of the most important aspect of our lives to promote good health.
- Obstructive sleep apnea is one of the most common conditions that prevent good sleep.
- Sleep hygiene are behaviors that research has shown to promote good sleep.

Resources

- Why We Sleep, Matthew Walker, Scribner, 2017

Chapter 16: Low Carb Side Effects/Troubleshooting

As individual change from the standard American diet to a low carb diet, there are sometimes disquieting symptoms experienced as the body begins to adapt to the changes.

1. Keto flu - Keto flu generally occurs within the first couple of weeks in some individuals initiating the ketogenic diet. Symptoms such as dizziness, fatigue and headaches are commonplace. This is generally thought to occur from dehydration and electrolyte shortages. To prevent this, individuals beginning a ketogenic diet should drink plenty of fluids and make sure they're getting enough sodium, potassium and magnesium. Some individuals will work assiduously adding salt to their food. Others will manage this with a low calorie sports drink. Others still will add electrolytes with drops or powders to their bottled water. Another option, is using plenty of 'Lite Salt', which is half sodium chloride and potassium chloride. This can be purchased at the local grocery store. Magnesium can be added to the diet a pill supplement.
2. Keto breath -
3. Constipation. Constipation is thought generally to be due to dehydration, increased fiber and decreased magnesium. Again, drinking plenty of fluids, including plenty of vegetables and magnesium supplementation should help with this. Another way of obtaining magnesium are soaking in a tub with Epsom salts.
4. Diarrhea -

5. Keto crotch -

Chapter 17: Weight Loss Stalls

First let us give a definition of a weight-loss stall. This is the lack of weight loss over a period of 4 to 12 weeks (https://www.youtube.com/watch?v=u9ibLC9DWel). It can be influenced by such things such as exercise, diet, sleep and stress to name a few. A normal amount of weight loss is approximately 1/2 pound to 2 pounds per week. Many people have too high of an expectation on weight loss. After initial loss of water weight, they expect to continue weight loss at the same rate.

Weight loss stalls can be frustrating. They can occur for many reasons. As you read through this chapter, read each of the possible causes and reflect on whether it is possible that they may be influencing your weight loss stall.

1. **Calories are restricted too much:** Some people experience a weight loss stall because they're restricting calories too much. The body senses this goes into "starvation mode". Clinicians will refer to this conservation of calories by the body as a decrease in total daily body energy expenditure. Remember, with therapeutic carbohydrate restriction we don't count or restrict calories initially. The theory is, the higher fat content of the diet will slowly, naturally, decrease the amount of food you eat. You slowly become satiated earlier and earlier. If the weight loss stall is encountered, the use of a ketocalculator can help (https://www.ruled.me/keto-calculator/). For some, it can be helpful to consult the calculator every month or so with every 10 pounds lost. In this way you

reduce your calorie deficit by small increments so as to not to trigger the bodies "starvation mode".

2. **Change in body composition:** Some people who begin TCR also start exercising. After their initial weight loss due to water loss, they stop losing weight primarily because they are gaining muscle mass or weight at the same time they are losing fat. These individuals should notice changes in how their clothes fit or their waist circumference. This is a good thing! Things will eventually stabilize and they will become leaner.

3. **Not eating the proper macronutrient percentage:** Some individuals are not eating a low carb diet even though they believe they are. These individuals may be eating too much protein. Even though protein does not increase insulin as much as carbohydrates, they never the less can increase the insulin preventing fat mobilization and weight loss. Eating too little protein decreases muscle mass, but eating too much may increase insulin and decrease fat burning.

4. **Food sensitivities.** Some individuals have food sensitivities. The most common offender are dairy products. Many people, when they include dairy, will experience a weight loss stall. Some are just eating too much of their daily allotment of calories with things such as heavy whipping cream and high fat cheeses. Try excluding dairy prosducts for a month and see what happens. Also, be on the lookout for hidden gluten found in low-carb, processed foods.

5. **Some people are just too stressed:** Perhaps they're burning the candle at both ends. Perhaps they've got untreated sleep apnea. Increased stress from a hectic lifestyle or the presence of sleep apnea causes an increase in cortisol which increases insulin, which decreases fat burning.

6. **Some folks snack too much.** Snacking takes the body out of the fasting mode. Fat burning ceases. Another possibility, perhaps they are eating too many nuts or too much chocolate or drinking too much alcohol. Everybody who experiences a weight loss stall ought to go back to tracking calories and macros to make sure they're adhering to a reasonable caloric intake and the proper amounts of macro nutrients (70% fat, 20% proteins and less than 10% carbs).

7. **Some people are just not sleeping enough.** Either they have sleep apnea and aren't using their CPAP machine, or perhaps they have sleep apnea and don't realize it. Perhaps their schedule is such that they are unable to get an adequate amount of sleep. Adequate sleep is essential for weight loss and improving health. Again, inadequate sleep increases the stress hormones which increases insulin.

8. **Some people are straying off the low carb path.** They are allowing "carb creep". This is where people begin including items in their diet that have "hidden carbs" in them. Processed foods are particularly likely to include hidden carbs and sugars. Maybe it is the barbecue sauce you are using. Or, maybe it is the spaghetti sauce. It is important to scrutinize food labels. Some individuals may be eating too many 'healthy sugars' such as brown sugar, honey, etc. finally,

some individuals may be allowing too many cheat meals or even cheat days. Remember, this is a marathon and not a sprint. The frequent intake of carbohydrates increases insulin and decreases fat mobilization and can sabotage your efforts at weight loss.

9. **Hidden medical conditions:** Some individuals may have a hidden medical condition. It's generally a good idea to have a thorough check up from thier primary care physician as they initiate TCR. Such a workup generally includes a number of laboratory studies to make sure they don't have a B12 deficiency, vitamin D deficiency or hypothyroidism.

Chapter Summay

- A weight loss stall is the lack of weight loss over a period of 4 to 12 weeks.
- Restricting calories too much causes the body to conserve energy by going into "starvation mode".
- Make sure you were eating the correct percentages of the macronutrients.
- Try eliminating dairy products for a month.
- Stress can prevent weight loss.
- Eating too frequently by allowing snacks can prevent weight loss.
- Lack of good quality sleep can prevent weight loss.

- Read the labels, carbohydrates can be hidden in some of the processed foods we purchase.
- A comprehensive medical check up may identify hidden medical conditions that prevent weight loss.

Resources

Chapter 18: Medications

One of the big advantages of adopting the low-carb lifestyle is the prospect of reducing the number of one's medications. For me personally, deprescribing, or stopping the medication because the underlying chronic medical problem has resolved, is one of the most satisfying things a physician can do. Before that occurs, part of a comprehensive program to lose weight is to look at what medications a person is taking that may actually be counterproductive. That is, they cause weight gain. These include medications used to treat blood pressure, diabetes, depression, bipolar disorder, seizures, migraine headaches and inflammation. Scrutinize the medicines that you take and ask your provider whether there are alternatives.

- **Antidepressants.**
    - Tricyclic antidepressants. These include amitriptyline, doxepin and imipramine.
    - Selective serotonin reuptake inhibitors (SSRIs). Paroxetine
    - Selective norepinephrine reuptake inhibitors (SSRIs). Venlafaxine
    - Monoamine oxidase inhibitors (MOI's). Isocarboxazide and phenelzine
    - Atypical antidepressants. These include brexpiprazole, mirtazapine and trazodone.
- **Antihistamines.** Diphenhydramine
- **Antipsychotics.** The list is long and includes clozapine, chlorpromazine, brexpiprazole, ilopridone, lithium, quetiapine, risperidone, sertindole, thioridazine, trifluoperazine, and zotepine.

- **Anti-seizure medications.** Medications such as carbamazepine, gabapentin, pregabalin and valproate are examples.
- **Antiviral medications.** This group includes highly active anti-retroviral therapies (HAART) protease inhibitors.
- **Blood pressure (antihypertensive) medications.**
    - **Beta blockers.** Medications such as atenolol, metoprolol and propranolol
    - **Calcium channel blockers.** These medications cause weight gain mainly by causing swelling, especially of the lower extremities and include amlodipine and nifedipine.
- **Chemotherapeutic and anti-inflammatory agents.** These include corticosteroids, aromatase inhibitors, cyclophosphamide, 5-fluorouracil, methotrexate and tamoxifen.
- **Hormones.** Steroids such as glucocorticoids and injectable progestins such as Depo-Provera used for birth control are anabolic, meaning they are growth hormones.
- **Migraine medications.** These medications include amitriptyline, the beta blockers listed above, gabapentin, paroxetine and valproic acid.
- **Mood stabilizers.** Medications most associated with weight gain include carbamazepine, cariprazine, divalproex, gabapentin, lithium, valproate and vigabatrin.

One of the attributes of eating a diet that is higher in fat such as in TCR, is the propensity to decrease appetite. This is because a diet lower in carbohydrates will result in less insulin and other 'hormones of hunger', particularly one named ghrelin. Still, many individuals feel that they need a little help to get started. The following medications are used to assist people in losing weight.

- **Phentermine (Adipex)** is a sympathomimetic amine. Works as an appetite suppressant.
- **Liraglutide** is a glucagon like peptide 1 receptor agonist (GLP-1). It is an injectable medication given to many with diabetes.
- **Naltrexone/bupropion** is a combination of an opioid antagonist and an antidepressant. It is generally not used in those with uncontrolled hypertension, chronic opioid use, seizure disorders and abrupt discontinuation of alcohol, benzodiazepines, barbiturates and antiepileptic drugs.
- **Orlistat** is a gastrointestinal lipase inhibitor. It is given with meals that contain fat. It inhibits the digestion of fats. This explains one of the more troublesome side effects, an oily rectal discharge.
- **Phentermine/topiramate** is a combination of 2 weight loss drugs. Side effects including paresthesias and dysgeusia (altered taste). It is not used in women wishing to become pregnant. Pregnancy tests should be performed monthly while using.
- **Topiramate.** Topiramate is an anti-seizure medication. It is also used to prevent migraine headaches.

Drug	Mechanism of action	Pros	Cons
Adipex (phentermine)	Decrease his appetite		Can increase blood pressure Is a stimulant
Liraglutide			
Naltrexone/bupropion			Oily rectal discharge
Orlistat			
Phentermine/topiramate			
Topiramate			

Chapter 19: Supplements

Nobody takes all the supplements listed below any more than one would take every medication listed in the Physician's Desk Reference (PDR). Rather, supplements should be taken to treat or prevent a condition a person is at risk for. For example, an individual with a history of bariatric surgery, would be wise to take certain vitamins and minerals.

1. The important supplements and vitamins
    a. **Fish oil** - Fish oil is used to treat elevated triglycerides. It also helps to improve the Omega 3/Omega 6 ratio. 3600 mg should be taken each day.
    b. **Iron.** Iron is given to individuals who have a deficiency. One of the most common dosage forms is ferrous sulfate 325 mg twice a day. It is available over-the-counter (OTC). Menstruating women are particularly at risk for iron deficiency anemia. As are vegetarians and vegans. It is typically given along with vitamin C 500 mg twice a day to improve its absorption.
    c. **Magnesium** - Magnesium is called the great relaxer. It is used to treat many symptoms such as numbness, tingling and constipation to name a few. The modern diet is notoriously deficient in magnesium. Approximately 250mg to 500 mg should be taken each day. It can be taken in the number of forms. It can be made in a homemade water by adding unflavored milk of magnesia to seltzer water. Or, it can be taken

as an oral supplement. Perhaps the most relaxing way is by taking an Epsom salt bath (See Appendix B).

d. **Vitamin B6.** Often given to those with a history of bariatric surgery.

e. **Vitamin B9.** Often given to those with a history of bariatric surgery.

f. **Vitamin B12.** B12 is an important vitamin. A lack of that will cause a type of anemia that increases the size of red blood cells, called a macrocytic anemia. It can be supplemented orally by taking a "B complex vitamin". In severe B12 deficiencies, B12 injections are given, typically monthly until the deficiency is restored.

g. **Vitamin C.** Vitamin C is an immune system enhancer. It is also given along with iron to improve its absorption.

h. **Vitamin D.** Vitamin D is not just to build strong bones. It is a immune system enhancer. It is a prohormone. Many people's testosterone levels will return to the normal range if there vitamin D deficiency is corrected.

i. **Vitamin K2.** Vitamin K2 is very important for cardiac health.

2. The unimportant supplements and vitamins

a. **Calcium.** Calcium, often to women to treat weak bones, or osteoporosis, is thought to a been oversold. There is no lack of calcium in the standard American diet (SAD) or low-carb diet.

b. **Vitamin E.** Although marketed as a powerful antioxidant, vitamin D is not all that important. The body makes plenty of antioxidants.

Chapter 20: Surgery

1. Bariatric surgery is usually reserved for those patients who have attempted to make reasonable attempts to lose weight through lifestyle changes but were unsuccessful. Insurance companies typical require documentation of such efforts. These procedures are generally very effective. Diabetes and hypertension often resolve through a combination of the procedure itself and the diet following the procedure. However, with time, if the person undergoing such a procedure does not alter their lifestyle, much of the weight loss will be regained.
2. Bariatric surgery
    a. **Laparoscopic adjustable gastric banding.** This procedure is the least invasive. It involves placing a removable band through the stomach wall and around the upper stomach using a laparoscope. The main drawback with these devices is back today have a removable rate of 25-40% during the following 5 years. One can expect 30-50% in excess body weight at 2 years. Persons with a lower BMI and no significant metabolic diseases are perhaps the best candidates for such a device.
    b. **Vertical sleeve gastrectomy.** This is perhaps the most frequently performed bariatric procedure at the present time. The expected loss in percent excess body weight at 2 years is 50-70%. As the name implies, it involves most of the of the stomach so it resembles more of a tube like the small and large intestine rather than a sac.

c. **Roux-en-Y gastric bypass.** It involves rerouting of the small intestine. The main drawback is an increased risk of complications due to malabsorption. The expected loss in percent excess body weight at 2 years is 60-75%. This is for those with higher BMIs, GERD and type 2 diabetes.

d. **Biliopancreatic diversion with duodenal switch.** This is perhaps the most extreme bariatric procedure. Although it can result in the greatest amount of weight loss and resolution of metabolic diseases. There is increased risk for malabsorption syndromes resulting in macronutrient vitamin and mineral deficiencies. The expected loss in percent excess body weight at 2 years is 70-80%. This procedure is generally for those with higher BMIs and type 2 diabetes.

3. Many vitamins and minerals need to be monitored and following bariatric procedures. Such vitamins include vitamins B1, P9, B12, and D. Minerals that need to be monitored include calcium and iron. For the biliopancreatic diversion with duodenal switch, other vitamins and minerals need to be monitored including vitamin A, vitamin D, vitamin K. Zinc and copper also need to be monitored following this procedure.
4. Chapter summary
5. Resources

a. Gastric Sleeve 2019-2020, 2 books in 1, The Ultimate Guide, Younan Campbell

b. Obesity algorithm, obesity medicine Association, 2020

Appendix A: Forms

Appendix B: Magnesium

Magnesium Water UNDOCTORED Style[2]

July 18, 2017 By Dr. William Davis

The most highly absorbable form of magnesium is magnesium bicarbonate. Because of an unusual tendency to absorb water in dry form (e.g., tablet or powder), no supplement manufacturer sells it. But you can make it in your own kitchen quite easily using readily available ingredients. Use Magnesium Water in place of magnesium supplements—i.e., don't take both—to avoid long-term magnesium overload.

While you can obtain magnesium from foods, especially sunflower, sesame, and pumpkin seeds, it is virtually impossible to obtain your full daily intake of 400-500 mg of ("elemental") magnesium per day from food

[2] https://blog.undoctored.com/magnesium-water-undoctored-style/

alone. This Magnesium Water is a terrific and inexpensive way to supplement your magnesium intake.

A 4-ounce (1/2-cup) serving of Magnesium Water provides 90 milligrams of elemental magnesium; 4 ounces twice per day adds 180 milligrams of elemental magnesium to your daily intake. You can drink up to 16 ounces per day (8 ounces, or 1 cup, twice per day), which provides a total of 360 milligrams of magnesium per day, especially useful during the first few weeks of your Undoctored experience to rapidly restore magnesium.

Because of better absorption, Magnesium Water yields faster relief from muscle cramps and migraine headaches, even abnormal heart rhythms. Such benefits are also more likely to occur with the 360-milligram-per-day total dose.

Note that the milk of magnesia used in the recipe must be unflavored, as flavoring will block the reaction creating the magnesium bicarbonate. Label your bottle of Magnesium Water to prevent unsuspecting people from drinking it (which can result in diarrhea). Magnesium Water does not need to be refrigerated if consumed within 1 week. Because the reaction involves carbonic acid (from carbonated seltzer) and magnesium oxide (milk of magnesia), the end result is magnesium bicarbonate and water, with little to no carbonation remaining.

Add several drops of your choice of natural extract, such as orange, lemon, coconut, or berry if desired for flavor. If some sweetness is desired, add a few drops of the flavored stevias available in place of the extract or add your choice of sweetener, such as several drops of liquid stevia or monk fruit, to the mixture. I used 20 drops of berry-flavored SweetLeaf Sweet Drops, which yielded a light sweetness, subtle enough to allow sipping over ice without being overly sweet. And be sure to choose a carbonated seltzer without sugar or high-fructose corn syrup.(This is why we avoid tonic water.)

Yield: 2 liters

2-liter bottle of seltzer (not tonic water)
3 tablespoons unflavored milk of magnesia
Naturally flavored extracts and/or sweetener

Uncap the seltzer and pour off a few tablespoons. Shake the (unflavored) milk of magnesia, and pour out 3 tablespoons. (Most brands come with a handy little measuring cup that works perfectly.) Pour the milk of magnesia into the seltzer slowly, followed by the extract and sweetener.

Cap the bottle securely, and shake until all the sediment has dissolved. Let the mixture sit for 15 minutes and allow to clarify. If any sediment remains, shake again. Drink as instructed above.

Resources

[i] https://www.cdc.gov/nchs/fastats/leading-causes-of-death.htm
[ii] https://www.thebloodcode.com/homa-ir-calculator/
[iii] The Big Fat Surprise, Nina Teicholz, New York, Simon & Schuster, 2015, page 3