Introduction: "Don't Leave the Path"

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''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 has been in the news. 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 696,000 deaths per year, cancer 602,000 deaths per year, stroke 160,000 deaths per year, Alzheimer's disease 134,000 deaths per year and diabetes 102,000 deaths per year.[1] All of these diseases are related to an entity called 'insulin resistance'.

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

Even as recently as the early 20th Century, the American diet was different. "Food was less processed, less refined and contained much less carbohydrates. More whole foods were

[1] https://www.cdc.gov/nchs/fastats/leading-causes-of-death.htm

consumed such as meat, vegetables and fruit when it was in season. The primary cooking fats were butter, lard and beef tallow.

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

The way I usually explain this phenomenon to my patients is by telling them a story I've come to call "The Zookeeper's Tale". It goes something like this: There was this zookeeper who had a lot of animals, he had so many animals that he needed help feeding them all. So he hired this guy and he screwed up! He took all the hay and fed it to the lions. Then, he took all the meat, and gave it to the elephants. Well, those animals didn't do too well on their new diet. Lions are genetically designed to eat meat, not hay. And elephants are genetically designed to eat hay, not meat. Likewise, the diet we humans eat today is not what our bodies were designed for. 12,000 years ago, before man began raising crops like wheat, rice and other grains, a phenomenon we call the Agricultural Revolution, Man was a hunter and a gatherer. Our genes have not changed much since then. Back then, man would eat what he could kill. Perhaps a bird here, a rabbit or fish there, and gather plants along the way to eat. So basically, men subsisted on meat, vegetables and perhaps a few berries or tree nuts if he could get them and they were in season. So, it seems to me that our ancestor's, the hunter and gatherer's diet, is the dietary gold standard with which we could compare all other diets to.

It is the opinion of many of us in the low carb community that the insulin resistance epidemic we are experiencing today can be explained by the dietary changes we have made, namely the inclusion of highly processed, refined carbohydrates as well as the introduction of unhealthy fats into our diet.

One outwardly apparent 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.[2] Most of the other 300 diseases resulting from insulin resistance are not so outwardly apparent, at least initially. 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.

So in summary, insulin resistance, and all the diseases that result from it, are caused by our diet. A diet predominantly made from highly processed carbohydrates, that over time, causes a chronic, excessive amount of insulin to be produced. This excessive amount of insulin, while it does keep the blood sugar level within normal limits for a time, has other harmful effects. This chronic excess of insulin, something we call a 'hyper-insulinemic' state, promotes changes in the body that propel us through three different stages of progressively greater insulin resistance and towards the development of diabetes. We go from a normal state where we are sensitive to insulin, towards an abnormal state of mild insulin resistance. Then, we progress from mild insulin 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.

Along the way, from the insulin resistant state to diabetes, many other diseases arise. These conditions are often called comorbid conditions. Comorbid conditions are those that tend to accompany one another. These are conditions such as hypertension, erectile dysfunction,

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

gallstones, kidney stones and 100s of other diseases. In fact, Alzheimer's disease is frequently called "Type 3 Diabetes".

The good news is, with dietary and lifestyle changes, these hyper-insulinemic states can be reversed. Many individuals can move from having diabetes to having pre-diabetes. Some individuals can then move from having prediabetes to having insulin resistance. And ultimately some individuals can move from being insulin resistant to becoming fully insulin sensitive again.

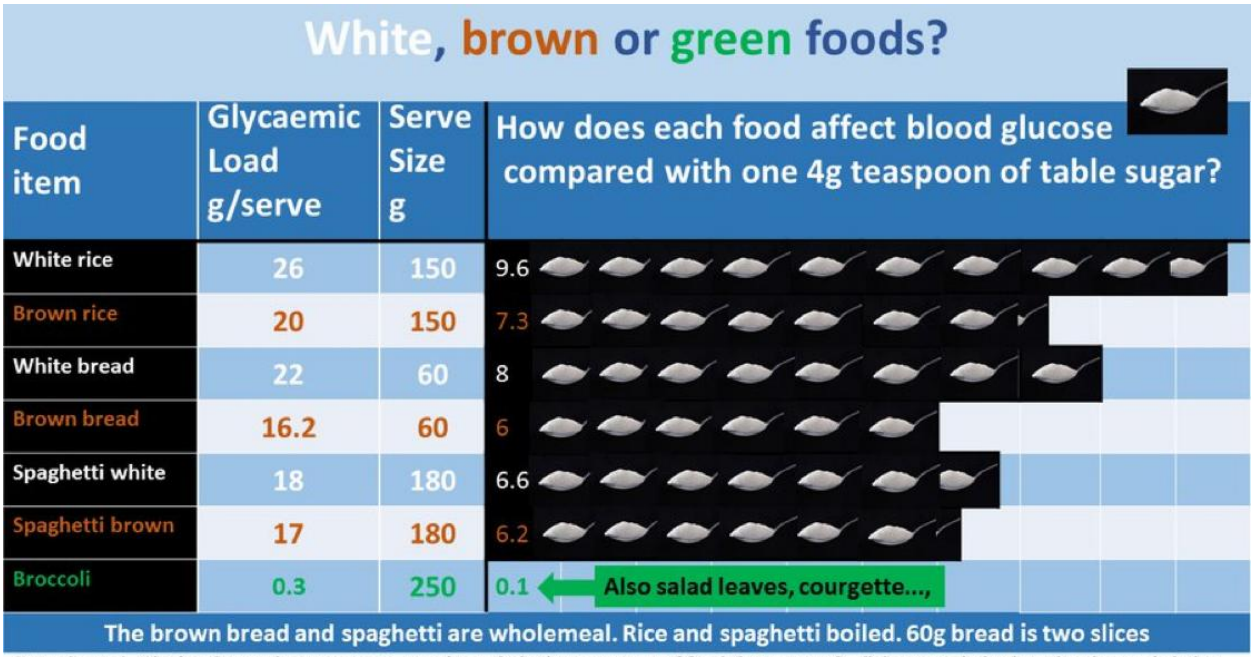
This book is about encouraging the reader to get back on the diet and lifestyle path that more closely resembles that of our ancestors, and not to leave it! For the gauntlet of fast-food restaurants lining the streets of our towns and cities, and the plethora of processed foods lining our grocery store shelves is extremely dangerous to our health. 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. If we "stick to the path" outlined in this book, it is hoped that the reader will reach their goal of taking back the health that was once theirs.

Chapter 1: The Macronutrients

The foods that we eat can be 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 modified by our metabolism 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.



Figured 2.

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 of our bodies like hair and nails. They can be used for metabolic uses like enzymes that help facilitate chemical reactions in the body, 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 by 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.

Obesity can be thought of as a hormonal problem. And that hormone At the center of this hormonal problem is insulin. Insulin has many different functions in the body. 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 our 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 in the form of fat. Insulin 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 readily available 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. 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.

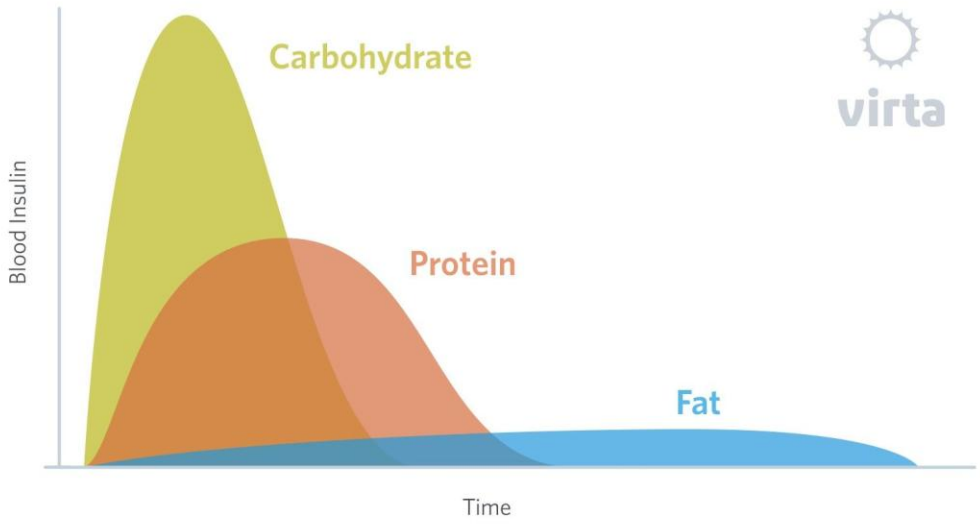


Figure 1. Macronutrient Effect on Insulin

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 chronically 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 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". However, with the low carb approach, we won't be counting calories or grams of carbohydrates, at least initially. Many people, by learning the foods to cut back on, can have success without tracking such things.

However, it is good to know we can track such things if our initial efforts To reverse our health issues are unsuccessful with the use of smart phone apps. It is actually fairly easy to track the number of grams of each of the three macronutrients. Apps like MyFitnessPal, CarbMaster or CarboKing make the job easy. You simply utilize the search function on one of these apps. For example, if you searched for white rice it might state that it has 24 grams of carbohydrates per ½ cup. 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 particular day.

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!

The diet that you may need to follow to resolve your particular issues depends on your unique set of circumstances. For example, your genetics and the severity and number of your pre-existing health problems, such as the presence of obesity, diabetes, hypertension, high cholesterol, and many others.

Chapter Summary

- The foods that we eat are broken down by digestion 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 energy production, and to make such things as enzymes and structural elements such as hair, nails, and bone.
- Fats are used for 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, carbohydrates are not an essential nutrient. We don't need carbohydrates. Our bodies can make all the carbs (sugar) that it needs out of the other two macronutrients.
- Obesity is a hormonal problem, Primarily insulin. Insulin has a number of different functions. Perhaps most importantly, supplying the body's immediate energy needs.

- Other functions of insulin include storing excess sugars as fat and preventing the breakdown of fat to be used later as an energy source.
- 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, calories consumed and calories burned if needed when our efforts to reverse our unique health issues a such as obesity or diabetes are not successful.

Chapter 2: 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.

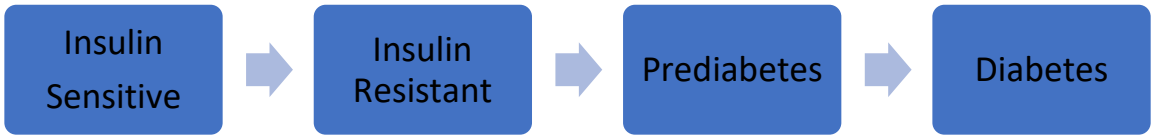


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Figure 2. The Four Insulin States

We can simply obtain a fasting glucose. A value of saying 90 would put us in the "normal "range. 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 and 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. One of the easier ways to distinguish between an individual with normal insulin sensitivity from an individual with insulin resistance is to obtain a fasting insulin level! To reiterate, a fasting insulin level is crucial! Values generally less than or equal to 8.4 indicate normal insulin sensitivity and those individuals with a value greater than 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.[1]

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%.

[1] https://www.thebloodcode.com/homa-ir-calculator/

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 most of the time 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 and thereby avoid progressing to prediabetes or diabetes. Strategies used include eating a diet lower in carbohydrates, eating less frequently, Exercising regularly (Chapter 12), Decreasing stress (Chapter 14) and making sure we obtain good quality sleep (Chapter 15).

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 be improved and in some cases reversed by decreasing the amount of carbohydrates in the diet and eating less frequently, exercising regularly and obtaining good quality sleep.

Resources

Chapter 3: The Diet-Heart Hypothesis Debunked

Contrary to popular belief “cholesterol” is not bad for you. 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 foods 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 by their sheer mass or by their inflammatory activity to form blood clots. The inflammation cases the formation of blood clots which then 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, our diet was changed with the result that 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. Since the turn of the last

century our diets changed significantly. Sugar became cheaper and more plentiful. Healthy fats, primarily from animal sources, were replaced with processed vegetable and seed oils such as corn oil, cottonseed oil, soy bean oil 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."[1]

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

[1] The Big Fat Surprise, Nina Teicholz, New York, Simon & Schuster, 2015, page 3

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. Tests obtained after you make changes to your diet 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 to see 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 carbohydrates and ends up trying to store some ofit 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 for 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 an indicator or marker 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. Score greater that 300 warrant a serious discussion about further work and the addition of a cholesterol lowering medication.

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 such as vitamin D, vitamin K2, magnesium and fish oil. For more information on reversing coronary calcium scores check out the book "Eat Rich, Live Long" by Ivor Cummins and Jeffrey Gerber, MD.

Although not typically covered by health insurance companies, the coronary calcium score test generally costs less than $100. It takes less than 5 minutes and involves a minimal amount of radiation. There are no Needles or intravenous (IV) injections or dyes needed.

Chapter Summary

- The obesity and diabetes epidemics have occurred primarily by changes in our diet since the 1900s.
- 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

Eat Rich, Live Long, Iver Cummins& Jeffery Gerber, Victory Belt Publishing, 2018

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 changes need 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 and think you 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. Keep in mind however, the more of the changes you implement, the more likely and profound the improvements.

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 for you 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 change or reframe the way we think about what is good. We need to tell us those things that will allow us 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, Mixed alcoholic drinks, beer 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, some sort of bread such as bagels or biscuits, 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. for their mid afternoon snack, they might have a cookie or granola bar. With dinner they might have garlic bread, yeast rolls or pita bread. And then for dessert, they may have a slice of cake, a slice of pie or another cookie.
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 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 can be found online that use these low carb flours. Check out www.DietDoctor.com or www.ruledme.com for such recipes.
9. **Unhealthy fats and oils.** Unhealthy fats and oils should likewise be eliminated. They are manufactured through an 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 and other artificial sweeteners
    - eliminating sweets
    - Eliminating processed flour
    - Eliminating pasta made with grains to those made from vegetables
    - Eliminating starchy vegetables
    - Eliminating most fruit
    - Introducing healthy fats and oils such as olive oil, avocado oil, coconut oil butter and ghee 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.

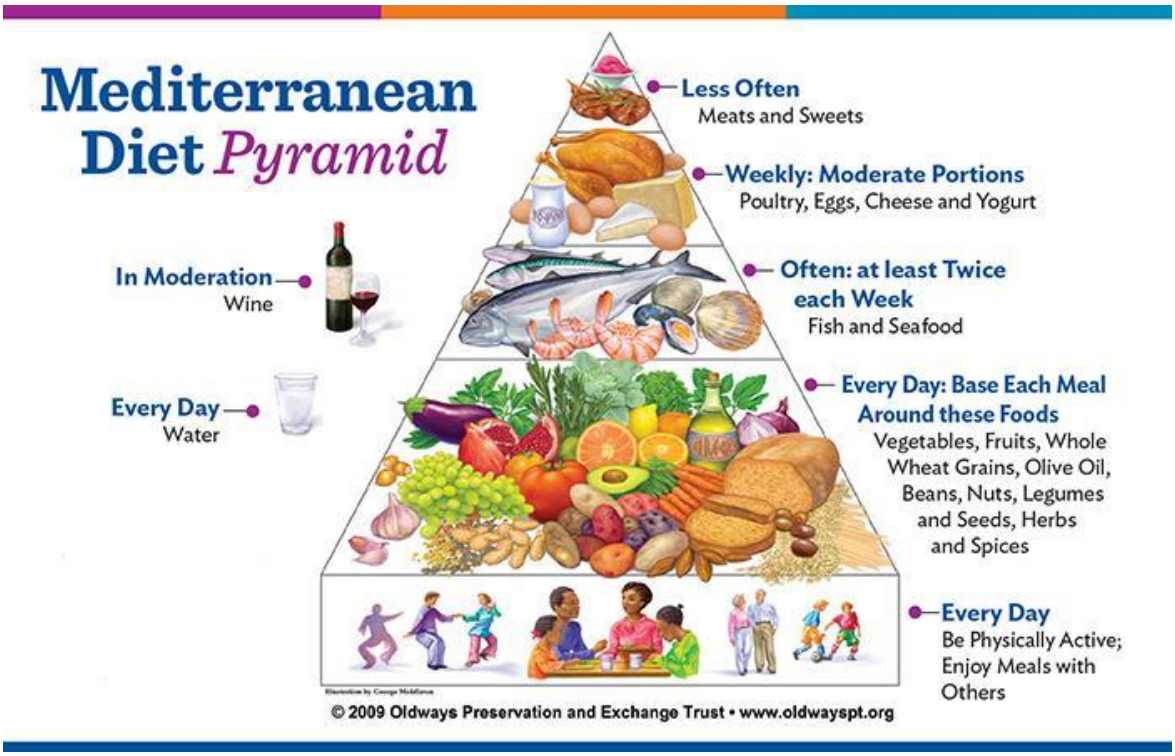

Figure 3. The Mediterranean Diet Pyramid

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 may not be adequate. Further carbohydrates restriction may be 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 something 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 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 full fat 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 Summary

- Adherence to a Mediterranean diet is a huge improvement for many currently eating the SAD diet.
- The modified Mediterranean diet maybe needed for those with health issues such as obesity, insulin resistance, diabetes or other medical conditions.
- Modifications to the Mediterranean diet include the addition of fattier cuts of meat.
- Decreasing carbs by minimizing breads.
- Substituting healthy fats and oils for unhealthy, artificial fats and oils, are recommended.

Chapter 6: The Ketogenic Diet

The ketogenic diet comes pretty close to our ancestors hunter and gatherer's diet. It is based on just a few principles. First, carbohydrates are kept to a minimum in an effort to keep insulin levels low. Second, in order to maintain healthy muscle mass, a moderate amount of protein needs to be included. However, protein is limited because of its tendency to increase insulin levels if 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

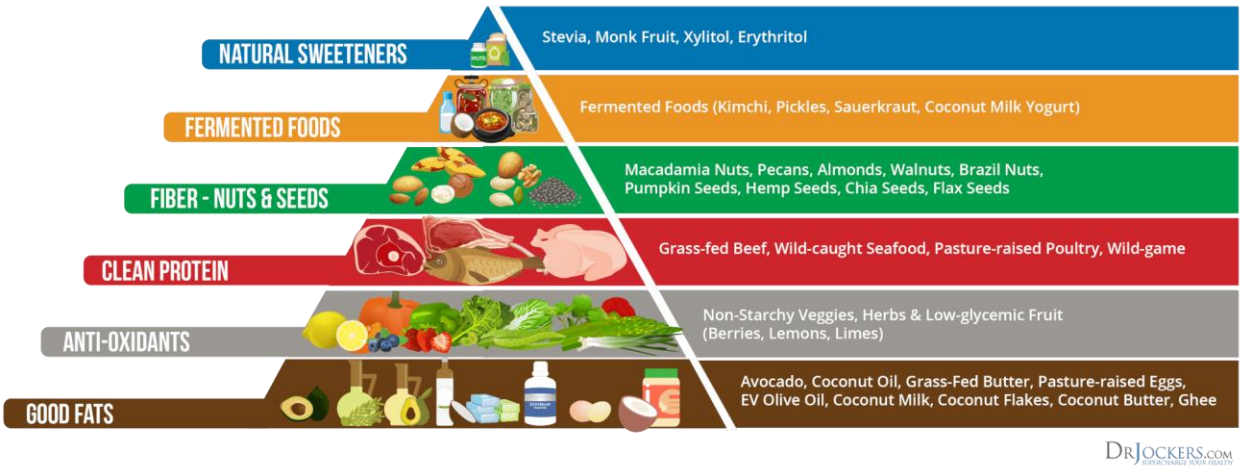

Figure 4. An example of a ketogenic diet pyramid

Perhaps the simplest way to describe this diet is by avoiding foods as described by the acronym "GPS". In this case, GPS does not stand for "global positioning satellite". Rather it stands for

grains, potatoes and sugar. Grains include oats as in oatmeal, granola bars and cereals. Corn as in corn on the cob, corn on 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 because of their carbohydrate content. 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. It should be noted that many people

cannot tolerate dairy products. Either because of lactose intolerance, or food intolerances due to some of the proteins they contain.

Nuts: Tree nuts can be used as a snack in small quantities. 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: Drinks without calories such as water, sparkling water, flavored water without sugar or artificial sweeteners, coffee and tea are permitted. Lemon and lime maybe used to flavor 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 and 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 or some other vegetable as a low carb side dish. What about grilled chicken fingers? Rather have pizza? Many pizza establishments include cauliflower pizza on their menus. Some establishments

have what is called a “pizza bowl”. This is basically cheese, tomato sauce and 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. You will want to avoid the beans and rice.

A taco salad is a great choice. 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 better choice. Italian restaurants often have a number of chicken, seafood and veal entrées As well. Feel free load up on the salad but not the bread sticks.

Chapter Summary

- The ketogenic diet comes pretty close to our ancestors hunter and gatherer‘s diet.
- The percentages of each of the macronutrients in a ketogenic diet are approximately 60-70% fats, 20-30% protein and 5-10% carbs.
- Perhaps the simplest way to describe the foods to avoid on ketogenic diet is by using the acronym “GPS” which stands for grains, potatoes and sugar.
- Meats, vegetables, full fat dairy and a few snacks such as pork rinds, tree nuts are included in a ketogenic diet.

- Healthy fats such as olive oil, avocado oil, coconut oil, butter, ghee, lard and beef tallow are recommended.
- Eating out, at most fast food, ethnic, or upscale restaurants should be easy if you know what to select.

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. They are all preferable to the SAD diet.

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 up 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.

Figure 5. 12 Low-Carb Diets Compared

Chapter Summary

- Perhaps the best low-carb diet is one that you can stick to.
- Everybody is different, a diet that works for one individual, may not work for another.
- In general, the lower carb content of the diet chosen, the more likely insulin resistance will improve.

How Do You Know If Low Carb Is Working?

Chapter 8: Physical

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 weight is due to the loss of water. Water follows carbs. When one eliminates carbs, one eliminates the water that hung around with it. This is one of the reasons why we encourage you to drink plenty of water, sodium and potassium. It is to replace all the water and electrolytes you lose by beginning a low carb diet.

BMI, or body mass index, is also 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 weight into a BMI calculator. A normal BMI is between 18.5 and 25. If you are starting with a BMI of greater than 30, a normal BMI is not the best goal to shoot for. Rather, shoot for a more moderate goal, say a five 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 likely all the metabolic markers we follow (fasting glucose, fasting insulin, lipid ratios, etc.) are likely to be significantly improved.

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

Besides body weight and BMI, waist circumference is another 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 frequent enough. If you're losing weight, you're also likely noticing the loosening of your old clothes.

If you have a history of high blood pressure also known as 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 decreased or even discontinued.

With decreasing weight and increasing physical activity you're likely to be in better 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

- Physical changes to our body are ways to gauge the effectiveness of our chosen dietary lifestyle.
- Measuring our weight, body mass index (BMI), waist circumference are simple to measure and allow us to track our progress.
- Improved physical conditioning can be measured by blood pressure, resting pulse and maximal heart rate during exercise.

Resources

Chapter 9: Lifestyle

Energy: About 2-3 weeks into a ketogenic diet most individuals reporting 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 and there are moments of low blood sugar or hypoglycemia. Individuals can feel fatigued and hungry.

Mental clarity: Mental clarity is commonly reported by those on a ketogenic diet.

Joint pain: The ketogenic diet is anti-inflammatory. Joint pain is decreased.

Improvement of skin conditions: Many skin conditions are due to autoimmune and inflammatory conditions improve including eczema, psoriasis, seborrhrea and other skin conditions. The ketogenic diet is anti-inflammatory and improves such conditions.

Sleep: The original use of a ketogenic diet was in the use in children with seizure disorders. Even today a ketogenic diet is recommended in cases where the seizures are difficult to control. The brain finds using ketones as a fuel calming.

Most people report an improvement in their sleep.

Chapter Summary

- Results of beginning a ketogenic diet include increased energy, improved mental clarity, decreased joint pain, improved skin conditions and improved sleep.

Resources

Chapter 10: Laboratory Assessment

Besides the physical measurements that can be used to follow progress on a low carb diet, a number of laboratory studies can be used to monitor metabolic improvement as well. A couple of them are urine tests, but most of them are blood tests.

Urine tests that can be followed include urine glucose and urine key tones.

Urine glucose: In those individuals with uncontrolled diabetes urine glucose test strips can be monitored with urine dipsticks. However blood glucose values are more accurate and are the standard of care.

Urine ketones: For those who want to test their urine to verify that they are in nutritional ketosis, urine ketone test strips can be purchased. This is probably a good way of determining whether you are correctly eating a ketogenic diet during the early stages. It is not necessary to be in a state of continuous nutritional ketosis to reap the metabolic benefits of being on a low carb diet. To use these strips, 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 after a certain number of seconds according to directions on the bottle. These can be purchased online if desired.

Blood Tests

Blood ketone test strips: These test strips use a drop of blood pricked from the finger and are read by a small monitor, much like a glucometer used by those with diabetes. It is utilized to measure beta hydroxybutyrate they are by indicating the degree of nutritional ketosis the user is in. They are more accurate than urine ketone test strips. Again, it is not necessary to be in a

state of continuous nutritional ketosis to reap the metabolic benefits of being on a low carb diet.

Fasting glucose: This test can be performed using either a test strip utilizing a drop of blood from a finger prick and read by a glucose monitor or from venous blood and sent to a commercial lab. It is capable of distinguishing between an individual with normal glucose control (a normal individual or one with insulin resistance) from 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 those no 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 both 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. A value of 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 adherent to red blood cells. The higher the level, the higher your average blood glucose is. It distinguishes between those individuals with normal average glucose levels, prediabetes and diabetes.

Liver enzymes: These tests use venous blood are sent to a commercial laboratory. You do not have to be fasting for this test. Elevated liver enzymes that include AST, ALT, and GGT raise the

alarm That something is amiss. Although there can be many reasons for the elevation of liver enzymes including medications, viral infections and toxic substances such as alcohol, one of the more common reasons that we are concerned about is the development of fatty liver disease. This disease is a result of prolonged high carb diets with resultant insulin dysfunction. Fatty liver disease can eventually result in the development of cirrhosis and liver cancer. Fatty liver disease can be reversed with a low carb diet.

Uric Acid: Uric acid is not just obtained to determine one's predilection for gout or kidney stones. It can also be used to monitor one's likelihood of developing insulin resistance. Levels greater than 5.0 may indicate The presence of insulin resistance. Following this test can provide evidence that one's overall metabolic condition is improving.

Fasting Lipid panel:

This test uses venous blood and is sent to a commercial laboratory. It has the following components.

Total cholesterol: This is the total of the various kinds of cholesterol in the blood.

HDL: This is the good cholesterol

Triglycerides: Triglycerides are typically the result of fats digested and I'm so the following a meal or fats mobilized from our fat stores.

LDL: This is the bad cholesterol.

Total cholesterol/HDL ratio: More important than either component by 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. Less than 3 is great!

Triglycerides/HDL ratio: Like the total cholesterol/HDL ratio, this ratio is more important than either component by itself. And, like the total cholesterol/HDL ratio, the lower the ratio, the less likely you have insulin resistance. Values less than 2 is great!

Thyroid panel:

Although TSH (thyroid stimulating hormone), free T3 and free T4 don't typically change whether you have diabetes or not, it's a good idea to check these hormones when you get started on a low carb diet. Especially if they haven' been checked in a while.

The presence of elevated thyroid antibodies indicates the presence of an autoimmune problem brought about by inflammation. When present the condition is called Hashimoto's thyroiditis. A ketogenic diet is considered antiinflammatory and may help with this condition.

Free T3: Free T3 is the active thyroid hormone. It is the free4 hormone with a single iodine molecule removed.

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

Thyroid-stimulating hormone (TSH): 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 to get proper amount.

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

Thyroid peroxidase (TPO) antibody: This is an antibody targeting the thyroid peroxidase enzyme. Its presence indicates inflammation of the thyroid.

Chapter Summary

- A number of laboratory studies can be used to monitor metabolic changes when a person's diet is changed.
- A diet with lower carbs would be expected to lower urine glucose if present and increase urine ketones.
- Blood tests improving on a low carb diet include fasting glucose, fasting insulin, Hemoglobin A1c, and liver enzymes.
- A low carb diet generally lowers total cholesterol, HDL, triglycerides, TC/HDL ratio, and TC/HDL ratio.
- Effects on LDL are mixed, that is they can be increased or decreased.
- The thyroid tests TSH, free T3 and free T4 don't change don't change with dietary changes but it's a good idea to check these hormones when you get started on a low carb diet. Especially if they haven't been checked in a while.
- A ketogenic diet is considered antiinflammatory and may help with Hashimoto's thyroiditis.

Resources

Chapter 11: Exercise

1. **Exercise:** Exercise has many benefits but weight loss is not at the top of the list. Exercise is good for developing and maintaining muscle mass. It is good for cardiopulmonary conditioning. 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 for about an hour to burn an equivalent amount of calories. A far better way of achieving weight loss is with the type and frequency of the food we eat. Following a low carb diet with intermittent fasting is a much better approach to weight loss. Having said that, exercising does help some.
2. It is said to maintain a weight 1 would have to exercise 150 minutes per week. That's 2-1/2 hours. Not many people can obtain this realistically over the long haul.
3. **Resistance exercise:** This form of exercise is said to be the best.
4. **Aerobic exercise:** Aerobic exercises good for the heart and lungs. Using high intensity interval training HIIT) is particularly beneficial. This is where for a short period of time, say 30 seconds to a minute, you run, bike, stairstep at just about the maximum effort your capable of. Continue slow down and continue to exercise at a much lower intensity level to recover.
5. **Chapter summary:** Exercise is not the best way to lose weight. Having said that there are many benefits to health. Resistance training is perhaps the best form of exercise. When performing a rather aerobic exercise, high intensity interval training decrease at the time needed to exercise.
6. **Resources**

a. The Lean Look

Chapter 12: The Fasting Progression

The fat stores of the body can be best mobilized during the fasted state. This is when insulin is low and not preventing fat from being used as an energy source. So, the longer glucose from a meal with carbohydrates is hanging around, the more insulin is hanging around and the less fat mobilized. Below are described a number of scenarios when a fasting state can occur thereby allowing the burning of fat.

Avoiding snacks: Decreasing insulin is paramount to losing weight. Not only is it important to decrease the level of insulin circulating in the bloodstream but also how many times per day it is allowed to increase. One of the first things that you will want to try and do on your weight loss journey is to avoid snacking. Every time you eat carbs or protein 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.

Intermittent fasting (time restricted feeding): Even better than eating 3 meals a day, is eating just 2 meals a day. Eating 2 meals within 8 hours apart, allows the body to fast for 16 or more hours. This gives the body more time to burn fat without insulin hanging around to prevent it.

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 span of 8 hours, it is not such 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.

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, after consulting with their doctors, fasting for longer periods of time.

Chapter summary:

- Fasting allows the body to burn fat.
- Avoiding in between meal snacks is the first step of progressively longer fasts that improve metabolic health and promote weight loss.
- Progressively more profound fasts start with avoiding in between meal snacks, followed by intermittent fasting (eating 2 meals a day within 8 hours), eating just one meal a day and then finally multi-day fasts. Intermittent fasting or longer fasts can assist you in bursting through a weight loss stall.

Resources:

a. The Ultimate Guide to Fasting, Jason Fung

Chapter 13: What's Between the Ears

1. Why we eat?
    a. What's between our ears is the biggest factor to our long term success!
        i. Changing our relationship with food
            1. The good stuff
            2. The pack of cigarettes
    b. Boredom
    c. Stress
2. Eating disorders need special help
    a. Bulimia
    b. Binge eating disorder
    c. The Home Environment
    d. Temptation
3. Chapter summary
4. Resources
    a. Six Factors to Fit, Robert Kushner
    b. The Anderson Method

c. Judith Beck

Much of this book discusses the importance of what we eat and when we eat. That is certainly one of the most important principles for improved metabolic health, weight loss and the 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 of our heads is in most cases most important.

There are likely dozens of interacting reasons why our metabolic health is suffering and we are carrying around too much weight. The resulting interplay of such reasons are as unique as the individual.

I often use the following example to a nonsmoker to illustrate how important our mindset is regarding food. It goes something like this. "If I left a pack of cigarettes out on your kitchen counter at home, How long could I expect that pack to stay there untouched?" I typically get an answer like "never" or "I'd throw them in the trash can". In other words, a nonsmoker does not think, behave or is motivated to have a cigarette like a smoker is. 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 while practicing a low carb lifestyle, I'll often get the comment "Aw Doc, you're taking away all the good stuff". Then I remind the patient "We need to relearn the way we think about food. We need to think of all the bad things that has happened to our health as a result of all that supposedly "good stuff".

We need to get ourselves to the point where, when passing a plate of chocolate chip cookies in the break room we think to ourselves “I’m not going anywhere near those, they are not good for me“. Or, ”I’m not going anywhere near those, I like the way my new clothes are fitting. Thank you very much.”

In the remaining part of this chapter I will briefly discuss a few resources and approaches you can consider if your attempts to follow the dietary and fasting suggestions laid out in this book are not working for you, or, you feel that your relationship with food is “complicated” and may involve deeper behavioral issues.

For example, Binge eating is a disorder where individuals can’t help themselves. When they are stressed, for any mumber of reasons. They tend to overeat and feel ashamed of themselves after binging. This topic is beyond the range of this book. However, there are books that can be read to address this. Often times, counseling is appropriate to address traumatic issues in an individual's past. There is, interestingly, an FDA approved medication, Vyvanse, that can be prescribed that may help.

Bulimia is an eating disorder associated with altered self image. This topic is also beyond the range of this book. These individuals almost certainly need counseling to address this issue. One variety of bulimia is characterized by binging (eating) and purging (making one‘s self 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 inducing vomiting by poking the fingers into the back of the throat and making oneself gag.

Resources that take different behavioral approaches in exploring our relationship with food that may be helpful include the following:

- Six Factors to Fit, Robert Kushner. This is probably the book on the subject I recommend most often. If you go to the authors website there is a quiz. When you complete the quiz you will see your scores for six different eating personality types. Typically your highest score indicates the types of issues you have with food and the book steers you to the appropriate chapter to work on your particular issues. If you think the quiz accurately characterizes your food issues, I recommend buying the book and reading the chapter to try and implement the suggestions. The book uses a number of cognitive behavioral techniques and also suggests practical tips to improve the home environment.

- The Anderson Method. The Anderson method is quite practical. And while it does suggest some cognitive behavioral therapy techniques is really a common sense way to to make healthier food choices and a way to have opportunities to “cheat”. It is perhaps the simplest read as well.

- The Beck Diet Solution by Judith Beck. 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.

For severe psychological issues regarding an individual’s relationship with food psychological evaluation and treatment is recommended.

Chapter 14: Sleep

1. Good sleep is necessary for weight loss and general good health.
2. Sleep deprivation increases cortisol and turns off fat burning.
3. The principles of sleep hygiene
    a. Get 30 minutes of sunlight each morning. Reset circadian rhythm. Suppresses melatonin.
    b. Limit caffeine to before noon Call mom or to the 6 to 8 hours after arising.
    c. Limit alcohol 4 hours Before bed
    d. Keep the bedroom cool, 68 or less
    e. Don't eat 2 hours before – reflux
    f. Limit liquids
        i. Reflux
        ii. going to bathroom
    g. Turn off electronic devices 2 hours before bed – blue light
        i. Glasses – starting at dusk
        ii. Apps – f.lux
    h. Hot bath or shower 2 hours before bed
    i. Keep the bedroom dark
        i. Mask?
    j. Consider ear plugs if …
    k. Maintain a regular sleep schedule
    l. Develop a regular bedtime ritual

m. White/pink noise
    i. Box fan
    ii. White noise machine
n. Box breathing
o. Don’t be a clock watcher
    i. Turn clock away from you
p. The bed is for sleeping and intimacy
q. If you don’t fall asleep in 20 minutes get up

4. Insomnia
    a. Weaning off sleeping pills
    b. Self assessment
    c. CBTi
    d. Sleep diaries
    e. Decreasing stress
        i. Relaxation response
        ii. Cognitive stress management techniques
5. Obstructive Sleep Apnea (OSA)
    a. What is OSA?
        i. Apneic episodes
        ii. Decreased oxygenation
        iii. Stress hormones
        iv. Effects on health

    b. The Epworth Sleepiness scale

6. Supplements
    a. Melatonin, 1-5 mg, for those > 30 years of age
    b. G.A.B.A, a neurotransmitter
    c. Magnesium, 200 mg – 800 mg, the great relaxer
7. Chapter summary
8. Resources
    a. Why We Sleep

Insomnia is a huge problem. Scientists have discovered that insomnia is actually a learned behavior. This learned behavior can be unlearned using a combination of cognitive behavioral therapy and relaxation techniques.

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 to increase the the oxygen level in the blood, another part of your brain wants you to continue sleeping. As a result, you wake up enough to take deeper breaths to supply the needed oxygen. However, prevents you from being able To fall into the deepest, most restorative stage IV sleep.

Untreated sleep apnea itself can causes a number of serious medical conditions including, heart palpitations, heart disease, hypertension, stroke, dementia, anxiety and depression to name a few. .

The Epworth sleep scale 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 and reading, watching TV, as a passenger in a car or in the car while stopped for a few minutes such as when one is stopped 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 a sleep clinic. The home sleep study is unable to diagnose other sleep disorders such as restless leg syndrome and narcolepsy. Bodily functions monitored during the sleep study include blood oxygenation levels, blood pressure, EKG, level of snoring, brain waves, and the number of times a person stops breathing called apneic episodes.

Going through life chronically sleep deprived causes the circulation of stress hormones. These stress hormones increased insulin and therefore turned off fat burning. Good sleep is necessary for metabolic health and weight loss.

Assuming you do not have sleep apnea (or, if you do but it is properly treated with CPAP, surgery or a pharyngeal implant) but are dealing with insomnia, the following tips are considered part of a process called sleep hygiene. Trying to implement these practices may correct your problem.

- The principles of sleep hygiene

- Upon awakening, expose yourself to as 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 a 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 causing 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 does two things. It decreases the likelihood reflux of the stomach contents and will minimize the number of times you 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 expose yourself to upon awakening, activates the brain and interferes with sleep. There are glasses available to wear during the evening to prevent your eyes from taking in the blue light. There are also smartphone apps which measure the amount of blue light admitted. Another reason to avoid screen time is

that 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 live 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, or some other device specifically designed to admit low volume benign noises such as ocean noises.
- Maintain a regular schedule. 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, beginning our pre sleep routine and going to bed at the same time help promote sleep.
- 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 go. 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
  - Good sleep is necessary for weight loss and general good health.
  - Sleep deprivation increases cortisol and turns off fat burning.
  - Developing a regular bedtime ritual. Using the suggestions listed in his chapter and developing your own, unique bedtime ritual is important.
- Resources
  - Say good night to insomnia, Gregg D Jacobs, PhD, Saint Martin's Griffin, 2009
  - Why We Sleep, Matthew Walker, Scribner, 2017

Chapter 15: The Effects of Stress

Stress

- Physical
    - Role of diet
    - Role of exercise
    - Role of sleep
- Psychological
    - Family
    - Work
    - Anxiety
    - Depression

Chapter Summary

Resources

- How to Make Disease Disappear
- Why We Sleep

Chapter 16: Side Effects/Troubleshooting

As individuals change from the standard american (SAD) diet to a low carb diet, there are a number of metabolic changes that occur. Our bodies are becoming more metabolically flexible. We are changing from being just a carb burner into a hybrid of sorts. Just as a hybrid car can burn two fuels, typically electricity and gasoline, our body is learning how to burn both carbs and fats more readily. Sometimes symptoms can be experienced as the body begins to adapt to these changes.

1. Keto flu. Keto flu generally occurs within the first few days in an individual initiating a very low card diet such as the ketogenic diet. Symptoms such as dizziness, fatigue and headaches can occur. 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. Using plenty of light salt, which is half sodium chloride and potassium chloride can be helpful. Magnesium can be added to food in the form of a powder or taken as 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. Other ways of obtaining magnesium taking a T-spoon of Milkof Magnesia at bedtime or soaking in a tub with Epsom salts.
4. Diarrhea.

5. Keto crotch.

Chapter Summary

- As our body adapts to a low diet that is lower in carbs some individuals may experience certain side effects.
- Keto flu generally occurs within the first few days of individuals beginning a very low carb diet like the ketogenic diet and is treated by drinking plenty of fluids and making sure they're getting enough salts in the form of sodium, potassium and magnesium.
- Constipation can be treated by drinking plenty of fluids and making sure you're getting enough sodium, potassium and magnesium.

Chapter 17: Weight Loss Stalls

1. Don't Leave the path!

2. How much fat and muscle mass you lose on the ketone diet depends on a number of factors. To prevent muscle mass loss:

    a. Exercise (see Chapter 12)

    b. Diet (see Chapters)

    c. Sleep (see Chapter 15)

    d. Stress (see Chapter)

3. Top reasons for weight loss stalls

    a. You've set expectations too high

    b. You're restricting calories too much

        i. Your body decreases its total daily body expenditure

        ii. Ketogenic calculator - track and recalculate calories and macros

            1. Every month or every 10 pounds lost

                a. Reduce your calorie deficit a bit so diet is easier to maintain, and metabolic rate doesn't rapidly slow down

            2. Track and recalculate calories

            3. Track and recalculate macros

c. Because you're exercising, you're losing fat, you just don't realize it

d. You're not eating the right amount of protein

    i. Too little decreases muscle mass

    ii. Too much increases insulin which decrease fat burning and ketone production

e. You're stressed

f. You're not eating nutritional food

g. You're eating too many nuts

h. You're not sleeping enough

i. Food sensitivity

    i. Dairy – try excluding

    ii. Gluten found in low carb processed foods

j. Consistency

    i. Cheat days

k. You're not exercising effectively

l. You're eating too many "healthy" sugars

m. Carb creep

n. A medical condition may be preventing weight loss

o. You’re eating too frequently

p. You’re eating too many unhealthy foods

q. You’re eating too many calories

r. You have been cutting carbs for too long

4. Troubleshooting

    a. Fasting

        i. Avoiding snacks

        ii. Intermittent fasting

    b. Fat fast – eating mostly fat and restricting calories for 2-4 days

        i. Depletes glycogen stores

        ii. Increase ketone production

            1. Breakfast – bullet proof coffee

            2. Lunch – deviled eggs

            3. Dinner – sardines and mayo

5. Chapter summary

6. Resources

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. It can be influenced by exercise, diet, sleep and stress among other things. A normal amount of weight loss is approximately 1/2 pound to 2 pounds per week. Many people have too high of an expectation. 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 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 to much:** Some people experience a weight loss stall because they're restricting calories too much. Their body senses that they are trying to starve themselves and the body goes into a "starvation mode". Remember, a lower carb diet, we don't initially count or restrict calories. The theory is that the higher fat content of the lower carb diet will slowly, naturally, decrease the amount of food you eat. You slowly become satisfied earlier and earlier. Having said this, sometimes it can be helpful to track your macronutrients (fats, proteins and carbs) and count your calories if there has not been the kind of beneficial effects you were expecting. Afterall, where you can measure you can manage. Sometimes the use of a ketogenic calculator can help. It might be wise to consult the calculator every month or so with every 10 pounds of weight loss. In this way you reduce your calorie deficit by small increments so as to not to trigger the body's "starvation mode".

2. **Change in body composition:** Some people who begin the ketogenic diet also start exercising a lot. After their initial loss of water, they stop losing weight primarily because they are gaining muscle 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 as low a carb low diet that they believe they are. Some individuals may be eating too much protein as well. Even though protein does not increase insulin as much as carbohydrates, they can nevertheless increase 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 and ketone production.

4. **Food sensitivities.** Some individuals have food sensitivities that may interfere with weight loss. Many people find that dairy in particular will cause 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 products 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:** They're burning the candle at both ends or they've got untreated sleep apnea. Increased stress, whether psychological or from an untreated medical condition such as sleep apnea can cause an increase in cortisol which increases insulin, decreases fat burning and ketone production.

6. **Some folks snack too much.** 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 in the case of a ketogenic diet).

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. Again, this increases the stress hormones which increases insulin.

8. **Some people eat too frequently**. In addition to their meals they may be snacking. This does not allow the body to fast and thereby mobilize and use fats for fuel.

9. **Some people are straying off the path.** They are allowing "carb creep". This is where people begin including items in their diet that have "hidden carbs" in them. Maybe it is barbecue sauce, may be it is spaghetti sauce, perhaps they're eating too many 'healthy' sugars such as honey, agave nectar, etc.

10. **Hidden medical conditions:** some individuals may have a hidden medical condition. It's generally a good idea to have a thorough check up from your primary care physician as they initiate their ketogenic diet. 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.

11. **Diet inconsistencies.** Some people are just being inconsistent with their diet. They feel like they deserve a few “cheat days“. Cheat days defeat the purpose of what is trying to be accomplished. Nutritional ketosis, the byproduct of a low carb diet with some type of fasting is needed to mobilize fat stores. Remember, this is a marathon and not a Sprint. The intake of calories and carbohydrates that occur too frequently will increase insulin and decrease fat mobilization and sabotage your efforts at weight loss.

Chapter Summary

- Don’t Leave the path! You are stuck with your genes. Returning to the SAD diet Or your previous way of eating set you back to square one.
- If you are not getting the results you want try tracking your macros and calories , then tweak and track again.

Sources

Chapter 18: Medications

1. Deprescribing
2. Medications for weight loss
    a. Adipex
    b. Topamax
    c. Belvique (locaserin)
    d. Bupropion/naloxone (Contrave)
    e. liraglutide
3. Medications that cause weight gain
    a. Insulin
    b. Antidepressants
    c. Antipsychotics
    d. Blood pressure medications
4. Chapter summary
5. Resources

One of the big advantages of adopting the low-carb lifestyle is the prospect of reducing the number of medications one is taking. For me personally, deprescribing, or stopping a medication because the underlying chronic medical problem has been 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 because many medications can cause weight gain. These common medications include medications used to treat blood pressure, diabetes, depression, seizures,

migraine headaches and inflammation. Scrutinize the medicines that you are currently taking and ask your provider whether there are alternatives.

The following medications can potentially cause weight gain:

- **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 an 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 benefits of eating a diet high in fat such as the low-carb ketogenic diet, is their propensity to decrease appetite. This is because carbohydrates and the resulting spike in insulin causes an increase in the hormones of hunger, particularly ghrelin. Still, many feel that they need a little help to get started. The following medications are commonly used to assist people losing weight.

- **Phentermine (Adipex)** is a sympathomimetic amine. It works as an appetite suppressant. Because this medication has the potential for abuse, it is generally only prescribed for short term use.
- **Phentermine – topiramate ER.** These two drugs together work better than either one alone. Users can expect a 10% body weight loss. The most common side effects are

constipation, dizziness, dry mouth, dysgeusia (altered taste), insomnia and paresthesia (numbness and tingling).

- **Lorcaserin** is a selective serotonin 2creceptor agonist that works on the appetite center of the brain. Users can expect to 7% body weight loss. It can lower hemoglobin A1c levels similar to anti-diabetes drugs. The most common side effects include constipation, dizziness, dry mouth, fatigue, headache and nausea.
- **Liraglutide** is a glucagon like peptide 1 receptor agonist (GLP-1). It is an injectable medication given to many with diabetes. Users can expect up to 9% baseline body weight loss. The most common side effects include nausea and other G.I. complaints.
- **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, barbituates and antiepileptic drugs. Users can expect a little over 8% of baseline body weight. The most common side effects are constipation, diarrhea, headache, nausea and vomiting.
- **Orlistat** is a gastrointestinal lipase inhibitor. users can expect up to a 10% body weight loss over the course of the year. It inhibits the digestion of fats. This explains one of the more troublesome side effects, an oily rectal discharge. It reduces the absorption of fat soluble vitamins: a, D, E and K. Thus users should be on a nutritionally balanced, reduced fat, reduced calorie diet.
- **Phentermine/topiramate** is a combination of 2 weight loss drugs. Side effects including paresthesias and dysgeusia. It is not used in women wishing to become pregnant. Pregnancy tests should be performed monthly while using this combination.

- **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. 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.

1. Among the more important supplements and vitamins are as follows::
    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. **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.
    c. **Iron.** Iron is given to individuals who have a deficiency. Menstruating women are particularly at risk for iron deficiency anemia. As are vegetarians and vegans. It is typically given along with vitamin C to improve its absorption.
    d. **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 and magnesium. Approximately 250-500 mg should be taken each day. It can be taken in a number of forms. It can be homemade by adding unflavored milk of magnesia to seltzer water (see Appendix C). It can be taken as an oral supplement in a number of forms. And perhaps the most relaxing way to absorb magnesium is by taking an Epsom salt bath.

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

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

g. **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.

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

i. **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.

j. **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.

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

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 typically 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. And after all, why would It? Your genes don't change with the surgery. So if you return to eating the same old SAD diet you will gain weight as before once the stomach stretches back out again. For those wishing to undergo bariatric surgery there are a number of options:
    a. **Laparoscopic adjustable gastric banding.** This procedure is the least invasive. It involves placing a removable band through the abdominal wall and around the upper stomach using a laparoscope. The main drawback with these devices is that they have a removal rate of 25-40% during the ensuing 5 years. One can expect the loss of 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 weight loss in percent excess body weight at 2 years is 50-70%. As the name implies, it involves

removing most of the stomach so that 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 of nutrients. 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.

2. As a result of any bariatric surgery, many vitamins and minerals need to be monitored and followed. Such vitamins include vitamins B1, B9, 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.

Chapter summary

Resources

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

Obesity algorithm, obesity medicine Association, 2020

Appendix A-Basic Principals

1. Don’t drink any calories
2. Eat meats and non starchy vegetables
3. Avoid sugar
4. Avoid grains
5. Avoid potatoes
6. Avoid processed foods
7. Use healthy fats

Appendix B - Basic Principals

1. Eat meats and non starchy vegetables
2. Avoid grains
3. Avoid potatoes
4. Avoid sugar
5. Use healthy fats
6. Don’t drink any calories
7. Avoid processed foods

Magnesium Water

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.

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.