

Obesity, Diabetes and Moringa Oleifera

Because of the increasing prevalence of obesity and diabetes, many are looking to more natural ways to control blood sugar and help reduce weight. And this search includes Moringa Oleifera, used for thousands of years for just these purposes.

Moringa oleifera is a fast-growing, small, drought-resistant tree. It's native to the sub-Himalayan areas around north-west India and has spread to tropical and sub-tropical areas of Africa, Arabia, South East Asia as well as the Pacific and Caribbean islands and on into South America.

Ancient cultures have found that over 20,000 plants have shown to have medicinal effects. And people have found that practically the entire Moringa oleifera tree is useful for medicinal purposes. This includes its fruit, seeds, flowers, leaves, bark and roots. Modern research has identified many essential nutrients including vitamins, minerals, amino acids, antioxidants, anti-inflammatory agents as well as omega 3 and omega 6 fatty acids.



From [Health Benefits of Moringa Oleifera](#) published in the *Asian Pacific Journal of Cancer Prevention*

Discovery Channel Documentary of Moringa Oleifera The Miracle Tree

What Scientific Studies of Moringa Oleifera Have Shown

Of course, like most scientific studies, animals are used first before human subjects. Animals like mice, rats or rabbits. Here are the results of two such animal studies.

In the first animal study 15 rats were divided into three groups of five each. Each group of rats was fed ad libitum (as much as they wanted). The

first group was fed a standard diet. The second and third groups were fed a high fat diet. The third group, however, also received a daily dose of *Moringa oleifera* leaf extract in an oral solution providing 1 mg per g of body weight.

As expected, the rats fed a high fat diet increased cholesterol levels in the serum (blood), liver and kidney. The third group of rats on the high fat diet plus *Moringa oleifera* showed reduced cholesterol levels by 14.35% in serum and 6.40% in liver and 11.09% in kidney. It's clear that *Moringa oleifera* can definitely lower cholesterol levels.

The second animal study involved young wistar albino rats. They were divided into 5 groups and treated as follows:

- **Group 1** was a normal control where the animals were feed on a normal pellet diet and had free access to water.
- **Group 2** was a negative control in which the rats were feed on high-fat diet for a period of 7 weeks.
- **Group 3** was standard control in which rats were treated with simvastatin (a lipid-lowering medication marketed under the trade name Zocor among others) (3mg/kg, administered orally).
- **Group 4** was test treatment group where rats were treated with methanolic extract of *M. oleifera* (200mg/kg) along with high-fat diet.
- **Group 5** was test treatment in which rats were treated with methanolic extract of *M. oleifera* (400mg/kg) along with high-fat diet.

As expected, rats feed with high-fat diet showed significant increase in body weight compared to those feed with normal pellet diet.

Also rats feed on high-fat diet showed an increase in lipid level including elevated levels of total cholesterol, triglycerides, LDL, VLDL, and reduced levels of HDL when compared to rats receiving the normal pellet feed.

But, treatment with methanolic extract of *M. oleifera* (as well as treatment with the simvastatin) significantly reversed the hyperlipidemic effect produced by high-fat diet. Also, methanolic extract of *M. oleifera* tended to reduce the formation of fatty plaques in the arteries.

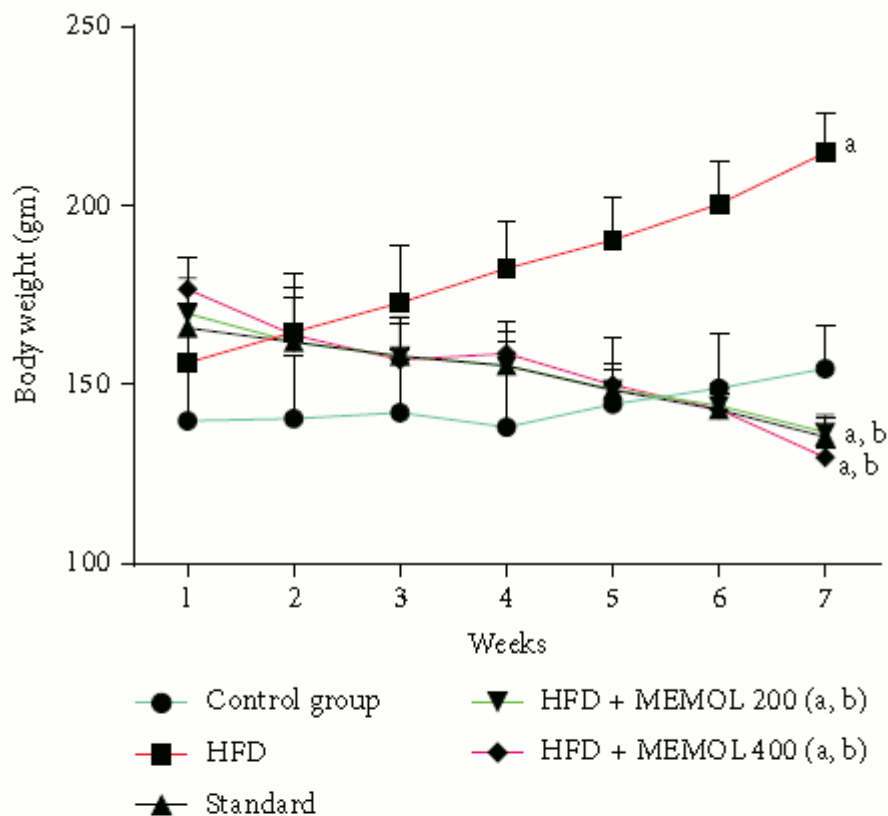


FIGURE 1: Body weight of rats fed a high-fat diet and treated with MEMOL extracts for 7 weeks; all values are expressed as Mean \pm SEM, ($n = 10$). (a) Significant difference compared to control; (b) significant difference compared to HFD, $P < 0.001$ (one-way ANOVA, Tukey's post hoc test, $n = 10$ per group).

From [Antiobesity and hypolipidemic activity of Moringa oleifera leaves against high fat diet-induced obesity in rats](#) as published in *Advances in Biology*

As can be seen in the above graph, treatment with both 200mg/kg and 400mg/kg methanolic extract of *M. oleifera* causes a significant reduction of body weights when compared to both the control group (feed normal pellets) and the high-fat diet rats.

The next study investigates the effects of *Moringa oleifera* leaf powder and *Azadirachta indica* seeds powder on human diabetics. Here, 55 patients with type 2 diabetes between the ages of 30-60 years were divided into two experimental groups and one control group. The experimental groups received either 8 g of *Moringa oleifera* leaf powder or 6g of *Azadirachta indica* seed powder each day. The control group did not receive any supplements.

Both the experimental groups showed very significant ($P < 0.01$) reductions in fasting glucose levels compared to the control group. Also, both experimental groups showed reductions in post prandial (after meal) blood glucose levels. The reduction of post prandial blood glucose was significant at the 0.05 level for *Azadirachta indica* seeds powder and highly significant at the 0.01 level for *Moringa oleifera* leaf powder.

Again, this study indicates that the herbs tested, especially *Moringa oleifera* leaf powder, had significant blood glucose level lower effects on people with diabetes.

In another study 15 obese people with type 2 diabetes were given 50 g packets of *Moringa oleifera* leaf powder. They took the powder for 40 days. It was found that serum glucose levels were significantly lowered and serum LDL cholesterol levels were significantly decreased by 30.94%.

Conclusions About Obesity, Diabetes and *Moringa Oleifera*

Moringa oleifera has been tested with both animals and humans. It has been found effective for managing lipid levels including lowering bad LDL cholesterol and raising good HDL cholesterol levels. It helps control blood glucose levels both after fasting and after eating. It is effective at reducing weight even on a high fat diet.

While you should take normal measures to manage your glucose and lipid levels, like reducing your carbohydrate intake and feeding your good gut microbes, *Moringa oleifera* can be another tool in your toolbox to help manage your condition.

Obesity, Diabetes and *Moringa Oleifera* References

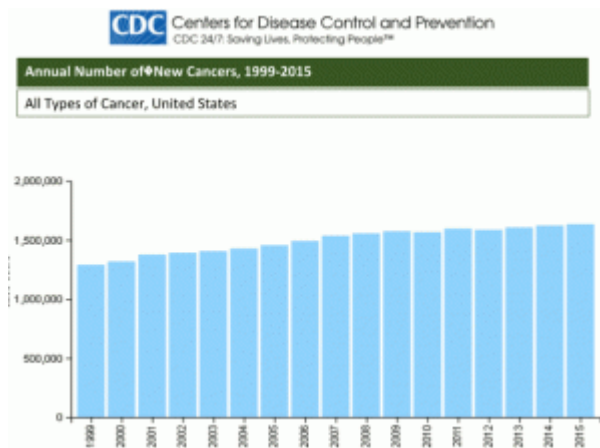
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Does Carbohydrate Restriction Fight Cancer? Use the Warburg Effect to Fight Cancer

Have we known that carbohydrate restriction fights cancer for nearly 100 years? One of the defining characteristics of cancer cells is the inefficient metabolism of glucose to lactate even in the presence of oxygen. This aerobic glycolysis (the breakdown of glucose by enzymes without oxygen) is known as the Warburg effect and has been known since the 1920s. Yet, little has been done to utilize this fact in helping to prevent or treat cancer.

The [National Cancer Institute](#) predicts that “in 2018, an estimated 1,735,350 new cases of cancer will be diagnosed in the United States and 609,640 people will die from the disease.”

In spite of all the cancer research, the number of people getting cancer in on the increase.



New Cancers in the United States

Shouldn't we limit the primary nutrient of cancer cells as a means of fighting cancer?

Sugar is a Key Nutrient for Cancer Cells

Your body typically processes glucose (a sugar from carbohydrates) in two ways. Each way produces ATP molecules (adenosine 5'-triphosphate, the energy source for all cells of the body).

The efficient production of ATP molecules occurs in the presence of oxygen. With oxygen, each glucose molecule is completely oxidized to carbon dioxide and water. This process produces 36 to 38 ATP molecules.

But, when oxygen is not present in sufficient amounts, glucose is converted

to pyruvate and further reduced to lactate which enters the blood stream. In this manner, a molecule of glucose can produce only 2 ATP molecules.

In contrast, production of ATP molecules from fatty acids in the presence of oxygen is far more efficient. Fats can produce 146 to 163 ATP molecules. If oxygen is available but glucose is in low supply, healthy cells, but not cancer cells, can produce ATP molecules from fat.

In the 1920s Otto Warburg observed that normal cells in the presence of oxygen inhibited lactate production. But, tumor cells (including cancer cells) maintained lactate production in spite of the presence of sufficient oxygen. In fact, cancer cells consumed ten times the glucose and produced two orders of magnitude (often 200 times) more lactate than normal cells.

Love of Sugar Helps Identify Cancer Cells

It is this “addiction” to excess glucose by cancer cells that enables the detection of many cancers. FDG-PET (fluorodeoxyglucose positron emission tomography) is often used to detect, diagnosis and monitor many cancers. Before the PET scan you receive intravenous injection of a tracer dose of mildly radioactive sugar (glucose). This radioactive glucose will be attracted preferentially to cancer cells where it can be easily detected in a PET scan.

This detection technique works well for many types of cancers including lung cancer, breast cancer, colorectal cancer, melanoma, Hodgkin lymphoma, endometrial cancer, and soft tissue and bone sarcoma. Some cancers do not seem to gulp down the radioactive sugar and are difficult to detect with a FDG-PET scan. These include liver cancer, prostate cancer and pancreatic cancer.

Does Sugar Help Cancer Develop?

The presence of excessive amounts of blood sugar seem to increase the risks of many types of cancers. Some think that the aerobic glycolysis within cancer cells may provide a growth advantage that helps cancer cells replicate. This is especially important among diabetics with insulin resistance who have trouble removing sugar from the blood stream. Diabetics have twice the risk for cancers of the liver and pancreas as well as for endometrial cancer. Diabetes also increases the risk for colorectal, breast and bladder cancers by 20 to 50%.

Metformin, a common diabetes drug, helps improve insulin sensitivity so sugar can be removed from the blood stream and it helps reduce gluconeogenesis (the generation of new glucose in the body). Metformin seems to help reduce cancer growth that would otherwise be stimulated by a high-energy diet. Compared with other diabetes drugs, metformin shows a significant 31% decrease in cancer risk among diabetes patients.

Cancer Prevention and Treatment with Diet

It seems an obvious question, but, can reducing the availability of sugar in the diet play a role in preventing or treating cancer?

Reducing the availability of sugar means consuming few, if any, carbohydrates. As you probably know, carbohydrates comprise a category of foods that are digested or broken down by enzymes into simple sugars. These foods include grain foods (like bread, rice, pasta), fruits and fruit juices, dairy products (especially with added sugars like most yogurts), starchy vegetables (like potatoes and corn), and all sugary beverages, treats and desserts.

The ketogenic diet is a popular way of greatly reducing carbohydrates. It allows moderate protein, with a shift from carbohydrates to healthy fats. This type of diet is used primarily to force the body to burn fat rather than glucose (sugar). There are many books available discussing the ketogenic diet and providing recipes for delicious meals.

A number of studies have been done to test the effectiveness of the ketogenic diet on cancer. Many initial studies were done on mice, but more recent studies have involved human cancer patients. But, because diet is not an "approved" cancer therapy, most human studies are done as a last resort after the traditional therapies favored by the cancer industry have failed.

Here are just a few such studies:

Mouse Study 1

In one mouse study a mouse brain tumor (CT-2A) was induced in mice by a chemical carcinogen. This mouse tumor and the human U87 tumor were then implanted in the right flanks of subject mice. Before implanting the tumors all mice were feed a standard diet of PROLAB chow.

These mice were separated into six groups (2 tumor types x 3 diets) and feed different diets consisting of

- Standard PROLAB chow (*ad libitum*, as much as they wanted)
- KetoCal®, a nutritionally complete ketogenic formula designed for children with epilepsy (*ad libitum*)
- KetoCal® (calorie restricted to reduce body weight by approximately 20%)

The tumors grew rapidly in mice feed *ad libitum*, but exhibited slower growth rates in mice feed a calorie restricted diet. The CT-2A and U87 tumor growth was reduced by approximately 65% and 35% in the KetoCal® calorie restricted mice. These mice also showed slower growth of new blood vessels to tumor cells.

Mouse Study 2

In this mouse study 24 mice were fed a standard mouse diet before they were injected with human gastric adenocarcinoma cells. The mice were then divided

into two groups and feed either:

- a ketogenic diet enriched with omega-3 fatty acids and medium chain triglycerides *ad libitum*
- a standard mouse diet *ad libitum*

The study looked to see how quickly the tumors reached a target size.

Tumors in the ketogenic diet group reached the target tumor volume in an average of 34.2 days while it took only 23.3 days for the mice in the standard diet group. It took 28 days for the last mice on the standard diet to reach the tumor target volume. But, it took 45 days for the last mice on the ketogenic diet to reach the target tumor volume.

Human Study 1

This study involves two pediatric oncology patients with advanced stated cancers that could not be removed. One patient was a 3 year old girl with stage IV anaplastic astrocytoma (malignant brain tumor) who no longer responded to radiation and chemotherapy. The second patient was an 8 1/2 year old girl with low grade cerebellar astrocytoma (brain tumor in the cerebellum) who underwent radiation, chemotherapy and an operations to remove 95% of her cerebellum.

The first patient started a ketogenic diet resulting in a 21.77% decrease in FDG uptake for PET scans and no changes in the tumor size while on the keytgenic diet. The patient remained on the ketogenic diet for 12 months after the study and showed no measurable progression of the tumor. She increased her ability to sit and stand without assistance and developed better control over bodily functions.

The second patient started the ketogenic diet and subsequent PET scans showed a 21.84% decrease in FDG uptake indicating decreased glucose metabolism within the tumor.

With both patients, the ketogenic diet significantly affected tumor metabolism.

Human Study 2

This 3-month long study involved 16 patients with advanced metastatic tumors who had no exhausted traditional therapeutic options. These patients were given instructions about following a ketogenic diet (with less than 70 g of carbohydrates per day) using normal groceries. They were provided with a supply of food supplements allowing them to create a protein/fat shake to make getting nutrients easier.

General health parameters were measured and a quality of life survey was administer every two weeks during the study. Two patients died of their disease, several discontinued the diet because of their disease and several dropped out because they found the diet difficult to follow.

Five patients completed the 3-month study. They reported improvements in their emotional functioning and less insomnia. But, their physical functioning became only slightly worse. The 5 patients who adhered to the diet for the entire 3 months had stable disease and lost weight.

The Ketogenic Diet and Cancer

Dr Michael VanDerschelden explains how a ketogenic diet can prevent and even cure cancer by depriving cancer cells of glucose, which is their only energy source.

Conclusions You Can Use

Most of us know that consuming high levels of carbohydrates causes weight gain (and all the other negative consequences of excess weight). Carbohydrates are digested into simple sugars that enter the blood stream. And, now for nearly a century research has shown that glucose in the blood is the chief nutrient of cancer cells.

It only makes sense that cutting down on blood glucose would help reduce the growth and spread of cancer cells.

For your own health, you should limit consumption of carbohydrates, especially simply carbohydrates like sugar that spike glucose levels in the blood.

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[Treating Metabolic Syndrome Naturally](#)

Metabolic syndrome is a group of symptoms that have been associated with an increased risk of type 2 diabetes and cardiovascular diseases. About [35% of the US adult population](#) has metabolic syndrome. For those aged 60 or more, the rate is close to 50%.

Women are more likely to suffer with metabolic syndrome than men, and Hispanics have a higher rate than non-Hispanics.

Just What is Metabolic Syndrome?

Metabolic syndrome is a group of 5 symptoms. If you have 3 or more of these symptoms you are said to have metabolic syndrome. These symptoms are:



1. Elevated blood pressure of 130/85 or more.
2. High triglycerides of 150 mg/dl or more
3. Low HDL cholesterol, less than or equal to 40mg/dl for men and 50mg/dl in women
4. Elevated fasting blood glucose levels of 100 mg/dl or more
5. Central obesity generally associated with a BMI of 30 or more

A study reported in the the [Journal of the American Medical Association \(JAMA\)](#) reported that metabolic syndrome is increasing long term in the United States. In 2003-2004 the rate was 32.9% but increased to 34.7% in 2011-2012, a 5% increase. Some short term studies indicate that in recent years the rate have leveled out.

The prevalence of metabolic syndrome means that many people are suffering from increased risks for a number of diseases including heart disease, stroke and diabetes. And often the symptoms and diseases result in limitations of

lifestyle options. In addition, [a study of members](#) of 3 health care plans indicated that those with 3 symptoms had 60% higher costs for health care than those without symptoms. And, the costs increased by a further 24% when a fourth or or fifth symptom was added.

These individual symptoms are pretty common among Americans. About a third of Americans have high blood pressure. About a third of American have high triglycerides. A fifth of American adults have low HDL cholesterol. Slightly under 10% of the population has elevated fasting blood glucose levels. And, a third of the population is obese.

Next, let's look at how doctors treat metabolic syndrome.

Treatment of Metabolic Syndrome

The best advice doctors can give is to avoid metabolic syndrome. To this end, [WebMD](#) advises you to:

- Exercise
- Eat a healthy diet
- Lose weight
- Quit smoking

Then, if this advice is not enough, you should take medicines to help you eliminate symptoms of metabolic disorder.

The traditional medical doctor is taught to identify symptoms that are not "normal" or healthy in the body. The idea is that the body is having difficulty keeping these symptoms under control, so it needs help in the form of drugs. Once a symptom is identified, the physician then prescribes one or more pharmaceutical drugs that have shown some effectiveness at reducing the symptoms.

Some types of the pharmaceutical drugs dealing with metabolic syndrome include:

<u>Symptom</u>	<u>Pharmaceutical Drug</u>
High Blood Pressure	Diuretics Calcium-channel blockers ACE inhibitors ARBs (angiotensin II receptor blockers)
High triglycerides	Statins like: Simvastatin (Zocor) Atorvastatin (Lipitor) Rosuvastatin (Crestor)
Low HDL cholesterol	Prescription niacin Fibrates such as gemfibrozil (Lopid) Statins like simvastatin (Zocor) and rosuvastatin (Crestor)

Elevated fasting blood glucose levels	Biguanides (Metformin) Sulfonylureas (Amaryl, Glucotrol, Glucotrol XL) Thiazolidinediones/Glitazones Meglitinides Gliptins Alpha-glucosidase inhibitors Sodium-Glucose Transporter-2 Inhibitors
Central obesity	Orlistat (Xenical) Lorcaserin (Belviq) Phentermine-topiramate (Qsymia) Naltrexone-bupropion (Contrave) Liraglutide (Saxenda)

While drugs can help control symptoms, they almost always have side-effects that are harmful. The doctor needs to determine if the patient will overall be better off with one drug or another.

On the other hand, most natural healing doctors believe that the body is quite capable of controlling the symptoms associated with metabolic syndrome. They typically believe that, for example, high triglycerides is **not** caused by a lack of Zocor or Lipitor. It is caused by a less than optimal lifestyle, including diet and exercise.

Next, let's look at some clinical studies that describe the natural causes and cures of metabolic syndrome.

Natural Treatments of Metabolic Syndrome

Natural treatments of metabolic syndrome primarily involve managing the intake of carbohydrates (like sweet beverages, bread, pasta, rice, potatoes). There are two considerations in the management of carbohydrate intake.

1. **Limiting the amount** of carbohydrates consumed
2. Consuming selected carbohydrates with a **low glycemic index**

Lower Carbohydrate Diet

An article in [The Journal of Nutrition](#) described two clinical trials which tested a low-fat meal plan against a low-carbohydrate meal plan. For half the trial period participants ate an amount of food that provided for their daily caloric needs. For the other half of the trial period the participants ate less food in what we normally think of as "dieting."

The results of these trials showed that during the non-dieting portion of the trial, the participants on a lower-carbohydrate meal plan lost significantly more abdominal fat (11%) than those consuming a lower-fat meal plan. In the traditional "dieting" phase the participants on the lower-carbohydrate meal plan lost significantly more total fat than those on a lower-fat meal plan.

The authors concluded that "restriction of dietary carbohydrate (relative to restriction of dietary fat) resulted in favorable changes in body composition, fat distribution, and glucose metabolism that may reduce the

risk of T2D [type 2 diabetes].”

Another study reported in the journal [Lipids](#) worked with 40 overweight subjects who had elevated levels of triglycerides and small-dense low-density lipoprotein (LDL) and low levels of high-density lipoprotein cholesterol (HDL). Half the group was put on a calorie restricted low-carbohydrate meal plan and half the group was put on a calorie restricted low fat meal plan. Both meal plans provided about 1500 calories per day.

After 12 weeks, the results indicated the effectiveness of the low carbohydrate meal plan.

- The total weight loss was nearly twice as great for those in the low carbohydrate group.
- The low carbohydrate group experienced a 12% reduction in fasting glucose levels while the low fat group saw almost no change.
- The low carbohydrate group had 3 times the fasting serum total ketones of the low fat group, indicating greater mobilization and utilization of fats.
- The low carbohydrate group had significantly better measures of fasting triglycerides and higher HDL cholesterol than the low fat group.

The results indicate that a limited carbohydrate diet significantly improves the overall symptoms of metabolic syndrome, more so than by a low fat diet.

The authors of this study conclude, “There are many options for treating obesity or the individual components of MetS [metabolic syndrome], but carbohydrate restriction has the ability to target the range of markers with a single intervention.”

Consuming Low Glycemic Index Carbohydrates

The glycemic index is a measure of how fast the carbohydrates you consume are digested to sugar and enter your blood stream. A value of 100 represents consumption of pure glucose that does not need digestion. The measure of blood glucose is taken two hours after the consumption of carbohydrates. The higher the glycemic index of a food, the faster the carbohydrate is digested to form sugar that enters the blood stream. The lower the glycemic index of the food, the slower its sugars enter the blood stream.

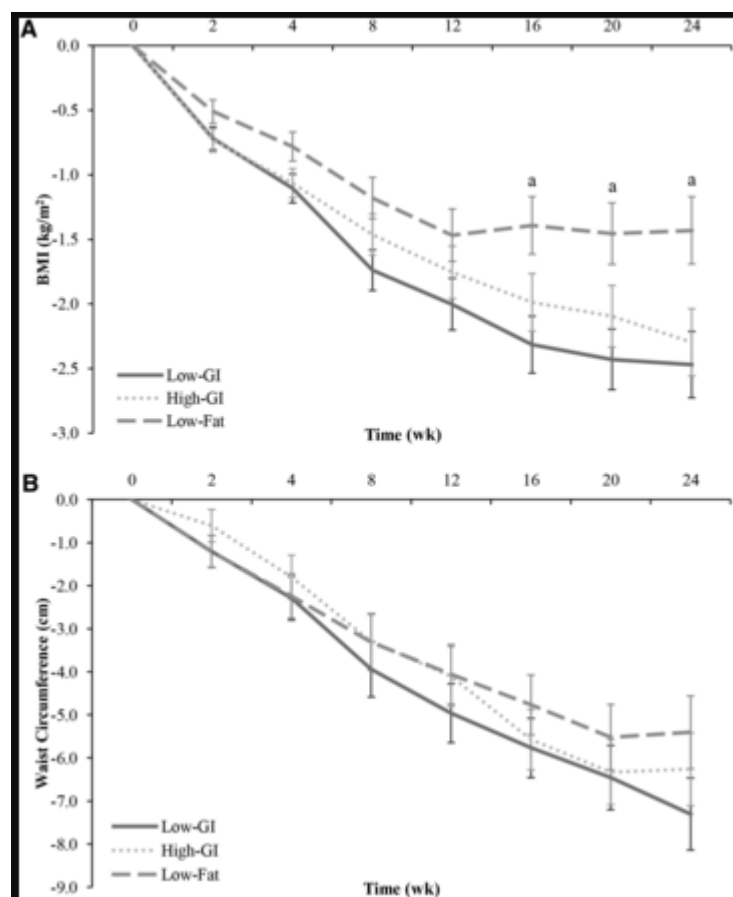
Low-glycemic index diets have been shown to benefit those with chronic conditions such as type 2 diabetes, ischemic heart disease, and some types of cancer.

[The American Journal of Clinical Nutrition](#) reports on a 6-mo randomized clinical trial that tried to determine effect of dietary glycemic index on a variety of metabolic risk markers.

The 122 participants were randomly assigned of the the following meal plans:

- Low glycemic index meal plans
- High glycemic index meal plans
- Low fat meal plans as specified by the American Heart Association

104 participants completed the study. The following graph shows that the low glycemic index meal plans produced the greatest reduction in waist measurements and the greatest reduction in BMI.



From [Effect of the glycemic index of the diet on weight loss, modulation of satiety, inflammation, and other metabolic risk factors: a randomized controlled trial](#)

In addition, the low glycemic food plan resulted in significantly improved insulin sensitivity than the low fat diet.

The authors conclude, “we showed that following a moderate-carbohydrate, LGI [low glycemic index] diet may be more effective for weight loss than a moderate-carbohydrate, HGI [high glycemic index] diet or a conventional LF [low fat] diet. Metabolic benefits observed for insulin resistance and sensitivity in subjects who were consuming an LGI diet and the tendency to improve other inflammatory and associated metabolic risk markers also indicated that LGI diets are better tools for managing obesity and its associated comorbidities.”

Conclusions You Can Use Today

Metabolic syndrome is basically a lifestyle issue. Carbohydrates are a prime controlling factor for the symptoms of metabolic syndrome.

You can reduce and even eliminate these symptoms by reducing your overall carbohydrate intake and selecting carbohydrates with a lower glycemic index.

If you do not control your carbohydrate intake you should expect your health care costs to grow and your lifestyle choices to become more limited.

Why Can't I Lose Weight?



Photo by [~Twon~](#) 

You've gone to the gym to do aerobics. You've done crunches and tried hours of spinning classes. You've done resistance exercises to build muscle to raise your metabolism.

You've tried the Zone diet, the South Beach diet, the Mediterranean diet, and even the Weight Watchers diet.

And you're still ready to shout: **Why Can't I Lose Weight?**

Missing Key to Weight Loss

You probably know that to lose weight, especially to lose fat, you need to cut back on calories. Calories represent the energy value of foods. Now, the cells of your body get their energy from these sources:

- Carbohydrates provide 4 calories per gram
- Proteins provide 4 calories per gram
- Fats provide 9 calories per gram
- Ketones provide 4.5 calories per gram
- Alcohol provides 7 calories per gram

Obviously, you may be thinking, the best way to cut back on calories is to limit your intake of fat and alcohol since they provide the most calories per gram. This gives you the greatest reduction in calories for the least reduction in the amount of food you won't be eating.

But, the real secret to efficient weight loss comes when you know how the body uses the energy from these sources.

The cells of your body primarily use glucose and fat for energy. So, let's concentrate our attention on these energy sources more carefully.

Glucose

Glucose comes primarily from carbohydrates when they are digested. But, it also comes from glycogen stored in the liver and skeletal muscles and it can be manufactured by the liver (a process called gluconeogenesis).

Carbohydrates come from three basic sources: starch (like potatoes and rice), sugar, and fiber.

Starch and sugar are primarily just chains of sugar molecules. They are broken apart by enzymes during digestion and pass into the blood stream. Fiber cannot be broken down and helps move waste products along your digestive tract.

Table sugar is a simple carbohydrate called sucrose. It consists of a glucose molecule and a fructose molecule joined together. Digestion breaks apart these sucrose molecules via the enzyme sucrase to glucose (blood sugar) and fructose. These smaller molecules then enter the blood stream. Fructose, though it tastes really sweet, cannot be used by the body and most of it is stored in the fat cells.

Excess carbohydrates (that are not stored as glycogen or used for energy) are converted by the liver into fat in a process called de novo lipogenesis.

Fat

Fat is digested in the small intestine where the enzyme lipase separates fat globs into fatty acids and monoglycerides which are then converted into triglycerides and enter your lymph system. They can be used to build cell membranes, build myelin sheaths that coat your nerves, insulate your body or be used as fuel when glucose is in low supply. They eventually enter your blood system and are stored in adipose tissue (your fat cells) to build up your fat storage.

When fat in your adipose tissue is ready to be burned as fuel, the triglycerides are broken down into fatty acids and glycerol.

The **fatty acids** move to cells that need energy and are used as fuel.

The **glycerol** is used by the liver to make glucose in the process of gluconeogenesis.

What About Ketones?

Ketones do not come from food. Your liver produces ketones from fat.

Your brain uses about 500 calories per day to think and send signals to

control all the processes of the body.

When glucose is plentiful, your brain uses glucose for energy. But, your brain cannot use fat for energy.

Instead, when glucose is in short supply, your brain uses ketones.

So, the level of ketones in your body is an indicator of what your body is burning as fuel.

You sometimes will want to measure the ketones in your body with urine test strips or a ketone breath monitor to ensure you are primarily burning fat rather than glucose.

What Determines if You Burn Fat or Glucose?

One main regulator is insulin. It works to help protect your body from high glucose levels.

When you consume a heavy carbohydrate meal, lots of glucose floods the bloodstream.

If you are unable to lower the concentration of glucose in your bloodstream you may experience negative symptoms of high blood sugar (hyperglycemia) such as

- Increased thirst or hunger
- Frequent urination
- Sugar in your urine
- Headache
- Blurred vision

Long term effects of frequent hyperglycemia include:

- Damage to your eyes, blood vessels, nerves, kidneys other organs
- Cardiovascular problems
- Stroke
- Problems healing wounds

So, insulin works to lower glucose levels in the blood. It stops your fat cells from releasing stored fat and ensures that your body's cells use glucose for energy.

Excess glucose is sent to the liver to produce more fat (lipogenesis) for storage.

Another regulator of the energy process is the hormone glucagon.

When glucose and insulin levels are low glucagon causes fat to be released from the fat cells so the fatty acids can be used for energy.

You Want to be a Fat Burner

To control your weight, especially your fat, you need your body to be a fat burning machine.

Your goal should be to reduce the amount of insulin so fat can be released from your fat cells and used for energy.

The way to do this is simple: restrict your carbohydrate intake. This means limiting your intake of foods like:

- Sugars
- Bread and all grains (wheat, barley, rye, oats, rice, and cornmeal)
- Beans and all legumes
- Potatoes
- Cookies and other desserts
- Pasta
- Corn (and sweeteners made with corn)
- Fruits

Sounds pretty restrictive, doesn't it? Well, people who love carbs remain sugar burners and let high insulin levels lock their fat in their fat cells.

What's the Evidence?

A two year study reported in [The New England Journal of Medicine](#) compared that effects of a low carbohydrate diet, the Mediterranean diet, and a low fat diet. The study began with 322 moderately obese subjects in a workplace with an on-site medical clinic.

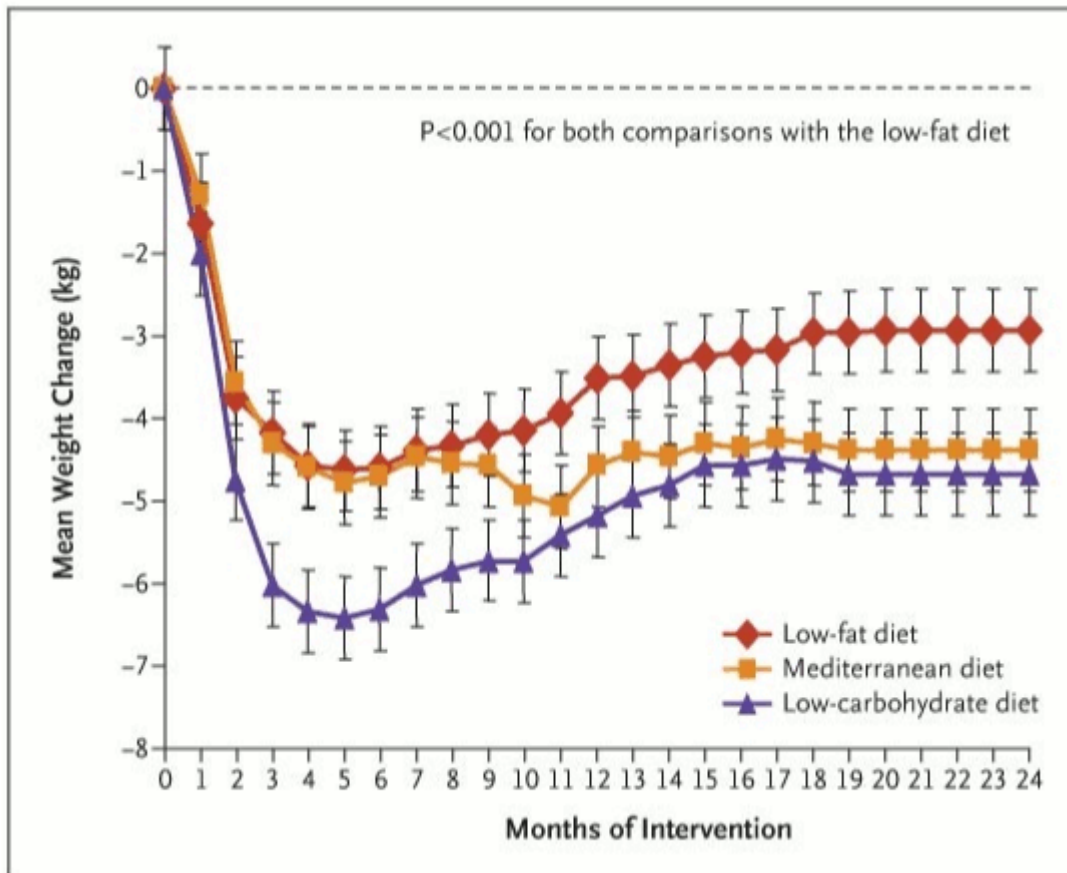
The low fat diet was based on the American Heart Association's [guidelines](#). Calories were restricted to 1500 for women and 1800 for men with 30% of the calories from fat.

The low carb diet was based on the Atkins diet. It started by restricting carbohydrates to 20g per day for the first two months, then gradually increasing carbs to 120g per day to maintain the weight loss.

The Mediterranean diet was based on the recommendations of [Willett and Skerrett](#). Calories were restricted to 1500 for women and 1800 for men. The diet was high in vegetables and low in red meat.

What were the results?

All three groups lost weight. The weight loss for the low carbohydrate diet was most dramatic. Only after several months when more carbs were added to the diet did the weight loss start to level out and then weight increased somewhat.



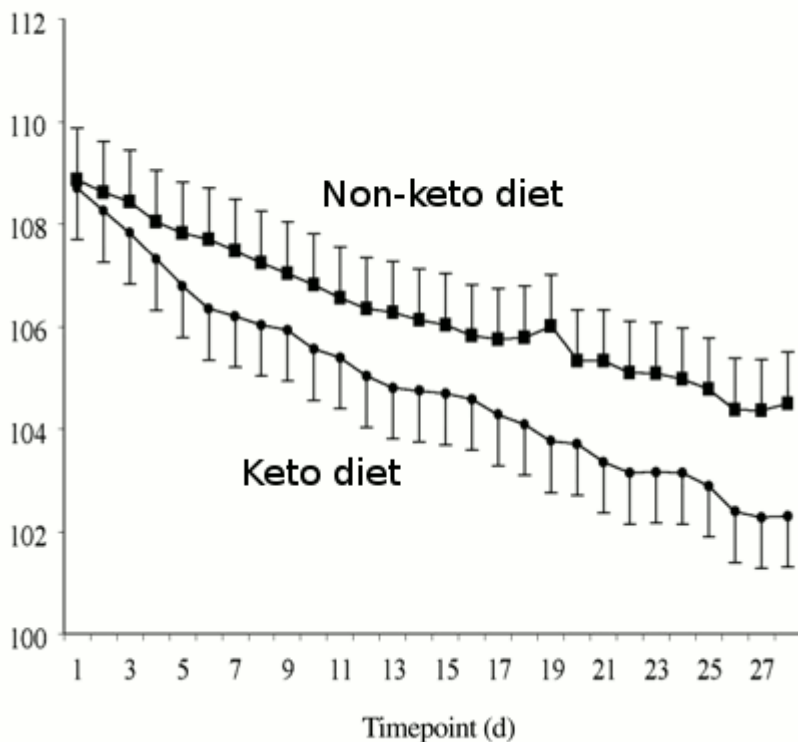
From [Weight Loss with a Low-Carbohydrate, Mediterranean, or Low-Fat Diet](#)

As you can see from the above weight loss graph, reducing carbs makes the dramatic difference. The conclusion is simple: If you want to lose weight, restrict your carbs.

Another study reported in [The American Journal of Clinical Nutrition](#) involved 17 obese men in a residential clinic with a BMI greater than 30. The study wanted to compare the results of a high protein low carbohydrate diet to a high protein moderate carbohydrate diet. Neither diet restricted calories.

This was a crossover study, in that all participants tried both diets. All subjects started with a 3 day maintenance diet. Then for 4 weeks half the subjects ate a high protein, low carbohydrate diet and the other half at the high protein, moderate carbohydrate diet. Then there was another 4 days of a maintenance diet. After that the groups switched diets. Then the subject had another 3 day maintenance diet.

The results demonstrated the value of the low carbohydrate diet (ketogenic) for weight loss. First, the subjects reported being less hungry on the low carbohydrate diet. And, second, the subjects lost more weight, including fat, on the low carbohydrate diet as shown in the following graph:



[Effects of a high-protein ketogenic diet on hunger, appetite, and weight loss in obese men feeding ad libitum](#)

Theory and Evidence Support a Ketogenic Diet

The message is clear. To lose weight, especially fat, cut your carbs.

Cutting carbs is the key to fat loss. The proof is clear. The evidence is overwhelming.

Benefits of the Ketogenic Diet

Dr. Josh Axe shares with you the benefits of a ketogenic diet. Ketogenic diets can actually help weight loss, cancer, and even Alzheimer's disease. When you are on a ketogenic diet, you are putting your body into a state of ketosis, which means your body is burning fat for energy rather than carbohydrates. The ketogenic diet could be the best diet for fat loss, however I don't believe anyone should be on this diet for more than 3-6 months. The reason why this diet works so effectively is your body stops feeding on sugar and starts burning fat. The diet consists of about 80% fats, 10% carbohydrates, and 10% protein.

References

[Weight Loss with a Low-Carbohydrate, Mediterranean, or Low-Fat Diet](#) published in *The New England Journal of Medicine*

[Effects of a high-protein ketogenic diet on hunger, appetite, and weight loss in obese men feeding ad libitum](#) published in *The American Journal of Clinical Nutrition*