

## FITNESS NUTRITION 101 SERIES:

### CARBOHYDRATES

Nate Miyaki

I'm not going to lie to you, this is not going to be a short or easy article. Carbohydrates are confusing as hell. There is a lot of technical information to cover if you want to understand, once and for all, the truth about optimal carbohydrate intake for the fitness athlete. If all you want to know is WHAT to do, this article is not for you. If you continue reading, I'm assuming you are interested in learning a little more about the science behind carbohydrates, and the WHY behind carbohydrate recommendations.

#### CARB CONFUSION

If protein is the most important macronutrient, then carbohydrates are certainly the most confusing. High carb, low carb, good carb, bad carb, high glycemic, low glycemic -- what's a person to do?

Twenty years ago nutrition authorities told us to eliminate fat and eat all of the carbohydrates we wanted. Today, the industry trend is to go low carb and eat more healthy fats. For the fitness athlete whose primary goals are to maximize lean muscle and minimize body fat, what is the most efficient and results-producing method?

In the commercial market, there are many high carb foods that are considered "health foods". There are just as many low carb foods that carry the same tag line. There are big businesses that stand to profit on both sides of the equation. These same businesses can influence the governing bodies that establish dietary guidelines and health maintenance standards. If you want real world results, you have to use science to cut through the biases, marketing, and politics to get down to what really works.

Many nutritionists and health care professionals recommend high carbohydrate diets for fitness athletes. Others recommend low carb diets as the best way to slash fat and optimize body composition. Both camps present an equal amount of research, case studies, and individual success stories to argue the validity of their stance.

The low carb camp calls the high carbohydrate diet archaic and uninformed. The high carb camp calls the low carb diet a passing trend, a fad diet, nothing more than guru nonsense. Each blames the other for the body composition and health woes of America. It's like two angry children stubbornly arguing to get their way instead of compromising and finding a real-world solution.

One of the major problems is that many nutritionists and fitness authorities try to slot every person into one cookie-cutter program. They are selling a system to the masses, and for it to be successful, they have to convince people that their system will work for everyone, everywhere. They have to make people believe that all people, regardless of lifestyle factors and activity levels need to eat "X". It doesn't work that way. Do you really think a fitness athlete who works out 4-6 times a week should be eating the same way as a sedentary office worker?

What works for one group of people is not the best method for the next group. These days you have sedentary office workers following nutrition programs best suited for athletes, athletes

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following quick-fix programs geared towards housewives, gurus preaching their system is the one and only way, and everyone across the board confused as hell.

The confusion stems from the fact that carbohydrates can be beneficial or detrimental, largely depending upon the circumstances. Carbohydrates can fuel activity, or they can fuel our fat cells. Carbohydrates can help us build muscle in response to activity, or they can help us build fat. Carbohydrates can help us recover from strenuous activity, or they can cause us to fatten up during periods of inactivity. You can see the key word in all of the above scenarios is **ACTIVITY**.

We'll get more into the details, but here is a quick summary. Your carb intake should be directly related to your activity level. Carbohydrates fuel intense activity, and help you recover from that activity. If you are sedentary or only perform low intensity activity (i.e., walking, housework) you don't need a lot of carbs. If you are an athlete and perform high intensity activity (weight training, aerobic activity) then you need carbohydrates, maybe a lot of carbohydrates.

As a fitness athlete, you fall under the second category (unless you're training like a wimp) so you'll need to include carbohydrates in your diet to maximize results. The key with carbohydrate intake in relation to optimizing body composition is to eat the right amount of the right types of carbohydrates.

As you can see, there's a lot to understand about carbohydrates if you are going to be successful with your body composition goals. Since the industry trend these days is to go low carb, let's start first with why fitness athletes need some carbs in their diets.

***1. Carbohydrates are the body's preferred source of energy during high intensity activity.***

The body burns predominantly fatty acids at rest and during low intensity activities - any activity you can sustain beyond 3 minutes without rest. This includes activities like housework, walking, and continuous, sub-maximal aerobic activity. Science geeks refer to this as aerobic (with oxygen) metabolism. Aerobic metabolism runs on fats.

As the intensity of activity increases, however, there is a shift in the body's fuel preference. The body burns predominantly glucose (blood sugar) and glycogen (stored sugar in muscle cells) during high intensity activity -- weight training, sprints, and interval aerobics. Science geeks refer to this as anaerobic (without oxygen) metabolism. Anaerobic metabolism runs on carbohydrates.

High intensity activity is the cornerstone of any fitness athlete's program. Fitness athletes need to consume carbohydrates to provide their bodies with the necessary amounts of glycogen to fuel their workouts. Low glycogen levels as the result of inadequate carbohydrate intake are associated with low energy levels, fatigue, lack of motivation, and decreased performance.

Sure the body can convert fatty acids and amino acids into glucose to be used as fuel, but it's not the most efficient route. That's like trying to get your accountant to do your plumbing work. It

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may get done, but its probably not going to get done right. The bottom line is the body prefers carbohydrates for fitness activities.

Hard training is a must if you want to maximize lean muscle mass and minimize body fat. You can't train hard and reach peak levels in the gym if you don't provide your body with the necessary fuel for optimum performance. Fitness athletes need carbohydrates to support their intense training.

## ***2. Carbohydrates are anabolic.***

Carbohydrates help us build lean muscle mass, period. If you want big biceps, obviously you need to build muscle. But even if your primary goal is fat loss, its important to understand that building lean muscle is an important part of the process. Increasing lean muscle mass boosts your metabolic rate and makes it easier to get lean. So, if you want a slim waist, sexy legs, and a firm backside, you still need to build some LEAN muscle.

Carbohydrates raise blood glucose and insulin levels, and insulin can be highly anabolic. Despite what you've heard about how bad insulin is (and it can be very bad); insulin can also do some good things. No hormone your body naturally produces is inherently bad, you just have to manage and control them to achieve the desired results.

Insulin carries nutrients out of the blood and deposits them into muscle cells. More specifically, insulin can shuttle amino acids (from dietary protein) into muscle cells to repair damaged muscle tissue from weight training, and to synthesize new muscle tissue in response to weight training.

Insulin, and thus carbohydrates, are an integral part of the muscle building process. You can eat all of the protein in the world, but if you don't eat enough carbohydrates, you won't build optimum levels of muscle.

## ***3. Carbohydrates are anti-catabolic during dieting phases***

Anti-catabolic means preventing the body from breaking down its own muscle tissue. Carbohydrates spare muscle from being broken down and used as an alternative fuel source when calories are low.

Remember the Golden Fitness Rule: if you want to drop body fat you have to create a calorie deficit. It would be nice if all of the deficit came from fat tissue; however, if that were the case, getting ripped would be as simple as just slashing calories as much as possible.

Unfortunately, it doesn't work that way. The body can make up for the deficit by converting fatty acids into fuel, but it can also convert amino acids into fuel. Those amino acids can come from dietary protein, but they can also come from the body's own muscle tissue.

Losing muscle is one of the worst things that can happen during a diet. When you lose muscle your metabolism slows down and it becomes harder and harder to lose weight no matter how

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much you exercise or cut calories. Plus, with muscle loss your body loses its tone/shape and becomes soft and flabby. You become a victim of the Skinny-Fat Guy (or Girl) Syndrome. Not exactly the lean, ripped, toned, firm look a fitness athlete is going for.

Carbohydrates are more muscle sparing than fats, and even protein to some degree. Remember, carbohydrates are the body's preferred fuel source and can easily be broken down in the body and used for immediate energy. If you keep moderate amounts of carbohydrates in your diet during a calorie deficit, it will help prevent your body from oxidizing protein and using it as a fuel, especially during exercise.

Fitness athletes following extremely low carbohydrate diets will inevitably lose some muscle, that's the bottom line. Yes, the body can use fatty acids as fuel, but in a frantic scramble to make up for the lack of glucose coming in from carbohydrates, the body will convert amino acids into fuel. Can you outpace it by simply eating more protein and fat? Maybe, but it's not the most efficient or healthy way.

I stand by my stance that for permanent fat loss, moderation - not extremes - is the way to go. That means keeping a moderate amount of carbohydrates in your diet for anabolic/anti-catabolic purposes.

#### ***4. Carbohydrates Support Normal Metabolic Functioning***

Ketogenic diets involve reducing carbohydrates to very low levels, sometimes less than 25g a day, while simultaneously increasing fat intake (think certain phases of the Atkins Diet). The body enters an altered physiological state called ketosis, where it produces ketone bodies to fuel the body and brain instead of glucose.

These diets can have a potent fat burning effect. Without glucose and glycogen, the body is forced to burn fatty acids and ketones as fuel. While you can lose a lot of weight, these diets are problematic for fitness athletes. We already discussed how a lack of carbohydrates can cause muscle loss and decreased performance in the gym. There are additional considerations.

First, the brain prefers glucose as its primary fuel. If you deprive your brain of glucose for too long you will become tired, irritable, fatigued, depressed, and will find it hard to focus and concentrate. No six-pack is worth that; you have to live your life and function in the real world. You will also be constantly craving "bad" carbs (sweets, snack foods, etc.) and be more susceptible to wild binge eating if you severely restrict carbohydrates.

Second, ketogenic diets drastically reduce insulin sensitivity. What this means is that if you severely restrict carbohydrates for too long, the body loses its ability to efficiently process them. When you go off the extreme diet and return to eating normal amounts of carbohydrates, your body is more prone to storing those carbohydrates as fat because it doesn't know how to deal with them. In essence, it's a more specific form of yo-yo dieting.

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## WHY NOT GO CRAZY ON THE CARBS?

So if carbohydrates are so essential, why not eat unlimited amounts, or at least very high amounts like the current RDA level recommendations (300-365g of carbohydrates per day)? If they fuel our workouts, help us build muscle, and prevent our bodies from breaking down muscle, wouldn't it make sense that the more carbs we consume the better?

Before you pull up to the bread factory and commit, as Bruno would say, "carbicide," there is more to the carb story.

### ***5. Carbohydrates can be extremely lipolytic (cause you to gain fat)***

For the human body to function normally, it keeps a tight regulation on blood sugar (blood glucose) levels. Whether it rises above or drops below normal, the body releases hormones to return levels back to within its preferred range. The body is always attempting to reach this balanced state.

When more calories are consumed than the body needs, especially carbohydrates, blood sugar rises above the normal upper limit. Insulin is the hormone released from the pancreas in response to elevated blood sugar levels. The primary role of insulin is to clear nutrients out of the bloodstream and deposit them into the body's cells -- including muscle and fat cells. It basically is a "storage" hormone, helping the body store sugar, fatty acids, and amino acids for use at a later date.

One of those storage tanks is glycogen, the storage form of sugar located in the muscle cells and the liver. Glycogen can later be broken down and used as fuel when energy demands increase. Much like a gas tank in a car, the body has a limited storage capacity for glycogen. There is only so much the body can hold. Once glycogen levels are full, however, all other glucose removed from the blood must be stored in the second storage tank – body fat!

Once glycogen levels are full, any excess sugar that insulin clears from the blood goes directly into body fat stores, and this storage tank is limitless. The constant bombarding of the body with high carbohydrate foods leads to full glycogen stores, chronically high levels of blood glucose, insulin, and fat accumulation.

Contrary to popular belief and prevailing myths from the low-fat food industry, you don't need dietary fat to store fat. The body can convert excess blood sugar into fat stores. That's one of the reasons why despite a low fat diet, we've gotten fatter than ever. High insulin is the real culprit, and high insulin is the result of chronic carbohydrate consumption.

High insulin can also trigger the uptake of fatty acids into fat stores. So it's a double-edged sword. Insulin can bring both blood sugar and fatty acids to fat stores. It's a super-sized meal for your fat cells.

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## HEADS YOU WIN, TAILS YOU'RE GONNA LOSE

So what is a fitness athlete to do? Too many carbs and you're adding fat. Too little carbs and you're losing muscle, suppressing your metabolism, and your workout intensity suffers. By understanding the science you now know you have to walk a fine line between eating enough carbs to support training and muscle maintenance/growth, but not so many that you facilitate storing fat.

You can't go high carb like the Food Pyramid recommends. You also can't go low carb like Atkins recommends. The answer for fitness athletes, once again, lies in moderation, and balanced protein-to-carbohydrate ratios.

The first key for fitness athletes is to eat the right amount of carbohydrates based on their goals. Muscle building requires more carbohydrates, fat loss requires less.

The second key is the type of carbohydrates you eat. Some carbohydrates are more beneficial than others. The fitness athlete needs to maximize the benefits of food and minimize the negative effects.

## QUANTITY

For fat loss, I believe the best advice is to keep a 1:1 ratio of protein-to-carbohydrate. Combining protein with carbohydrates slows down the digestion of those carbohydrates and prevents drastic swings in blood sugar and insulin levels. This in turn makes it more likely those carbohydrates will be used for energy and glycogen storage, and less likely they will be stored as fat.

Ratios are important for the day, but also on a meal-per-meal basis. If you eat 20g of carbohydrate, it should be accompanied by 20g of protein. Of course this is not going to be exact at every meal, but the important message is that you should not eat carbohydrates alone without attempting to accompany it with a little bit of protein.

Portion control is key for the fitness athlete. A general serving size of  $\frac{1}{2}$  cup of cooked rice or most cereal generally contains 25g of carbohydrate. If you use a measuring cup for precision, you'll see just how small half a cup really is. Most people eat 3-5 times the normal amount when they fill their plate or bowl, thus drastically overshooting carbohydrate limits.

If protein for the fitness athlete is set at 0.75g-1.25g/lb of lean body mass, then carbohydrates should be the same.

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Daily Carbohydrate Intake Chart

<b>Lean Bodyweight</b>	<b>0.75g/lb</b>	<b>1.0g/lb</b>	<b>1.25g/lb</b>
<i>100lbs</i>	<i>75g</i>	<i>100g</i>	<i>125g</i>
<i>125lbs</i>	<i>94g</i>	<i>125g</i>	<i>156g</i>
<i>150lbs</i>	<i>113g</i>	<i>150g</i>	<i>188g</i>
<i>175lbs</i>	<i>131g</i>	<i>175g</i>	<i>219g</i>
<i>200lbs</i>	<i>150g</i>	<i>200g</i>	<i>250g</i>
<i>225lbs</i>	<i>169g</i>	<i>225g</i>	<i>281g</i>
<i>250lbs</i>	<i>188g</i>	<i>250g</i>	<i>313g</i>
<i>275lbs</i>	<i>206g</i>	<i>275g</i>	<i>344g</i>

If your primary goal is to add muscle/add body weight, carbohydrates can go up to 1.5-2.0g/lb of lean body mass.

Daily Protein Intake Chart

<b>Lean Bodyweight</b>	<b>1.5g/lb</b>	<b>2.0g/lb</b>
<i>100lbs</i>	<i>150g</i>	<i>200g</i>
<i>125lbs</i>	<i>188g</i>	<i>250g</i>
<i>150lbs</i>	<i>225g</i>	<i>300g</i>
<i>175lbs</i>	<i>263g</i>	<i>350g</i>
<i>200lbs</i>	<i>300g</i>	<i>400g</i>
<i>225lbs</i>	<i>338g</i>	<i>450g</i>
<i>250lbs</i>	<i>375g</i>	<i>500g</i>
<i>275lbs</i>	<i>413g</i>	<i>550g</i>

CARB QUALITY: THE CARB RUNDOWN

***Sugar***

Along with trans fats, sugar is the worst thing you can put into your body, both for body composition and overall health. The rise in sugar consumption (including high fructose corn syrup) is directly related to the health epidemics currently plaguing America. Obesity, type II diabetes, and elevated cholesterol levels are all linked to excessive sugar consumption.

The problem with sugar is that it requires little digestion. It basically is dumped into the bloodstream, which rapidly elevates blood sugar beyond its normal limits. This whole process happens way too fast for the body. The body responds by releasing insulin to clear this sugar out of the blood. Most of this sugar is carried to fat cells to be stored as body fat.

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A person can stay within their required calorie and carbohydrate totals and still gain body fat due to the dramatic effect sugar can have on blood sugar and insulin levels. It doesn't matter if you "eat like a bird" if your bird food is pastries and soda. With rapid elevations in blood sugar, whether from too many calories or too much sugar, the body is going to pack away fat.

There is also evidence that sugar and the resulting high levels of insulin affect appetite centers in the brain. In high amounts, insulin is an appetite stimulant. Eating sugar makes you even hungrier, which in turn causes you to overeat. They are the most dangerous foods to overeat because of this appetite stimulating affect. They make you hungrier and crave more of the same.

Like all things related to fat loss and gain, this can be related to blood sugar levels. When simple sugars are consumed, blood sugar rises above its upper limit. Insulin is released in large amounts to clear sugar from the blood. The large amount of insulin can end up doing too good of a job, so much sugar is cleared from the blood that blood sugar levels are left low, below the normal limits. Low blood sugar causes fatigue, low energy, and hunger.

The body craves food to return blood sugar back to higher amounts. It craves a type of food that will enter into the bloodstream and raise blood sugar levels quickly – more simple sugars. It's a harsh cycle of peaks and valleys; simple sugars cause you to eat more simple sugars. It's a roller coaster ride of energy bursts and energy crashes. Not only do you gain body fat, but hormonal processes in the body make you more prone to continue eating in this destructive manner.

Finally, sugar is one of the most addictive compounds known to man. Sugar triggers serotonin release in the brain, which has a calming effect and gives us a sense of well-being. Have you ever just eaten one M&M or one potato chip? You can't do it, because your body gets a glimpse of that drug-like effect and craves more. Its not just the taste or a weak will, it's a physiological desire to eat more.

This is the main problem with "emotional eating". People don't run to chicken and broccoli when they are stressed, anxious, or depressed. They run to comfort foods that make them feel better. They run to sugar. You need to find healthier ways to deal with your emotions than relying on a drug-like chemical disguised as food.

It certainly is true that you can become both mentally and physically addicted to sugar. With American eating habits, we are abusing a powerful drug that is slowly crippling us.

If you want to lean up and improve your health profile, you have to cut out the sugar intake. This is not easy to do in today's American lifestyle. Virtually every processed food has sugar in some form or another, whether it is pure cane sugar or things like high fructose corn syrup. The answer is to eat more natural foods, and cut down on the man-made junk.

Just like trans fats, my recommended sugar intake for the fitness athlete is 0g per day. For those interested in general health, my recommended sugar intake is 0g per day.

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## REFINED STARCHES

Refined starches -- things like pastries, chips, crackers, flour, bread, pasta, cereals, etc -- are sugar's ugly cousins. They basically have the same effects on blood sugar, hormonal response, and fat gain as sugar. The fitness athlete needs to approach these types of food with the same apprehension as pure sugar.

Many companies will market processed foods as health foods to get you to feel good about buying and eating them. There are "healthier" versions of chips, crackers, juices, and breakfast cereals. "Uses whole grains," "heart healthy," "lowers cholesterol," "baked not fried," "100% natural ingredients," are just some of the tag lines. Just because a sales rep at Kellogg's says something is healthy doesn't mean it is.

Foods such as whole grain, high fiber breads, cereals, and snack foods have been touted as health foods. Dieters and health conscious people have long been told by traditional nutritionists to increase their consumption of these types of foods. With less processing and more fiber, clearly these foods are much better choices than refined, simple carbohydrates, but I would argue (and many other fitness authors would agree), that regular consumption of these foods in high amounts is not as good for your physique as most people believe.

Look, is a health food cereal with lots of fiber better for you than Lucky Charms? Absolutely! Is whole grain bread better for you than white bread? Sure. But are "healthier" versions of processed, man-made foods ideal for fitness athletes -- absolutely not.

The current food pyramid recommendation for whole grains is 7-11 servings a day. This amount is absolutely ridiculous, especially for those who are sedentary for most of the day. You'll never get lean following this advice.

Don't fall for the hype. You know what is low glycemic, has fiber, helps you control blood sugar, and helps you control body fat? Apples, oranges, spinach, and broccoli. There is nothing healthier than truly natural foods -- lean meats, vegetables, natural starches, and whole fruits.

It's amazing to see the progress clients make when they can let go of outdated nutrition advice that has been engrained in them from a very young age. When they finally reduce their consumption of whole grain (but man-made) foods that they believed to be healthy, many clients who have struggled with weight loss for years suddenly find fat disappearing from their body. Symptoms of food allergies such as gluten allergies -- lethargy, digestive problems, pain/inflammation, and weight gain -- suddenly become less frequent and less intense.

One of the famous lines from fitness icon Jack LaLanne is, "If man made it, don't eat it". It is such a simple rule, but says so much at the same time. I believe it is very sound advice. But what about this, or what about that? What about my all-natural whole grain, fiber stick, wheat and bran mix breakfast cereal? The answer is always the same, spoken with a little bit of tough love -- if man made it, don't eat it! By the way, Jack LaLanne is lean, fit, and healthy and he is in his 90's.

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## VEGETABLES

Which brings us to the healthiest carbohydrates on earth -- vegetables. Vegetables are the carbohydrates Mother Nature intended for us to eat. They are the closest thing to a magic pill that we have. The high fiber content slows down the digestion of other nutrients, which helps to control blood sugar levels and allows the body to properly absorb and utilize the food you take in.

Although low in calories, they are high in food volume. They take up a lot of space in the stomach. This tricks the body into thinking its eating a lot of food, which helps to control hunger and food cravings. If you always include vegetables as a side dish and eat them first, you will be less likely to overeat other macronutrients. They are full of healthy vitamins, minerals, and phytochemicals. They help scrape the internal walls of the digestive track, helping to eliminate waste and in lowering blood lipid and cholesterol levels.

Vegetables are great for both your internal health and external appearance. This is the one food group of which you can eat unlimited amounts. There is no need to measure out or be concerned with portion sizes when it comes to vegetables. In fact, whatever your normal daily intake of vegetables is right now, double it.

## FRUITS

Whole fruits are also a good option for carbohydrate intake, but only in limited quantities. More specifically, the average person should only have roughly 1-2 servings of fruit a day. They contain many phytonutrients, antioxidants, and vitamins, along with fiber and water. If overemphasized, however, fruit can be problematic for optimal fat loss.

Fruit contains fructose – a natural sugar, but a sugar nonetheless. The problem with fructose is that it is digested differently than other sugars. Glucose can be stored as glycogen in muscle tissue. Fructose does not go through this same process, and is not stored significantly as muscle glycogen. Fructose is stored predominantly as liver glycogen.

Our bodies only have a limited capacity to store liver glycogen. It doesn't take much fruit to fill this tank, and once its full, all remaining fructose must be stored as fat. On a gram per gram basis, fructose is more likely to be stored as body fat than starch/glucose.

Concentrated sources of fructose should be eliminated from the diet to avoid this type of overflow. Don't drink fruit juice or smoothies. Fruit juice is not a health food despite what any so called authority tells you. If you have fruit, you should eat it, not drink it. Never eat any processed food or condiment that contains high fructose corn syrup. Never drink beverages sweetened with fructose or high fructose corn syrup.

We often lump fruits and vegetables into one category. You've undoubtedly been told in your life to "eat more fruits and vegetables" if you want to improve your health. This is a mistake as

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vegetables and fruits are very different and have different effects on our bodies. Perhaps this is why famed nutrition author and healthy fat guru Udo Erasmus recommends changing the advice about fruit and vegetable intake. He believes the traditional 5 servings of fruits and vegetables slogan should be changed to 9 servings of vegetables and 1 serving of fruit a day.

Whole fruit, however, is a healthy food and can be included in your nutrition plan. Just make sure not to overdo it. 1-2 pieces or servings a day will give you the benefits of fruit without the problems associated with a higher fructose intake.

#### NATURAL STARCHES

Natural starches should be the primary fuel for fitness athletes. We're talking foods like yams, sweet potatoes, potatoes, rice, oatmeal, and quinoa. These foods have gotten a bad rap over the years in the low carb dieting craze, but they are important to anyone who is active and consistently training with weights.

Vegetables are great, but they alone do not provide fitness athletes with enough fuel for intense activity. Natural starches provide the more concentrated source of energy necessary for the metabolic demands of hard training athletes.

Natural starches are superior to refined starches and sugars because they digest slower and provide a more even blood sugar response. This controls insulin release and makes it much more likely they will be used for energy, and less likely they will be stored as body fat.

And dare I say it, but I believe natural starches are superior to fruits for fitness athletes. Remember, fruits are preferentially stored as liver glycogen. These stores are limited, and once they are full, all excess nutrients are stored as body fat. Starches are preferentially stored as muscle glycogen, which is a major distinction. These stores are larger and can hold more in reserve.

In addition, MUSCLE GLYCOGEN is the primary energy source used to fuel intense activity like weight training. Doesn't it make sense, muscle energy reserves fuel muscle activity? As fitness athletes, we need to store and replenish muscle glycogen, and this requires natural starch intake.

Vegetables are the most important carbohydrate for overall health. Natural starches are the most important carbohydrate for activity. Yes, they need to be portioned and controlled to prevent body fat storage, but they provide us with the raw energy compounds necessary to fuel and recover from our workouts, and reap the body transformation benefits of busting our ass in the gym.

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THE TAKE HOME MESSAGE

Well, it's been a long and winding road through this carbohydrate journey. Once again, I've thrown a s\*#!load of information at you all at once. Don't worry if you didn't get it all, because the take home message is a lot simpler than the details of carbohydrate metabolism.

Activity should determine carbohydrate intake, exclamation point! This means that sedentary (non-active) populations should be eating much differently than active fitness athletes.

If you are sedentary, don't let traditional nutritionists or ADA guidelines make you think you need to be eating a ton of carbohydrates. You don't. In fact, if you are sedentary and are pounding carbs all day, I'll bet that you're fat. For non-active populations, over consuming the wrong types of carbohydrates is the #1 reason why you are overweight.

Lower carbohydrate diets are the best diets for sedentary populations or those who perform exclusively low intensity activity (i.e., walking). Notice I said lower carbohydrate, not NO carbohydrate (yeah I know it's a double negative, relax grammar boy). You still need to eat vegetables, and to a lesser extent fruits for overall health and micronutrient intake.

Carbs ARE the enemy if you are inactive. I wouldn't even count them. Simply eliminate all starch (even natural starches) and sugar and rely solely on fruits and vegetables for carbohydrate intake. The rest of your calories should come from lean protein and healthy fats. This is the protocol of lower carbohydrate diets like the Zone Diet.

Fitness athletes, however, need more fuel than sedentary populations. If you are active, don't let some low carb guru make you think that carbs are the devil reincarnated. In fact, if you are active and are severely restricting your carbohydrate intake, you're sabotaging your potential results. I'd bet that you are not gaining muscle or dropping body fat at the rate you think you should be. You're not giving yourself the nutrients you need to build/maintain muscle, sculpt your body, boost your metabolism, and burn fat.

Fitness athletes need fruits and vegetables for overall health, but they need the extra natural starches because of increased energy and metabolic demands. They should cut out sugars and refined starches, and eat the right amounts and ratios of natural starches to optimize results.

Wow, glad that's over, now its time for the test. Ready?

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CARBOHYDRATE FOOD CHARTS

Vegetables (good choice for everyone)

Broccoli	Cabbage	Lettuce	Spinach
Tomato	Cucumber	Mushroom	Onion
Green Onion	Zucchini	Cauliflower	Sprouts
Peppers	Swiss Chard	Carrots	Artichoke
Asparagus	Bok Choy	Brussel Sprouts	Green Beans
Collard Greens	Eggplant	Kale	Okra
Celery	Sea vegetables	Peas	

Whole Fruits (good choice for everyone, 1-2 servings a day)

Apple	Blueberry	Blackberry	Raspberry
Orange	Grapefruit	Apricot	Cantaloupe
Cherry	Grape	Honeydew Melon	Kiwi
Nectarine	Peach	Pear	Strawberry
Tangerine	Watermelon	Plum	Pineapple
Banana	Papaya	Mango	

Natural Starches (good choice for fitness athletes)

Yam	Sweet Potato	Potato	Rice
Oatmeal	Quinoa	Squash	Beans

Man-made Carbs (bad choices)

Fruit Juice	Fruit smoothies	Jam/Jelly	Candy
Soda	Chips	Crackers	Muffins
Bagels	Pastries	Doughnuts	Pasta
Breads	Cereal	Pitas	Tortillas
Popcorn	Corn	Dried Fruits	Honey
Molasses	Maple Syrup	High sugar condiments	Table Sugar
Brown Sugar	Cereal Bars		