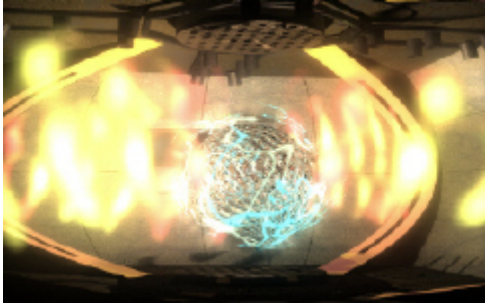


The Window of Opportunity



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Abstract

The sweat, the blood, and the tears...You have given it your all. This time you didn't hold back. You truly gave it everything you had and then some. You've trained beyond failure, beaten your body into submission, and conquered the hardcore world of mass training. One final step remains in the quest for hypertrophy...

A Body Builder's Outline to Post-Workout Nutrition

Sealing the Deal

Post-workout nutrition is a short, but crucial, window of opportunity that only comes immediately following a brutal bout of training.

This is one opening that you do not want to compromise on even one percent. Doing so will not only hinder previously hard earned gains, but will undermine any potential gains you would have made from your training programs.

What happens within the body during this window in time establishes whether you will gain muscle in response to the workout you just completed, or simply return to your pre-existing state.

Post-workout recovery is the primary factor of the outcome of this short-term muscle recovery process. This is the one time of the day that can literally "make you" or "break you" as a body builder.

It is the intention of this article to give you an understanding how to get the maximum potential from your maximum efforts, via **post-workout nutrition!**

See: [Active Recovery - A Threefold Breakdown](#)

The Oasis in a Desert of Intensity

Before we get into the overview of post-workout nutrition, let us first cover why immediate, post-training nutrition is so vital.

See: [Muscle Fibers Part One](#)

Hardcore training necessitates extreme energy demands on our body!

ATP is the immediate supply of energy for our muscles as we workout. As we continue our training, ATP stores are reduced and glucose and glycogen are used as fuel for our muscles. Glycogen is the primary fuel source for moderate- to high-intensity exercise. The longer exercise continues the more glycogen is burned.

Journal entries required for sufficient understanding of carbohydrate metabolism and pathways:

[Fast Acting Hormones and their Role in Fuel use during Exercise](#)

[Slow Acting Hormones and their Role in Fuel use during Exercise](#)

[Analysis of Nutrient use during Low, Moderate, and High Intensity Exercise](#)

[Direct Comparisons of Fuel use during Low, Moderate, and High Intensity Exercises](#)

What is the Secret to consistent gains?

In order to develop muscular endurance, and thereby become capable of performing longer and more intense workouts, we as body builders need to enhance our ability to store the carbohydrate fuel known as glycogen in our muscles.

See: [Muscle fibers part 3](#)

And in order to gain new muscle from our workouts, we need to regularly stimulate a protein surplus with which to stimulate hypertrophy in our muscles.

Following a workout, muscle glycogen stores are depleted, and many muscle proteins are also broken down, leaving us in a deficit state in respect to both of these crucial nutrients.

As more and more glycogen and glucose is burned up for energy, blood glucose levels begin to drop-off, which in turn cause insulin levels to drop drastically.

That is a very vital step to grasp because of the properties insulin has in relation to protein synthesis and anabolic hormone production.

These drops give rise to the catabolic hormone Cortisol.

See: [A Scientific Investigation into the Rationality of Post Workout Carbohydrate Consumption](#)

Cortisol converts muscle tissue to proteins for conversion into glucose. This is your body's way of producing energy when all readily available energy (glucose) and stored forms (glycogen) of energy have been expended. To compensate for this depletion of energy your body will go into a process called gluconeogenesis to produce glucose from amino acids in the liver.

In general following a workout, cortisol increases, and insulin decreases.

This scenario presents several needs to our starving bodies.

In order to get maximum results from our workout we must turn these glycogen and protein deficits into glycogen and protein surpluses immediately afterward.

So the two most important components of muscle recovery are replenishing the glycogen fuel burned during the workout and rebuilding the muscle proteins that are destroyed during the workout.

These processes are highly time-sensitive: the sooner they are allowed to begin, the faster they proceed and the more likely they will be completed in time for the next training session.

Editors Note: I found this to be extremely fascinating. Consequently, Adam is discussing a process which the human body already realizes is of extreme vitality. I have read countless scientific journals on hypertrophy and study after study has shown an increase in the enzyme Ubiquitin in response to hypertrophy training. It has the ability to target and speed necessary degradation, which in turn shortens the time between a training session and subsequent supercompensation. Adam, is emphasizing the scientific fact that the quicker you get down to business, the greater your gains will be. Just as the body fights to improve this ability, you need to take advantage of this knowledge and assist it in every way, shape and form possible, and do so at extreme and precise moments. Read on to find exactly what these moments are.

This is because following training; the muscle cells are highly receptive to insulin, the hormone responsible for transporting glucose and amino acids through the bloodstream and into the muscle cell.

This crucial stage of receptiveness is more technically known as facilitated diffusion.

Jacob Wilson describes this process best in his article, Muscle Fibers Part I:

"Facilitated Diffusion - This is diffusion that is assisted by protein transports. When a needed nutrient is low in the muscle cell environment and it cannot pass through the pores, then it must be transported). This is similar to the above process except that it needs a boat to get across the plasma membrane and into the cell environment. Following a workout, when glucose concentrations are low, and you down a high carb drink, the glucose in your

blood stream has a high concentration. Therefore it diffuses to the lower concentration area inside your muscle cells. The green nutrients are insoluble to lipids, they therefore must move across the membrane in a transported manner. The purple protein transporters as you can see take the nutrients, carry them across the membrane and then release them inside of the cell environment!"

Immediately after our training session, a natural restoration occurs.

This restorative process is called biochemical supercompensation.

Protein synthesis will be severely impeded if there is an insufficient or delayed supply of energy and amino acids to offset post-workout catabolism.

The primary goal of post-workout nutrition is to rapidly induce an environment that will recoil, and help increase, these naturally occurring hormone levels to begin the crucial process of protein synthesis.

Decreasing post-workout cortisol levels rapidly and aiding our bodies in rebounding insulin levels, to further aid in the release of Growth Hormone and Insulin-Growth factor, can best accomplish this.

By consuming the proper carbohydrates post-training we can induce an increased production of these anabolic hormones and thwart gluconeogenesis; thus maintaining a more positive nitrogen balance.

Cortisol Execution

So how exactly do we generate this atmosphere of anabolism?

First and foremost we need to suppress cortisol as fast as possible!

This is the number one rule of post-workout nutrition:

Whether bulking, maintaining, or cutting, cortisol suppression is of the utmost importance for:

- 1. Gaining or maintaining lean mass.**
- 2. Recovering glycogen stores.**
- 3. Increasing anabolic hormone levels.**

Cortisol cannot be suppressed any faster than through a burst of insulin release from High GI carbohydrate source. A prompt insulin discharge is highly beneficial in the post-training atmosphere because of the hormones uncanny ability to suppress cortisol. The faster this release takes place the faster protein and carbohydrates are delivered to the muscles to promote muscle recovery and adaptation.

See: [Dextrose, Maltodextrin, and Sodium an In Depth Analysis](#)

Insulin is secreted by the pancreas automatically in response to rising levels of glucose or protein in the bloodstream.

Because of the body's receptiveness to nutrition post-workout it is crucial to feed the "window of opportunity" as soon as possible following a maximum output of anaerobic threshold intensity.

Consequently, both glycogen and protein synthesis proceed faster when carbohydrates and protein are consumed together.

Rapid absorption of post-workout nutrients is the key to success following a workout program. This is best accomplished from the insulin inducing carbohydrate-protein supplement combination.

Again, the rate of glycogen and protein synthesis in the muscles depends on the amount of insulin present in the bloodstream. With that, let's take a look at the most vital ingredients of post-workout nutrition.

High GI Carbohydrates:

See: [Dextrose, Maltodextrin, and Sodium an In Depth Analysis](#) and [How To Asses Yourself As A Bodybuilder 2 - Nutrition](#)

Our bodies use carbohydrates (CHO) as fuel to obtain energy (ATP and heat). Dietary carbohydrates consist of starches (found in bread, rice, pasta, and potatoes), fruits, beans, and milk.

Carbohydrates may be simple sugars (six-carbon monosaccharides, principally glucose, galactose and fructose), oligosaccharides (chains of two to ten simple sugars), or polysaccharides (larger polymers of glucose or other simple sugars).

Polysaccharides occur in starches; disaccharides are found in milk (lactose) and table sugar (sucrose). The monosaccharide fructose is the sugar found in fruits.

It is important to note that only simple sugars can be absorbed. All carbohydrates are digested by intestinal enzymes into only three simple sugars: glucose, galactose, and fructose. These are absorbed across the intestinal mucosa and transported via the portal vein to the liver.

During the post-workout phase of training our bodies are in a hypoglycemic stage. Blood sugar and insulin levels have drastically dropped. Immediately following exercise natural GH concentrations struggle to increase as insulin levels try to rebound from its current highly catabolic state.

A high GI carbohydrate supplement combined with the post-workout window of opportunity will give immediate rise to blood glucose levels and cause a state of hyperglycemia. This will force an increase in the production of insulin! In other words high GI carbohydrates will lay the smack down on cortisol production.

The newly increased quantity of insulin in the blood will drive much needed glucose and amino acids through the receptor sites in the muscle cell at an increased rate.

These elevated stages of blood glucose will begin causing further secretions of Growth Hormone, the key hormone responsible for producing Insulin Growth factor.

Why high GI carbohydrates? Increased absorption rates, and an abruptly induced insulin burst. The faster you can get glucose into your bloodstream and muscles, the less protein destroyed and the more glycogen stored.

This is the one time of the day when you want to stay clear of low GI carbohydrate sources. Complex and fibrous carbs simply take way too long to digest and will not give optimal insulin release to offset muscle catabolism.

See: [A Scientific Investigation into the Rationality of Post Workout Carbohydrate Consumption](#)

You also want to stay far away from any fat and fructose sources post-workout. Fructose will not replenish muscle glycogen but rather will replenish liver glycogen. Fat severely delays digestion because it metabolically requires so many more processes to break down.

Another vital key to post-workout nutrition is insulin sensitivity. Creating stronger insulin sensitivity is the primary way to get the most out of your post-workout high GI carbohydrate intake.

Jacob Wilson covers how to do this in his [13 Weeks to Hardcore Fat Burning "The Diet"](#) article. I highly recommend adhering to the list of ways to increase insulin sensitivity he describes in that article whether you are on a bulk or cut. It will make your insulin spike, via high GI carbs, that much more potent.

Only certain types of carbohydrates will replenish muscle glycogen in the manner in which we seek. These are carbohydrates in the form of glucose and dextrose.

See: [Dextrose, Maltodextrin, and Sodium an In Depth Analysis](#)

The basis of our high GI carbohydrates (post-workout) should come from sources that register high on the glycemic index. Dextrose or Maltodextrin are the two sources of high GI carbohydrates that are to be ingested post-exercise in equal 50/50 proportions.

Protein:

See: [The Anatomy of a Muscle](#)

Proteins are an essential part of our daily lives, whether we actively consider them or not. Protein, in essence, is the building blocks of life. Proteins act in every cellular structure in the human body. Understanding the nature of proteins and their interactions, we can better understand how to manipulate protein ingestion to enhance muscular growth.

Protein intake, in combination with high GI carbohydrates post-workout, is the key ingredients to achieving a state of anabolism.

Fast absorption via rapid gastric emptying, is of paramount importance at this stage. So a liquid or powdered form of protein derived from hydrolyzed whey is the best logical supplement. Whey in powder or liquid form takes an average of twenty minutes to absorb, making this form of protein number one in the race for assimilation.

Water:

See: [Effect of Plasma Volume on Myofibril Hydration, Nutrient Delivery, and Athletic Performance](#)

Hydration is vital for maximal performance and thermoregulatory balance. Cardiac output, blood flow, LA clearance, and sweat, among other physiological occurrences, are dependent on blood plasma. Moreover, proper levels of osmolarity must be taken into account. Imbalances will inhibit gastric emptying, intestinal fluid absorption, blood pumps, and induce side effects such as fever, and cramping.

Sodium

See: [Sodium - A comprehensive Analysis](#)

See: [Effect of Plasma Volume on Myofibril Hydration, Nutrient Delivery, and Athletic Performance](#)

The macromineral sodium is required for proper levels of osmolarity, electrolyte balance, the thirst mechanism, and much more. Several hormones such as ADH, and the Renin-Angiotensin System were designed to regulate a wide variety of sodium intakes. While your kidneys are highly efficient at excreting this water-soluble mineral, excess Na^+ can promote hypertension, and osteoporosis.

Post-exercise supplementation is vital. Several nutrients must be consumed in this short period of time such as glucose, Maltodextrin, and whey protein. The problem is, the more calories consumed, the slower gastric emptying is. However, having between a 2.5-10% carbohydrate solution has been shown to be almost equivalent in gastric emptying rate to just plain water. Moreover, the glucose sodium co transport system greatly increases fluid absorption compared to plain water, as discussed previously. An additional 500 mg of sodium per liter of water should be ingested, and a 92% water solution (including carbohydrates and proteins).

So, following the window of opportunity journal entry, a man with 200 pounds of LBM cutting would have 50 grams of protein, 50 grams of carbohydrates, 550 mg of sodium, and 1,250 milliliters of water post-workout.\

L-Glutamine:

See: [Glutamine—The Conditionally Essential Amino Acid](#)

Oxidative stress, sickness, catabolism, and much more, is often the result of inadequate nutrition, compounded with a hardcore workout. There are many ergogenic aids, which have been advertised to assist athletes in these times of distress. However, only few have survived the harsh scrutiny of the scientific community.

Among these is the conditionally essential amino acid—glutamine. For decades, scientists have marveled at its ability to decrease proteolysis by actions such as minimizing ubiquitin mRNA, and enhancing protein syntheses and osmotic cellular swelling via an electrogenic and electro neutral sodium absorption pathway. Its involvement in leukocyte metabolism and intestinal structure has assisted a great many of ill patients and athletes suffering from OTS, among other scenarios. Indeed, glutamine is only beginning to be understood for its wide range of anabolic traits.

The greater number of days you're training, the higher your risk of fatigue and symptoms of overtraining will be. You can greatly reduce this risk by adding additional glutamine to your post-exercise meal.

High-protein foods such as meat, fish, beans and dairy products are excellent sources of glutamine that should be eaten on a regular basis as well as supplementation.

Supplement throughout the day with as much as you can afford! If you are on a tight budget I recommend saving this miraculous amino acid for the post-workout window of opportunity.

Anti-Oxidants:

See: [Role of Antioxidant Supplementation in Response to Exercise Induced Oxidative Stress](#)

A manifold of chemical reactions occur within the body as a result of intense physical training. During both aerobic and anaerobic training, one such reaction is the occurrence of excess and adverse free radical production. Furthermore, concentric and eccentric contractions, which are crucial to exploiting hypertrophy/hyperplasia, appear to enhance this reaction, known as Exercise Induced Oxidative Stress (EIOS).

Apposite antioxidant supplementation has been revealed through an abundant amount of studies to aid in counteracting such negative responses to training. In addition, the post-workout "window of opportunity" has shown itself to be an exceptional timeframe in which to administer anti-oxidant supplementation in direct combat of EIOS.

Exercise induced oxidative stress is a corporal reaction that needs to be counterbalanced during the body's peak time of receptiveness to nutrition.

This phase of the physique's response to extreme physical stress can best be remedied through appropriate post-workout supplementation.

A proper post-workout anabolic cocktail elaborating on the shuttling effects of insulin and rapid gastric emptying is the ideal atmosphere for anti-oxidant consumption in the effort to combat EIOS.

Although the intention of this entry is to focus discussion on anti-oxidant complementation for the anaerobic post-exercise window of opportunity,

supplementation covering the route of an entire day must be planned out to confer ratios specifically for post-training consumption.

Meal One	Multi-Vitamin
Meal Two	Anti-Oxidant Supplement including Vitamin C, E, and A
Meal Three	500-1000mg Gram Vitamin C
Meal Four	500-1000mg Gram Vitamin C
Meal Five	Post Workout, 1-2 grams Vitamin C, or Anti-Oxidant Supp * Recommended to Consume 10-20 minutes into post-workout shake
Meal Six	500-1000mg Gram Vitamin C

Chromium:

See: [13 Weeks To Hardcore Fat Burning - The Diet](#)

Chromium increases insulin sensitivity and the lack there of will do the opposite! There is no RDA for chromium; however, most experts agree you need at least 200 mcg/day. A recent study, which showed positive results, used 1,000 mcg/day. Hard-working athletes want to make sure they get at least 400 mcg/day.

Assembling the Ingredients for Maximal Recovery:

For information on exactly what to include in your post workout shake, read this article:

[Layman Post Workout Article](#)

For an easy to use post workout shake calculator, click here:

[Post Workout Shake Calculator](#)

Building a Better You!

We've covered the importance and seriousness post-training nutrition demands!

It will take some planning and consideration to prepare, but I assure you giving 100% to this all-encompassing meal will reap the rewards of your labor 100 fold.

This is one time of the day that you don't want to be caught ill equipped!

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