BULKING FOR ECTOMORPHS

So You Think You're a Hardgainer?

By: Derek Charlebois B.S. CPT

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Chapter 1
— Introduction

It is easy to create a bulking program for someone who does not struggle to gain weight, but what about a program for a hard gainer? What bulking strategies should they follow? Do they need to eat or train differently than a mesomorph or an endomorph who gains weight more easily? The answer is "yes" due to physiological and metabolic differences between these three phenotypes.

The simplistic distinction between the three different phenotypes when it comes to body composition changes is:

- Ectomorph—naturally skinny and has a hard time gaining weight (both muscle and fat).
- Mesomorph—naturally built and has the tendency to gain both weight easy but can also lose weight fairly easy.
- Endomorph—naturally heavy and has an easy time gaining weight (more so fat than muscle) and a hard time losing it.

In most cases, mesomorphs and endomorphs need to eat less food than an ectomorph in order to gain weight.

I would like to point out that I do not like the term "bulking diet." Some bodybuilders feel that they need to eat everything in sight to gain weight while "bulking." I do not agree with that approach. Instead I prefer to call a diet geared towards gaining muscle a "lean mass" diet. One's body weight can be divided into two basic groups, fat mass and lean mass. Fat mass includes one's body fat stores (adipose tissue) while lean mass includes skeletal muscle, bone, and other organs. The goal is to gain lean mass and not fat mass.

When a bodybuilder eats a hypercaloric diet, their goal is not just to gain weight, which could be both fat and lean mass, but rather to gain LEAN MASS. The strategies outlined in this book will help ectomorphs gain lean mas, not fat. The strategies in this book are specifically developed for ectomorphs who are having trouble gaining weight. It can be very frustrating to train hard and eat right and not progress. Perhaps the biggest roadblock to growing for ectomorhs is getting enough calories. This book will outline strategies to get enough calories for ectomorphs to GROW. This book will also give you the recipe to a great, affordable, homemade meal replacement shake as well as outline a post-workout shake that is guaranteed to help you add quality mass.

If you have been struggling to gain weight and you feel like all is lost, this book could be just the solution. Hard gainers have no fear! It's time to gain some muscle!

Chapter 2

— Explanation on Phenotypes: What Makes an Ectomorph an Ectomorph?

The term phenotype is defined as "The observable physical or biochemical characteristics of an organism, as determined by both genetic makeup and environmental influences." (dictionary.com). Ones body type/structure can be placed in three phenotypes:

- Ectomorph—Naturally skinny, narrow bone structure, has a hard time gaining weight
- Mesomorph—Naturally built, broad shoulders, can gain or lose weight relatively equally
- Endomorph—Naturally heavy, wide bone structure, gains weight easily

There is a clear visible physical distinction alpha pharma between the three phenotypes, but what is not visible and often ignored is the biochemical and metabolic differences between the three
phenotypes.

An ectomorph has a fast metabolism and needs more calories to maintain a given weight then an endomorph. This elevated metabolism/increased need for calories could be due to a number of factors including resting metabolic rate (RMR), hormone levels (i.e. thyroid), insulin sensitivity, fat oxidation capacity, to name a few. We will not be examining the biochemical aspects that cause ectomorphs to require more calories, but rather we will go over how to set up a diet and training program geared toward "hard gainers."

The number one reason causing "hard gainers" not to gain weight is UNDER EATING. In most cases increasing your caloric intake will lead to weight gain. No one should ever say "I'm a hard gainer and that's that!" because in reality you just need to eat more. It is possible for everyone to gain muscle to matter what their genetic predisposition may be, it just might be harder for some than others. Let's get into the diet strategies for ECTOMORPHS to gain weight.

Chapter 3
— Diet Strategies for Ectomorphs to Gain Weight

Simply put, you are going to have to eat a lot to grow! There is no way around that. The primary factor that determines whether you gain or lose weight is your caloric intake (how many calories you eat). If you eat more calories than you burn (hypercaloric diet) you will gain weight and if you burn more calories than you eat (hypocaloric diet) you will lose weight. When you eat exactly the same amount of calories as you burn, it is called a maintenance caloric diet. Ectomorphs trying to gain muscle need to eat a hypercaloric diet like anyone else who wants to gain weight.

A *simple* calculation to determine your maintenance caloric intake is to take your body weight and multiply it by 15; this gives you your total calories to be consumed each day. For example, a 200 pound person would consume 3,000 calories a day. Now this is a **very** basic way to determine your maintenance caloric intake. A good starting point for ectomorphs is to set your calories to 500 calories over maintenance. Remember that you want to gain lean mass, not fat. It would be easy to gain weight by just eating junk food all day, but you would most likely gain a chunk of fat with the muscle you do gain. Instead I recommend eating good, clean, nutrient dense foods. If you do not gain weight at 500 calories over maintenance then increase your calories more.

Tips for Daily Eating

1. **Eat lean protein with every meal—**Good proteins include chicken, lean beef and turkey, tuna and other fish, eggs (also has fat) and egg whites, and protein supplements.
2. **Eat unprocessed carbs—**The bulk of your carb consumption should be in the form of quality, unprocessed, low glycemic carbs such as oatmeal, sweet potatoes, rice, whole gain pastas, breads, and cereals.
3. **Eat fruits and vegetables EVERYDAY—**Fruits and vegetables contain vitamins, minerals, and many nutrients vital for good overall health, wellness, and growth.
4. **Eat good fats with every meal (except post-workout)—**Dietary fat is very important for proper body functioning and hormone production. Most people have an unbalanced view of dietary fat and therefore limit it. Good sources of fat include almonds and almond butter, peanuts and peanut butter, avocado, flax seed and olive oil, and eggs.
5. **Don't eat until you feel like you are going to vomit—**When trying to gain weight, some hard gainers eat to the point of vomiting. This is not healthy or necessary. Instead of eating HUGE meals, I recommend eating 6-7 decently-sized meals that make you feel full but not STUFFED and BLOATED.

6. **Cook meals in advance—**Have food already cooked and ready to go when it is time to eat makes getting enough calories much easier and less of a burden.
7. **A macronutrient ratio for bulking is 50:30:20 carbs:protein:fats**—One should always get 1-1.5 grams of protein per pound of bodyweight, this is your primary objective. Above that, carbs and good fats will make up the bulk of your calories. If you are consuming 3,000 calories, this would equate to:
    a. **Carbs = 375 grams**
    b. **Protein = 225 grams**
    c. **Fat = 67 grams**
8. **Eat the bulk of your carbs around your workout**—Weight lifting increases the body's need for glucose, therefore it makes sense to eat carbs around your workout.
9. **If you aren't gaining weight you need to increase your calories**—While some people might be able to gain muscle on 3,000 calories, you may need to eat 4,000 or even 5,000 calories a day in order to grow. It is important to monitor your weight and body fat% so you can tell whether or not you need to increase your caloric intake.
10. **A cheat meal here and there won't kill you**—If you eat 6 meals a day then that means you are eating 42 meals a week. Having one or two "off" meals will not kill you and can me psychologically refreshing. If you want to enjoy a meal out with your friends and family that is fine and encouraged.

Now that you know how you should eat everyday, it is time to get into the stimulus for growth, the workout!

Chapter 4

— Hard Gainer Weight Training Program

In order to grow, you need to get STRONGER! The best way to accomplish this is with heavy compound lifts. At this point in your development, there really is no need to do isolation exercises as you need to build solid MASS. The primary exercises you want to stick to are:

- **Chest**
  - Bench Press (Flat, Incline, Decline)
  - DB Press (Flat, Incline, Decline)
  - Dips
- **Back**
  - Deadlift/Rack Deadlift
  - Bent Over Row/T-Bar Row
  - Pull-Ups/Lat-Pulldown
- **Shoulders**
  - Military Press
  - Clean and Press
  - DB Side Laterals
- **Traps**
  - Barbell Shrug
  - DB Shrug
- **Triceps**
  - Close Grip Bench Press
  - Reverse Bench Press
  - Skull Crusher
- **Biceps**
  - Barbell Curl
  - DB Curl
  - Reverse Curl
- **Quads**
  - Squats
  - Leg Press
  - Hack Squats
- **Hams**
  - Stiff Leg Deadlift
  - Good Mornings
  - Leg Curls
- **Calves**
  - Calf Raises (Seated and Standing)
  - Donkey Calf Raises
  - Leg Press Calf Raises

Ectomorph Mass Program

- Your primary goal is to increase the weight you lift/reps completed each workout!

Load Phase (4-8 Weeks)

Push A- Monday		**Pull A- Tuesday**	
Bench Press	3 X 4-8	Bent Over Row	3 X 4-8
Military Press	3 X 4-8	Lat-Pulldown	3 X 4-8
Close Grip Bench	3 X 4-8	DB Shrug	3 X 4-8
Squats	3 X 4-8	DB Curl	3 X 4-8
Seated Calf Raise	3 X 4-8	Stiff Leg Deadlift	3 X 4-8

Push B- Thursday		**Pull B-Friday**	
Incline DB Press	3 X 4-8	Deadlift (Full or Rack)	3 X 4-8
DB Shoulder Press	3 X 4-8	Pull-Up	3 X 4-8
Skull Crusher	3 X 4-8	Barbell Shrug	3 X 4-8
Leg Press	3 X 4-8	Barbell Curl	3 X 4-8
Leg Press Calf Raise	3 X 4-8	Lying Leg Curl	3 X 4-8

***This workout could also be done:
Mon, Wed, Fri, Sat or Sun.

Directions

1. Choose a weight that will allow you to get at least 4 reps, but no more than 8 reps.
2. If you can get 8 reps with a given weight, then increase the load.
3. Rest 2 minutes between sets.
4. Exercises can be swapped from the list above for each given muscle group if desired.
5. Follow the above routine for 4-8 weeks (recovery pending) and then deload for 1 week.
6. The deload week consists of 2 sets of 10 reps per exercise per muscle group.

Deload Week (1 Week)

Push A- Monday		**Pull A- Tuesday**	
Bench Press	2 X 10	Bent Over Row	2 X 10
Military Press	2 X 10	Lat-Pulldown	2 X 10
Close Grip Bench	2 X 10	DB Shrug	2 X 10
Squats	2 X 10	DB Curl	2 X 10
Seated Calf Raise	2 X 10	Stiff Leg Deadlift	2 X 10

Push B- Thursday		**Pull B-Friday**	
Incline DB Press	2 X 10	Deadlift (Full or Rack)	2 X 10
DB Shoulder Press	2 X 10	Pull-Up	2 X 10
Skull Crusher	2 X 10	Barbell Shrug	2 X 10
Leg Press	2 X 10	Barbell Curl	2 X 10
Leg Press Calf Raise	2 X 10	Lying Leg Curl	2 X 10

***This workout could also be done: Mon, Wed, Fri, Sat or Sun.

Directions

1. Exercises can be swapped from the list above for each given muscle group if desired.
2. Isolation exercises not on the list may be used during this week.
3. Stop all sets 1 rep shy of failure.
4. Rest 1-2 minutes between sets.

Chapter 5
— The Importance of Year Round Cardiovascular Training

Endurance A.K.A. cardiovascular training improves the heart's ability to pump blood and increases oxygen uptake into cells. A "fit" person also burns more fat at rest and during exercise than an unfit person. Bodybuilders use cardiovascular training mainly as a means to increase caloric expenditure thereby increasing fat loss or decreasing fat gain. By doing cardio year round you will increase your body's capacity to burn fat at both rest and exercise. Let's discuss what type of cardio to do.

Low-Moderate Intensity Cardio on Weight Training Days

As stated in the intro, bodybuilders primarily use cardio as a means in increase their caloric expenditure (Cardiovascular training has a TON of other health benefits, but we will not touch on those benefits here). The use of low-intensity cardio, done either pre or post weight training, allows one to burn more calories while not hampering recovery. Low-intensity cardio is not as strenuous on the body as high-intensity cardio or high-intensity interval training (HIIT). It would be very hard for someone to complete a HIIT session pre weight training as it would decrease your performance when lifting weights or to complete the session post weight training as it would be very fatiguing.

We want to keep the body healthy and injury free. If you get injured then your workouts will suffer or cease altogether. Therefore, I feel it is more practical to perform low to moderate intensity cardio on weight training days. Now one could perform their cardio separate from their weight training, but for most that would mean two trips to the gym, which is impractical; Hence my recommendation to perform cardio pre or post weight training. For ectomorphs, I recommend 15-20 minutes of low-intensity cardio done post-workout.

Whether you choose to do your cardio pre or post weight training is a personal preference. Remember, your main goal is to hit it hard in the weight room. If doing cardio pre weight training decreases your performance then it would be better for you to do it post workout. If you find that you are too tired to do cardio post weight training or simply find you become too bored and enough do not finish your cardio session, it would be better for you to do your cardio pre weight training.

High-Intensity/High-Intensity-Interval Training on Non-Weight Training Days

High-intensity cardio stresses both the aerobic and anaerobic energy systems. The anaerobic energy system is what is stressed during weight training. Putting too much

stress on the anaerobic system and hampering recovery is one reason why I do not recommend performing weight training and HIIT on the same day. Obviously running at 6 mph will burn more calories than running at 3 mph, but one has to balance their activities to allow for proper recovery.

There are two main types of high-intensity cardio: Continuous and Interval Training. Continuous high-intensity cardio would be running at a high speed on the treadmill or elliptical machine for a long duration (i.e. 5+ minutes). Interval training involves alternating periods of work and rest (or lower levels of work). For example, running a 100 meter sprint then alpha pharma healthcare walking back to the start, resting, then repeating could constitute HIIT. HIIT is more intense than high-intensity continuous cardio and much more intense than low-intensity cardio. If you choose to do HIIT, only do it on your off days.

Cardio for Ectomorphs

Because you have trouble gaining weight you need to limit cardio. You should still do cardio, just not a ton of it. I recommend 15-20 minutes of low-intensity cardio done post workout on weight training days **OR** HIIT on off days, **NOT BOTH**. Cardio increases nutrient partitioning, which means it increases the delivery/utilization of nutrients in muscle over fat. This can lead to increased gains in muscle mass and decreased gains in fat mass. Just make sure not to overdo the cardio as too much can impede your progress. Doing cardio can help you grow so long as you are eating sufficient calories. The next chapter will give you an easy solution to getting enough calories.

Chapter 6

— Getting Enough Calories during the Day to Grow: Power MRP

One of the biggest obstacles when it comes to gaining weight is eating enough food. If you are not gaining muscle then you need to eat more calories. As I said in the introduction, I do not believe in the "eat everything you see" style bulking diet, but rather eating large quantities of healthy foods. You must eat to gain weight! Here are some ways for getting enough calories to grow.

You may not have the appetite to eat 6-7 solid food meals a day, so in order to get the calories you need, you can implement shakes. Now I am not talking about just a whey protein shake, but rather a MEAL in the form of a shake. Here is an ingredient list for a high calorie, nutritious, AFFORDABLE shake:

- Whey Protein Powder
- Oatmeal
- Skim Milk
- Peanut Butter
- Honey or Banana

Once you have the ingredients you can choose how many calories you want the shake to have by choosing from the recipes below. This shake can be used for 2-3 of your daily meals. The amount of each ingredient can be adjusted to change the total calorie content of the shake. The recipes are listed in 100 calorie increments starting at 500 calories and are close to the recommended 50:30:20 macronutrient ratio.

500 Calories		*Servings*			
Ingredient	**Amount**	**Protein**	**Carbs**	**Fat**	**Calories**
Whey Protein	1 Scoop	3	0	0	84
Oatmeal	1/2 Cup	0.5	2	0.5	156.5
Skim Milk	1.5 Cups	1.5	1.5	0	132
Peanut Butter	1 TBSP	0.5	0	1.5	81.5
Honey	1 TBSP	0	1	0	60
TOTAL Grams/Calories		38.5	67.5	10	514

600 Calories		*Servings*			
Ingredient	**Amount**	**Protein**	**Carbs**	**Fat**	**Calories**
Whey Protein	1.5 Scoops	4.5	0	0	126
Oatmeal	3/4 Cup	0.5	3	0.5	216.5
Skim Milk	1.5 Cup	1.5	1.5	0	132
Peanut Butter	1 TBSP	0.5	0	1.5	81.5
Honey	1 TBSP	0	1	0	60
TOTAL Grams/Calories		49	82.5	10	616

700 Calories		*Servings*			
Ingredient	**Amount**	**Protein**	**Carbs**	**Fat**	**Calories**
Whey Protein	1.5 Scoops	4.5	0	0	126
Oatmeal	3/4 Cup	0.5	3	0.5	216.5
Skim Milk	2 Cups	2	2	0	176
Peanut Butter	2 TBSP	0.5	0	3	149
Honey	1 TBSP	0	1	0	60
TOTAL Grams/Calories		52.5	90	17.5	727.5

800 Calories		*Servings*			
Ingredient	**Amount**	**Protein**	**Carbs**	**Fat**	**Calories**
Whey Protein	2 Scoops	6	0	0	168
Oatmeal	1 Cup	0.5	4	0.5	276.5
Skim Milk	2 Cups	2	2	0	176
Peanut Butter	2 TBSP	0.5	0	3	149
Honey	1 TBSP	0	1	0	60
TOTAL Grams/Calories		63	105	17.5	829.5

900 Calories		*Servings*			
Ingredient	**Amount**	**Protein**	**Carbs**	**Fat**	**Calories**
Whey Protein	2 Scoops	6	0	0	168
Oatmeal	1 Cup	0.5	4	0.5	276.5
Skim Milk	2 Cups	2	2	0	176
Peanut Butter	2.5 TBSP	0.5	0	3.5	171.5
Honey	2 TBSP	0	2	0	120
TOTAL Grams/Calories		63	120	20	912

1000 Calories		*Servings*			
Ingredient	**Amount**	**Protein**	**Carbs**	**Fat**	**Calories**
Whey Protein	2.5 Scoops	8	0	0	224
Oatmeal	1 Cup	0.5	4	0.5	276.5
Skim Milk	2 Cups	2	2	0	176
Peanut Butter	3 TBSP	0.5	0	4.5	216.5
Honey	2 TBSP	0	2	0	120
TOTAL Grams/Calories		77	120	25	1013

An example daily meal schedule could be:
Meal 1 = Solid Food
Meal 2 = Power MRP
Meal 3 = Solid Food Meal
Meal 4 = Post Workout Shake
Meal 5 = Solid Food
Meal 6 = Power MRP

Boosting the Anabolic Effect of the Power MRP

Adding BCAA/Leucine to meals has been shown to boost the increase in protein synthesis seen from the meal. I recommend adding 1-2 Scoops of Scivation Xtend or 1-2 Scoops of Primaforce Bulk BCAA to your Power MRP for extra anabolism, which is always a good thing! We will discuss BCAA more in the next chapter.

Chapter 7
— Anabolic Workout Nutrition

Giving your body the nutrients it needs to grow pre, during, and post-workout can lead to accelerated progress. While all of the meals you eat are important, proper workout nutrition cannot be overlooked. As an ectomorph struggling to gain weight, the pre, during, and post workout periods are the prime times to jack amino acid and insulin levels up to increase protein synthesis, decrease protein breakdown, and put your body in an anabolic state.

If you have read some of my other work, you know that I do not recommending using high glycemic carbs as workout nutrition for all people. The strategies in this chapter are recommended for ectomorphs struggling to gain weight; I do not recommend this strategy for endomorphs. First we will discuss pre and during workout nutrition.

Anabolic Ammunition Arsenal™
A^{3}™

All athletes desire to excel. In this pursuit of excellence, athletes look for ways to enhance their training and performance. There exists today a plethora of training routines and exercises, nutritional programs, and dietary supplements. This makes sifting through all the available options a difficult and often times frustrating task. Time and time again though, examining scientific journals instead of the latest muscle magazine proves to produce the best results. Why? Because the information presented in these scientific studies are based on actual data and observations and have backing. In this chapter, we will examine a scientifically backed nutrition and supplement plan designed to promote an anabolic environment that will ensure growth and advancement.

Protein Turnover

Before we discuss the dietary blueprint for anabolism, an understanding of how muscle grows and gets stronger must be gained. All tissue of the body (skin, hair, muscle, etc.) goes through a process of turnover, or renewal. With skin, old tissue dies off and is replaced with new skin. This renewal process is accelerated if the tissue experiences a form of stimulus or overload. Continuing with skin, a guitar player's fingers serve as a fine example. When someone first begins to play the guitar, the tips of their fingers are soft. This makes playing against steel strings painful. Frequent playing causes the skin at

the tips of the fingers, where they come in contact with the guitar strings, to become hard and calloused. The old, soft skin has been replaced by a tough, durable layer of skin, allowing the guitar player to play with ease and comfort. Without turnover taking place, no skin would not have formed. The same process applies to muscle tissue.

Muscle tissue, just like skin, is constantly being turned over. The rate at which this turn over occurs is governed by protein synthesis and protein breakdown. In turn, protein synthesis and protein breakdown are regulated by one's diet, lifestyle (sedentary verses active), and genetics [31]. Just as the guitar player must apply a stimulus with the steel strings, an athlete must stimulate their muscles to accelerate this process.

Protein Turnover = Protein Synthesis - Protein Breakdown

The purpose of exercise, especially resistance training, is to increase protein synthesis, making protein turnover positive. In addition to increasing protein synthesis, weight training also increases protein breakdown. When a resistance training exercise is performed, the muscle cells used to create the force needed to achieve the desired movement can become damaged. These muscle cells need to be repaired and made stronger. By progressively increasing the weight lifted and the force needed to move the weight, the body becomes programmed to think it must prepare itself for heavier workloads. Therefore the damaged muscle cells are made stronger by adding additional proteins to them.

When you stop lifting weights, there is no longer a stimulus to keep the muscle cells at their new, strengthened level. Going back to the guitar player example, when a guitar player stops playing the guitar for a period of time, the callouses that were formed are removed. The body senses there is no longer a need for the tough layer of skin and replaced it with weaker skin. The exact thing happens with muscle tissue. That is why when one stops lifting weights, their muscles stop growing and actually decrease in size and strength. That is just a brief overview of protein turnover.

It should be clear that in order to continuously prep the body to strengthen muscle cells, causing them to grow, one must overload the muscle. But what happens when overload occurs and there are not adequate materials to create the new muscle? Muscle is lost!

Protein Turnover = Protein Synthesis - Protein Breakdown

If the amount of muscle broken down exceeds the amount that can be replaced, protein turnover is negative and there is a net loss of muscle. This is counterproductive to what the athlete is trying to accomplish with their training.

To ensure that an athlete's hard work and time spent exercising is wasted, protein turnover must remain positive. To accomplish this, precise nutritional requirements must be meet.

Protein

The word protein comes from the Greek word meaning "of prime importance." The naming of this nitrogen-containing macronutrient is extremely fitting, especially when considering its need during strenuous period, such as exercise. Proteins are the most abundant organic compounds in the body [32]. Their primary function is growth and repair of body tissue (anabolism). Proteins can also be used as energy through catabolic reactions, such as **gluconeogenesis**. Amino acids are the "building blocks" of protein. Amino acids are made up of an amino radical (NH_2) and a carboxyl group (COOH). What makes amino acids different is their side chains.

A protein molecule is made up of long chains of amino acids bonded to each other by amide bonds, or peptide linkages. When two amino acids are bonded together, a dipeptide is formed. Three amino acids bonded together produces a tripeptide. When 50 or more amino acids are bonded together, a polypeptide is formed, creating a protein molecule[41]. An almost endless combination of amino acid bonds can exist. The combination of amino acids governs the protein's properties.

Amino acids can be divided into two groups, essential amino acids(EAA) and nonessential amino acids(NEAA). EAA must be consumed through ones diet, because the body cannot be synthesized in the body at a sufficient rate to meet demands [32]. NEAA can be synthesized in the body from other protein and non-protein nutrients.

Essential Amino Acids	Nonessential Amino Acids
Histidine	Alanine
Isoleucine*	Arganine
Leucine*	Asparagine
Lysine	Aspartic Acid
Methionine	Cysteine
Phenylalanine	Glutamic Acid
Theronine	Glutamine
Thyptophan	Glycine
Valine*	Proline
	Serine
	Tyrosine
*Denotes Brain Chain Amino Acids	

Amino acids have a very strong impact on muscle growth. Specific amino acids and amino acid combinations also have special properties. Combinations of different carbohydrates also create special properties.

Carbohydrates

Carbohydrates are organic, water-soluble substances. The formula for a carbohydrate is $(CH_2O)_{N,}$ where N can be three to seven carbon atoms. Glucose is the

body's primary energy source. It can be directed used by the cell for energy, stored as glycogen for later use, or converted to fat and stored as energy. More specifically, glucose is a monosaccharide, meaning it cannot be broken down into simpler units. Other monosacaccharides include fructose and galactose. The bonding of two simple sugars creates a disaccharide. Examples of disaccharides are sucrose (glucose and fructose), maltose (glucose and glucose), and lactose (glucose and galactose). These monsaccharides and disaccharides are known as simple sugars. Then three or more sugars bond together, a polysaccharide is formed. Examples of polysaccharide, or complex carbohydrates, are fiber, glycogen, and starch. Glycogen is not present in large amounts in the foods we eat, so it must be created.

Glycogen is formed of glucose molecules lined together in chains. These chains can contain hundreds, over even ten thousand plus glucose molecules. The glycogen in our bodies is created from the glucose we consume in our diets. This glucose becomes "trapped" in the liver and muscles, where it is synthesized as stored for later use as glycogen. The liver can hold around 100 grams of glycogen, while around 325 grams of glycogen is stored in muscle. The amount of unstored glucose circulating in the blood is only around 15 to 20 grams [32, 33]. This process of creating glycogen in the liver is called **glycogenesis**. When glucose is needed for as an energy source, the glycogen stored in the liver is reconverted to glucose through a process called **glycogenolysis**.

When glycogen stores are low, glucose can be derived from other nutrients, such as protein. This creation of glucose from non-glucose nutrients is called **gluconeogenesis**. Gluconeogenesis is regulated by the catabolic hormone cortisol, which is one of an athlete's worse enemies. Many changes take place in the body during exercise. In order to create the most anabolic environment, we have to understand these changes.

What Happens During A Workout?

I'd like to note that my reference to exercise will be dealing with strength training and not endurance training. The effects of endurance training on protein turnover are somewhat different than the effects from strength training.

After an exercise session, two main things have occurred. One is the depletion of muscle glycogen. And the other is an increase in protein breakdown. Protein synthesis has either experienced no change from its pre-workout status or a slight increase. Remember when one lifts weights, they damage muscle cells. When these cells are damaged, they are removed. Because of the elevated level of protein breakdown and the almost unchanged level of protein synthesis, protein turnover is negative, meaning one is in a catabolic state[41]. Low glycogen levels can also put one in a catabolic state.

Low Glycogen

Exercise causes glycogenolysis to take place. The glycogen stored in the liver and muscle is released, when needed, to be used in the production of adenosine triphosphate (ATP), or energy. ATP is the body's fuel for all energy-requiring processes. ATP of made up of one molecule of adenine and ribose (together called adenosine) and three phosphates (consisting of phosphorus and oxygen atoms). Energy is stored in the bonds that link the two outermost phosphates. When the outermost phosphate--phosphate

bond is broken, energy is released. What is left is a molecule called adenosine diphosphate, which has one adenosine molecule and two phosphates. This ADP molecule can become ATP by using energy from foodstuffs and the ATP-PC system (creatine-phosphate). For example, the energy created by splitting the bonds between glucose molecules can be used to regenerate ATP from ADP. The body only stores around 85 grams of ATP at any given time [32]. Because of this limited storage, the demand for glucose to create ATP is accelerated when on lifts weights.

Strength training is a form of anaerobic exercise, meaning energy-releasing reactions happen without oxygen. Without oxygen present, the body must rely on the ATP-PC and anaerobic glycolysis to obtain the energy needed to regenerate ATP. The problem is, the ATP-PC energy system is very limited. It provides energy for muscular contraction during short, high intensity burst of exercise, usually lasting less than five seconds [33]. Therefore the energy demands for regeneration of ATP during weight training primarily come from the anaerobic glycolysis system, meaning muscle glycogen is an athlete's primary fuel during intense exercise [34]. This elevated need for glucose leads to extreme depletion of muscle glycogen stores and blood glucose. Studies show that intense strength training depletes muscle glycogen stores much my than had previous been thought [35-38].

Low glycogen levels have been shown to cause decreased intensity, mental focus, and performance during exercise [1-11]. The exact opposite occurs when sufficient glycogen is present, as endurance increases [12]. Of more concern to weightlifters is that low muscle glycogen levels means reduced strength [39, 40]. Even worse is the fact that low glycogen levels increase muscle protein breakdown [14, 15]. These findings hold true for both endurance and strength training [2, 6, 7, 8]. This increase of protein breakdown is on top of what is caused by the exercise itself.

Protein Breakdown

During exercise, catabolic activities cause proteins and muscle tissue to be broken down. The greater the intensity of the workout, the greater the catabolic response will be. This is due to the increase in production of **catecholamines** and **glucocorticoids**. Of prime concern to us is the glucocorticoid cortisol. Cortisol is a very catabolic hormone as it increases muscle protein breakdown [42, 43]. Cortisol regulates glucose synthesis from amino acids through the process of gluconeogenesis [32]. Another reason why exercising with low glycogen levels is a bad idea as lean muscle tissue will be lost. In order to recovery adequately, cortisol levels must be controlled.

Recovery Goals

From the above, it should be obvious that after training we need to:

1. Rapidly restore glycogen stores
2. Rapidly decrease protein breakdown
3. Rapidly increase protein synthesis

How can this be done? By eating carbs and protein. Studies have shown that in the absence of food, protein breakdown exceeded protein synthesis after a workout[56, 57, 58]. Most athletes know the positive effects of consuming a post workout meal. The body

is primed for nutrient uptake after a workout. So one way, and the most popular, to accomplish the above is to consume a post workout shake. There are many commercial powders available for this purpose. This is a good start, but I am here to show you one of the most efficient workout nutritional setups. Not only will this setup promote extreme anabolism, but it will also stop catabolism dead in its track before it even starts. This workout nutritional setup involves consuming three shakes: a pre-workout shake, a during workout shake, and a post workout shake.

Anabolic Nutrition

In order for these shakes to be effective, they need to contain both protein and carbohydrates. And not just any type of protein or and type of carbohydrate, but specific forms.

Amino Acids and Exercise

Only six of the 20 amino acids are directly metabolized by muscle. These six amino acids are, alanine, aspartate, glutamate, isoleucine, leucine, and valine [44, 45]. These six amino acids are metabolized at accelerated rates during exercise[45]. They are also imtermediates that regenerate the aerobic-TCA energy cycle[45]. This is not good for muscle anabolism because their cellular levels greatly impact growth. Therefore when the supply is depleted, growth suffers. Of these six amino acids, alanine, aspartate, and glutamate are nonessential, but isoleucine, leucine, and valine are the essential branch chain amino acids(BCAA), which serve an even greater role in energy metabolism and muscle growth.

BCAA are of extreme importance. BCAAs pass directly into the circulatory system, bypassing the liver, which allows them to be used for rapid protein synthesis. Studies have shown that BCAA directly supply the nitrogen needed to create and export concentrations of alanine and glutamine produced by muscle [44, 46,47,48]. Because of this, BCAA concentrations are lowered from any type of exercise. One study showed that BCAA concentrations were decreased by 30% from aerobic exericise and 8-20% from anaerobic/aerobic exercise [46]. The largest decrease in BCAA concentrations were seen in anaerobic exercise, such as weight training[49]. Of the three BCAA, leucine is of greatest importance during exercise.

Transaminiation of of leucine’s nitrogen to alanine is doubled during exercise [45]. Leucine is the only amino acid that is capable of being completely oxidized in the TCA-aerobic cycle. And again, because leucine is an EAA, this is not good for muscle growth. Leucine has been shown to directly stimulate protein synthesis and muscle turnover [50, 51]. And without leucine, protein synthesis rates are impaired[52]. To make matters worse, leucine has the shortest half-life of all amino acids in the free pool of 45 minutes. This is compared to the 5-10 hour half lives of the other amino acids[46]. It is constantly being oxidized, leaving little for protein synthesis. Leucine levels need to be increased before protein synthesis can excel.

It should be obvious from examining the above information that the protein source used contain large amounts of EAA, especially BCAA, and with even more emphasis on leucine. To accomplish these needs, a complete protein—one that contained

all the EAA-- is needed. In order for this shake to be as effective as possible, it needs to contain a fast absorbing protein. Therefore, protein powders such as casein and milk isolate are discouraged because of their slow digestion rates. Egg protein is another option, but it is still absorbed too slow. These slow digesting proteins can create an environment in the intestines that competes with the muscles for blood flow. That leaves us with whey protein. The quickest absorbed of the whey family is hydrolyzed whey. Hydrolyzed whey is one of the most rapidly digested proteins available. Hydrolyzed whey has an excellent amino acid profile. Here is the amino acid profile (listed in mgs) of 25 grams of a typical (some will vary) hydrolyzed whey protein powder:

Amino Acid Name	Amino Acid Profile
Alanine	1115
Arginine	407.5
Aspartic Acid	2550
Cystine	525
Glutamic Acid	4095
Glycine	367.5
Histidine	363.75
Isoleucine	1562.5
Leucine	2236.25
Lysine	2268.75
Methionine	440
Phenylalanine	491.25
Proline	1363
Serine	1027.5
Threonine	1727.5
Tryptophan	337.5
Tyrosine	1435
Valine	1326.25
Total Amio Acids:	23639.25 mg (23.63925 grams)
Total EAA:	10753.75 mg (10.75375 grams)~ 45.5%
Total NEAA:	12885.5 mg (12.8855 grams)~ 54.5%
Total BCAA:	5125 mg (5.125 grams)~ 21.7%

As you can see, hydrolyzed whey protein is close to 50% EAA and 50% NEAA. In order to get the amount of EAA and BCAA that we need to ensure growth, a large serving of this whey need to be consumed.

NEAA Are Not Needed

Research studies have shown time and time again that NEAA are not needed to stimulate protein synthesis when the EAA are consumed [16, 17, 18]. A study showed that consuming NEAA did not increase protein synthesis while consuming EAA did in fact increase protein synthesis[18]. A single six-gram serving of EAA is more than twice as effective as two, six-gram servings of mixed amino acids (EAA and NEAA) in increasing protein synthesis [17, 19]. A 200% increase in protein synthesis was observed due to EAA available after resistance exercise[22].

It has been shown that exercising after ingestion of an EAA drink maintained intracellular levels of NEAA. This showed that NEAA availability did not limit protein synthesis. The intracellular pool of amino acids were increased with EAA supplementation, but not with supplementation of EAA + NEAA[16], meaning when EAA are consumed, they go into the cells. This is in part due to EAA absorption speed. EAA are the fastest absorbed of all amino acids[20]. All these facts show that half of the amino acids we consume from the whey protein are needed for increased anabolic activity. All these benefits were seen just with the ingestion of 6 grams of EAA. Watch what happens when carbohydrates are ingested, and in turn insulin is released.

Summary of Protein Synthesis Rates When Compared to Rest

50% increase from hyperinsulinemia [59]
100% increase from resistance exercise [21]
150% increase from amino acid availability [22]
200% increase from amino acid availability after resistance exercise [22]
400% increase from hyperinsulinemia and amino acid availability after resistance exercise [20]

I recommend consuming a combination of free form amino acids and fast acing carbohydrates before and during your workout. The carb source should be a fast-acting, high glycemic carb such as dextrose, maltodextrin, or waxy maize starch. Waxy maize starch is relatively new to the general public, but it has been getting great reviews. While there might not be a ton of studies backing its use over dextrose, anecdotal feedback shows that waxy maize starch provides better pumps and muscle fullness over dextrose. My own personal experience with waxy maize starch agrees with this anecdotal feedback.

The Anabolic Ammunition Arsenal (A^3)

These meals should be consumed in liquid form because solid foods take longer to digest.

<u>Pre-workout</u>

0.125 grams X TBW in EAA

0.25 grams X TBW in High Glycemic Carbs

During Workout
0.1-0.17 grams X TBW in BCAA
0.25 grams X TBW in High Glycemic Carbs

Example

A 160 pound lb bodybuilder is trying to bulk up to 180 lbs. His pre and during workout nutrition would include:
Preworkout
0.125 grams X TBW in Essential Amino Acids = 22.5 grams
0.25 grams X TBW in High Glycemic Carbs = 45 grams

During Workout

0.1-0.17 grams X TBW in BCAA = 18-30 grams
0.25 grams X TBW in High Glycemic Carbs = 45 grams

The perfect pre and during workout shake can be created using products from the Scivation and Primaforce lines—Primal EAA, Carb Slam, and Xtend or Bulk BCAA. Using our example numbers above, our pre-workout shake would contain:

- 1 Scoop Primal EAA
- 1.5 Scoops Carb Slam

Our during workout shake would contain:

- 4-8 Scoops Scivation Xtend or Primaforce Bulk BCAA
- 1.5 Scoops Carb Slam

Primal EAA + Carb Slam = Anabolic Pre-workout Nutrition!

By consuming both a pre and during workout shake, you prime your body for growth before you even start lifting weights and this effect is sustained throughout your workout and post workout. Because of this, you simply need to eat your next scheduled meal post workout, which should contain some good low-glycemic carbs such as oatmeal, rice, or sweet potatoes.

More on BCAA

In Summary, The Metabolic Roles Of The BCAA Include:

- Substrate for energy production
- Substrate for protein synthesis
- Precursor for the formation of other amino acids
    - Primarily Alanine and Glutamine
- Metabolic signals (Primarily Leucine)
    - Stimulates protein synthesis through insulin secretion/activation of the PI3K pathway
    - Stimulates protein synthesis through activation of mTOR
    - Stimulates leptin expression in adipocytes through activation of mTOR

What all this means is ingesting BCAA primes your body for growth (protein synthesis). All of these actions are beneficial to an athlete and should not be overlooked. There is endless research backing BCAA supplementation. I feel it would be much more

beneficial, both performance/results wise and money wise, to go "old school" and supplement with BCAA than to buy alpha gen steroids into all the current hype supplements on the market
today.

Cost vs. Benefit

When it comes down to it, everyone is concerned with the cost of their supplements. Some are willing to pay a little extra for quality supplements, while others are not. Initially, people look at this setup and think it is not cost effective or they can get the same benefits by just taking whey protein. While whey protein is good, it should be clear that consuming free form EAA, especially leucine, have many more advantages. Some also say that they can just increase the amount of whey protein they take to get more of the EAA and BCAA. By doing this, you are now spending more money, which was your primary concern. In the end, one will get the most "bang for their buck" from this setup. Unlike other plans, this setup increases anabolism while decreasing catabolism. If performing at your full potential is important to you, then you will use what has been shown to work best. Why pay for something that will not deliver the best results? Other beneficial supplements will be discussed in the next chapter, but the above workout nutrition is what I consider vital.

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Glossary

Catecholamines- Various secretions, or byproducts of secretions, of the adrenal grand which affect the sympathetic nervous system.

Deamination- The amino group is removed the an amino acid, leaving a carbon skeleton which can be coverted to glucose of fat.

Glucocorticoids- Any of a group of steroid hormones, for example cortisone, that are produced by the adrenal cortex. They contribute to protein, carbohydrate, and fat metabolism, and have anti-inflammatory properties.

Glycogen- Chains of glucose stored in the body for later use.

Glycogenesis- The formation of glucose into glycogen in the liver.

Glycogenolysis- The formation of glucose from stored glycogen.

Transamination-The synthesization of non essential amino acids in the body from essential amino acids, dietary carbohydrates and lipids (fats) and/or carbon, oxygen, and hydrogen.

Chapter 8

— Supplementation to Decrease Fatigue during Exercise

Fatigue is defined as "The decreased capacity or complete inability of an organism to function normally because of excessive stimulation or prolonged exertion (dictionary.com)." With regards to exercise, fatigue could be considered the point where your performance has decreased or you can no longer perform. Examples of fatigue in relation to exercise would be:

- Inability to perform another rep during a set of bench press
- Inability to continue running during a 5k race
- Inability to maintain peak velocity during a 100m sprint

One can prolong the time until fatigue by giving their body substrates/nutrients pre-workout. We are going to examine the metabolic causes of fatigue during exercise and discuss how precise supplementation can decrease the onset of fatigue during exercise, allowing you to train more intensely.

Causes of Fatigue during exercise

Newsholme et al. (1992) proposed that there are at least five metabolic factors that can cause fatigue during exercise:

- Increase in plasma tryptophan:BCAA concentrations
- Decrease in muscle phosphocreatine levels
- Hypoglycemia (low blood glucose levels)
- Muscle glycogen depletion
- Proton (H+) accumulation in muscles

Reference: Newsholme, 1992

Anyone of these metabolic factors of fatigue can cause your workout performance to suffer. We will examine each of these metabolic factors and then address how to overcome them through supplementation.

Plasma Ratio of Tryptophan:BCAA

5-hydroxytryptamine (5-HT) levels in the brain are believed to be a contributing factor to fatigue. Transport of the amino acid tryptophan, the precursor for 5-HT, across the blood brain barrier (BBB) is the rate limiting step in 5-HT synthesis. Therefore, increased plasma tryptophan levels can lead to fatigue. The Branch-Chained-Amino-Acids (BCAA) are transported across the BBB by the same carrier as tryptophan.

During exercise the plasma ratio of Tryptophan:BCAA increases (tryptophan increases and BCAA decreases), leading to fatigue.

Muscle Phosphocreatine Levels

The body needs a continuous supply of energy to both perform and survive. All of the body's energy requiring processes use the potential energy stored within the bonds of adenosince triphosphate (ATP). The phosphocreatine (PCr) system is an anaerobic (does not require oxygen), alactic (does not produce lactic acid) system that rapidly restores ATP levels.

While this reaction is very rapid, it has a low capacity, meaning it cannot produce a tremendous amount of energy. Therefore, it is in greatest demand during high-intensity, short duration exercise, such as resistance training and sprints. The maximum energy able to be yielded from this reaction occurs after about 10 seconds. After those 10 seconds, energy for ATP resynthesis must be obtained from stored nutrients. Because resistance training heavily relies on the PCr system for energy production, depletion of phosphocreatine levels can decrease performance (i.e. the number of reps you can complete).

Hypoglycemia

Hypoglycemia is low blood glucose levels caused by a low carbohydrate intake or excessive insulin secretion (insulin causes glucose [carbs] in the blood to be stored) and is commonly experienced during exercise. When blood glucose levels drop below normal levels during exercise one often becomes fatigued. This is due to glucose being a primary fuel during exercise, especially high-intensity exercise. Hypoglycemia can be overcome be consuming adequate dietary carbohydrates and maintaining stable insulin/blood sugar levels both before you workout and while you workout.

Muscle Glycogen Depletion

Glycogen is glucose stored in the body in the form of glucose chains. These chains can contain hundreds to thousands of glucose molecules. The glycogen in our bodies is created from the glucose and other nutrients we consume in our diets. This glucose becomes "trapped" in the liver and muscles, where it is synthesized and stored for later use. The liver can hold around 100 grams of glycogen, while muscle can store around 325 grams. The amount of unstored glucose circulating in the blood is only around 15 to 20 grams (Katch and McArdle, 1988) (Powers and Howley, 2001).

The glycogen stored in the liver is released, when needed, to be used in the production of ATP. The glycogen stored in skeletal muscle is used to produce ATP for that muscle to use. Low glycogen levels have been shown to cause decreased intensity, mental focus, and performance during endurance exercise while endurance performance increases when sufficient glycogen is present (Pizza, 1995). Like hypoglycemia, muscle

glycogen levels can remain elevated by consuming adequate dietary carbohydrates and maintaining stable insulin/blood sugar levels.

Proton (H+) accumulation in Muscle

During exercise, blood and skeletal muscle pH levels may become acidic due to hydrogen ion (H+) accumulation, which is termed metabolic acidosis. In order to stabilize an acidic pH level the body must neutralize the excess acids. The two main ways the body does this is by taking calcium (and other minerals) from bones and glutamine from skeletal muscle. Both of these corrective mechanisms have negative consequences for the body.

Skeletal muscle contains the body's greatest glutamine stores. Glutamine binds to H+ to create ammonium, which is excreted from the body. In the face of metabolic acidosis and elevated H+ levels, breakdown of skeletal muscle and glutamine release is increased and can lead to muscle protein loss in addition to causing fatigue. The build-up of H+ in the blood and skeletal muscle is the cause of the burning sensation you feel during exercise (i.e. high rep leg extensions).

Now that we have a basic understanding of the metabolic factors causing fatigue during exercise we can discuss which supplements can be used to delay the onset of fatigue and improve performance.

Supplementing to Decrease Fatigue during Exercise

The most important thing one can do to decrease fatigue during exercise is consume adequate dietary macronutrients (protein, carbs, and fat) and get enough rest/recovery time. Once this is done, supplementation of the following supplements can be used to delay fatigue and enhance performance.

- BCAA
- Creatine
- Citrulline Malate
- Beta-Alanine

  ***Note there are other viable supplements that could be used, but this article will focus on these four supplements.

Branch Chained Amino Acids (BCAA)

The BCAA (leucine, isoleucine, and valine) are different from the other 17 amino acids in that they are primarily metabolized in skeletal muscle (Layman, 2003) and metabolized at a much lower rate in the liver (Norton, 2005). Studies show that BCAA ingestion during exercise delays fatigue due to limiting the amount of tryptophan that can cross the BBB (Bromstrand, 2006). In addition to dietary intervention, BCAA supplementation has been shown to spare muscle glycogen during exercise (Bromstand, 2006).

Fatigue and protein loss can be diminished by supplementing with BCAA, which increases de novo synthesis of glutamine inside skeletal muscle, allowing H+ to be removed from the muscle (Houston, 2001). We see that BCAA supplementation can delay the onset of fatigue by overcoming three of the five metabolic causes of fatigue: increase in plasma tryptophan:BCAA concentrations, muscle glycogen depletion, and proton (H+) accumulation in muscles.

Creatine

Creatine supplementation is used to supply the body with more creatine, increasing the body's capacity for phosphocreatine and ATP resynthesize through the PCr system. Phosphocreatine depletion is one of the metabolic factors leading to fatigue. If you can increase the amount in creatine in your muscles, your muscles should have more creatine to use in the resynthesis of phosphocreatine, delaying the onset of fatigue.

Research has shown creatine monohydrate supplement to decrease ATP loss during intense anaerobic performance while at the same time increasing work performed. This enhancement in anaerobic performance from creatine monohydrate supplementation has been shown in both men and women (Tarnopolsky, 2000). Skeletal muscle has a limited storage of creatine. Therefore supplementing with creatine increases your ability to form ATP and therefore increases the available energy for exercise (Casey et al. 1996 & 2000).

Citrulline-Malate

Citrulline-Malate has been shown to increase the rate of oxidative ATP production during exercise and the rate of phosphocreatine replenishment post exercise (Bendahan, 2002). Increasing the rate of ATP production and phosphocreatine production would aid in delaying fatigue.

Citrulline-Malate also has anti-fatigue properties due to its ability to decrease ammonia/H+ levels and prevent against metabolic acidosis (Callis, 1991). Decreasing the sensation of fatigue (i.e. burning sensation) would allow one to workout harder and push out additional reps.

Beta-Alanine

Beta-alanine is one of the two amino acids (histidine being the other) that make up the protein carnosine. Carnosine is an important metabolic buffer in skeletal muscle (Suzuki, 2002), which means it helps maintain the acid-base balance in the presence of high H^+ (hydrogen ion) concentrations. Beta-Alanine availability is the limiting factor in muscle carnosine synthesis (Hill, 2007). Beta-alanine supplementation increases muscle carnosine levels and aids decreasing muscle H+ levels. Beta-Alanine supplementation has directly been shown to decrease neuromuscular fatigue (Stout, 2006).

Putting It All Together

There are at least five metabolic factors that can cause fatigue during exercise:

- Increase in plasma tryptophan:BCAA concentrations
- Decrease in muscle phosphocreatine levels
- Hypoglycemia (low blood glucose levels)
- Muscle glycogen depletion
- Proton (H+) accumulation in muscles

Reference: Newsholme, 1992

Once you have your dietary needs met, you can incorporate specific supplements to delay fatigue and enhance performance by fighting against the above metabolic factors. In this article we learned that the recommended alpha pharmaceuticals supplements delay fatigue and improve performance by:

- BCAA—decreaseing blood tryptophan levels, sparing muscle glycogen, increasing de novo glutamine production to shuttle H+ out of skeletal muscle.
- Creatine—increasing phosphocreatine and ATP resynthesis
- Citrulline Malate—increasing ATP production and phosphocreatine replenishment, delaying fatigue by decreasing ammonia/H+ concentrations
- Beta-Alanine—decreasing muscle H+ levels, delaying neuromuscular fatigue

Combining these supplements with a well-structured diet can allow you to workout more intensely by delaying fatigue and enhancing performance.

Pre-Workout Supplementation Recommendation

- 5-10 grams BCAA
- 2-5 grams Creatine Monohydrate
- 3 grams Citrulline-Malate
- 2 grams Beta-Alanine

My Current Pre-Workout Supplementation Regime

- 1 serving Scivation VasoCharge
  - Takes care of the creatine, citrulline-malate, and beta-alanine recommendation
- 2 servings Scivation Xtend
  - Takes care of the BCAA recommendation
  - If you use Primal EAA pre-workout you do not need to add additional BCAA from Xtend.

Xtend+VasoCharge = Pre-workout nutrition + Performance Enhancers

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Chapter 9
—Putting Everything into Action

Now that you have all this information it is time to put it into ACTION! I am going to list to potential meal schedules for a morning and evening lifter and exercise schedules.

Meal Schedule

Morning Lifter
Meal 1- Solid Food
Pre/Post Workout Shake
Meal 2- Solid Food
Meal 3- Power MRP
Meal 4- Solid Food
Meal 5- Power MRP
Meal 6- Solid Food

Evening Lifter
Meal 1- Power MRP
Meal 2- Solid Food
Meal 3- Power MRP
Meal 4- Solid Food
Pre/Post Workout Shake
Meal 5- Solid Food
Meal 6- Solid Food

Exercise Schedules

Option 1
Monday- Push A + 15-20 minutes Low-Intensity Cardio post-workout
Tuesday- Pull A + 15-20 minutes Low-Intensity Cardio post-workout
Wednesday- Off/Rest Day
Thursday- Push B + 15-20 minutes Low-Intensity Cardio post-workout
Friday- Pull B + 15-20 minutes Low-Intensity Cardio post-workout
Saturday- Off/Rest Day
Sunday- Off/Rest Day

Option 2
Monday- Push A
Tuesday- Pull A
Wednesday- HIIT
Thursday- Push B
Friday- Pull B

Saturday- HIIT
Sunday- Off/Rest Day
*If you choose option 2 you should treat the HIIT as a weight training workout concerning workout nutrition, but cut the pre and post workout shakes' macronutrient amounts in half.

Daily Calories

- Your starting caloric intake is 15 * your bodyweight + 500
- If you weigh 160 lbs your starting caloric intake would be 2400 (160*15) + 500 = 3100 calories.
- Using the recommended ratio of 50:30:20 (carbs:protein:fat) you would consume
    - Carbs = 387 grams
    - Protein = 232 grams
    - Fat = 69 grams
- More carbs should be eaten around your workout than at other times during the day.
- Power MRPs can be used to meet your calorie requirements as outlined in chapter 6.
- Pre and during shakes should be implemented as outlined in chapter 7.
- I am not going to tell you to eat this many grams of protein and carbs in meal 1 and this many in meal 2. Instead your main focus should be on hitting your targeted caloric intake and macronutrient amounts by choosing healthy foods from the "High Performance Nutrient Selection" in chapter 10.

Chapter 10
— High Performance Food List

High Performance Nutrient Selection

Starches (equal to 1 serving of Carbohydrate)

12-15 grams carbohydrate

BREADS	
* Bagel - whole-wheat, oat-bran, 9-grain (3.5 inch)	½ or 42g
* Bread - whole-wheat, oat-bran, 9-grain	1 slice or 32g
* Ezekiel bread (sprouted grains NO FLOUR)	1 slice
* Whole Wheat English muffin	½ or 33g
* Whole Wheat Pita bread (6.5 inch in diameter)	½ or 32g
* Whole Wheat Tortilla, 6 inches across	1 or 35g
CEREALS & GRAINS	
* Barley (pearled) (dry)	1.25 tbsp or 15.6g
* Kashi Medley	1/3 cup or 19.8g
* Cream of Wheat regular or quick (dry)	1.5 tbsp or 16.7g
* Granola, low-fat (Heartland brand)	2.5 tbsp or 16.5g
* Grape-Nuts (Post brand)	2.5 tbsp or 16.5g
* Honey	¾ tbsp or 15.8g
* Millet (dry)	1.5 tbsp or 18.75g
* Oat Bran (dry)	3.5 tbsp or 20.5g
* Oatmeal (Quaker Instant/Old Fashion, dry)	¼ cup or 20g
* Pasta, wheat (noodles, bowtie, shells etc), (cooked)	1/3 cup or 46g
* Quinoa Grain (dry)	1.75 tbsp or 18.6g
* Rice, brown long-grain (cooked)	1/3 cup or 64.35g
* Rolled Oats	¼ cup or 20.25g
* Steel Cut Oats, dry	1/8 cup or 20g
STARCHY VEGETABLES	
* Baked potato (no skin)	63.8g or 2.25 oz
* Baked Sweet potato (baked no skin)	56.7g or 2 oz
* Yams (baked, no skin)	56.7g or 2 oz
DRIED BEANS & LENTILS	
ALSO COUNTS AS 1 MEAT SERVING	
* Black Beans (S&W - canned)	106g or 3.75 oz
* Red Kidney, Pinto Beans (Green Giant - canned)	85g or 3 oz

Fruits (equal to 1 serving of Carbohydrate)
12-15 grams carbohydrate

* Apple, (with peel)	3.25 oz or 92g
* Banana, (peeled)	2.25 oz or 64g
* Blueberries (fresh)	3.5 oz or 99g
* Grapefruit, (peeled)	6.5 oz or 184g
* Grapes	3 oz or 85g
* Mango (fresh)	3 oz or 85g
* Orange, (peeled)	3.5 oz or 99g
* Pineapple	4 oz or 113g
* Peach (fresh)	4.55 oz or 127.5g
* Pear (fresh)	3 oz or 85g
* Papaya (fresh)	5 oz or 141.75g
* Raisins (seedless)	2 tbsp or 18.5g
* Strawberries (fresh)	6.5 oz or 184g
* Watermelon (fresh)	5 oz or 141.75g

Milk (equal to 1 serving of Protein & 1 serving Carbohydrate)
12-15 grams carbohydrates
6-8 grams protein

MILK & VERY LOW-FAT MILK

* Skim milk (0 grams fat)	1 cup or 8 Floz
* 1% Milk	1 cup or 8 Floz
* Plain non-fat yogurt	¾ cup or 6 oz
* Yoplait/Dannon Light Fruit yogurt	6 oz (1 container)

LOW-FAT MILK

Also Counts as 1 Fat serving

* 2 % milk	1 cup or 8 oz
* Plain low-fat yogurt	¾ cup or 6.5 oz
* Sweet acidophilus milk	1 cup

WHOLE MILK

Also Counts as 2 Fat servings

* Whole milk	1 cup or 8 oz

Vegetables (equal to 1 serving alphagen pharmaceuticals of Vegetables)

4-6 grams carbohydrates

- **All servings sizes are based on (raw or steamed)**

* Asparagus	4 oz or 113 g
* Broccoli	2.75oz or 78g or ½ cup
* Cauliflower	2.75oz or 78g or ½ cup
* Green Beans	2.2oz or 62.5g or ½ cup
* Onions	53g or 1.86 oz or 1/3 cup
* Spinach	125g or 4.4oz or 2/3 cup
* Celery	120g or 4.25 oz or 1 cup
* Cucumber	156g or 5.5 oz or 1/3 cup
* Green onions	50g or 1.75 oz or ½ cup
* Mushrooms	78g or 2.5 oz or ½ cup
* Tomato	90g or 3.2 oz or ½ cup
* Salad greens (lettuce, romaine)	165g or 5.2 oz or 3 cups

Protein (equal to 1 serving of Meat)
6-8 grams protein

VERY LEAN MEAT (all measurements AFTER cooked)

* Chicken breast (white meat) boneless/skinless	1 oz or 28.35g
* Turkey breast (LEAN)	1 oz or 28.35g
* Fresh fish (cod, haddock, halibut, tuna, tilapia)	1 oz or 28.35g
* Shell fish (crab, lobster, shrimp)	1.25 oz or 35.5g
* Egg whites	2 or 67g
* Egg Beaters	¼ cup or 2.15 oz or 61g
* Non-fat cottage cheese	¼ cup or 2 oz or 57 g
* Salmon Fillet	1 oz or 28.35g (also counts as ½ fat serving)
* Lean Sirloin	¾ oz or 21.25g
* Egg (including yolk)	1 or 50g (also counts as 1 fat serving)
* Cheese 2% (Reduced Fat)	1 oz or 28.35g (also counts as 1 fat serving)
* Salmon	1 oz or 28.35g (also counts as ½ fat serving)

Fat (equal to 1 serving of Fat)
5 grams fat

MONOUNSATURATED FATS & POLYUNSATURATED FATS

* Avocado	1 oz or 28.35g
* Almonds (dry roasted)	1/3 oz (~ 6 pieces) or 1 tbsp or 8.6g
* Benecol light	1 tbsp or 14g
* Cashews	1/3 oz or 1 tbsp or 9.65g
* Enova oil	1 Tsp or 4.5g
* Flax oil	1 Tsp or 4.5g
* Mayonnaise (Light, reduced-fat)	1 Tbsp or 15g
* Oil (olive or canola, Enova)	1 tsp or 4.5g or 0.16 oz
* Peanuts	1/3 oz or 9.36g
* Peanut/Almond butter (smooth or crunchy)	2 tsp or 0.38 oz or 10.6g
* Pecans	¼ oz or 1 tbsp or 7.44g
* Salad dressing (Light, reduced-fat)	2 Tbsp or 30g
* Sesame seeds	1Tbsp or 1/3 oz or 9.4g
* Smart Balance Light spread	1 tbsp or 14g
* Sunflower seeds	1Tbsp or 1/3 oz or 9.0g
* Walnuts	1Tbsp or 1/4 oz or 7.5g

FREE FOOD LIST
Less than 20 calories per serving
Less than 5 gram carbohydrates per serving
Recommended at 1 serving per meal per day

FAT FREE or REDUCED FAT

* Cream cheese	1 Tbsp
* Creamers, non-dairy liquid	1 Tbsp
* Creamer, non-dairy powder	2 Tbsp
* Mayonnaise, fat-free	1 Tbsp
* Margarine, fat-free	4 Tbsp
* Miracle Whip, non-fat	1 Tbsp
* Salad dressing, fat-free	1 Tbsp
* Sour cream, fat-free	2 Tbsp

SUGAR FREE or LOW SUGAR

* Hard candy, sugar free	1 piece
* Gelatin dessert, sugar free	1
* Gum, sugar free	1 piece
* Jam or jelly. Low sugar or light	2 tsp
* Syrup, sugar free	2 Tbsp

DRINKS
* Coffee
* Club soda
* Diet soft drinks, sugar free
* Tea
* Tonic water

SUGAR SUBSTITUTES
Equal (aspartame)
Splenda (Sucralose)
Sprinkle Sweet (saccharin)
Sweet One (Acesulfame potassium)
Sweet ‘n Low (saccharin)

About the Author

Derek "The Beast" Charlebois is an ACE certified personal trainer, competitive bodybuilder, and holds a Bachelor's degree in Exercise Science from The University of Michigan. Derek is the Promotions Coordinator/R&D at Scivation/Primaforce and is involved in coordinating promotions, research and development, advertising, and marketing. Derek is an accomplished author with articles on such websites as Bodybuilding.com, Bulknutrition.com, the online magazines StrengthAndScience.com and *Game Over:* ***The Final Showtime Cut Diet You'll Ever Need! and The Lifestyle Diet: The Final Diet You'll Ever Need to Stay Lean and Healthy Forever.*** **Derek is available for online personal training; personal training inquiries**