

**THE**  
**BODY**  
**TRANSFORMATION**  
**BLUEPRINT**  
**SUPPLEMENT GUIDE**

RESEARCH-BACKED SUPPLEMENTATION PROTOCOL



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## INTRODUCTION



Although the use of supplements is not a *mandatory* aspect of an effective muscle building and fat burning program, a few carefully selected items taken in the proper forms and dosages can help to maximize your results over the long term and improve the overall convenience of your diet plan.

There are an endless number of different supplements out there to choose from, the overwhelming majority of which are over hyped, over priced and downright ineffective. Supplements are a multibillion dollar a year industry, and trying to separate the fact from fiction can be a pretty daunting task for the average lifter.

This step by step guide will cut straight through the hype and lay out the real, science-based truth when it comes to safe, effective and cost-efficient fitness supplementation. The guide is separated into three categories:

**Recommended Supplements:** These are the core essentials that should form the underlying basis of a proper supplementation plan. The products included in this category are research proven for their intended use and will cover your most basic needs.

**Secondary Considerations:** These supplements should be treated as secondary add-ons and can be optionally utilized depending on your specific goals and budget.

**Non-Recommended:** Supplements in this category are either lacking in sufficient scientific evidence or have been directly shown in research to be ineffective for improving body composition and training performance.

Some of the information found in this guide was already covered in chapter 6 of the main Body Transformation Blueprint Manual, with the purpose here being to distill the advice down into the most usable steps while providing additional insight into other supplements that weren't covered in the e-book.

Included for each recommended and secondary supplement will be a brief summary of exactly what it is and how it works, along with proper dosing guidelines, tips and specific recommended products. This will include certain "approved" third party brands, as well as

supplements from [RealScience Athletics](#), a company I personally founded as a way of combatting all of the misleading tactics so common in the supplement industry today.

[RealScience Athletics](#) takes a much different approach to most “mainstream” supplement brands by providing only a small list of select products that are 100% research-backed, clinically dosed, transparently labelled and manufactured with the highest quality cGMP certified methods available.

There are ultimately a variety of acceptable brands and products out there if you research carefully, but if you want to remove all the guesswork and know for certain that you’re getting the highest quality and most cost-efficient options available, [RealScience Athletics](#) was specifically formulated with that goal in mind. (Body Transformation Blueprint members are also eligible for a 10% discount on their first order by using coupon code **BTB10**)

If this is your first time using supplements, incorporating them one at a time is usually the best way to go about it. That way, in the unlikely event that you do experience an adverse reaction, you’ll be able to narrow down which specific item is causing it and can adjust accordingly. This is especially true for any stimulant-based ingredients, as these should always be introduced gradually and at the lower end of their dosage range to assess your tolerance first.

If you have any pre-existing medical conditions or are currently using any medications, always make sure to consult a doctor before using any of the supplements outlined in this guide.

Lastly, if you’re a competitive athlete, always test out any new supplements before practice first rather than incorporating them for the first time during a live game scenario.

With those few pieces of cautionary advice out of the way, let’s get started...



**SECTION #1**  
**RECOMMENDED SUPPLEMENTS**

# PROTEIN POWDER

## Supplement Description

Although protein powder is traditionally classified as a “supplement”, it’s technically more accurate to simply view it as being a regular food product instead. That’s because whether it’s whey, egg, casein or a plant source such as pea, soy, brown rice or hemp, all protein powders are ultimately derived from whole foods and provide additional protein to your diet in the same way as any other source. The only real difference is that, because of their concentrated form, they provide a much higher amount of protein per serving in comparison to other typical solid foods.

If you have no issues meeting your daily protein needs from a regular solid food diet (or would just prefer to go about it that way), then the use of a protein powder is by no means mandatory and your results won’t be negatively affected if you choose to exclude it from your plan. However, if you do enjoy the convenience factor that protein powders provide and/or the taste of the various high protein smoothies and recipes that can be created with it, including one in your program can be a helpful option to streamline your overall eating plan.

## Dosing Guidelines

There is no set “dosage” for protein powder since it is essentially a regular food product just like any other protein source. The specific amount you should consume each day ultimately comes down to your individual protein needs and how much you prefer eating in solid form versus liquid form (or in the form of protein powder recipes). For most people, anywhere from 1-3 scoops per day would be a standard amount depending on body weight and total protein requirements.

In terms of protein powder timing, this is also just a matter of personal preference as there won’t be any specific benefit to consuming it at one time of day over another. Whether it’s consumed in the morning, pre-workout, post-workout or later in evening, it just depends on your individual schedule, hunger levels and what types of meals you prefer having at various times of the day.

Protein powders can be mixed straight into water, milk, a milk substitute (like almond milk, rice milk etc.) or juice, and can be optionally blended with other items (such as fruit, oats, yogurt, peanut butter, healthy oils etc.) to make a more complete meal replacement shake if desired.

## Recommended Product(s)

As long as you're consuming sufficient total protein for the day as a whole (around 0.8-1 gram per pound of body weight), the specific type of protein powder you select is by no means a crucial decision. All forms of protein are ultimately broken down into their individual amino acid building blocks after they're ingested, and you'll easily be getting enough of all the different aminos your body requires for the day assuming sufficient total protein quantity is present.

That said, whey protein works very well as a reliable "default" option since it ranks highly for taste, mixes easily, is cost-effective and provides the highest quality source of protein on a gram for gram basis for those whose daily protein intake is a bit closer to the borderline.

There are plenty of acceptable whey protein products out there to choose from, but here are three reputable "tried and tested" options you can trust that provide a clean mix of whey protein isolate and whey protein concentrate, striking a good balance between overall quality and price:

- 1) [Optimum Nutrition 100% Whey](#)
- 2) [Dymatize Elite Whey](#)
- 3) [Cellucor COR-Performance Whey](#)

(RealScience Athletics does not currently offer protein powders, though this will be added to our product line in the future.)

If you'd prefer a naturally sweetened powder (the three products above are sweetened with sucralose) then [Optimum Natural 100% Whey](#) or [Body Nutrition Trutein](#) are both good choices in this category.

For those who are lactose intolerant, a 100% whey isolate would be more suitable in order to avoid digestive issues, such as [Dymatize ISO-100](#) or [Allmax IsoNatural](#).

Lastly, if you follow a vegan diet or would just prefer a vegan powder for whatever reason, you can go with [S.A.N Raw Fusion](#) or [VEGA Sport Performance](#), which all contain blends of plant-based sources such as brown rice, pea, artichoke, alfalfa and pumpkin seed. (These are of course suitable for lactose intolerant individuals as well)

Protein "snacks" are also another option to consider if you'd prefer something that can be more easily taken with you on the go. There are an endless number of different options available in this category as well, and a few choices worth checking out include [Quest Bars](#), [Quest Cookies](#), [Combat Crunch Bars](#) or plant-based options such as [MusclePharm Organic Protein Bars](#) or [VEGA Sport Bars](#).

# MULTIVITAMIN

## Supplement Description

In order for your body to build muscle, lose fat and maintain optimal health and performance, it must be provided with a wide array of individual vitamins and minerals each day. Eating a varied, minimally processed whole food diet will certainly go a long way in meeting a high percentage of your micronutrient needs, but is typically not enough on its own to fully maximize the positive effects that each individual vitamin and mineral has to offer. Certain micronutrients are drained from the body as a result of intense training, and some can also provide additional health and fitness related benefits when consumed in slightly higher amounts. This is where the use of a multivitamin comes into play, as it will help to cover up any potential “holes” in your diet while also increasing levels of the specific micronutrients that are the most difficult to obtain in optimal amounts from regular food alone.

It’s important to note, however, that if you’re already following a reasonably healthy eating plan to support your fitness goals, a good portion of your vitamin and mineral needs are already being covered as is. Not only does this make supplementing with some micronutrients unnecessary from a cost perspective, but going too high on certain ones can even be detrimental to your health.

This is why traditional “full spectrum” multivitamins (those that include a long list of every vitamin and mineral available combined in various forms and potencies) are not the ideal choice. Not only do they include a wide variety of ingredients you don’t really need (or that are even potentially harmful when consumed over the long term), but even the ones that *are* beneficial to consume are typically under-dosed and delivered in lower quality forms that your body can’t properly absorb.

When it comes to proper micronutrient supplementation, the four vitamins and minerals listed below are where the majority of trainees should place their focus.

### Vitamin D

Unless you live in a warm climate and spend multiple hours a day outside in the sun, there’s a very good chance that your Vitamin D levels fall below the ideal range. The list of overall health and fitness benefits associated with improved vitamin D status is very lengthy, including strengthening the immune system, boosting cognitive function, improving mood and well-being, optimizing testosterone levels and increasing muscular strength and performance.



## Magnesium

Since magnesium is depleted from the body through sweat, those who regularly perform weight training, cardio and other intensive physical activities tend to have lower levels that can be improved through supplementation. Magnesium is a co-factor in hundreds of important processes in the body and plays a key role in maintaining optimal energy production, heart health, digestion, detoxification, bone strength, mood and more. It also assists in keeping testosterone and IGF-1 levels elevated, as well as improving muscular performance and sleep quality.

## Zinc

Just like magnesium, zinc is another important mineral involved in testosterone production and immunity (along with hundreds of other processes related to general health) and is drained from the body through sweating. Several studies have shown that hard-training lifters and athletes are at risk for impaired zinc status, increasing the need for additional supplementation to prevent a potential deficiency.

## Vitamin K

Obtaining optimal levels of vitamin K through food alone is often very difficult (unless you regularly eat fermented soy), making additional supplementation a smart option for both gym-goers and sedentary individuals alike. Vitamin K plays an important role in the maintenance of cardiovascular health, bone strength and insulin sensitivity, and may increase longevity as well.

## **Dosing Guidelines**

Although there is no single “perfect” dosage that will apply to every single person across the board (since the ideal amounts ultimately depend on the specific diet, training program, lifestyle and genetics of the individual), these are the basic ranges that will work safely and reliably in most cases:

**Vitamin D:** 2000-4000IU per day in the form of vitamin D3.

**Magnesium:** 200-400mg per day in the form of magnesium citrate, gluconate or diglycinate.

**Zinc:** 15-30mg per day in the form of zinc citrate, gluconate or picolinate.

**Vitamin K:** 500-1000mcg per day as a mixture of vitamin K1 (phytonadione) and vitamin K2 (menaquinone).

These vitamins and minerals are best consumed alongside a meal to maximize absorption and minimize stomach discomfort, and should ideally be taken with breakfast and/or lunch since vitamin D may interfere with sleep quality if taken too late in the day.

## Recommended Product(s)



One way to go about supplementing with these recommended micronutrients is to simply purchase them all on their own individually. However, a much more convenient option is the [Microcore](#) blend from RealScience Athletics, as this product combines all of them together into a single formula using their highest quality forms and full potencies. That way you can meet your daily vitamin and mineral needs in the most streamlined way possible without any guesswork involved and know you're getting a premium grade product that your body can fully utilize.

[Microcore](#) takes the opposite approach of the common “full spectrum” multivitamin by focusing only on the select micronutrients that hard-training lifters truly require. The formula includes vitamin D, magnesium, zinc and vitamin K and excludes all of the other vitamins and minerals that you don't need to be paying for or that are potentially harmful when consumed in excessive amounts.

[Microcore](#) also includes a full B vitamin complex as an added bonus, as these compounds play a critical role in converting food into usable energy and aid in an endless number of important processes related to the immune system, hormone production, cognition, growth/repair of cells and much more. Although they can be found in abundance in whole foods, some data suggests that intense physical activity increases B vitamin requirements and that some athletes may have less than optimal levels. Given the possibility of an additional health and performance benefit and the minimal impact on cost, the nine B vitamins (thiamin, riboflavin, niacin, pantothenic acid, pyridoxine, biotin, folate and cobalamin) were included in [Microcore](#) to ensure that all your bases are fully covered in this area while still staying well within safe limits.

### **Additional Notes**

Calcium is one other mineral to consider, as some people do tend to fall short of the optimal daily amount. Since calcium intakes can vary significantly from person to person based on their diet (primarily dependent on whether or not they consume dairy), calcium is best supplemented with on an “as needed” basis only if it’s required to help an individual meet the recommended intake of about 1000mg daily. If your calcium intake is a bit on the lower end, calcium citrate is a reliable form to consume for supplemental purposes.

# FISH OIL

## Supplement Description

Fish oil contains the highly valuable omega-3 fatty acids EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid), two essential nutrients that produce a long list of benefits within the body related to improving overall health and preventing disease. Fish oil is backed by countless studies demonstrating it to be an effective supplement for a variety of uses such as improving heart health, reducing inflammation, improving joint health, boosting cognitive function, raising immune system function and enhancing skin health, vision and circulation.

A proper daily dose of EPA and DHA can also have positive effects on your ability to build muscle, burn fat and perform at your full potential in the gym by increasing activation of the mTOR pathway (a central trigger of protein synthesis), reducing cortisol levels (helping to prevent muscle breakdown), improving fatty acid oxidation, increasing insulin sensitivity, decreasing the effects of delayed onset muscle soreness and reducing joint pain.

Unfortunately, despite all of the potential benefits associated with adequate EPA/DHA consumption, the average person following a typical Western diet consumes just 10-20% of the optimal daily amount. The American Heart Health Association recommends 1 gram of combined EPA/DHA per day, with some research showing benefits up to as high as 6 grams.

If you are in the minority of people who consume the equivalent of about one serving of fatty fish every day (roughly 100 grams), then you're likely already receiving enough EPA and DHA from your diet to maximize its benefits. However, keep in mind that eating very high amounts of fish rich in omega-3's also increases your risk of consuming an excessive concentration of heavy metals and other environmental toxins, making fish oil supplementation a good option to help get in your daily dose without this potential downside.

## Dosing Guidelines

A good supplemental guideline to aim for is 1-2 grams of combined EPA/DHA per day, going with the lower or higher end depending on how much (if any) fatty fish you consume from your regular diet.

Although fish oil is not a stimulant, it does increase brain activity and so a slight stimulatory effect may be felt after supplementation. For that reason, taking your fish oil dosage in the morning and/or afternoon would be ideal.

## Recommended Product(s)



There are an endless number of different fish oil products on the market to choose from, but a very high quality option that matches all of the guidelines a premium grade oil should follow is the [O3 Prime](#) formula from RealScience Athletics. [O3 Prime](#) provides a 100% re-esterified triglyceride form fish oil, delivering a higher absorption rate in comparison to the commonly sold ethyl ester and natural triglyceride forms. It's sourced from Icelandic deep water anchovy, as studies have shown that small, cold-water, non-predatory fish provide the healthiest source of oil available.

[O3 Prime](#) is processed using a method known as “enhanced molecular distillation” to purify the oil further, and contains 565mg of combined EPA/DHA per serving delivered in enteric coated, lemon flavored softgels to eliminate the fishy aftertaste very common with other lower grade fish oil products.

As an added bonus, [O3 Prime](#) is also a proud member of “Friend Of The Sea”, a strict certification that evaluates manufacturers to ensure that they're sourcing their oil using sustainable, environmentally friendly methods. This includes the use of minimally destructive fishing methods, limiting how much can be caught from specific areas, avoiding critical habitat areas, prohibiting the use of growth hormones/GMO's/toxins, and minimizing carbon footprint.

## Additional Notes

Since [O3 Prime](#) is delivered in the leading quality re-esterified triglyceride form (which is less susceptible to rancidification than other forms) and is provided in softgels coated with natural lemon flavoring, the chance of experiencing “fish burps” is very unlikely as long as you consume it alongside food. However, if you do experience this issue, keeping the bottle in the freezer and splitting the dosage up throughout the day should eliminate it.

# CREATINE MONOHYDRATE

## Supplement Description

Creatine is the single most researched sports supplement available and is backed by hundreds of studies demonstrating it to be a safe and effective compound for improving muscle growth and training performance.

The primary way that creatine works is by improving the efficiency of the body's ATP energy system, resulting in an increase in overall muscular strength. ATP (adenosine tri-phosphate) is the key energy molecule utilized during short, explosive bouts of exercise such as weight training. This energy is produced as the body "rips off" one of ATP's phosphate groups and converts it into ADP (adenosine di-phosphate). Supplemental creatine helps the body convert ADP back into ATP at a faster rate, allowing you to lift slightly more weight and squeeze out additional repetitions on your sets.

Since creatine requires additional water for it to be stored in the body, another added benefit is that it produces a slight increase in muscle "fullness" as it draws that extra fluid into the muscle cells. Some people worry that this will result in a "soft" or "bloated" looking appearance, but this is not the case since the added water is stored intra-muscularly rather than directly beneath the skin.

## Dosing Guidelines

Consume 3-5 grams (roughly 1 rounded teaspoon) of creatine once per day. You can mix your creatine with any liquid of your choice (juice, water, tea, coffee, protein shake etc.) and can take it at whatever time of day is most convenient for you. Creatine has no immediate, acute effects on strength and performance, and once your body has reached full creatine saturation, that creatine will always be readily available for your muscles to use any time they need it. For that reason, there's no specific benefit to taking creatine directly before your workout as is often recommended.

Although many creatine products will commonly advise the use of a "loading phase" (where 20 grams in total is consumed in divided doses of 5 grams for the first 4-5 days), this is also an unnecessary method. A loading phase will allow you to experience the full benefits of creatine within a slightly shorter time frame, but 2-3 weeks at the standard 3-5 gram per day dose will still get you to the exact same point regardless.

There's also no need to perform a "creatine cycle" by periodically going "on" and "off" every few weeks or months as is also sometimes advised. Continually un-saturating and re-saturating the muscles with creatine is not going to provide any advantage beyond steady

continuous use, and there is no evidence to suggest that ongoing creatine supplementation poses any health risks or causes any alterations to the body's natural production.

### Recommended Product(s)

Despite the many “new and improved” forms of creatine that have been released over the years (such as creatine ethyl ester, creatine hydrochloride, buffered creatine, creatine nitrate and creatine serum), not a single research study to date has ever demonstrated any of these so-called “advanced” creatines to be superior to the original monohydrate form in any way.

Creatine monohydrate has an extremely high bio-availability in humans of nearly 100% and will result in full creatine saturation of the muscles within a few weeks of continued use. It does not cause “bloating”, “cramping” or other unwanted side effects as many companies will often claim, and has a solid safety profile backed by countless studies. There's really nothing more you can ask for from a creatine supplement, and until or unless further research is conducted to show otherwise, monohydrate is still the most reliable and cost-efficient option available by far.

Just make sure that your monohydrate is sourced as Creapure™ (you'll see this listed on the product label), as this is the highest grade form available and will ensure that you're receiving a fully purified powder that meets label claim. There are many different Creapure™ based products out there to choose from, with [Optimum Nutrition 100% Creatine](#) being a reputable source to go with.

### Additional Notes

A certain percentage of the population (up to 30%) are classified as “creatine non-responders” who don't obtain any noticeable benefits from creatine supplementation. This may be due to certain genetic differences and/or the amount of creatine that was already being naturally consumed through the diet. However, given the very low cost of creatine supplements (anywhere from 2-4 cents per gram if you select the right product), you can experiment with it very inexpensively to determine whether or not it's worth keeping in your plan. If you don't experience any clear increase in strength or any changes to your visual appearance or scale weight after 2-3 weeks of consistent use, there's a good chance that you're a non-responder (or at least, a minimal responder) and can simply discontinue using it.

## PRE-WORKOUT

### Supplement Description

The purpose of a pre-workout formula is to maximize the overall quality of your training sessions by increasing your levels of energy, strength and mental focus. While a pre-workout would not be considered a “mandatory” inclusion in an effective supplement plan, a few basic ingredients prior to hitting the gym can certainly be a helpful addition for those who enjoy the extra “kick” they provide and who are serious about fully optimizing their training performance.

However, it’s important that the terms “few” and “basic” not be overlooked here, as there’s no need to turn your pre-workout supplementation plan into an overly complicated process involving an endless list of different ingredients costing 50 dollars a month or more. The vast majority of fancy “commercial” pre-workout blends might seem appealing at first glance, but in most cases they’re based on nothing more than over-hyped marketing and flashy packaging as opposed to legitimate supplement science.

Rather than trying to needlessly cram 8, 10, 12 or more different ingredients into your pre-workout blend (many of which are likely providing minimal to no real benefit at all in the first place), a much more effective approach is to just focus in on a smaller number of compounds (those that are actually backed by solid research) and consume them in their full clinical doses and highest quality forms for maximum benefit. While there are several viable pre-workout compounds that could be potentially used for this, three particular ingredients stand out based on their overall effectiveness, safety profile and cost.

### Caffeine

Caffeine improves workout performance by increasing energy levels, mental focus and alertness. Caffeine has also been shown in research to directly boost muscular strength, cardiovascular endurance and reaction times, along with lowering the perception of fatigue and discomfort during training. In addition, caffeine helps to offset the natural decrease in strength that occurs during morning workouts as compared to afternoon/evening workouts, which is a useful benefit for those who prefer to train earlier in the day.

### L-Tyrosine

This amino acid is one of the primary building blocks for important catecholamines involved in neuromuscular performance: dopamine, adrenaline and noradrenaline. Several studies have shown significant benefits associated with l-tyrosine supplementation regarding cognitive enhancement, improvements in concentration, as well as helping the



mind cope more effectively in stressful situations. L-tyrosine works synergistically alongside caffeine, since it increases catecholamine production while caffeine increases their release.

### **Citrulline Malate**

L-citrulline is an amino acid, while malic acid is a salt compound found in apples and other fruits. When combined as citrulline malate, these compounds work together to minimize muscular fatigue by accelerating the clearance of ammonia and lactate, two metabolic waste products that impair muscular contractions. Citrulline malate has also been shown to reduce post-workout muscle soreness, which can improve recovery in between training sessions and maximize strength and performance on upcoming ones. Along with these two benefits, citrulline malate may also improve aerobic exercise performance and increase nitric oxide circulation by raising blood levels of l-arginine.

### **Dosing Guidelines**

**Caffeine:** A standard dose of caffeine for pre-workout purposes is between 200-300mg. This amount is large enough to deliver the performance boosting benefits of caffeine, but small enough to eliminate the unwanted “jitters” or “mid-workout crash” that often accompanies larger doses.

**Tyrosine:** Effective dosages for l-tyrosine can fall into quite a wide range depending on a variety of factors, from as little as 500mg up to 6000mg or more. As part of a balanced pre-workout blend, a middle ground dose of around 2000-3000mg will work well for most trainees when paired with 200-300mg of caffeine.

**Citrulline Malate:** The research supported dosage for citrulline malate typically falls between 6-8 grams, taken in a 2:1 ratio of l-citrulline to malic acid. Citrulline malate has no stimulant properties, though consuming very large doses can cause gastrointestinal discomfort in some people. Just to be on the safe side, it's usually best to start off with a slightly lower amount in order to assess your tolerance first.

This pre-workout combination should ideally be taken 20-30 minutes before training for the best results.

## Recommended Product(s)



While purchasing all of these ingredients on their own is one option, the [PureForm](#) pre-workout blend from RealScience Athletics is a great way to streamline the process and guarantee that you're getting the highest quality versions and proper doses for each one.

[PureForm](#) provides a 100% naturally sweetened fruit punch flavored powder consisting of the highest grade forms of caffeine anhydrous (200mg), l-tyrosine (3000mg) and citrulline malate (6000mg) in each scoop.

As an added bonus, the formula also includes 200mg of the amino acid l-theanine, which works alongside caffeine to further increase mental focus, alertness and motivation, while at the same time “smoothing out” the caffeine buzz by inducing mental relaxation without any sedative effects. The combination of l-theanine and caffeine is one of the most widely studied “nootropic stacks” available for promoting enhanced cognition, since the two compounds have synergistic effects when consumed together.

## Additional Notes

In order to maximize the body's sensitivity to these ingredients and prevent tolerance from building, a pre-workout should ideally be used no more than 2-3 times per week (4 times at the very most) and should be cycled off for 1-2 weeks after every 6-8 weeks of continued use. Minimizing your intake of other caffeine-containing beverages is helpful for this as well.

You should also make sure to avoid consuming your pre-workout within 6-8 hours of bed to ensure that your sleep isn't disturbed, and if you have any pre-existing medical conditions or are using any prescription medications, consult your physician first before supplementing with any stimulant-based ingredients.

A wooden spoon filled with light-colored capsules on a wooden surface with green herbs in the background.

**SECTION #2**  
**SECONDARY SUPPLEMENTS**

## BETA ALANINE

### Supplement Description

Beta alanine is a non-essential amino acid and is a precursor to a substance called carnosine. Carnosine is highly concentrated in muscle tissue and helps to neutralize the buildup of hydrogen ions, which are a by-product of muscular contractions that are formed as ATP is broken down for use as energy. As hydrogen ion concentrations rise, the PH of the muscle falls and it becomes more acidic. This rise in acidity is what causes the burning sensation felt in the muscles during prolonged moderate to high intensity activities such as weight training and cardiovascular exercise.

Beta alanine supplementation has been shown to increase intramuscular levels of carnosine by up to 64% after 4 weeks and 80% after 10 weeks. The result is a slight improvement in performance during physical activities lasting 60-240 seconds in duration, such as higher rep weight training (15-20+ reps per set), moderate to high intensity cardiovascular exercise and start/stop sports.

For those whose workouts are primarily centered around low to moderate rep sets, beta alanine supplementation likely won't provide anything noticeable in the way of improved performance. However, for those who do include a reasonable amount of higher rep work in their programs, utilize circuit-style training with shorter rest periods, or who are looking to increase their endurance levels during cardio intensive activities, beta alanine can be optionally included to provide a small additional boost.

Just keep in mind that the results from beta alanine will be fairly modest overall (likely no more than a few percent increase), so it is typically only recommended for those who are aiming to squeeze out every last bit of progress from their workouts and who have the extra money to spend.

### Dosing Guidelines

The research studied dosage for beta alanine falls between 3.2-6.4 grams daily. The lower end dose appears to be equally as effective as the higher one when used over the long term, so a middle ground amount of 3-4 grams daily (slightly less than a teaspoon) is a good figure to aim for. The full effects of beta alanine supplementation will be experienced after 6-10 weeks of daily use.

Beta alanine can be mixed with any liquid of your choice and can be taken at any time during the day. Although many pre-workout supplements include beta alanine in their formulas, beta alanine does not provide any immediate effect when used directly prior to training. The benefits of beta alanine are produced as a result of consistent daily supplementation over the long term, which gradually raises and sustains elevated levels of carnosine in the muscle tissue.

## Recommended Product(s)

There are many high quality beta alanine products out there to choose from, and aside from comparing prices to find the most economical choice, the only real factor to take into account is how the beta alanine is sourced. Check the label and always go with a product that sources the beta alanine from CarnoSyn™. This ensures that you're getting a pure, high quality source of beta alanine as opposed to the regular l-alanine that some companies use in order to cut costs. [PrimaForce Beta Alanine](#) is one high quality option of many.

## Additional Notes

Beta alanine supplementation often leads to a harmless tingling/flushing sensation on the surface of the skin about 10-20 minutes following consumption. This is known as the "histamine response" and gradually subsides with continued use. If you find this sensation uncomfortable, it can be minimized by splitting up the dosage throughout the day and/or by consuming your beta alanine with a meal.

# L-CARNITINE L-TARTRATE

## Supplement Description

L-Carnitine is an amino acid that is formed from l-lysine and l-methionine. Its primary function is to transport fatty acids into the mitochondria, which is the primary area in the cell for energy production. L-carnitine l-tartrate (LCLT) is a salt of l-carnitine that is bound to tartaric acid. Although the research on LCLT is still in its infancy and requires further investigation, it does possess several mechanisms of action that could make it a potentially useful supplement for optimizing muscle growth and strength gain over the long term.

Supplemental LCLT has been shown to increase the concentration of androgen receptors in muscle tissue, which are the areas of the cell that testosterone attaches to in order to exert its anabolic effects. Rather than boosting testosterone levels directly, this mechanism may improve the muscle building effects of one's existing testosterone by providing a greater number of receptors for it to act on. It's important to note that this has only been observed in test tube studies thus far, so more research is needed to confirm if oral supplementation produces the same effect in humans.

In addition to its possible role in increasing androgen receptors, studies have also demonstrated that LCLT reduces markers of muscle damage after anaerobic exercise. This is most likely due to its ability to improve muscle tissue oxygenation, potentially allowing for improved recovery in between workouts.

As with beta alanine, LCLT should be viewed as an optional add-on for those who already have all of the basics covered and the extra money to spend, and who are aware that its benefits are still speculative and will likely only produce a modest improvement at best.

## Dosing Guidelines

The research studied dosage for l-carnitine l-tartrate is 2 grams daily, taken at any time of day.

## Recommended Product(s)

Any basic l-carnitine l-tartrate supplement is ultimately acceptable, with [Bulk Powders LCLT](#) being one of many fine options.

## JOINT SUPPLEMENTS

### Supplement Description

The most effective means of keeping your joints and connective tissues healthy over the long term is by taking the proper training precautions as discussed in the “injury prevention” section of The Body Transformation Blueprint Manual. However, for those who are already dealing with existing joint pain or who simply want to take every step possible to minimize the risk of future injuries, supplementation is another option to consider.

It's important to keep in mind though that joint pain can be caused by a wide variety of different factors, and no supplement is guaranteed to provide benefits in every case. For that reason, joint supplements are best viewed as simply being a form of extra “insurance” to help mitigate joint discomfort and injury risk, but should not be relied upon as a first-line treatment.

There are many different compounds available that are commonly used for the purpose of improving joint health, and below are the four main options that would be recommended.

### Fish Oil

The previous section already touched on the wide variety of benefits associated with fish oil supplementation, one of those being its ability to reduce inflammation and improve joint and connective tissue health as a result. EPA and DHA decrease the levels of certain enzymes that degrade cartilage (IL-1alpha, TNF alpha, COX-2) and increase anti-inflammatory markers such as IL-10 and TGF beta.

Unlike many other joint care supplements that have only been studied in the context of treating diseases such as arthritis, fish oil has been shown to decrease swelling, stiffness and pain associated with work-related joint stress and is commonly supplemented by weightlifters and athletes for this reason.

The recommended dosage previously outlined was 1-2 grams of combined EPA/DHA per day. Those who are utilizing fish oil specifically for joint care purposes should stick to the higher end of the range at 2 grams daily.

**Recommended Product:** [O3 Prime](#)

### Curcumin

Curcumin is an anti-inflammatory compound derived from turmeric (*curcuma longa*). It works by inhibiting the body's cyclooxygenase (COX) enzymes, acting similarly to nonsteroidal anti-inflammatory drugs (NSAIDS) such as aspirin and ibuprofen. Some research has shown curcumin to be equally as effective as these drugs for relieving the pain and inflammation associated with both rheumatoid and osteoarthritis. Whether or not these

joint-related benefits carry over to athletes without arthritis has not yet been specifically studied, but given its mechanism of action, curcumin would be a reasonable addition to a supplement stack aimed at optimizing overall joint health.

It's important to note that curcumin itself has a very low bio-availability in humans and must be consumed alongside an enhancing agent in order to increase its uptake. The most effective way of doing this is to pair curcumin with a black pepper extract, as this has been shown to increase curcumin absorption significantly. 500mg of curcumin in combination with 5-10mg of a black pepper extract 1-2 times per day would be considered a standard dose.

Although not formally studied, some users anecdotally report a libido reducing effect associated with higher doses of curcumin. This effect appears to be inconsistent from person to person but is something to keep in mind if you do decide to supplement with it.

**Recommended Product:** [Doctor's Best Curcumin C3 Complex](#)

### **Boswellia Serrata**

*Boswellia serrata* is a plant source of frankincense, a compound that has been used in traditional medicine for thousands of years as a way of treating inflammation. Frankincense is rich in a compound known as acetyl-keto-beta-boswellic acid (AKBA), which has been shown to inhibit the production of proteins that lead to inflammation. Some research has shown *Boswellia serrata* to be as effective as certain pharmaceuticals for treating joint pain and improving flexibility.

*Boswellia serrata* is often used alongside curcumin, as it has been proposed that the two may work synergistically together due to their differing mechanisms of action. While curcumin treats joint pain by inhibiting cyclooxygenase (COX) enzymes, *Boswellia serrata* exerts its effects by reducing the production of lysyl oxidase (LOX) enzymes.

The recommended dosage for *Boswellia serrata* is 100-200mg once per day with breakfast, ideally in the form of AprèsFLEX<sup>™</sup>, Aflapin<sup>™</sup>, or 5-Loxin<sup>™</sup>, since these specific forms provide the highest concentration of the active ingredient AKBA.

**Recommended Product:** [LifeExtension 5-LOX Inhibitor](#)

### **Cissus Quadrangularis**

*Cissus quadrangularis* is a plant that belongs to the grape family and has been used in traditional medicine to heal joints and treat bone fractures. It is commonly used by athletes as a joint care supplement, though its research in humans is fairly limited at this time.

*Cissus quadrangularis* does seem to have a fairly high anecdotal success rate in those who supplement with it, and has also been shown to have very significant pain killing effects in rodents. Further evidence is needed to determine the precise mechanisms of this compound in humans, but *Cissus quadrangularis* could be optionally included by those



with the extra money to spend and who want to get every possible edge in this area of their supplement plan.

The optimal dosage for *Cissus quadrangularis* is yet to be determined, though the one study that did show benefits in humans used 3200mg, which is also in a similar range to what the animal studies suggest. *Cissus quadrangularis* has been shown to have relaxant effects, so it is best taken after training or before bed.

**Recommended Product:** [PrimaForce Cissus \(capsules\)](#) or [PrimaForce Cissus \(powder\)](#)

## Stacking Guidelines

Since the research behind these various joint health supplements is fairly mixed overall – and because each compound appears to have varying effects between individuals – there is no single established method of stacking them together for optimal results.

For most average trainees, a sensible approach would be to use fish oil as the primary base supplement, optionally paired with curcumin and/or *Boswellia serrata* depending on your budget and individual goals. For those who consider joint care to be an absolute top priority and who are willing to experiment with a compound whose benefits are mostly anecdotal at this time, *Cissus quadrangularis* can then be optionally tagged on at the end to fully round out the stack.

## Additional Notes

Three other popular supplements that are very commonly utilized for improving joint health are glucosamine sulfate, chondroitin and MSM, with many companies selling products that contain a blend of all three. While it is possible that these compounds may provide benefits for lifters and athletes, most of the research has specifically examined their effects in treating rheumatoid and osteoarthritis. Including glucosamine, chondroitin and/or MSM in your joint supplement stack is an option as well, though this should be treated as more of a “just in case” type of approach rather than being the main focus.



**SECTION #3**  
**NON-RECOMMENDED**

## BRANCHED-CHAIN AMINO ACIDS

### Supplement Description

The BCAA's consist of l-leucine, l-isoleucine and l-valine, three essential amino acids named this way because of their branching chemical structure. In supplemental form, branched-chain amino acids are typically consumed before, during and/or after training at a combined dosage of between 10-20 grams.

BCAA's continue to remain as one of the most widely used bodybuilding supplements on the market and are heavily promoted for their supposed ability to stimulate muscle growth, prevent muscle breakdown, reduce fatigue during workouts and decrease the effects of delayed onset muscle soreness.

### Why BCAA's Are Not Recommended

Despite their huge popularity and the many millions of dollars that are regularly spent on BCAA's every single day by consumers, the evidence overwhelmingly points to the fact that this supplement simply does not produce any significant anabolic or anti-catabolic effects when used in conjunction with a properly structured diet.

While it is true that the branched-chain amino acids play a central role in the muscle building process, virtually all high quality whole food protein sources are already very rich in BCAA content as is, often measuring as high as 15-25% per gram of protein. In other words, if you're already consuming adequate protein each day from your diet (0.8-1 gram per pound of body weight is a safe guideline to aim for), you'll already be receiving more than enough BCAA's in order to maximize protein synthesis.

Keep in mind that just because *some* BCAA's are good doesn't automatically mean that more is better, as there's a finite limit as to how much your body can utilize in any given day. This is probably why the only studies demonstrating significant benefits from supplemental BCAA's are those that were conducted in the absence of proper protein intake. Several studies have shown noteworthy effects when comparing the consumption of BCAA's versus a placebo, but no reliable research has been able to replicate these effects when BCAA's are used in combination with sufficient protein intake.

The use of BCAA's in isolation (such as during periods of fasting) also appears to be ineffective at stimulating additional muscle growth or preventing muscle breakdown. Although the consumption of l-leucine is in fact the underlying "trigger" for protein synthesis, the problem is that without the spectrum of other essential amino acids present, the body lacks the raw materials needed to actually construct new muscle proteins. It's analogous to having a construction team show up to build a house but not having any concrete, wood or tools handy.

Rather than supplementing with BCAA's as a way of warding off potential muscle loss during fasted training, the more effective option (as discussed in the previous section) is to consume either a full spectrum essential amino acid supplement or a scoop of protein powder instead. That way you'll be receiving all of the BCAA's needed to stimulate protein synthesis along with the other amino acids needed to carry out the muscle building process.

So much for the claimed anabolic/anti-catabolic effects of branched chain amino acid supplements, but what about their supposed benefits when it comes to reducing fatigue during training sessions?

This idea stems from the fact that as your workout drags on for longer periods of time, BCAA levels become depleted in the body and the amino acid tryptophan begins entering the brain at an increased rate. This influx of tryptophan causes serotonin levels to rise, producing feelings of physical and mental fatigue. BCAA's blunt this natural rise in serotonin by preventing tryptophan from entering the brain.

However, there are two key points to consider here, the first being that this will typically only be a concern during very long and exhaustive workouts similar to those that an endurance athlete might perform. If you're simply going into the gym to carry out a standard 60-90 minute weight training workout with normal rest periods inserted throughout, intra-workout BCAA's are probably not going to be noticeably helpful in terms of improving energy levels.

Secondly, even though BCAA's do decrease tryptophan uptake, they also decrease tyrosine uptake at the same time. As we covered in the previous pre-workout section, tyrosine is an amino acid that improves mental focus and energy. This reduction in brain tyrosine levels may produce a counter-acting effect and could partly explain why most research only shows a very modest performance benefit at best from BCAA consumption.

The final consideration for BCAA supplementation is in regards to its claimed benefit of reducing delayed onset muscle soreness. However, the only research demonstrating a decrease in muscle soreness involved BCAA's taken in isolation without any additional whole food protein. All this really tells us is that consuming BCAA's is better than consuming nothing at all, but it's perfectly plausible (and quite likely) that this effect would be mimicked by simply consuming adequate dietary protein and obtaining the branched chain amino acids that way.

What's the bottom line when it comes to branched chain amino acid supplements?

Rather than running out and spending your hard-earned money on a bottle of BCAA powder every month, just focus on eating enough total protein each day instead. This will easily provide your body with all of the branched chain amino acids it requires to optimize muscle recovery and growth, rendering stand-alone BCAA supplements unnecessary.

# TESTOSTERONE BOOSTERS

## Supplement Description

When it comes to building muscle, testosterone is king. It's the primary male sex hormone and plays a central role in the development of muscle mass and strength. The higher your levels of testosterone are, the faster and more efficiently you can alter your body composition and improve training performance. When bodybuilders take anabolic steroids, they're consuming synthetic variants of testosterone.

Because of the critical role that testosterone plays in maximizing muscle hypertrophy, an entire breed of "testosterone boosting supplements" have become available, promising huge increases in the body's natural production of this hormone. Tribulus terrestris, fenugreek, maca, d-aspartic acid, long jack and anti-estrogens are a few of the most popular examples.

## Why Testosterone Boosters Are Not Recommended

The one key factor to take into account when it comes to any product claiming to naturally increase testosterone levels is that simply "increasing testosterone" in and of itself will not automatically lead to measurable increases in muscle mass or strength. This is because in order for testosterone to exert any significant impact on your ability to build muscle or burn fat, the levels of this hormone must be boosted up into a supraphysiological range measuring several hundred percent or more.

As of now, no over-the-counter supplements exist that are capable of producing testosterone increases anywhere near this amount. The highest level that has been reached is through the use of d-aspartic acid, which has been shown to produce up to a 30-50% testosterone increase at peak efficacy. However, even this amount is likely not high enough to be of significant use to bodybuilders, and testosterone levels typically return back to baseline after around two weeks of consistent DAA use anyway.

Some of these so-called "testosterone boosters" may provide benefits in terms of increasing libido (maca is one supplement that has been shown to be reasonably effective for this purpose), but as a muscle building aid they don't appear to have any real use.

The one caveat here is that, for those with compromised testosterone levels due to certain vitamin or mineral deficiencies, proper supplementation can help to re-elevate those levels back into a normal healthy range. As covered in the previous multivitamin section, vitamin D, magnesium and zinc are the most important compounds to look at for this purpose since hard-training lifters in particular tend to have lower than optimal amounts.

Aside from that, those looking to naturally maximize their testosterone levels will be much better off to ignore the hype surrounding these ineffective "test boosters" and to just focus on adopting the proper training, nutrition and lifestyle habits instead. This includes

following a consistent weekly weight training and cardio program (while keeping the volume/frequency within the proper range to avoid overtraining), staying at a healthy body fat percentage, ensuring adequate consumption of dietary fat (no less than 25% of total calories), maintaining a healthy sleep schedule and minimizing external lifestyle stressors.

## GROWTH HORMONE BOOSTERS

### Supplement Description

Human growth hormone (hGH), also referred to as “somatotropin”, is a peptide hormone that is produced and secreted from the pituitary gland. It is released into the body in a pulse-like fashion throughout the day, stimulating the liver to produce insulin-like growth factor (IGF-1) which then aids in over 450 bodily functions including the growth and repair of bones and other tissues such as muscle, skin and organs.

Although its effects on muscle growth are fairly modest in otherwise healthy individuals, growth hormone administration can produce significant reductions in body fat levels even at relatively small dosages. This is believed to be due to IGF-1 competing with the same receptor sites as insulin on the surface of cells. As a result, less glucose is transported into the cells to be burned as energy, and body fat is preferentially utilized instead.

On top of this, growth hormone is often used as a “recuperative tool” both for enhancing recovery in between workouts (or for athletes who want to stay in peak condition between games and training sessions), and for healing injuries.

As the name implies, “growth hormone boosters” are supplements that are claimed to naturally increase GH levels in order to improve fat loss and speed up recovery.

### Why Growth Hormone Boosters Are Not Recommended

While there are compounds available that can boost growth hormone levels naturally to some degree, the increases are likely not large enough (or sustained for a long enough period of time) to where fat loss or recovery would be significantly affected. Keeping in line with the same reasoning given in the previous testosterone booster section, it must be understood that simply “increasing growth hormone” is not enough on its own. The real questions that need to be asked are “by how much” and “for how long”. As with testosterone, hGH levels must also in be significantly increased above baseline *and* for an extended time frame order to produce measurable effects on body composition.

Studies using exogenous growth hormone have been able to elevate whole-day hGH levels by 300-600%, however, there is no research available to show that any “natural” growth hormone supplements can produce results anywhere near this. Compounds that are commonly marketed for this purpose include l-arginine, GABA, creatine, alpha GPC, l-citrulline and melatonin. Much of the research on these supplements is mixed and inconclusive, demonstrating at best a short-lived spike in hGH which then falls back to baseline within a matter of hours.

When combined with other growth hormone boosting methods (such as maintaining a healthy body fat percentage, sleeping well each night and exercising intensely on a regular basis), it's possible that the small spike in hGH levels some of these compounds can deliver

may provide certain modest health benefits. If your primary goal is to improve body composition though, over-the-counter growth hormone boosters are not likely going to be of any real use.



# L-GLUTAMINE

## Supplement Description

Glutamine is a non-essential amino acid (meaning the body can produce it on its own) which becomes conditionally essential under periods of high stress. It is the most abundant amino acid found in human muscle, making up roughly 60% of the total content.

Though not quite as popular as in previous years, glutamine supplements are still commonly recommended as a “bodybuilding staple” by some for their claimed benefits of increasing muscle protein synthesis, strengthening the immune system, boosting growth hormone secretion and replenishing post-workout glycogen levels.

## Why L-Glutamine Is Not Recommended

The first important point to consider is that approximately 10% of your overall dietary protein intake will already be comprised of l-glutamine as is. Assuming you're consistently reaching the recommended daily amount of 0.8-1 gram of protein per pound of body weight, you'll already be consuming all of the glutamine necessary in order to maximize its muscle building benefits.

Secondly, a very high percentage of l-glutamine consumed in isolated supplement form never even makes it to the bloodstream and is instead used up by the intestines for energy. The percentage varies depending on how much glutamine is consumed, but the research seems to indicate an average of about 65%.

Thirdly (and most importantly), the overwhelming majority of the research has not shown any significant benefits associated with glutamine supplementation in relation to increasing muscle mass or strength. Glutamine supplements do not increase protein synthesis to any meaningful degree in otherwise healthy individuals (they are only helpful for this purpose in those suffering from clinical stress), do not improve immune function following exercise, and do not increase growth hormone levels to a high enough degree to positively influence fat loss. Glutamine does appear to be effective at replenishing glycogen levels following training, however, there is no need to purchase a glutamine supplement for this specific purpose since regular dietary carbohydrates will accomplish the exact same thing.

The only segment of the population who may benefit modestly from glutamine powders are vegans or vegetarians who have a low dairy intake. In that case, the total amount of glutamine being consumed from the diet may be low enough to warrant additional supplementation. However, it's not known what the optimal dosage is (though it's typically recommended at around 5-10 grams per day) or exactly how beneficial the added glutamine would truly be in the overall picture. For that reason, this is best treated as an optional “just in case” supplement to include in those specific instances.

## WEIGHT GAIN POWDER

### Supplement Description

“Weight gainers” provide a high calorie mix of protein, carbohydrates and fats in powdered form and are typically marketed to those who are looking for an easy way to increase their daily calorie intake in order to bulk up more quickly. While a pure protein powder may only provide roughly 120-130 calories in each scoop, weight gainers often contain as high as 800-1000 calories or more per serving and can be consumed on their own as a stand alone meal replacement.

### Why Weight Gain Powders Are Not Recommended

For those with a particularly high calorie maintenance level who have trouble meeting their daily needs for muscle growth (either due to having a naturally high basal metabolic rate or very high activity level), a *moderate* amount of a weight gain powder can be optionally used here and there to squeeze in some extra calories and make the overall process a bit easier. For the vast majority of lifters out there though, weight gain powders won't be necessary and are generally best avoided.

The first thing to keep in mind is that, as discussed in the nutrition chapter of The Body Transformation Blueprint Manual, it only requires a modest calorie surplus in order to maximize the body's muscle building capabilities over any given day. 100-300 calories above maintenance is all that will be needed in most cases, with the majority of calories consumed beyond that point simply being stored as fat. Aimlessly trying to cram in more and more calories through the use of these weight gain shakes will often push your total daily intake up to an excessive level, increasing the chances that you'll put on an unnecessarily high amount of body fat throughout your bulking phase.

The second reason why weight gainers should not be used as a primary source of calories is that the majority of their carbohydrate content is typically derived from maltodextrin. A small amount of maltodextrin won't pose any problems as part of an otherwise properly structured diet, but since it's really nothing more than a processed simple sugar devoid of any nutritional value, consuming maltodextrin in large quantities is not recommended from a basic health perspective. Some weight gainers do attempt to include other more nutrient-dense carbohydrate sources in their formulas (such as potato, oats or brown rice), but the taste on these types of powders is usually much less palatable.

Rather than purchasing a commercial weight gain powder as a way of bumping up your calorie intake, a much healthier (and better tasting) option is to just stick with a pure protein powder on its own and then simply blend in your own sources of carbohydrates and fats. Some good options for this include fruit, oats, dairy (such as milk or yogurt), nut butters and/or healthy oils like flaxseed or extra virgin olive oil. Going this route will provide you with all of the calories and macronutrients you need to support your muscle

building goal, along with the added vitamins, minerals, fiber and healthy fats that most typical weight gainers lack.

# HMB

## Supplement Description

Beta-hydroxy-beta-methylbutyrate, otherwise known as HMB, is a metabolite of the amino acid l-leucine. HMB supplements are claimed to stimulate muscle protein synthesis and inhibit muscle protein breakdown through a variety of mechanisms, leading to improved muscle growth, strength gains and enhanced recovery in between workouts.

HMB was first released in the mid 1990's and was touted as the "next big thing" in the bodybuilding supplement world. Although the hype around this compound has quieted down a bit over the years, it is still heavily marketed by some companies for its supposed muscle building and anti-catabolic properties.

## Why HMB Is Not Recommended

Early HMB studies conducted on animals showed very positive results. When given high amounts of HMB under stressful conditions, animals were able to retain more muscle mass and also had lower death rates than those who were not receiving it.

Studies conducted on humans, on the other hand, have produced conflicting outcomes. Positive results were initially seen with a dosage of 3 grams daily, but many of the original studies contained several methodological flaws and were performed on untrained individuals. In addition, the majority of the initial research showing beneficial effects was carried out by the same company holding the patent on HMB. This doesn't automatically make the studies invalid, but when looking at the hugely positive conclusions that were produced, it certainly is something to take it into account.

Several follow up studies on HMB showed either no positive effect at all on lean body mass or strength performance in trained lifters, or at best only a very modest improvement. Several of these studies even used double the amount that most HMB supplements recommend.

Two additional papers – one released in 2014 and the other in 2016 – produced outcomes that flew completely off the chart in comparison to any previous HMB research, even going as far as to claim that HMB was more effective than steroids for increasing lean mass and strength. Over the course of 12 weeks, the participants in one study gained an average of 18.7 pounds of lean mass while losing 8.5% body fat at the same time. Given that many previous studies had demonstrated no benefits at all associated with HMB supplementation in trained lifters, having research that (seemingly out of nowhere) was able to produce gains equivalent to that of steroids raised a huge red flag and drew plenty of skepticism from those in the scientific lifting community. Not surprisingly, it turned out that the studies were funded by Metabolic Technologies Inc. (a company that manufactures and sells HMB supplements), with two 2018 follow up studies once again showing no significant improvements in strength or lean mass as a result of HMB use.

All in all, considering the lackluster results produced by the majority of independent HMB research – and that the studies showing significant benefits were primarily those funded by companies marketing HMB supplements – the overall evidence does not support the use of HMB for improving muscle growth, recovery or training performance in those who are already consuming adequate protein (and thus l-leucine) each day.

# SARMS

## Supplement Description

SARMS (selective androgen receptor modulators) are synthetic drugs that are chemically similar to anabolic steroids. The most popular forms include Ostarine (GTx-024 or MK-2866), Ligandrol (LGD-4033), Andarine (S-4 or GTx-007), Cardarine (GW-501516) and LGD-3303.

The basic claim behind SARMS is that they provide a similar mechanism of action to steroids, but without the common side effects such as acne, male pattern baldness, testicular shrinkage, heart dysfunction and liver disease, among others. This is because, unlike anabolic steroids, SARMS stimulate the androgen receptors in muscle and bone cells only, with minimal effect on other cells throughout the body or the endocrine system in general.

SARMS are also not easily converted into the enzyme 5-alpha-reductase, which is responsible for converting testosterone into DHT (dihydrotestosterone) and generating many of the unwanted negative effects associated with traditional steroid compounds. SARMS also don't convert to estrogen as readily as steroids do, and don't suppress the body's natural production of testosterone to as high a degree since they're less potent overall.

## Why SARMS Are Not Recommended

When used within the proper dosages, SARMS do appear to produce muscle building effects more significant than other standard over-the-counter bodybuilding supplements such as creatine, beta alanine or LCLT. They're certainly nowhere near as potent as regular anabolic steroids like some companies claim, but the available research (though still in its infancy) and anecdotal evidence does support a hypertrophic benefit as a result of SARMS use. The reason why SARMS fall into the "non-recommended" category, however, is due to their potential side effect profile and the fact that their long-term mechanisms have not been sufficiently studied in humans. SARMS likely are safer than anabolic steroids when used in the short term, but that doesn't necessarily mean they're safe for ongoing use.

Research has shown that SARMS do suppress the body's natural production of testosterone (one study noted a 43% decrease in total testosterone after 3mg of Ostarine was taken for 86 days), exert possible negative effects on liver health (12 weeks of Ostarine use has been associated with an increase in the enzyme alanine aminotransferase, which can lead to liver damage over time), and decrease levels of HDL (the "good" cholesterol). In fact, some studies on rodents using 10mg/kg of body weight (an amount roughly equal to what many SARMS users routinely take) has been shown to cause cancerous intestinal growths. Whether this effect would carry over to humans is unknown, but it's just another reason to be cautious about these supplements.

It should also be noted that SARMs are now included on the World Anti-Doping Agency's list of banned substances, and some reports have also stated that The International Olympic Committee is currently planning to ban their use as well.

What's the bottom line on SARMs?

Each person is ultimately responsible for their own supplement choices and should conduct their own research to weigh out the potential benefits and drawbacks of consuming any given compound. That being said, given the lack of long-term human research and the available studies that do show potentially harmful side effects from their use, SARMs are probably best avoided for the time being until further research becomes available regarding their safety.

## MYOSTATIN INHIBITORS

### Supplement Description

Although its exact functions in humans are not fully understood as of yet, myostatin (also known as “growth differentiating factor-8” or “GDF-8” for short) is a protein encoded into the MSTN gene in humans that is believed to inhibit muscle growth in order to keep it within certain limits. Those with mutations to the MSTN gene show highly elevated levels of muscle mass and strength. Studies have also shown that blocking the myostatin gene in mice produces significant increases in muscle mass that otherwise would not be possible. Similar experiments have also been successfully performed on cattle in an effort to grow livestock with more meat and less fat.

Once the myostatin gene was discovered, supplement companies looked to capitalize by creating so-called “myostatin inhibitors” that would supposedly reduce the activity of the myostatin gene. This would then remove the limit that myostatin imposed on trainees and allow them to make improved gains in size and strength beyond their genetic limits.

### Why Myostatin Inhibitors Are Not Recommended

Of any bodybuilding supplement available on the market, myostatin inhibitors are perhaps the single most baseless one you’ll come across, completely lacking any scientific evidence at all to back up their claims. The first generation of myostatin inhibitors were commonly made up of a brown seaweed extract known as “cystoseira canariensis”. It was found that when this extract was placed into a test tube it would bind to myostatin. As far as the “supporting research” is concerned, that’s basically the extent of it. A 2004 study using 1200mg of a popular myostatin blocker daily concluded:

*“Twelve weeks of heavy resistance training and 1200mg of cystoseira canariensis supplementation appears ineffective at inhibiting serum myostatin and increasing muscle strength and mass or decreasing fat mass.”*

Further ingredients have been added to these formulas over the years, though not a single one has ever been shown to directly affect the activity of the myostatin gene or produce measurable increases in hypertrophy or strength as a result.

It’s important to keep in mind that even those at the leading edge of myostatin research still don’t fully understand the gene’s precise role in the muscle building process. How exactly does myostatin limit muscle growth? Can we actually alter this gene in adult humans and see measurable changes? This still remains to be seen.

Many supplement companies promoting their myostatin inhibitors often use pictures of the heavily muscled mice and cattle whose myostatin genes were altered. What they fail to tell you is that these alterations were achieved through state-of-the-art genetic engineering techniques (such as cell cloning and pre-birth gene manipulation) and were most certainly



not achieved by consuming brown seaweed extract or any other over-the-counter supplement compounds.

Bottom line?

Myostatin blockers represent the very epitome of fantasy-based supplement marketing and are not supported by a single shred of evidence for their claimed benefits of improving muscle growth or increasing strength.

# METHOXY

## Supplement Description

5-methyl-7-methoxy-isoflavone, otherwise known as methoxyisoflavone or "methoxy", belongs to the flavone family, a group of compounds derived from plants. Isoflavones can be found in soy beans and other soy-containing foods.

The list of claimed effects on this supplement is lengthy. Methoxy is said to increase protein synthesis, reduce body fat, decrease cortisol levels, promote increased endurance, an increased state of vitality, and also increase the body's ability to utilize oxygen. When it first became popular in the late 1990's, methoxyisoflavone was dubbed as the next "breakthrough miracle supplement." In fact, there was so much hype surrounding the effects of methoxy that many supplement companies went as far as to claim that it would produce all of the benefits associated with anabolic steroids but without the side effects.

## Why Methoxy Is Not Recommended

The first round of research on methoxy was conducted in the late 1970's on barnyard animals. It was shown that when methoxy was given to the animals, a 10-20% increase in overall body weight was seen. A small amount of research was also conducted on chronically ill patients that showed some minor body weight increases. Sadly, when it comes to the research, this is pretty much all that the "steroid-like effects" of methoxy are based on. As of today, there are absolutely no studies available that show any correlation between methoxyisoflavone supplementation and an increase in muscle mass or strength.

The only official methoxy study conducted on humans was presented at the 2001 American College of Sports Medicine annual conference. The study examined the effects of methoxy supplementation on 14 male college students following a resistance training program. The study was poorly controlled (training and diet protocols were not carefully monitored), and not surprisingly, no significant effects were seen.

Based on the complete lack of evidence, there should be no good reason at all to include methoxy in any fitness supplementation plan. There is no legitimate science to support its effectiveness and no reason to believe that it provides any benefit to bodybuilders or athletes. Furthermore, methoxy may produce false positive results in urinary tests for cannabinoid use, which is another reason to steer clear of this supplement if you are someone who undergoes drug testing.

# CLA

## Supplement Description

CLA (conjugated linoleic acid) refers to a mixture of polyunsaturated fatty acids, most commonly “c9t11” (cis-9, trans-11) and “t10c12” (trans-10, cis-12). It is claimed to aid fat loss in two main ways. The first is by binding to and activating “peroxisome proliferator-activated receptor alpha” (PPARα), a receptor that promotes the uptake, utilization, and breakdown of fatty acids. PPARα promotes fat breakdown mainly in the liver and to a lesser extent in brown fat, the heart, kidneys, and other metabolically active tissues.

The second way is by inhibiting the PPARγ receptor, also called PPAR gamma. Contrary to PPARα, PPAR gamma promotes fat gain. Inhibition of PPAR gamma increases fat loss by decreasing food intake, reducing the production of new fat cells, and preventing fat storage.

## Why CLA Is Not Recommended

The fat burning mechanisms of CLA may seem impressive on paper, but unfortunately the real life results are far less exciting. When examining the human research that has been conducted on CLA supplements up to this point, most of what we see is either a very minor benefit or no benefit at all.

For example, a double-blind study from the Royal Veterinary and Agricultural University in Denmark tested the effects of daily CLA supplementation in 122 obese but otherwise healthy subjects. After receiving 3.4 grams of CLA or a placebo daily for one year, the results showed no statistical difference in body weight or fat mass among both groups.

Not only are the results in obese individuals quite lackluster, but studies on average weight individuals who exercise regularly have found similar results. One study in the *British Journal Of Nutrition* found no statistical difference between subjects who consumed either a CLA supplement or a placebo (sunflower oil) for 12 weeks. Several other human CLA studies have come to the same conclusion, showing that supplementation does not decrease body weight or body fat and does not prevent fat gain.

Not only does CLA appear to be ineffective as part of a fat loss or muscle building program, but it may even have some potential drawbacks as well. When consumed through food as part of a regular balanced diet, CLA provides certain benefits such as improving immune system function and keeping cholesterol levels in check. But as is often the case with nutrition, there is a bell curve response to CLA. In other words, some is good, but more is not better and may even be potentially harmful. High doses of CLA in the range of 3,200-6,400mg daily (the amount commonly prescribed for fat burning purposes) have actually been shown to produce certain side effects in some individuals such as increased inflammation, elevated blood triglycerides, lowered insulin sensitivity and a reduction in HDL.

When considering the myriad of CLA studies showing no benefits from supplementation (and that the studies that do show positive effects are quite underwhelming and conflicting), along with the potential side effect profile, CLA gets a thumbs down as a fat burning supplement at this time.

# L-CARNITINE

## Supplement Description

Since this compound plays an important role in transporting fatty acids into the mitochondria of the cell where they can be utilized for energy, l-carnitine is regularly promoted as a fat loss supplement for its supposed ability to increase the rate of fat burning both during and after exercise.

## Why L-Carnitine Is Not Recommended

Although the l-tartrate form may provide a modest benefit when used as a muscle building supplement (as covered in the previous section), l-carnitine appears to come up short when used specifically for the purpose of improving fat loss. The fat burning mechanisms of l-carnitine do make sense in theory, however, it only appears to increase fat loss in those who are deficient. Those at risk for l-carnitine deficiency include vegans, vegetarians and the elderly, as well as those with compromised l-carnitine utilization.

One study in the American Journal of Clinical Nutrition showed notable decreases in fat mass when 2g of l-carnitine was given to elderly individuals over a six month period, while another demonstrated improvements in body composition and blood parameters with 2g of l-carnitine consumed over a thirty day period (also by elderly individuals). Unfortunately, its fat burning benefits don't seem to carry over to younger subjects with normal l-carnitine levels. L-carnitine does appear to influence fat utilization during and after training, but the effect is small enough to where it does not actually translate to increased overall fat loss in the long term.

Those who consume very little to no meat may benefit modestly from l-carnitine supplementation (the standard dose is between 500-2,000mg per day), whereas those who consume sufficient l-carnitine from their diets likely won't see any significant benefit.

The one other potential use for this compound is through the supplementation of acetyl l-carnitine (ALCAR) as a means of improving cognitive function and alertness during training sessions. ALCAR is sometimes added to pre-workout formulas (1000-2000mg would be a standard dose) and may indirectly improve body composition to a small degree by optimizing workout quality in those who respond well to it.

## RASPBERRY KETONES

### Supplement Description

Raspberry ketones are a natural substance found in various fruits such as blackberries, cranberries, kiwis, and of course, raspberries. They are often used in cosmetics and processed foods for their strong flavor and aroma. It is claimed that raspberry ketones stimulate fat loss by increasing the activation of certain genes involved in fat burning (such as adipose triglyceride lipase and hormone sensitive lipase), as well as by making the body more sensitive to the fat burning catecholamine norepinephrine.

### Why Raspberry Ketones Are Not Recommended

Some research (though mixed and inconclusive) does show that when taken in high doses, raspberry ketones can produce fat burning effects in fat cells. However, all of the studies examining this were either conducted on single cells in vitro (in a test tube) or on rats using very high concentrations which cannot be replicated through oral supplementation in humans. Rat studies used a dosage of .545-2.18g/kg (equating to 80-340mg/kg in humans), which is an impractical amount to be consuming based on the potency of available raspberry ketone supplements.

Even at these very high dosages, it still isn't known how significant the potential fat burning effect would be. There are no studies in humans to date showing any reliable fat loss effects from raspberry ketone supplementation, and the only study that did demonstrate a small benefit involved raspberry ketones taken in combination with caffeine, capsaicin, garlic, ginger and synephrine, so whether or not the raspberry ketones actually contributed to the overall result is unknown.

This supplement may have some potential use when it comes to aesthetic benefits such as hair growth and skin elasticity (though further research is still needed in these areas as well), but as a fat loss aid raspberry ketones are not backed by sufficient evidence to reasonably support their use in humans.

# HOODIA GORDONII

## Supplement Description

Hoodia Gordonii (also known as “Bushman's hat”) is a small shrub native to the Kalahari Desert in South Africa. It is promoted as a weight loss supplement for its supposed ability to suppress appetite and decrease overall food intake, increasing long term dietary adherence as a result.

## Why Hoodia Gordonii Is Not Recommended

The main active compound in hoodia (P57) has been shown to reduce food intake in rats receiving direct injections into the hypothalamus. Studies on humans using oral supplementation have not been able to replicate this effect. This is likely because P57 cannot easily reach the brain through oral supplementation in order to exert its appetite suppressing effects.

The first studies conducted on hoodia that did demonstrate positive effects were carried out by the same company that introduced hoodia to the supplement market (PhytoPharm), while a lone independent study on overweight women in the American Journal of Clinical Nutrition failed to replicate the results and showed no significant effect on energy intake between a placebo and a hoodia supplement.

Not only does hoodia appear ineffective at inducing weight loss in humans, but it may also be mildly toxic and therefore unsafe for supplementation. Though further research would be needed in this area, toxic effects have been confirmed in mice using the same concentrations that are typically used in available hoodia supplements for human consumption.

Overall, hoodia definitely falls into the “non-recommended” category of supplements since it may very well be dangerous to human health and doesn't appear to work for its intended fat burning purpose anyway.

# GREEN COFFEE BEAN EXTRACT

## Supplement Description

Green coffee beans are simply coffee beans which haven't yet been roasted. They contain a compound called chlorogenic acid that is normally removed once the coffee is processed. Chlorogenic acid is claimed to increase metabolic rate and reduce the absorption of carbohydrates, leading to improved fat loss.

## Why Green Coffee Bean Extract Is Not Recommended

Mice and rat studies have found that chlorogenic acid can reduce body weight by decreasing fat absorption, increasing the fat burning hormone adiponectin, and activating fat metabolism in the liver. Some human studies have also shown minor positive effects in overweight and obese individuals, though the results have been fairly weak and inconclusive overall. Many of the studies included serious methodological flaws, and several were also sponsored by the same companies selling green coffee bean extract. This doesn't necessarily mean the results are invalid, but it is a factor to take into account due to the increased risk for bias.

Aside from the few questionable studies that did demonstrate minor effects, others have shown no fat loss benefit at all associated with green coffee bean extract supplementation. For example, a placebo-controlled, randomized trial from Japan looked at the effects of 480mg of green coffee extract supplementation on 28 subjects and found no difference in body mass changes between the groups.

A 2011 meta analysis reviewing all of the available human studies on green coffee bean extract and weight loss concluded:

*“The results from these trials are promising, but the studies are all of poor methodological quality. More rigorous trials are needed to assess the usefulness of GCE as a weight loss tool.”*

It's possible that down the line new studies will emerge showing clearer fat burning benefits from this supplement, but based on the available evidence there shouldn't be any real reason to place your stock in it as a weight loss aid. Chlorogenic acid does hold promise in other aspects of health and cognition (such as improving heart health), but as a fat burner it's probably best left on the shelf for now.



# GARCINIA CAMBOGIA

## Supplement Description

Ever since Dr. Oz labeled garcinia cambogia as a “revolutionary fat burner”, the popularity of this pumpkin-shaped fruit skyrocketed. Garcinia cambogia is a source of hydroxycitric acid and is claimed to aid weight loss by inhibiting the enzyme citric acid lysase, a substance required for the synthesis of fatty acids. It is also claimed to reduce appetite by enhancing the taste experience of meals, thereby increasing overall satisfaction.

## Why Garcinia Cambogia Is Not Recommended

Although garcinia cambogia does seem to improve fat loss in rat and mice studies, the benefits don't appear to carry over to humans. This is likely due to the fact that citric acid lysase plays a more active role in fat production in rodents than it does in humans.

One 2011 study had 86 people supplement with 2g of garcinia cambogia daily. After 10 weeks, the researchers found no significant difference in weight loss or food intake between the garcinia cambogia supplementation group and those who received a placebo. Another 12 week randomized, double-blind trial in *The Journal of the American Medical Association* found that those who took a placebo lost more weight than those who supplemented with hydroxycitric acid. Other research has noted a very minor fat burning benefit, but the effect was quite small and unreliable.

All in all, garcinia cambogia looks to be nothing more than yet another over hyped weight loss supplement that is big on claims but weak on real world results. Even if it does produce some measurable effect on fat loss over the long term, it's likely so small so as to be essentially irrelevant.

## WHITE KIDNEY BEAN EXTRACT

### Supplement Description

Typically marketed as a “carb blocker”, white kidney bean extract (specifically known as alpha-amylase inhibitor isoform 1) is a weight loss supplement claimed to inhibit the uptake of starches in the small intestine when consumed alongside a carbohydrate-containing meal. The starches are left undigested and are excreted with the calories being unabsorbed, or they are eaten by colonic bacteria. The idea is that by blocking the digestion of carbohydrates, they can't be stored and thus won't lead to additional fat gain.

### Why White Kidney Bean Extract Is Not Recommended

Based on the available research, white kidney bean extract does appear to reduce the absorption of starches to some degree. Unfortunately, the effect is minor and unreliable in humans and may literally work out to the caloric equivalent of simply having a few less bites of food. Along with inhibiting the absorption of carbohydrates, white kidney bean may also have the negative effect of reducing the uptake of certain vitamins, minerals, antioxidants and other nutrients from the foods you eat alongside it.

Due to its relatively minor effects and potential downsides, white kidney bean doesn't hold much promise as a weight loss supplement and is likely best avoided until or unless further research becomes available to confirm its safety and efficacy.

## FINAL WORDS

As you can see, effective fitness supplementation does not need to be overly complicated or involve a large number of highly expensive products in order to obtain the improvements in body composition, training performance and overall health you're after.

The recommended items in the first section will typically be enough to cover the needs of most average lifters, with the supplements in section two being considered as optional additions that can be experimented with depending on your budget and individual needs.

If you don't see a particular supplement included in this guide, there's an almost certain chance that it falls into the non-recommended category. The advice given here is based on the most up-to-date supplement science available, with new research being continually reviewed as it is released.

If and when new studies are conducted that demonstrate any noteworthy outcomes, this guide will be updated accordingly to incorporate additional supplements that may be worth experimenting with.

*S. Salewanyj*