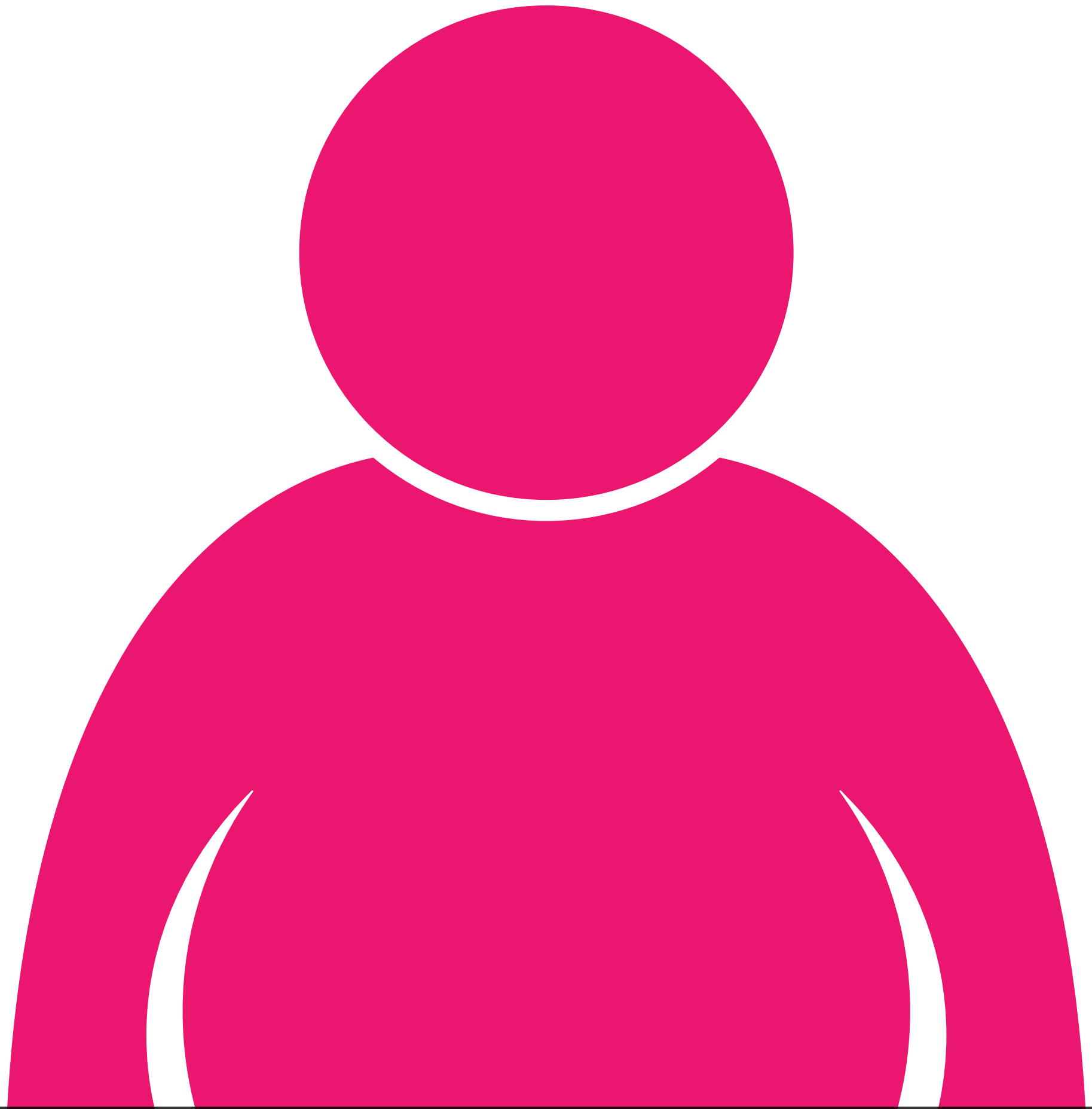
Examine.com

Fat Loss Supplement Guide



Written by the editors of Examine.com

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Medical Disclaimer

This guide is a general-health document for adults over 18. Its aim is strictly educational. It does not constitute medical advice. Please consult a medical or health professional before you begin any exercise-, nutrition-, or supplementation-related program, or if you have questions about your health.

This guide is built on scientific studies, but study outcomes are never homogeneous: individual results do vary. If you engage in any activity or take any product mentioned herein, you do so of your own free will, and you knowingly and voluntarily accept the risks. While we mention major known interactions, it is possible for any supplement to interact with other supplements, as well as with foods and pharmaceuticals.

A product may not contain the exact compounds and amounts listed on its label. Before you decide whether to take it, investigate it and its manufacturer. More than isolated compounds, herbs are prone to batch-to-batch variability, which can alter their efficacy and safety.

For evidence supporting the claims mentioned in this guide, please visit Examine.com.

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How to Use This Guide

The Examine.com team has been publishing research on nutrition and supplementation since March 2011. Drawing from all we've learned, we've designed this Stack Guide to help you figure out which supplements can help you reach your health goal, and which can hinder you or just waste your money.

Core supplements have the best safety-efficacy profile. When used responsibly, they are the supplements most likely to help and not cause side effects.

Primary options may provide substantial benefit, but only in the right context. A primary option is not for everyone, but if you read the entry and find that you meet the criteria, consider adding the supplement to your stack.

Secondary options have less evidence for their effects. They could work or be a waste of money. Keep them in mind, but think twice before adding them to your stack.

Promising supplements are backed by tradition or by mechanistic, animal, epidemiological, or anecdotal evidence, but not yet by convincing human trials.

Inadvisable supplements are either potentially dangerous or simply ineffective, marketing claims notwithstanding. Do not add them to your stack. At best, they'll be a waste of money; at worst, they can cause you harm.

Now that you've been presented with various supplements worthy of your interest, the time has come to combine them based on your objective. We'll guide you in **assembling your stack**.

Then comes the **FAQ**, in which we cover common questions that may arise when assembling your stack.

Lastly, we include information on **precautions and troubleshooting**.

With all this combined, you should be able to identify and assemble the supplement stack best suited to your objective.

Core Supplements

Protein

Why it's a core supplement

Protein can support fat loss in different ways. **First**, protein is more filling than carbohydrate or fat, though less so than protein *with* carbohydrate and/or fat. **Second**, digesting protein burns more calories than digesting carbohydrate or fat. **Third**, converting protein into fat is inefficient; excess dietary protein (i.e., dietary protein not needed to support physiological functions, such as preserving lean tissues) is more likely to be oxidized for energy or converted into glucose to be stored as glycogen. On a low-calorie diet, consuming enough protein helps preserve muscle mass, which is important since the goal is not to lose *weight* but *fat*.

Any protein found in food or supplements is called dietary protein. Whole foods should be your first choice, but if your food intake fails to cover your daily protein needs, you could add a supplement, preferably a powder.

Whey protein and casein powders are both derived from milk protein (which is 20% whey and 80% casein). If you are neither lactose intolerant nor vegan, look for a whey protein concentrate that is at least 80% protein. Whey protein is cheap and very anabolic (good for building muscle). Micellar casein is more expensive but more anti-catabolic (good for preserving muscle). Since micellar casein digests slowly, it is often seen as the ideal protein to consume before sleep.

But what if you are lactose intolerant or vegan? Fortunately, you can still supplement protein powders. Whey protein isolates contain very little lactose. For vegans, two popular options are soy protein, a complete protein, and a 70:30 pea:rice protein blend, which is seen as the vegan alternative to whey protein due to their similar amino acid profiles. Depending on processing techniques, the estrogenic isoflavone content can be greater in a soy protein isolate than in a soy protein concentrate, but it is still too small to elicit any significant hormonal response when as much as 200 g of soy protein isolate is consumed each day.

How to take it

In the United States, the Recommended Daily Allowance (RDA) for protein is 0.8 g per kilogram of body weight (0.36 g/lb/day), but more recent research suggests that 1.2 g/kg (0.54 g/lb) is a safer minimal daily intake for sedentary adults wishing to maintain muscle mass without losing or gaining weight, whereas adults with fat loss goals can benefit from 1.5–2.2 g/kg (0.68–1.00 g/lb).

Table 1: Daily protein intake

Body weight	0.36 g/lb (0.8 g/kg)	0.54 g/lb (1.2 g/kg)	0.68 g/lb (1.5 g/kg)	1.00 g/lb (2.2 g/kg
100 lb (45 kg)	36 g	54 g	68 g	100 g
150 lb (68 kg)	54 g	81 g	102 g	150 g
200 lb (91 kg)	72 g	108 g	136 g	200 g
250 lb (113 kg)	90 g	135 g	170 g	250 g

Adapted from Thomas et al. *J Acad Nutr Diet*. 2016 Mar; 116(3): 501–28.

Unless you have a pre-existing condition that affects your liver or kidneys, the intakes in the above table will not harm those organs. However, if you have a BMI of more than 30, you may want to calculate your protein requirements based on your goal body weight rather than your current body weight, so as to avoid overeating.

Consume 20–40 g of protein within the two hours preceding or following your workout to help stimulate muscle growth. Consume 20–40 g of protein before bed to help stimulate muscle growth or at least reduce muscle breakdown while you sleep. Spread the rest of your intake over a few meals, starting with breakfast, so as to ease digestion and provide your body with a consistent flow of amino acids.

Primary Options

5-HTP

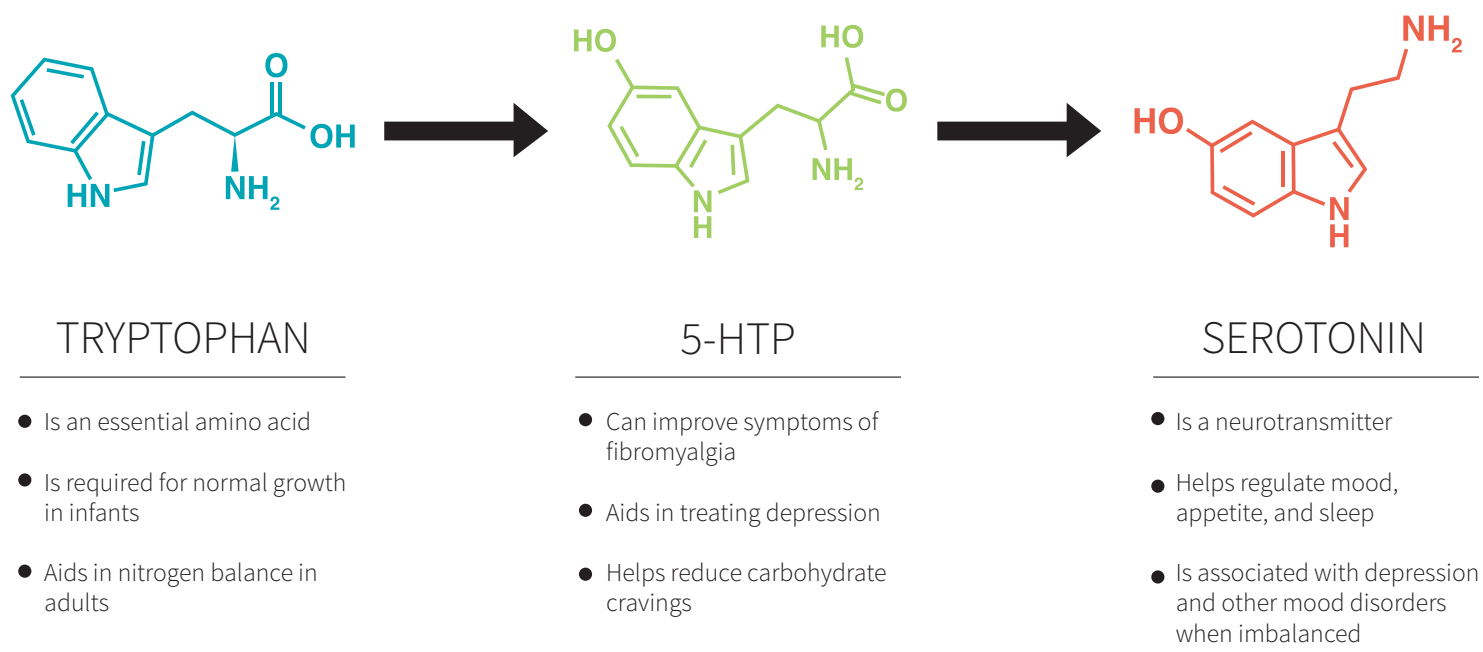
Why it's a primary option

5-Hydroxytryptophan (5-HTP) is an intermediate in serotonin production. Supplementing 5-HTP improves serotonin signaling, which may reduce carbohydrate cravings. Fewer and less intense carbohydrate cravings usually translate as reduced overall food intake, and thus as weight loss. Evidence suggests that 5-HTP works for people with obesity and/or diabetes; further research is needed to confirm whether healthier people can benefit.

Readily available as capsules and tablets, supplemental 5-HTP is extracted from the seed of the African shrub *Griffonia simplicifolia*.

5-HTP should not be taken alongside antidepressants, antipsychotics, or other medications that affect serotonin, such as dextromethorphan and tramadol.

Figure 1: Production of 5-HTP



How to take it

Take either 300–500 mg once a day or 150–250 mg twice a day, preferably 30 minutes before a meal, especially one containing carbohydrates. If taken in the

evening, 5-HTP may reduce food cravings before bed and may also improve sleep quality by helping the body produce melatonin, a hormone that regulates sleep.

Once in a while, you should suspend 5-HTP supplementation to assess if it is still able to reduce your carbohydrate cravings.

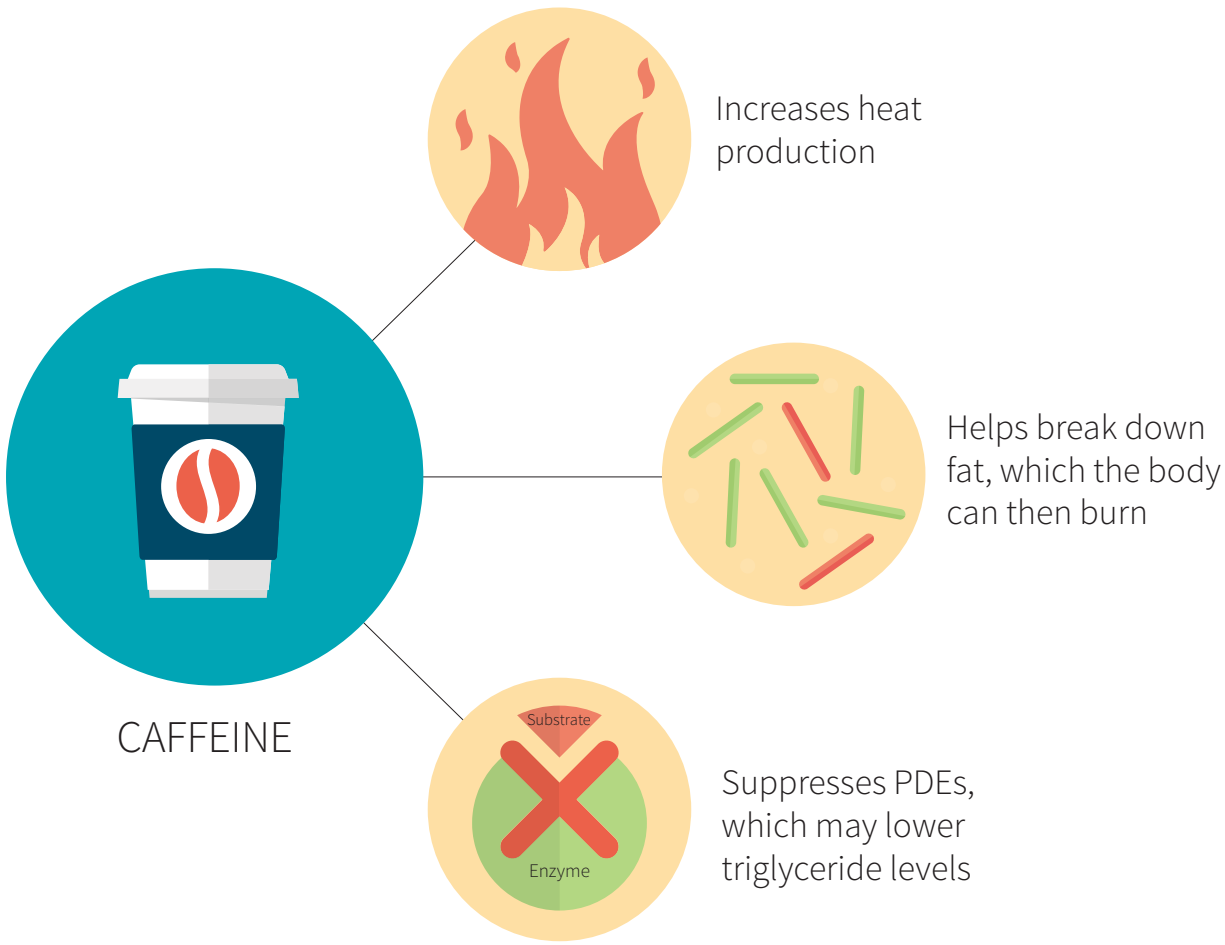
Caffeine

Why it's a primary option

By causing epinephrine (a.k.a. adrenaline) and dopamine to be released, caffeine has beneficial effects on energy, mood, and fat loss. However, after prolonged consumption, only the ability to ward off sleep remains strong. Euphoria and excitability both fade away, while the fat loss effect is at least significantly diminished.

Two distinct effects contribute to caffeine's fat-burning properties: a thermogenic effect (in the short term, caffeine increases heat production) and a weaker lipolytic effect (in the long term, caffeine causes triglycerides to release fatty acids, which the body can then use for fuel).

Figure 2: Three ways caffeine can assist in fat loss



More precisely, by inhibiting a category of enzymes called phosphodiesterases (PDEs), caffeine can increase the body's levels of cyclic adenosine monophosphate (cAMP). Elevated cAMP levels are associated with lower triglyceride levels in fat cells (due to cAMP increasing lipolysis) and improved protein synthesis in muscle cells. Moreover, when PDEs are inhibited, compounds that increase cAMP levels (such as synephrine and forskolin) might become even more effective at increasing heat production.

Even though coffee is a popular beverage worldwide, caffeine is not innocuous. Regular consumption leads to tolerance and often to dependence and withdrawal. Moreover, caffeine interacts dangerously with monoamine oxidase inhibitors (MAOIs), a kind of antidepressant, and several other pharmaceuticals, notably tizanidine.

Caffeine can also decrease blood lithium levels. Suddenly eliminating all caffeine from your diet can cause lithium levels to rise. If you are on lithium, keep your day-to-day caffeine intake roughly the same; if you wish to stop taking caffeine, talk with your doctor about slowly weaning yourself from it.

How to take it

To supplement caffeine for a prolonged period of time, take 100–200 mg twice a day (i.e., 200–400 mg/day). Caffeine in this range can be consumed through coffee or tea; do not supplement caffeine if you get enough through dietary sources. People unused to caffeine should start at the low end of this range. People who are sensitive or new to stimulants should supplement caffeine by itself before introducing other stimulants (such as synephrine).

Supplementing caffeine on an empty stomach can increase the rate of absorption, but it can also cause gastrointestinal upset. Caffeine can disrupt sleep when consumed in the evening, or even in the afternoon; even if it does not prevent you from falling asleep, caffeine will impair the *quality* of your sleep. In healthy adults, the average half-life of caffeine falls between 5 and 6 hours, but this number can vary greatly between individuals, because of genetics and other factors — heavy smoking can double the rate of caffeine metabolism, pregnancy can halve it, etc.

EGCG

Why it's a primary option

Tea is the most popular beverage in the world after water. Although there are many kinds of herbal infusions, actual teas are made from the leaf of *Camellia sinensis*. From least to most fermented, the best-known types of tea are: green, yellow, oolong, black, and pu-erh. In most of the world, white tea undergoes little to no fermentation (a little more or a little less than green tea), but in China it is a fermented tea.

Catechins are phytochemicals with antioxidant properties. The less fermented the tea, the richer it is in catechins. Of the catechins found in tea, epigallocatechin gallate (EGCG) is the most bioactive and abundant (48–55% of total catechin content).

As a fat burner, EGCG works by inhibiting catechol-O-methyltransferase (COMT), an enzyme that helps degrade catecholamines (the hormones and neurotransmitters dopamine, epinephrine, and norepinephrine). Catecholamines help break down stored body fat, which can then be used or excreted by the body. When EGCG inhibits COMT, it allows catecholamines to liberate stored fat over a longer period of time.

The addition of EGCG to a weight loss program has been shown to decrease body weight by 0.64–2.50 kg (1.41–5.51 lb) more than placebo over an average of 12 weeks.

How to take it

Take 400–500 mg of EGCG per day. The EGCG content of a standard cup of green tea can vary greatly, from less than 50 to more than 110 mg per cup. If you do not wish to take a supplement, you will need to drink some 4–8 cups a day to reach the minimum EGCG dose.

You can enhance the effects of EGCG by taking it with caffeine, but only if you are not a regular caffeine consumer. If you consistently take EGCG with caffeine, the fat-burning "boost" you get from pairing these supplements will diminish over time, and EGCG may become less effective than when taken on its own.

Taking EGCG on an empty stomach leads to a quadruple increase in blood concentrations but can cause nausea.

Yohimbine

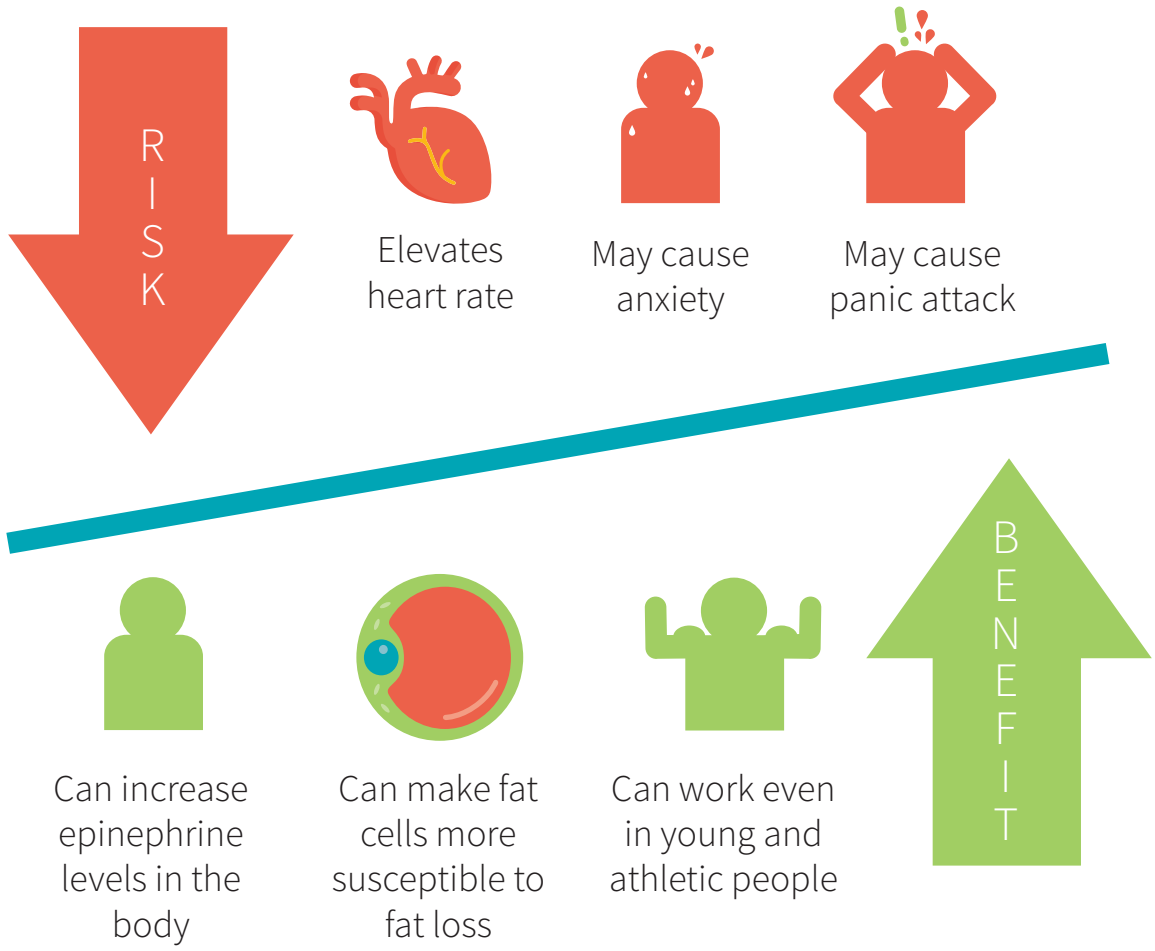
Why it's a primary option

Yohimb**ine** is a an alkaloid found in the bark of the African tree yohimb**e** (*Pausinystalia johimbe*). It works as a fat burner by increasing epinephrine (a.k.a. adrenaline) levels in the body and by inhibiting a regulatory process in fat cells that normally suppresses fat use. Unlike most other fat burners, yohimbine works even in young and athletic people.

Because the receptors it targets are found in higher levels around the oblique muscles, yohimbine might prove especially efficient at burning the "stubborn fat" of love handles. Studies that used topical yohimbine support this theory, but the evidence they provide is preliminary and weak.

Despite its efficacy, yohimbine is not a core supplement, due to a variety of side effects, such as elevated heart rate and anxiety. In fact, studies on anxiety commonly use yohimbine to *induce* anxiety. In people with panic disorders, it can even induce panic attacks. ***Anyone susceptible to anxiety should steer clear of yohimbine.***

Figure 3: Weighing the benefits and risks of yohimbine



Yohimbine should not be used alongside antipsychotics. It should not be used alongside antidepressants, such as monoamine oxidase inhibitors (MAOIs) or tricyclic antidepressants (TCAs). It should not be used by people who treat their migraines with ergotamines.

Yohimbine must be used carefully, especially when combined with other stimulants. People unaccustomed to stimulants should avoid yohimbine.

How to take it

Yohimbine is dosed differently whether it is supplemented by itself or as part of a stack: 5–15 mg twice a day (i.e., 10–30 mg/day) is a typical dosage for yohimbine on its own, whereas 2.5–7.5 mg twice a day (i.e., 5–15 mg/day) is a typical dosage for yohimbine when stacked with other stimulants. It is strongly recommended to start at the low end of the range before supplementing higher doses. Supplementation is more effective on an empty stomach (i.e., during short-term fasting or even just between meals).

Yohimb**ine** has fewer side-effects than yohimb**e** (bark powder). For that reason, and because the yohimbine content of yohimbe can vary greatly, supplementing yohimbine is considered safer than supplementing yohimbe. However, companies selling "yohimbine" often use a bark extract whose yohimbine content has been estimated rather that ascertained, so the actual yohimbine content of a product can differ dangerously from the number on the label. Should you decide to supplement yohimbine, start with the lowest possible dose (often, 2.5 mg), then slowly work your way up.

Because rauwolscine is a compound similar to yohimbine in structure and function, it can be seen as an alternative, but it has only preliminary evidence for its effects and should be supplemented with caution.

Secondary Options

Atypical Caffeine Sources (Guarana, Yerba Mate)

Why they're a secondary option

Guarana (*Paullinia cupana*) and yerba mate (*Ilex paraguariensis*) are popular caffeine sources, but they require a lot more research before they can be recommended for fat loss. Both herbs contain unknown bioactive compounds, so avoid them if you take amphetamines (e.g., Adderall).

How to take them

Different batches can contain different amounts of caffeine and other bioactive compounds, so always start with very low doses.

To supplement **guarana**, assuming a 9% caffeine content, take either 50 mg at both breakfast and lunch (i.e., 100 mg/day) or 50–75 mg once in the morning.

To supplement **yerba mate**, take 1 g of leaf powder in the morning. This dose provides about 17.5 mg of caffeine, but it should only be increased very cautiously.

Both herbs may be supplemented as teas, but this makes accurate dosing difficult. Too high of a dose can lead to excessive stimulation and cardiac complications, such as arrhythmia.

Coleus Forskohlii

Why it's a secondary option

Coleus forskohlii is an herb historically used in Ayurvedic medicine. It can increase the body's levels of cyclic adenosine monophosphate (cAMP), one of the molecules responsible for the effects of some stimulants. It might also improve the efficacy of other supplements that increase cAMP, such as caffeine and synephrine.

Elevated cAMP levels are associated with lower triglyceride levels in fat cells (due to cAMP increasing lipolysis) and increased protein synthesis in muscle

cells, yet there's currently no solid evidence linking *Coleus forskohlii* to fat loss or muscle gain. Based on its theorized mechanism of action, if this herb helps at all, it is more likely to benefit overweight than lean people.

Because of its many bioactive compounds and a lack of information on its long-term effects, *Coleus forskohlii* should be cycled. It should not be taken with blood thinners, calcium-channel blockers, or pharmaceutical nitrates (supplementing nitrates through foods, such as beetroot juice, is fine), as this could result in hypotension (low blood pressure). In addition, it might not be safe for people suffering from liver ailments, as a rodent study noted an increase in liver fat (not due to forskolin but to other, unknown compounds in the herb).

Because of those caveats, and the limited number of randomized controlled trials in humans, *Coleus forskohlii* is only a secondary option.

How to take it

The main bioactive compound in *Coleus forskohlii* is called forskolin. More research is needed to confirm an ideal dosage, but the standard protocol is 25 mg of forskolin twice a day, 4 to 6 hours apart, for a total of 50 mg/day. Most *Coleus forskohlii* extracts are 10% forskolin, in which case 25 mg of forskolin translates to 250 mg of the extract.

Coleus forskohlii supplementation should last no longer than 12 weeks, followed by a 12-week break. Short-term use has been shown to be safe, but more research is needed to determine the long-term effects.

Fiber

Why it's a secondary option

Dietary fiber is a kind of carbohydrate found in plant food. While your gut microbiome can feed on it, your body cannot absorb it. Therefore, while it helps make you feel full, fiber cannot be used as energy or stored as fat; it is fermented in the colon then excreted. This is true of both soluble and insoluble fibers.

Soluble fiber dissolves in your stomach into a gel that slows down digestion and prolongs satiety. This gel also helps lower blood levels of glucose and cholesterol.

Insoluble fiber does not dissolve in your stomach but "scrubs" your digestive tract. It facilitates and speeds up digestion, yet it also prolongs satiety, possibly in part due to the short-chain fatty acids born from its fermentation by the gut microbiome.

Fiber has been theorized to enhance weight loss by decreasing appetite through hormonal signaling, and in the case of soluble fibers, delaying digestion. However, although many types of fiber have been investigated, only a small minority of studies have reported an effect on weight loss, which is why fiber is only a secondary option.

Among the fibers investigated were different types of inulin-type fructans (ITFs). Of the only three studies on ITFs that noted an effect on weight loss, one used yacón syrup and the two others Synergy1, a proprietary enriched form of inulin. Aside from yacón, natural sources of ITFs include asparagus, bananas, chicory roots, dahlia tubers, garlic, Jerusalem artichokes, leeks, onions, and wheat, among others, but their effects of weight loss have yet to be explored.

A common ingredient of protein bars, isomalto oligosaccharide (IMO) was once thought to be fiber, since it dissolves neither in the mouth nor in the stomach. As it later surfaced, however, IMO gets mostly digested in the small intestine, providing 2.7–3.3 kcal/g (compared to 4 kcal/g for fully digestible carbohydrates).

How to take it

Psyllium, glucomannan, beta-glucan, and ITFs are soluble fibers. Chia seeds and oat brans contain both soluble and insoluble fibers.

To supplement **psyllium** or **glucomannan**, take 5 g half an hour before a meal, two or three times a day (i.e., 10–15 g/day).

To supplement **beta-glucan** daily, take 1.5–6 g of a pure powder or 20–80 g of oat bran.

To supplement **ITFs** daily, take either **Synergy1** (30 g) or **yacón syrup** (140 mg per kilogram of body weight, so 63.5 mg/lb). A higher dose of yacón syrup (290 mg/kg/day, so 132.5 mg/lb/day) led to gastrointestinal symptoms in some of the study participants.

To supplement **chia seeds** daily, take up to 50 g. Chia seeds can absorb 27 times their weight in water, leading to a greater feeling of satiety (if you have a history of swallowing problems, let the chia seeds expand in liquid *before* eating them). Alternatively, take up to 35 g of chia seed flour, which can be added to baked goods for ease of consumption.

You can mix those different options, but keep an eye on your total dosage. For instance, in one day you could take one third of the upper dosage for glucomannan (5 g), one third of the upper dosage for psyllium (5 g), and one third of the upper dosage for chia seeds (about 15 g).

MCTs

Why they're a secondary option

Fatty acids can be classified as short chain, medium chain, long chain, and very long chain. Fatty acids with 6 to 12 carbon atoms (C6:0 to C12:0) are usually considered medium chain. Arguments exist in favor of reclassifying C12:0 as long chain, however, since it metabolizes differently from C6:0, C8:0, and C10:0, the fatty acids suspected to support fat loss. Medium-chain triglycerides (MCTs) are formed when medium-chain fatty acids are bound together. Coconuts, often touted for their high MCT content, are rich in C12:0 (aka lauric acid) but poor in C6:0, C8:0, and C10:0.

MCTs are thought to help with weight loss by increasing thermogenesis. Because MCTs are smaller and more water soluble than long-chain triglycerides (LCTs), they are rapidly metabolized ("burned") and so less likely to end up stored as fat. Actual weight loss results (in controlled trials) have been lackluster, though, which is why MCTs are only a secondary option.

It has also been hypothesized that MCTs could help preserve muscle during periods of caloric restriction, but study results thus far have proven equivocal.

How to take them

To supplement MCTs, take 2–12 g of C8:0 (i.e., caprylic acid) or C10:0 (i.e., capric acid) per day. Higher doses (20–54 g/day) have sometimes been used in clinical trials, but they failed to elicit any additional weight loss benefits. Moreover, while

high doses of MCTs do not appear to negatively affect the lipid profiles of healthy individuals, they amount to quite a lot of calories (486 kcal for 54 g).

MCTs can be taken with or without food. The MCTs you add to your diet should replace some of the LCTs you usually consume. Among foods rich in LCTs are corn oil, safflower oil, and soybean oil.

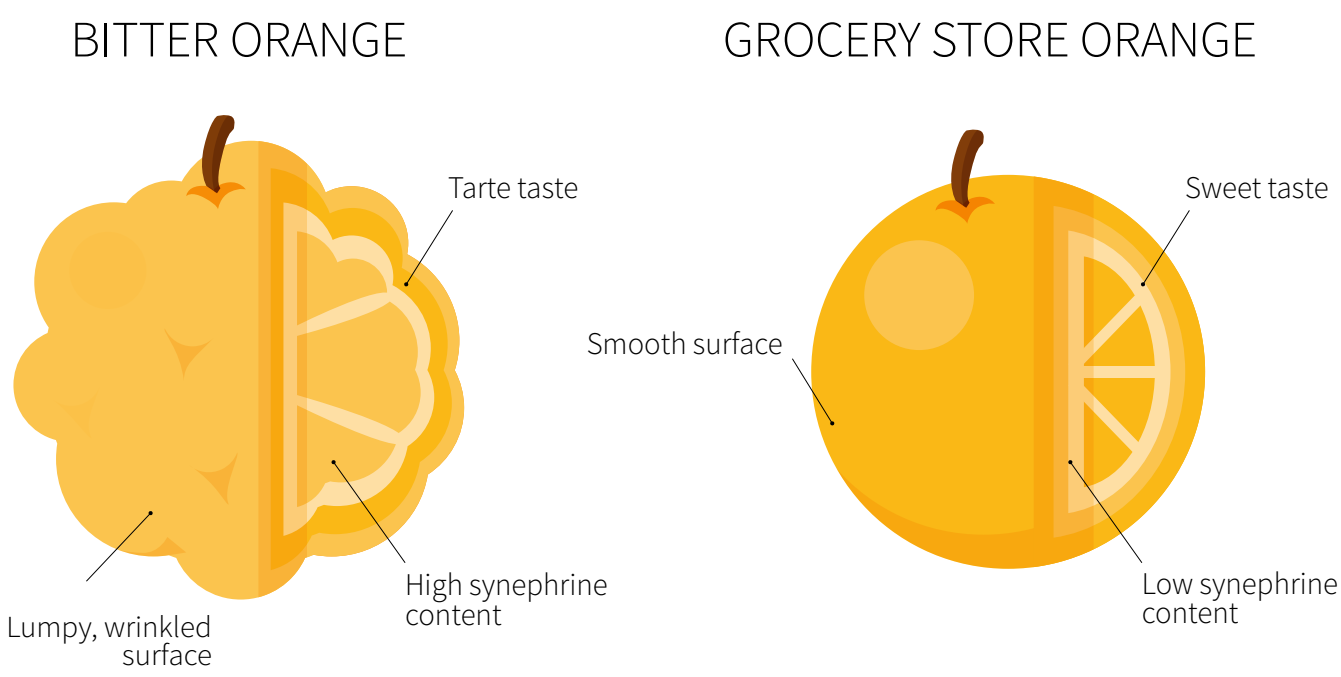
MCTs are generally well tolerated, but taking too much at once (based on individual tolerance levels) may result in diarrhea.

Synephrine

Why it's a secondary option

Only one citrus fruit contains enough *p*-synephrine to affect us: *Citrus aurantium*, better known as bitter orange — not to be confused with the oranges you see at the grocery store. When used carefully, *p*-synephrine is safe and can reliably cause a mild increase in metabolic rate. Other variants, such as *o*-synephrine and *m*-synephrine, have less evidence for their efficacy and safety.

Figure 4: Bitter oranges vs. normal oranges



Like ephedrine, synephrine affects the dopamine, epinephrine (a.k.a. adrenaline), and norepinephrine (a.k.a. noradrenaline) systems, causing an increase in metabolic rate. Like ephedrine, synephrine can be used indefinitely without losing

its fat-burning effect, though the feeling of stimulation may fade over time. Like ephedrine, though to a lesser degree, synephrine is a vasoconstrictor (it constricts blood vessels) and thus can interact negatively with monoamine oxidase inhibitors (MAOIs), a kind of antidepressant.

Synephrine has only been studied in overweight people — unlike yohimbine, which has also been studied in lean individuals. As a stimulant, synephrine is less potent than yohimbine and seldom taken on its own; it is most often used to complement caffeine, in combination with a white willow bark extract.

How to take it

Take 10–20 mg twice a day (i.e., 20–40 mg/day). Start at the lower end of the range, especially if you choose to supplement synephrine with other stimulants (or with supplements that potentiate stimulants, such as EGCG).

Synephrine should be supplemented on an empty stomach in the morning, and again 6 to 8 hours later. If supplementing synephrine on an empty stomach causes nausea, take it with a meal instead.

Synephrine can also be supplemented through a bitter orange extract, in which case said extract should be dosed in accordance with its synephrine content. For example, to supplement 10 mg of synephrine through a bitter orange extract with a 6% synephrine content, take 167 mg of the extract.

Bitter orange extracts also contain flavonoids, which may further raise your resting metabolic rate (RMR). However, at least two of those flavonoids (naringenin and hesperidin) also interact with several drug-metabolizing enzymes, which means that ***bitter orange extracts may interact negatively with pharmaceuticals*** and thus cannot be recommended over isolated synephrine.

Theanine

Why it's a secondary option

While theanine (the amino acid L-theanine) does not directly influence fat loss, it can be of use to people supplementing stimulants, notably caffeine. Its calming effect on the nervous system can reduce the overexcitability caused by stimulants without decreasing the stimulant-derived benefits to focus and attention span.

In fact, the improvements in concentration induced by caffeine and theanine respectively have been shown to be synergistic.

Theanine can be added to any stimulant that provides too much nervous energy at the standard dose.

How to take it

If you take **caffeine**, take an equal dose of **theanine**. At the lower end of the range, if you take 100 mg of caffeine twice a day, take 100 mg of theanine twice a day (i.e., 200 mg/day). At the higher end of the range, if you take 200 mg of caffeine twice a day, take 200 mg of theanine twice a day (i.e., 400 mg/day).

White Willow Bark

Why it's a secondary option

White willow bark is a plant source of salicin, which is metabolized into salicylic acid, a cousin of acetylsalicylic acid, better known as aspirin. Aspirin in excess is less harmful than salicylic acid in excess, but you need a lower dose of salicin than of aspirin, thanks to synergistic compounds in white willow bark. As it stands, extracts of white willow bark are overall safer than aspirin, which is more likely to damage the lining of the digestive tract. Nevertheless, patients with known aspirin allergy should avoid willow bark products.

By inhibiting prostaglandin production in neurons, salicin can enhance stimulatory signaling and the effects of epinephrine (a.k.a. adrenaline). Salicin is thought to be synergistic with the caffeine-synephrine stack because aspirin has been shown to be synergistic with the caffeine-ephedrine stack (aspirin can potentiate the increase in epinephrine and norepinephrine caused by ephedrine). In short, there is good reason to believe that salicin, and thus white willow bark, can enhance the fat-burning effect of the caffeine-synephrine stack (to a greater extent in people with a higher body fat percentage).

White willow bark is only a secondary option because it helps little with fat burning on its own and because it may interact with some drugs — notably blood thinners, such as warfarin (Coumadin). Although to a lesser extent than aspirin, salicin is itself a blood thinner, which is another reason why

white willow bark works well with caffeine and synephrine: It can reduce the strain on the heart caused by these two vasoconstrictors.

How to take it

Take 60 mg twice a day (i.e., 120 mg/day). A white willow bark extract should be dosed in accordance with its salicin content. For example, to supplement 60 mg of salicin through a white willow bark extract with a 15% salicin content, take 400 mg of the extract.

Salicin is most effective when taken with synephrine and caffeine, along with a meal to reduce the possibility of heartburn or upset stomach.

Inadvisable Supplements

Berberine

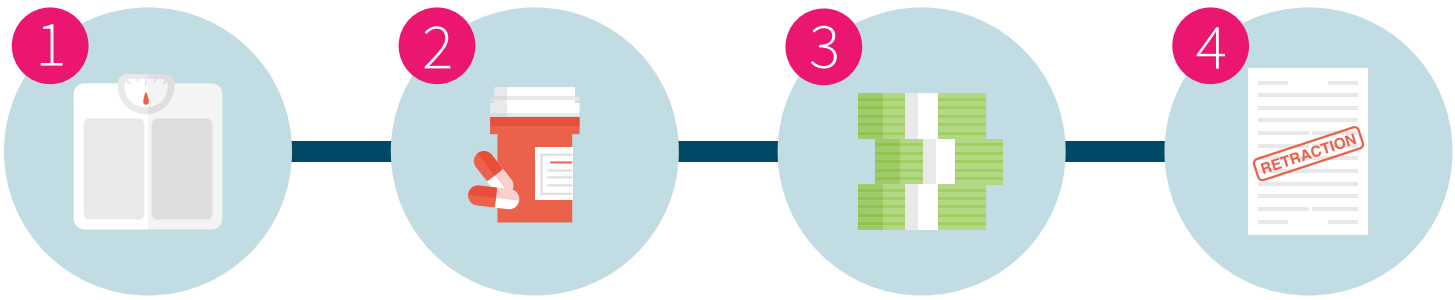
Berberine is an alkaloid extracted from various plants. It may lower blood levels of sugar and cholesterol, and a few studies found it helped with weight loss. Those studies, however, were of low quality; among other problems, they often did not implement blinding, randomization, or control groups, and they mostly failed to differentiate between weight loss and fat loss. Higher-quality studies attributed no weight or fat loss to berberine.

Berberine interacts with metabolic enzymes, and thus with some drugs. Moreover, higher doses (>1 g/day) can cause gastrointestinal upset. For those reasons, the inclusion of berberine in any fat loss stack is not recommended.

Green Coffee Extract

Green coffee extract (GCE) is an extract of unroasted, green coffee beans, rich in chlorogenic acid. While chlorogenic acid may benefit blood flow, there is limited evidence that it reduces blood sugar levels and none that it helps with fat loss. There is no compelling reason to include it in any fat-burning stack.

Figure 5: Green coffee extract: a cautionary tale



Poorly conducted trials can lead to exceptional results. It is usually best to wait and see if those results can be replicated before drawing a conclusion.

Fucoxanthin

One human study showed benefit from 2.4–8 mg/day, but it used a proprietary seaweed extract, has never been replicated, and its results seem too good to be true: an average fat loss of 3.6 kg (7.9 lb) in 16 weeks. More research is needed before fucoxanthin can be recommended for fat loss.

Hoodia Gordonii

According to preliminary animal evidence, a bioactive compound in *Hoodia gordonii* (an African cactus) could suppress appetite, but follow-up research has confirmed that oral supplementation does not deliver this bioactive to the brain. Moreover, hoodia supplementation is associated with substantial blood pressure increases and minor but concerning increases in heart rate and liver enzymes.

There is no evidence that *Hoodia gordonii* can help with fat loss, but plenty that it can damage the liver and the cardiovascular system. *Hoodia gordonii* should not be included in any stack.

Raspberry Ketone

Raspberry ketone is a molecule initially extracted from raspberries but now mass-produced synthetically for use in perfumes and cosmetics.

Early evidence suggested that raspberry ketones could promote fat oxidation, but the ketone concentration required for this effect is too high to be achieved through oral supplementation. The original fat loss claim stems from toxicity studies in animals, not from fat loss studies in humans, and the one fat loss study in humans that showed benefit was highly confounded: The product tested contained not only raspberry ketones but also caffeine, capsaicin, garlic, ginger, and bitter orange as a source of synephrine, making it impossible to assess the respective efficacy of each ingredient.

In short, current evidence does not support the inclusion of raspberry ketones in any fat loss stack.

Senna Alexandrina

Senna alexandrina, or just senna, is an herb frequently marketed as a dietary cleanser and detoxifier. However, while it can cause temporary weight loss thanks to its potent laxative effect, it lacks an inherent fat loss effect.

Daily or chronic use of any potent laxative (except for fiber and caffeine) can result in colon damage. *Senna alexandrina* should not be included in any stack.

Assembling Your Stack

Incorporating Core Supplements

Consume 1.5–2.2 grams of protein per kilogram of body weight over the course of the day (0.68–1.00 g/lb/day), with the help of protein powders if necessary. Keep at it for at least one month before making any modification, such as adding one of the following options.

Incorporating Options

Combining supplements should always be done cautiously, but people combining stimulants should be especially careful. Stimulants can be synergistic; when combined, even low doses can have powerful effects … and be potentially dangerous, notably for the heart.

To burn fat without stimulants

Take 5-HTP (300 mg/day, increasing to 500 mg/day over a week), EGCG (400–500 mg/day), fiber (consult the dedicated entry to set your intake), and MCTs (2–12 g/day).

Once in a while, suspend supplementation of 5-HTP to assess if it is still able to reduce your carbohydrate cravings.

This stack can be supplemented year round, on its own or in conjunction with the stimulant stack:

To burn fat with stimulants

Take the following doses twice a day for 12 weeks, followed by a 12-week break.

Take 100–200 mg of caffeine. Once tolerance sets in, add synephrine (10–20 mg) and a white willow bark extract (60 mg of salicin). For both caffeine and synephrine, start at the lower end of the range.

If, for your next 12-week cycle, you wish for greater stimulation, add yohimbine (2.5 mg, increasing to 5 mg after a week and 7.5 mg after another week). Once accustomed to this protocol, you can add *forskolin* (25 mg).

Other options

Adding theanine to an equal dose of caffeine can ward off overstimulation while retaining the benefits to attention span and focus. If you take 100–200 mg of caffeine twice a day, take 100–200 mg of theanine twice a day. Alternatively, you could drink several cups of black tea (the type of tea with the highest amount of caffeine).

Caffeine can be consumed as pills but also through coffee, tea, energy drinks, etc. You could try replacing 200 mg of caffeine by either 50–75 mg of guarana (assuming a 9% caffeine content) or 1 g of yerba mate leaf powder (about 17.5 mg of caffeine), but neither option is recommended, and both should be avoided if you take amphetamines (e.g., Adderall).

Synephrine (10–20 mg) can be replaced by a bitter orange extract (167–333 mg, assuming a 6% synephrine content), with the understanding that some of the flavonoids in bitter orange may interact negatively with pharmaceuticals.

Salicin can be replaced by a baby aspirin (81 mg). The warnings in the White Willow Bark entry also apply to aspirin.

FAQ

Can I add to my stack a supplement not covered in this guide?

Supplement your current stack for a few weeks before attempting any change. Talk to your doctor and research each potential new addition in advance. Check for known negative interactions with other supplements in your current stack, but also for synergies. If two supplements are synergistic or additive in their effects, you might want to use lower doses for each.

Can I modify the recommended doses?

If a supplement has a recommended dosage range, stay within that range. If a supplement has a precise recommended dose, stay within 10% of that dose. Taking more than recommended could be counterproductive or even dangerous.

Should I take my supplements with or without food? And at what time?

Answers are provided in each supplement entry whenever the evidence permits. Too often, however, the evidence is either mixed or absent. Besides, a supplement's digestion, absorption, and metabolism can be affected differently by different foods. Fat-soluble vitamins (A, D, E, K), for instance, are better absorbed with a small meal containing fat than with a large meal containing little to no fat.

Starting with half the regular dose can help minimize the harm a supplement may cause when taken during the day (e.g., tiredness) or in the evening (e.g., insomnia).

Should I continue using white willow bark if it aggravates my heart burn?

No, you shouldn't. Although a study reported that, "in contrast to synthetic aspirin, willow bark [did] not damage the gastrointestinal mucosa" (probably thanks to some phenolic compounds in the plant), there is still a risk of it exacerbating stomach ulcers. Keep in mind that your body metabolizes salicin into salicylic acid, a close cousin of acetylsalicylic acid (aspirin), which several studies have shown can damage the lining of the digestive tract.

Why isn't ephedrine included in this guide?

Ephedrine, an alkaloid from the plant *Ephedra sinica*, cannot be marketed as a

fat burner. Its sale is prohibited or restricted in various countries, so it cannot be recommended in this guide.

Synephrine is similar to ephedrine. It is a safer compound, though it is also less effective.

Why isn't DNP included in this guide?

DNP (2,4-dinitrophenol) is most often sold as an herbicide or a pesticide; it cannot legally be sold as a food supplement. Ingested, it creates a leak in the energy pathway of mitochondria, the ATP generators in our cells, so that everything you do, from exercising down to breathing, burns more calories (as heat). For that reason, DNP has been studied as a potential obesity drug, and it has proven very effective. Alas, the side effects include dysgeusia (a distortion of the sense of taste), cataracts, and death. Because the efficacious dose and the lethal dose are very close and vary between individuals, even what was once considered a safe dosage has killed.

Since our bodies all react differently, and since the line between the efficacy and lethality of DNP is thin, what was safe for your friend may not be safe for you. At any dose, taking DNP is very much like playing Russian roulette.

Precautions and Troubleshooting

Stack components are seldom studied together. The safest way to add supplements to your daily routine is one at a time, at least a couple of weeks apart, to better assess the effects (and side effects) of each new addition. Start at half the regular dose for a week, then slowly increase to the regular dose if you are not experiencing the desired effects.

Any supplement that can affect the brain, especially supplements with a stimulatory or sedative effect, should first be taken in a controlled situation. Do not take a dose, least of all your first dose, before events such as driving or operating heavy machinery, when impaired cognition may be a risk for your safety and the safety of others.

Most stimulants can disrupt sleep and should not be supplemented in the evening. If sleep does not come easily or if you sleep badly several nights in a row, suspend supplementation. Using a fat burner is counterproductive if sleep quality suffers.