MD LipoFlush

LipoFlush Extreme version VI

LipoFlush Competition version VI

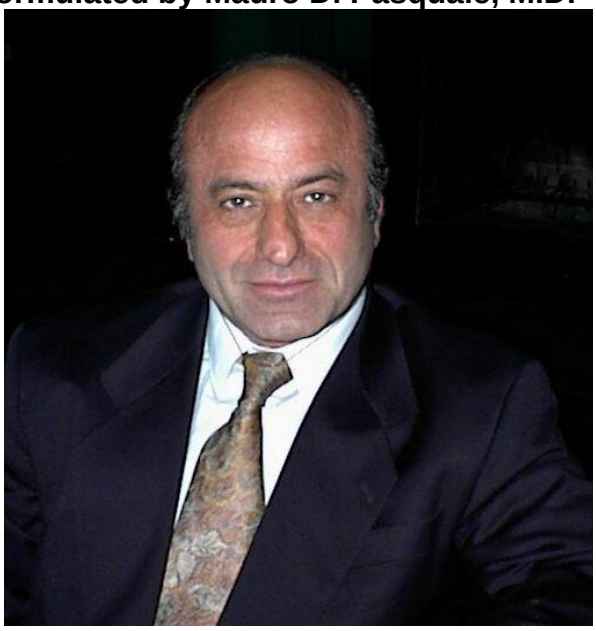
R

LipoFlush Does It All:

- **Flushes fat from your body, and decreases the number of fat cells, much like liposuction.**
- **Decreases fat absorption and increases body fat breakdown.**
- **Keeps energy levels high.**
- **Reverses the effects that cutting back on calories has on the body.**
- **Suppresses appetite.**
- **Keeps your metabolism going 24 hours a day so that you lose and burn fat even while you sleep.**
- **Improves your health.**
- **And much more.**

Information updated October 1, 2021by Mauro Di Pasquale, B.Sc. (Hon); MD.
https://metabolicdiet.com/product/lipoflush-extreme-version-vi-new/
https://metabolicdiet.com/product/lipoflush-competition-version-vi-new/

Formulated by Mauro Di Pasquale, M.D.



Dr. Di Pasquale is an author, a former world Powerlifting champion, a professor at the University of Toronto, and actively involved in the health, sports, fitness, and weight loss, fields for over six decades.

He is presently a physician in Ontario, Canada, and besides his involvement in his medical and bariatric clinic, he has also dedicated himself to researching and writing on Sports Medicine, physical and mental performance, and all aspects of Nutrition and nutritional supplements.

Research Driven Fat Loss and Body Composition Formula

Table of Contents

Introduction

LipoFlush version VI represents a quantum leap in fat loss supplements. It's the only supplement on the market that effectively decreases body fat by working at all the relevant metabolic, absorption and excretion levels, while at the same time providing substantial health benefits.

LipoFlush is a research-driven, synergistic blend of natural ingredients are designed to dramatically decrease body fat, increase energy levels, preserve skeletal muscle, and provide major health benefits.

While other fat loss supplements work on one or at the most two dimensions of the fat loss equation, LipoFlush attacks fat from several independent and synergistic ways, resulting in unprecedented fat loss and improvements in body composition and performance.

One of these ways, not available in any other fat loss supplement, will literally flush the fat right out of your body. Like liposuction, LipoFlush can make some of your fat simply disappear, but unlike liposuction, LipoFlush can do it in the problem areas and also evenly all over your body, leaving you with an aesthetic looking body with just the right look.

LipoFlush, unlike the old ephedra based and all the present weight and fat loss formulas, improves your health and provides a natural energy boost. Because of the multi-step way LipoFlush approaches fat loss, some of the fat loss effects take place 24 hours a day work even while you're sleeping. On top of all this it protects muscle so that when you lose weight it's almost 100% fat.

But that's not all. LipoFlush is not only useful in getting rid of unwanted fat, it also helps you to keep it off. There are several ingredients in LipoFlush that counteract the rapid increase in weight and body fat that happens when you go off most diets.[123]

The information below on the new LipoFlush version VI is in draft form and will be expanded and revised over time. For now, this latest information will give you the flavor of just what LipoFlush version VI will do for you in helping you achieve your health, body composition and performance goals.

LipoFlush Extreme version VI Nutrition Panel

Supplement Facts: Serving Size: 6 Tablets; Servings Per Container: 30

	Amount Per Serving	% Daily Value
Vitamin A (Palmitate)	1000 IU	20%
Vitamin D (as Cholecalciferol)	400 IU	100%
Vitamin B1 (as Thiamine and Benfotiamine)	10 mg	666%
Vitamin B2 (as Riboflavin)	10 mg	490%
Vitamin B5 (d-Calcium Pantothenate)	20 mg	200%
Vitamin B6 (as Pyridoxine HCL and Pyridoxal 5 Phosphate)	25 mg	100%
Vitamin B12 (as Methylcobalamin)	1000 mcg	16667%
Folic Acid	1000 mcg	250%
Vitamin C (as Ascorbic Acid)	100 mg	167%
Vitamin E (d-Alpha Tocopherol Succinate)	100 IU	333%
Biotin	200 mcg	67%
Potassium (as Potassium Phosphate)	99 mg	3%
Calcium (as Calcium Phosphate)	400 mg	40%
Magnesium (as Magnesium Phosphate)	200 mg	50%
Zinc (as Zinc Phosphate)	10 mg	67%
Chromium (as Amino Acid Chelate)	100 mcg	82%
Choline (as Choline Bitartrate)	650 mg	*
L-Carnitine (as L-Carnitine Fumarate, L-Carnitine-L-Tartrate and Propionyl-L-Carnitine)	650 mg	*
Acetyl-L-Carnitine (as ALCAR HCL)	300 mg	*
Bioperine®	5 mg	*

	Amount Per Serving	% Daily Value
Pyruvate (as Calcium Pyruvate)	550 mg	*
Garcinia Cambogia Extract	500 mg	*
Citrus Aurantium (6% Synephrine)	350 mg	*
Cordyceps Sinensis Extract	300 mg	*
Conjugated Linoleic Acid (CLA)	250 mg	*
Caffeine	99 mg	*
LipoFlush Proprietary Complex 6035 mg*		
Green Tea Extract (Ext), Panax Ginseng Root Ext, Eleutherococcus Senticosus, Beta-Alanine, Phosphate, Guarana Ext, Curcumin, Kelp, Gum Guggul Ext, Evodiamine, Hoodia Gordonii Ext, Inositol, Phophatidylserine, Quercitin Dihydrate, Betaine HCL, Kola Nut Ext, Cocoa Ext (12% Theobromine), Green Coffee Bean Ext, Alpha Lipoic Acid, N-Acetyl-L-Cysteine, Magnolia Bark Ext, Cayenne Pepper, Mucuna Pruriens, White Kidney Bean Ext, Yerba Mate Ext, Turmeric Ext (95% Curcuminoide), Gymnema Sylvester Ext, Hawthorne Berry Ext, Holy Basil Leaf Ext, Bitter Melon Ext, Capsicum, Ashwagandha Root Ext, Bauhinia Purpurea Ext , Horse Chestnut Ext, Beta Sitosterol, Ginger Root Ext, Cinnamon, Rutin, Probiotic (L. acidophilus & B. bifidum), L-Lysine, L-Tyrosine, L-Histidine, L-Glutamine, L-Arginine AKG, L-Phenylalanine, L-Glycine, L-Alanine, Lecithin, Damiana Leaf, Naringin, White Willow Bark Ext, Banaba Leaf Ext, Grape Seed Ext, Resveratrol, CoQ10, Diiodotyrosine, Astaxanthin Complex.		

Other Ingredients: Microcrystalline Cellulose, Methylcellulose, Hydroxypropylmethylcellulose, Silicon Dioxide.

*Daily Value Not Established

LipoFlush Competition version VI Nutrition Panel

Supplement Facts:

Serving Size: 6 Tablets
Servings Per Container: 30

	Amount Per Serving	% Daily Value
Vitamin A (Palmitate)	1000 IU	20%
Vitamin D (as Cholecalciferol)	400 IU	100%
Vitamin B1 (as Thiamine and Benfotiamine)	10 mg	666%
Vitamin B2 (as Riboflavin)	10 mg	490%
Vitamin B5 (d-Calcium Pantothenate)	20 mg	200%
Vitamin B6 (as Pyridoxine HCL and Pyridoxal 5 Phosphate)	25 mg	100%
Vitamin B12 (as Methylcobalamin)	1000 mcg	16667%
Folic Acid	1000 mcg	250%
Vitamin C (as Ascorbic Acid)	100 mg	167%
Vitamin E (d-Alpha Tocopherol Succinate)	100 IU	333%
Biotin	200 mcg	67%
Potassium (as Potassium Phosphate)	99 mg	3%
Calcium (as Calcium Phosphate)	400 mg	40%
Magnesium (as Magnesium Phosphate)	200 mg	50%
Zinc (as Zinc Phosphate)	10 mg	67%
Chromium (as Amino Acid Chelate)	100 mcg	82%
Choline (as Choline Bitartrate)	650 mg	*
L-Carnitine (as L-Carnitine Fumarate, L-Carnitine-L-Tartrate and Propionyl-L-Carnitine)	650 mg	*
Acetyl-L-Carnitine (as ALCAR HCL)	300 mg	*
Bioperine®	5 mg	*
Pyruvate (as Calcium Pyruvate)	600 mg	*
Garcinia Cambogia Extract	600 mg	*
Cordyceps Sinensis Extract	400 mg	*
Conjugated Linoleic Acid (CLA)	250 mg	*

LipoFlush Proprietary Complex 6298 mg*

Green Tea Extract (Ext), Panax Ginseng Root Ext, Eleutherococcus Senticosus, Beta-Alanine, Phosphate, Curcumin, Kelp, Gum Guggul Ext, Evodiamine, Hoodia Gordonii Ext, Inositol, Phophatidylserine, Quercitin Dihydrate, Betaine HCL, Alpha Lipoic Acid, N-Acetyl-L-Cysteine, L-Lysine, L-Tyrosine, L-Histidine, L-Glutamine, L-Arginine AKG, L-Phenylalanine, L-Glycine, L-Alanine, Magnolia Bark Ext, Cayenne Pepper, Mucuna Pruriens, White Kidney Bean Ext, Turmeric Ext (95% Curcuminoide), Probiotic (L. acidophilus & B. bifidum), Yerba Mate Ext, Kola Nut Ext, Cocoa Ext (12% Theobromine), Guarana Ext, Green Coffee Bean Ext, Gymnema Sylvester Ext, Hawthorne Berry Ext, Holy Basil Leaf Ext, Bitter Melon Ext, Capsicum, Ashwagandha Root Ext, Bauhinia Purpurea Ext, Horse Chestnut Ext, Beta Sitosterol, Ginger Root Ext, Cinnamon, Rutin, Lecithin, Damiana Leaf, Naringin, White Willow Bark Ext, Banaba Leaf Ext, Grape Seed Ext, Resveratrol, CoQ10, Diiodotyrosine, Astaxanthin Complex.

Other Ingredients: Microcrystalline Cellulose, Methylcellulose, Hydroxypropylmethylcellulose, Silicon Dioxide.

*Daily Value Not Established

Why Two Versions of LipoFlush?

LipoFlush is now available as LipoFlush Extreme version VI and LipoFlush Competition version VI. The latter is for WADA/IOC and all non-IOC amateur and professional sports that use their protocols (there aren't many that don't defer to the WADA/IOC protocols).

The reason for this is that although none of the ingredients in LipoFlush Extreme version VI are on the 2020 banned list (see **https://www.wada-ama.org/en/content/what-is-prohibited**), some are on the WADA Monitoring Program (**https://www.wada-ama.org/sites/default/files/wada_2020_english_monitoring_program_.pdf**. For example, Garcinia Cambogia (which contains synephrine) and free caffeine have been removed from LipoFlush Competition and a few other ingredients including those in the Proprietary Complex

have been added while others have been adjusted to make up for the lack of free caffeine and synephrine.

As such, to prevent any problems for athletes who may be wary that WADA may put one or more of the ingredients they're monitoring on the banned list at any time, however unlikely that is since they haven't made any significant changes in the monitoring program for several years, I decided to put out LipoFlush VI Competition for drug tested athletes.

Both the Extreme and Competition versions of LipoFlush version VI added many ingredients and changed the amounts of others.

For example, **damiana** was added to make up a **guarana, yerba mate combo** that has been shown to enhance weight loss (see below).

Hoodia extract, from the Hoodia cactus found in parts of South Africa, was added to work synergistically with other ingredients, such as **calcium, HCA, citrus aurantium (in LipoFlush Extreme only), garcinia,** and some neurotransmitter precursors **(such as DMAE, tyrosine, mucuna pruriens** and **choline)**, to decrease appetite,[4] and **acanthopanax senticosus** to help decrease body fat.[5]

Banaba leaf extract increases insulin sensitivity as well as promoting weight loss.[6][7] The active ingredient in banaba extract, corosolic acid, has been shown to have some anti-obesity potential.

Cinnamon has also been shown to affect insulin metabolism and increase insulin sensitivity.[8][9][10] As well cinnamon has been shown to positively affect obesity and body composition.[11]

Vitamin D3 and **magnesium** were added to increase the anti-obesity effects of calcium. As well, vitamin D3, based on its anti-inflammatory and immune system effects has been shown to enhance health beyond just helping to build strong bones (see below).

Zinc was added since it's been shown that there is an improvement in insulin resistance with zinc supplementation and that zinc is involved in controlling some of the aspects of obesity.[12] Zinc also improves calcium metabolism and thus the beneficial effects that calcium has on fat metabolism (see below).

LipoFlush version VI added still other ingredients, while increasing the quantity of others, all done to increase the effectiveness of LipoFlush by providing extra synergistic and additive effects, and also keeping adverse effects to a minimum.

For example, three other forms of L-carnitine were added to increase the total L-carnitine complex to almost twice as much as in previous versions. The proprietary complex has many additions and the amount of all the ingredients in the complex is more than twice as much as in previous versions.

Several ingredients have been added to increase the anti-inflammatory and health promoting effects of LipoFlush.

Weight Loss versus Fat Loss

Weight loss is an oxymoron. Who really wants to just lose weight if that means losing weight from the various tissues in your body, including muscle, brain, and bone?

That's not what people want when they say they want to lose weight. What they really want to lose is FAT, and especially not other tissues including muscle. After all, maintaining or even increasing muscle mass not only makes the body look and function better, but it makes it easier to lose body fat and keep it off.

It's important to realize that fat loss is not simply a matter of exercising more and eating less, although these are part of the fat loss equation. Effective fat loss also means guiding your body down the right metabolic paths where you target fat breakdown and spare muscle.

It's also more than just breaking down body fat. You also have to do something with that body fat so it doesn't simply reform. That means getting rid of it by increasing the burning of this fat for fuel and flushing some of it right out of the body.

Simple as that sounds, it's not what most weight and fat loss supplements do. Many of the formulations on the market today, including those no longer on the market such as the once popular ECA stack (combinations of ephedra, caffeine and ASA) formulations, will increase fat breakdown (lipolysis) but do not dispose of this fat efficiently and in most cases the fat is reformed and just goes right back to the same body areas. Also, the weight loss and fat loss formulations miss the mark when it comes to using cutting edge research studies to solve the fat loss and body composition equations.

Besides increasing lipolysis and making sure you get rid of that released fat, it's also important to make sure that the weight you lose is fat and not muscle (I repeat this because it's so important). Cutting calories can lead to weight loss but some or even most of this weight loss may in fact represent muscle and other tissues. The trick to losing weight is to lose mostly fat so that when you're down to your target goal you look and feel good.

It's also important to keep making progress. Anyone can lose weight at first but it's a real challenge to keep it up. That's because your body reacts to the imagined threat of starvation by instituting some ages old survival mechanisms, mainly slowing the metabolic rate so you can get by on fewer calories and increasing hunger so you can take full advantage of any food that you find.

Even though you're deliberately trying to lose weight to improve your looks and health, your body looks at the calorie reduction as a sign of impending starvation and adjusts accordingly. Blame our evolution which through a combination of genetic, epigenetic and environmental conditions blended together to lead us astray at times when food is plentiful.[13][14]

So, unless you understand what's happens when you cut back on your calories, and make the appropriate adjustments, including taking the right supplements, you can reach a plateau fast.

Put all this together and it's no wonder that most people find it impossible to lose any significant amount of fat, to keep any fat they do lose from coming back, and to prevent loss of muscle while they're dieting.

Effective Fat Loss

In my mind the most important steps to effective fat loss, besides reducing calories and exercise, are:

- Increasing fat release from the fat stores in the body, including cellulite - this is done by triggering lipolysis via various mechanisms including triggering the right signaling systems (for example by selectively increasing cyclic AMP levels in fat cells either directly or indirectly) and maintaining thyroid hormone levels and activity.

- Decreasing fat formation or lipogenesis. This is done by using various ingredients that decrease the stimulus and the enzymes that support lipogenesis. Decreasing inflammation, insulin resistance and cortisol secretion are important in both increasing fat release and decreasing fat formation.

- Increasing the elimination of the released fat from the body by burning it up and by flushing it out. Increasing the burning of fatty acids is done by increasing the metabolic rate (including normalizing thyroid hormone levels, increasing T3 formation and effect, and increasing UCP3 uncoupling protein – these also increase lipolysis), increasing the transport of fatty acids into the mitochondria (the fat furnaces of the body) and by priming and optimizing the functioning of the TCA cycle so that beta oxidation and the efficient utilization of the basic 2 carbon groups that result from fatty acids metabolism. Increasing the removal of fat from the body is done by increasing the amount of fatty acids that are dumped into the urine and flushed out of the body.

- Targeting fat loss and not muscle loss. This is done by increasing levels of certain hormones and factors, such as IGF-I that have anti-catabolic effects.

- And counteracting the metabolic genomic effects of dieting, i.e. increased hunger and decreased metabolic rate.

And that’s what LipoFlush is all about. LipoFlush does it all and then some because it attacks the problem of getting rid of body fat in innovative ways.

LipoFlush not only has all the “usual suspects” - the fat loss ingredients that are in all the other high-profile weight and fat loss supplements, but it also has ingredients, and synergistic combinations of ingredients not found anywhere else.

The natural ingredients in my supplements work synergistically at many sites to produce the desired fat loss effect, without side effects and with health benefits to boot. Targeting various ingredients to affect various aspects of pathways that lead to specific effects, as against violently disrupting a specific pathway as some drugs do, is a much more natural and effective way to go.

It’s important to repeat that the synergistic effects of various ingredients in LipoFlush that complement each other in improving body composition also act to decrease any potential adverse effects of any one ingredient in the formulation.

Testing several dozen men and women taking LipoFlush long term has shown that LipoFlush has no adverse metabolic effects, and no deleterious effects on bodily organs, including liver, kidney, and gonadal function.

LipoFlush - The Nutritional Equivalent to Liposuction

What better way to lose body fat than to simply make it disappear? This is the promise of liposuction and in fact it does deliver somewhat as liposuction is one of the most effective ways to decrease body fat. But it has some serious problems to overcome before it becomes everyone's favorite way to lose body fat.

The good thing about liposuction is that it basically takes fat out of the metabolic equation. You don't have to worry about the calories in that fat since it's physically removed. Up to now any other method of losing body fat has involved increasing the calorie deficit by either exercising or dieting, and usually both, so that the fat is burned as fuel to make up the calorie deficit.

But liposuction has its problems. First, liposuction is a surgical procedure and like all surgery, it carries inherent morbidity and mortality risks – you can get sick and even die from the surgical procedure alone. Also, liposuction is best used for small problem areas. In fact, it doesn't do that good a job on large areas since it can leave the areas looking lumpy and uneven. And doing large areas carries much more risk. And last of all liposuction doesn't just suck out your body fat, it can also suck your wallet dry.

Wouldn't' it be much nicer if you could just take the fat out of the equation, the same way that liposuction does, but do it naturally? And wouldn't it also be nice if you could take the fat off in the problem areas and everywhere else at the same time, and not have to mortgage your house to do it?

Well now you can. Not only does LipoFlush help you to burn off the fat more efficiently, it also flushes some of your fat out of your body and takes that fat, just like liposuction does, out of the metabolic equation. Like liposuction, LipoFlush contains several ingredient combinations including the **Choline** and **Carnitine** and **CLA** and **Guarana** Combos that can make some of your fat simply disappear.

But unlike liposuction, LipoFlush can do it in the problem areas and also evenly all over your body, leaving you with an aesthetic looking body with just the right look. And it's affordable. In fact, given the high cost of the ingredients in LipoFlush, never mind the work that's gone behind this innovative product, it's a real bargain.

History of LipoFlush

I've been involved in the sports and weight loss business for over five decades. For most of that time I've helped athletes in all sports, from professional bodybuilders to Olympic 100-meter gold medalists, optimize their body weight for maximum performance. I also operated a bariatric clinic for over two decades, seeing and helping many thousands of overweight people lose weight and body fat.

As well, I've researched and written books, several hundred magazine articles (in top fitness, sports and bodybuilding magazines), and published on the Internet about ways to optimize body composition and sports performance for over five decades (just over a few decades on the Internet since it didn't become public domain until 1993).

All this time I've been searching for the ideal weight loss supplement. One that wasn't all smoke and mirrors, as are many of the weight loss supplements on the market today, regardless of price, but really worked, and was safe. In fact, not only safe but a supplement that naturally increased health

and wellbeing, as well as helping people to reach their weight, body composition, and performance goals.

All my knowledge and research has come to fruition in my ever-improving line of nutritional supplements sold on my site www.MetabolicDiet.com. I formulated the original versions for most of my supplement line a few decades ago and taking a hint from the software companies (for example the Windows operating system by Microsoft) subsequent significant changes in the formulations were labelled as new versions.

For example, LipoFlush is now version VI, which is the sixth version and the fifth reformulation of the original LipoFlush version. I reformulated it and other supplements in my lineup as needed, prompted by research, feedback from customers, and my own experiences with the product. Like medicine, my formulation were a combination of science and art.

Both coming from my several decades being in the trenches (I started weight training and being interested in nutrition shortly after my 13th birthday and competed nationally in several sports including track, gymnastics, wrestling and finally powerlifting), my education (BSc (Hons) research based with majors in Genetics and Molecular Biochemistry, and my medical degree, both from the University of Toronto), and finally my unrelenting research.

LipoFlush version VI, as well as the most recent versions of the rest of my nutritional supplement lineup are examples of cutting-edge formulations, each version represents a new generation of supplements incorporating the latest knowledge and technology to maximize the intended effects of the supplement.

For example, LipoFlush version VI maximizes fat loss, body composition, skeletal muscle sparring and even hypertrophy, and mental and physical performance. This amazing, patent-pending formula produces an entirely new level of effectiveness in the diet supplement industry. In fact, it is the first product ever to look at all aspects of weight loss and contains dozens of ingredients that work synergistically and additively to maximize fat loss.

The ingredients in this evidence-based, research-driven formula have been proven to affect your metabolism and result in unprecedented fat loss, without the use of counterproductive stimulants such as ephedra, and without causing any negative health effects.

LipoFlush is the culmination of my over five decades of research and involvement in the sports performance and weight/fat loss fields (as are the rest of my nutritional supplement lineup). LipoFlush is a true fat loss breakthrough that is unequaled in its ability to attack fat metabolism at several levels and bring the fastest possible fat-loss and muscle-sparing results.

It’s so good that LipoFlush has been and is still being used **by many of the top athletes in the world** to optimize body composition and performance. With LipoFlush they’re able to maximize muscle mass and performance while taking body fat levels to the absolute minimum for their needs.

These athletes find that LipoFlush is the perfect supplement to complement their diet and training efforts without any side effects. And with the emphasis on drug testing in many of these sports, LipoFlush offers the advantages of being a potent fat loss and anti-catabolic supplement without containing any WADA/IOC banned substances.

The combinations of choline and carnitine, guarana and CLA, HCA, carnitine and fumarate, and yerba mate, also combined with guarana, are but four examples of the interactive science behind LipoFlush.

Version VI of LipoFlush represents the sixth evolution of this supplement. Each formulation is an improvement over the previous one, taking into consideration the most recent research and findings, and applying these to make LipoFlush even more effective.

And it's not just what's in LipoFlush that's important, it's what's not in it as well. In looking at the possible list of ingredients, I eliminated those that I felt were useless, but that are the backbone of many of the weight loss supplements.

One of these ingredients is chitosan. Several studies and reviews have concluded that it's useless for weight loss.[15][16][17] For example, one study looked at the effectiveness of chitosan as a weight loss product, based on the exaggerated claims that it traps dietary fat before it's absorbed into the body and thus takes hundreds of calories out of the equation.[18]

The study found that chitosan, in the dosages present in these formulations, was far from being a fat trapper and only accounted for one gram of fat per day – that's a whopping 9 calories a day taken out of the equation. The authors of the study concluded that "The fat trapping claims associated with chitosan are unsubstantiated." I concluded that it wasn't worth including chitosan in the LipoFlush formulation.

Ditto for the so-called carbohydrate blockers such as phaseolus vulgaris extracts since any appreciable carb blocking effects that results from high doses is tied in with decreased absorption of protein, peptides and amino acids. As well, animal studies have shown that ingestion of phaseolus vulgaris may result in injury to the gastrointestinal tract.[19]

LipoFlush version VI

The new formulations of LipoFlush involves LipoFlush Extreme version VI and LipoFlush Competition version VI. Both Versions of LipoFlush represents the ongoing improvement of the best fat and weight loss supplement on the North American and International markets. LipoFlush VI represents a new paradigm and is a quantum leap above all other products that target weight loss and body composition.

The previous version of LipoFlush, LipoFlush Extreme version V, already represented the ultimate fat and weight loss product, especially for those that exercise. However, the new versions are dramatic improvements on a product that already had no competitors.

In keeping with the holistic, multifunctional approach that LipoFlush takes to weight and fat loss and improving body composition, over a dozen ingredients have been added that enhance various pathways involved in these processes such as increasing fat breakdown and utilization, decreasing appetite, increasing satiety, maintaining muscle, etc.

The changes made to the LipoFlush formulation are extreme enough to make it more powerful than ever before. Hence the new label names for LipoFlush extreme version VI and LipoFlush Competition version VI. For an overall view of the ingredients in both versions look at the two nutrition panels below.

Pro-Inflammatory Cytokines, Insulin Resistance and Cortisol

One of the ongoing changes in LipoFlush version VI is the emphasis on the **pro-inflammatory cytokines**, a subject that is increasingly preoccupying researchers to the point that today they're one of the hottest research topics.[20],[21] Pro-inflammatory cytokines (markers and regulators of inflammation) have been implicated in obesity, visceral body fat (fat around the belly), a variety of diseases and in aging. As such, they're becoming increasingly important when it comes to dealing with the human condition, including many diseases, the accumulation of body fat and quality and length of life itself.

But what's interesting for our purposes is that these cytokines have been linked to changes in various hormones and functions in the body and can lead to increases in body fat, including abdominal fat, and decreases in muscle mass.

While the emphasis of some of the new diet pills is on cortisol and the effect it has on increasing body fat, in reality increased cortisol, especially local increases in body fat, is simply another manifestation of a system gone wrong, as evidenced by the increase in the pro-inflammatory cytokines seen in obesity, rather than the cause.[2223] In fact increases in cortisol, insulin resistance, and a host of other maladaptive responses, often find their origins and manifestations in the increase in the pro-inflammatory cytokines.

Because this concept is so new and revolutionary, I cover it in much more detail later on (see Is Obesity an Inflammatory Condition?). For now, it's important to realize that LipoFlush is formulated to help us decrease the counterproductive effects of the pro-inflammatory cytokines not only on body fat and skeletal muscle, but also on our health and longevity.

There are many ingredients in LipoFlush that target inflammation and the pro-inflammatory cytokines including all forms of **L-carnitine, phosphatidylserine, vitamins B6, B12, folic acid, vitamin D3, betaine, calcium, magnesium, curcumin, astaxanthin, willow bark, quercetin, ginger, yerba mate, green tea extract, alpha lipoic acid, capsicum, kelp and various antioxidants.**

L-carnitine (LCAR) is considered by many to be essential nutrient with critical roles in energy metabolism. Several studies have shown that LCAR decreases the production of some of the pro-inflammatory cytokines and has anti-inflammatory and immunomodulating effects.[2425] In one study the authors concluded that the use of L-carnitine can improve cellular defense against chronic inflammation and oxidative stress, most likely by modulating the specific signal transduction cascade activated by an overproduction of pro-inflammatory cytokines and oxidative stress.[26]

Vitamin D deficiency is fairly common, especially in the more Northern climates.[27] Several studies have found a link between vitamin D deficiency and various disorders that have an inflammatory link, including obesity, coronary artery disease, diabetes and the metabolic syndrome (see below). As well, studies have shown an association between vitamin D deficiency and inflammation in otherwise healthy people, and a decrease in inflammation with vitamin D supplementation.

Curcumin, which comes from the spice turmeric, is documented to have anti-inflammatory and antioxidative benefits.[28] As an antioxidant, curcumin reduces the activity of certain enzymes, inhibiting all branches of the arachidonic acid cascade, and reduces pro-inflammatory cytokine synthesis. The rhizome of this plant has been traditionally used as an anti-inflammatory agent in Ayurvedic medicine. In a double-blinded trial, post-surgical patients receiving curcumin experienced reductions in stiffness

and joint swelling comparable to the effects of phenylbutazone, a potent anti-inflammatory drug with significant hermetic effects.[2930]

Of all the spices and herbal preparations, it seems that only the spice turmeric has any anti-inflammatory effects. This was the conclusion of a study of a variety of Ayurvedic and herbal preparations, which was presented at the 9th Asia Pacific League of Associations for Rheumatology Congress.

In this study, a variety of herbal and Ayurvedic preparations were tested in rats. The rats were fed oral doses of the varied herbal and Ayurvedic recipes. Only turmeric showed anti-inflammatory effects when tested on irritated paws of the rats.

As well, curcumin has been shown to improve body weight, BMI, insulin resistance, obesity, and waist circumference.[313233]

The use of piperine with curcumin enhances its bioavailability and therefore increases its beneficial effects.[3435] See the information below on Bioperine, a patented form of piperine that I use in my formulations because of its proven efficacy and safety.

Cinnamon has also been shown to positively affect obesity. [36]

Green tea also has beneficial effects on physical and mental health, weight loss, and has significant anti-inflammatory properties.[37383940414243] As well, through the effects of its three major components, catechins, caffeine and theanine, it has weight loss and fat loss effects.[44]

Green tea extract may well prove to be more useful than green tea itself. One study found that green tea extract supplements retain the beneficial effects of green and black tea and allow larger doses of tea polyphenols to be used without the side effects of caffeine associated with green and black tea beverages.[45]

The bioflavonoid **quercetin** has been shown to have significant anti-inflammatory activity in cases of both acute and chronic inflammation[4647] and protective effects against the pro-inflammatory cytokines.[48] As well, several inflammation-promoting pathways are known to be inhibited by quercetin. For example, quercetin is known to have antioxidative and antihistaminic effects.[4950]

As well, LipoFlush contains ingredients to decrease inappropriate increases in cortisol and thus augment the decrease in the pro-inflammatory cytokines. These ingredients decrease the factors responsible for both excess body fat and increased cortisol.

For example, **phosphatidylserine** has been shown to not only to reduce levels of inflammatory mediators,[51] but also to dampen the ACTH and cortisol response to physical stress and decrease the reaction of the body to stressors.[52]

Beta sitosterol, used mainly for people with prostate problems**,**[53] also has immune system, cortisol controlling and anti-inflammatory effects.[545556] In one study a mixture of beta sitosterols were tested on marathon runners. The supplemented group, but not the placebo group, showed increased immune cell numbers, decreased inflammation, and decreased cortisol levels.[57]

Beta-alanine, a precursor to carnosine**,** was added as it has significant effects on muscle protein synthesis, body composition, and athletic performance.[58596061]

Bitter melon extract (Momordica charantia extract) has been shown to have effects on decreasing fat production and inhibiting lipogenesis.[626364] It's also been shown to have significant beneficial effects on insulin sensitivity, diabetes and cholesterol levels.[65666768]

Some of the Main Ingredients

Besides the ground breaking effects that LipoFlush has on the pro-inflammatory cytokines, and on insulin sensitivity and body fat cortisol production, it has a host of other ingredients that together make LipoFlush the premier fat loss supplement.

Choline and Carnitine – the Dynamic Duo for Fat Loss

Choline and carnitine are commonly used nutritional supplements, usually used alone or in combination and usually for the purposes of fat loss. Carnitine is essential for fatty acid transport and proper muscle function, and some studies have shown that carnitine supplementation improves exercise performance.[69]

Choline. a lipotropic agent that prevents deposition of fat in the liver, is an essential nutrient that while produced endogenously, must be taken exogenously to prevent signs of deficiency.[70] This is especially true for vegetarians since choline is found mostly in animal derived foods.

Choline is essential for health and is necessary for cell membranes for providing structure and structural strength to cell membranes and is involved in the signaling across this membrane as well as synthesis and release of the neurotransmitter acetylcholine.[71] Like carnitine, choline supplementation may also improve physical performance.[72] A recent study found that people could experience slower muscle growth when they exercise because of choline deficiency.[73]

Another recent review concluded that choline is crucial "in modulating muscle fat metabolism, muscle proteins homeostasis, and the modulation of inflammation and autophagy."[74]

Choline is the major source of methyl-groups in the diet (one of choline's metabolites, betaine, participates in the methylation of homocysteine to form methionine).

The possible synergistic interaction between carnitine and choline has been known for several years. A study on rats clearly showed that choline in combination with caffeine plus carnitine resulted in a significant conservation of carnitine and augmented exercise performance and promoted fatty acid oxidation as well as disposal in urine.[75]

As well, the use of the three supplements resulted in two other beneficial effects, a decrease in blood triglycerides and an increase in the triglyceride content of skeletal muscles. Since muscle fat is used to supply energy to exercising muscles, and actually increases muscle size, much like glycogen, this is a whole different thing to increasing fat in subcutaneous skin and other fatty areas of the body. The increase in intramuscular fat also helps endurance and recovery and would be useful on any diet.

But there's more to the story. A study has shown that choline and carnitine supplementation with or without exercise alters carnitine status, body fat and biochemical markers of fat oxidation in humans.[76] In this study nineteen women were placed in three groups: *1*) placebo, 2) and 3) choline or carnitine preloading period of 1 week followed by supplementation with choline plus carnitine during wk 2-wk 3.

There were several interesting results of this study outlining the effects of choline, and choline plus carnitine supplementation. Without going into all the details, the study showed that the choline-induced decrease in serum and urinary carnitine is buffered by carnitine preloading, and these supplements shift tissue partitioning of carnitine that favors fat mobilization, incomplete oxidation of fatty acids and disposal of their carbons in urine as acylcarnitines in humans.

Flushing out fat in the urine has another interesting and useful effect for those trying to lose body fat. Flushing out fat in the form of acylcarnitines acts as an osmotic diuretic and increases urine flow, in some people more than others. LipoFlush seems to have much more of a diuretic effect on people who are retaining fluid in the first place. It does not affect the serum electrolytes (I've checked serum levels of several electrolytes and minerals and found not change in the sodium levels, but improved levels of potassium, calcium and magnesium) and does not dehydrate the body.

As such, LipoFlush, along with its effects on appetite and fat loss, may be effective in decreasing fluid retention, a problem often seen in people dieting. As well, LipoFlush is the ideal cutting or definition supplement for bodybuilders or anyone who wants to minimize bodyfat and not have their definition blurred by water retention.

For women there may also be an added benefit in that LipoFlush may be useful in relieving the symptoms of PMS. That's because fluid retention can worsen the symptoms of the premenstrual syndrome (PMS). Women with severe symptoms may experience increased irritability and decreased ability to cope with everyday stresses during the premenstrual phase - they often compensate by eating more. In these women the weight gain is due to a combination of fluid retention and increased caloric intake.

You can minimize fluid retention by cutting down on salt intake - avoiding foods heavy in salt and use of the salt shaker, and in the more severe cases using medication such as prescription diuretics. However, LipoFlush, because of its diuretic like action, may naturally decrease fluid retention and improve symptoms.

The diuretic effect of LipoFlush is also easily controlled since it is dependent to some extent on fluid intake. Taking in more water (keep away from diet pops and other drinks that have salt in them) increases this diuretic effect while curtailing water intake decreases it.

The bottom line is that choline and carnitine supplementation increased fat loss by both increasing the breakdown and burning of body fat and, interestingly enough, actually flushing fat (in the form of acylcarnitines, which are actually chunks of fatty acids combined with carnitine) into the urine and out of the body. In this latter action it's as close as you can get to being the nutritional supplement equivalent of liposuction. LipoFlush will literally flush the fat right out of your body.

Conjugated Linoleic Acid (CLA) and Guarana Combo

This combo has been shown to not only decrease the size of fat cells but also to decrease cell number.

Both **CLA** and **guarana** have been shown to increase weight and fat loss and improve body composition. For example, studies in mice fed CLA showed a marked reduction in body fat and an increase in body protein levels.[77] Other animal studies demonstrated similar or even better results.

But CLA has marked effects in humans as well.[78] A study published in the International Journal of Obesity found that those who were given CLA for a four week period had significant decreases in abdominal fat.[79] As well, several studies have concluded that long term CLA supplementation not only helps to decrease body fat but also helps to maintain weight loss in the long term.[808182838485]

Even more revealing, however, is the synergism shown by the combination of guarana (from a plant found in the Amazon and used for its effects on decreasing appetite and increasing weight loss) and CLA. While studies have shown that CLA can reduce the volume of fat cells, in one study two groups of mice given CLA or CLA plus guarana had a significant reduction in fat mass. However, the group of mice that were fed the CLA/guarana combination not only showed a decrease in the size of the fat cells but also a decrease in the **number** of fat cells (FASEB Journal, v. 16, no. 5, pt. I; March 22, 2002).

Because of its effect on decreasing the number of fat cells, this combo **contributes to the body shaping effects of LipoFlush version IV**.

Chromium and CLA

Chromium enhances insulin sensitivity and decreases insulin resistance and helps you to lose body fat. A recent meta-analysis concluded that “chromium supplementation generates statistically significant reductions in body weight.”[86]

One of the most frustrating aspects of being overfat is that your body has become conditioned to converting excess calories, especially in high carbohydrate intake, into body fat. Part of the problem with this fat conditioning involves insulin. The problem is that as you gain more body fat you become more insulin resistance so that you need more insulin to do the same job as when you had less body fat. This increase in insulin decreases your ability to use body fat as fuel and stores more energy as body fat. The end result is a fatter you.

Chromium helps to increase insulin sensitivity and thus your body’s ability to burn off body fat as a preferred fuel and decreases body fat production.

Although most diets just barely provide the RDA for chromium, for many it’s not enough to make up for daily losses, especially if they exercise. With LipoFlush you get another 50 mcg per day (using two doses daily), so that you have all the chromium you need for fat loss purposes.

But not any kind of chromium is OK. For example, the most commonly used form of chromium, chromium picolinate, has potential adverse effects associated with its use.[87] The amino acid chelate form of chromium used in LipoFlush is a readily absorbable and biologically active form of chromium that enhances insulin sensitivity, without side effects.

It’s been shown that combining chromium with CLA enhances insulin sensitivity and body composition even more when used together. One study found that CLA alone lowered body weight, total body fat mass, and visceral fat mass, the last of which decreased further with the combination of CLA and Chromium.[88]

Hydroxycitrate (HCA), Carnitine and Fumarate

Laboratory research suggests that **garcinia cambogia** extract or **HCA** may be an effective compound for promoting weight loss. It is believed that HCA acts in several different ways. It is an

effective appetite suppressant, and also limits the production of cholesterol and fatty acids in the body. It is also believed to raise body temperature to act in a thermogenic manner. HCA has also been shown to suppress weight regain.

HCA is not one of the new kids on the block. Over the last 30 years there has also been a lot of research on HCA and its effects on fat metabolism, with even the early research looking at its effects on fat metabolism.[89]

Theoretically, because HCA decreases the 2-carbon pool necessary for the formation of fat, and increases certain enzymes that promote fat oxidation, it should increase fat oxidation and decrease fat formation. In fact, several studies have shown that these effects do occur. For example, in one study, HCA and other tricarboxylic acids were shown to inhibit fatty acid synthesis from body glycogen without affecting protein synthesis.[90] Studies have also shown that HCA has appetite suppressant effects, especially if taken prior to meals.[91]

Even though its use in weight loss is supported by animal studies, where it appears to act (by a mechanism which is not yet clear, although some studies have implicated a serotonin connection) by reducing food intake, much of the research on the effects of HCA on appetite and body composition has been inconclusive and in some cases showed no effects, especially in humans. As well, there's been a lack of studies that show significant long-lasting effects on weight loss and total fat formation and oxidation.

Over the past few decades, however, this situation has changed. One study on humans has shown that 2 weeks of taking as little as 300 mg of HCA three times a day reduced 24-hour energy intake in obese humans with no increase in hunger.[92]

Another study has shown that HCA has sustained long-term effects in rats on various parameters of weight loss and hunger.[93] An interesting finding in this study is that the fat content of the diet seemed to be important for the long-term suppressive effect of HCA on feeding. HCA had little effect on rats that were on a very low-fat diet.

A recent review stated the following:[94]

"In animal studies, HCA was shown to inhibit adenosine triphosphate citrate lyase, which cleaves citrate to acetyl coenzyme A (acetyl-CoA) and oxaloacetate in the citric acid cycle in the liver. As a result, the production of acetyl-CoA, which is required for fatty acid synthesis and lipogenesis, is lessened. The reduced fatty acid synthesis and lipogenesis may suppress food intake and lead to weight loss in humans. In addition, acetyl-CoA is a precursor to malonyl-CoA, which inhibits carnitine palmitoyltransferase I (CPT 1), an enzyme responsible for lipid oxidation.8 With limited malonyl-CoA production, CPT 1 inhibition is reduced and lipid

oxidation is increased, which may result in increased fat loss with aerobic exercise. In an in vitro study in rats, HCA caused a 20% decrease in serotonin reuptake in brain tissue, whereas a combination of fluoxetine and clomipramine caused a 30% decrease. Increased availability of serotonin may suppress appetite, which could be another mechanism for weight loss with G. cambogia use in humans."

The bottom line is that HCA has the potential to decrease appetite, weight and fat loss and help keep weight and fat loss over the long term thus improving long term body composition. Along with a proper diet, exercise and other targeted nutritional supplements, HCA should be part of any serious weight and fat loss regimen.

But there's more!

A pilot study showed that the use of hydroxycitrate (HCA), **carnitine** and pyruvate to obese subjects resulted in a remarkable rate of body-fat loss and thermogenesis,[95] which pointed to an uncoupling of fatty-acid oxidation – that is the energy from the burning of fat was thrown off mostly as heat, and thus took some fat out of the metabolic equation.

However, considering the amount of pyruvate already in LipoFlush version VI, I decided to combine HCA with **L-carnitine fumarate**.

I believe that using fumarate instead of pyruvate an advantage over pyruvate in that it is a more direct Tricarboxlyic Acid cycle (TCA cycle) intermediate resulting in an anapleurotic increase in TCA cycle intermediates and an increased TCA cycle flux.

The increased flux, combined with the activation of fatty acid oxidation induced by HCA and carnitine, increases fat breakdown and the oxidation of fatty acids, along with an increase in uncoupling protein. The overall result is an increase in fat breakdown and an increase in heat production from the metabolism of fat.

Yerba Mate, Damiana, Guarana Combo

Researchers in Switzerland performed a study on human subjects (in 1999) that indicated yerba maté could be beneficial as a weight-loss aid. They noticed a thermogenic effect in healthy individuals where a drop in respiratory quotient was observed—indicating a rise in the proportion of fat oxidized.[96]

In another study, yerba maté was given in combination with the plants guaraná and damiana (all three are in LipoFlush). This combination prolonged gastric emptying (which made the subjects feel "fuller" longer) and significantly reduced body weight in overweight people over a 45-day period.[97]

Clinical studies indicate yerba maté leaf inhibits lipoxygenase, an enzyme involved in inflammation and inflammatory diseases. Yerba maté extracts also have been shown to relax smooth muscle, act as a choleretic (increase bile flow), and inhibit vasoconstriction.

A U.S. patent cites yerba maté for inhibiting monoamine oxidase (MAO) activity by 40–50% in vitro, reporting that it might be useful for a variety of such disorders as "depression, disorders of attention and focus, mood and emotional disorders, Parkinson's disease, extrapyramidal disorders,

hypertension, substance abuse, eating disorders, withdrawal syndromes and the cessation of smoking."

Yerba maté has significant antioxidant activity, demonstrated in numerous studies. Its high antioxidant values are linked to rapid absorption of known antioxidant phytochemicals found in maté leaves. An infusion (tea) of the leaf has been demonstrated to inhibit lipid peroxidation—particularly LDL (low-density lipoprotein) oxidation. Oxidation of LDL is considered to be the initiating factor in the pathogenesis of atherosclerosis.

Another study in vitro has shown yerba maté to inhibit the formation of advanced glycation end products (AGEs), with an effect comparable to that of two pharmaceutical AGE inhibitor drugs. The formation of AGEs plays a part in the development of diabetic complications.

Guggulsterone and Phosphate Combo - Support for the Metabolism and Thyroid

As we mentioned above, your body reacts to decreasing calorie intake, and what it believes is impending starvation, by putting in place three main survival mechanisms.

Number one it decreases your metabolic rate, mainly by decreasing the amount and activity of thyroid hormone, and number two it increases your appetite and cravings so that anything that's even

remotely edible is gobbled up. The third mechanism is by decreasing the action of neurotransmitters in the brain, with the purpose of decreasing energy output and metabolism.

Unfortunately, your body by putting itself in survivor mode counteracts and even sabotages your weight loss efforts.

Various ingredients in LipoFlush are meant to counteract all three of these mechanisms. We've already mentioned several ingredients that decrease appetite and we'll mention more below.

Several ingredients in LipoFlush optimize and increase thyroid hormone activity and increase metabolic rate. For example, **phosphates, guggulsterones Z and E, and kelp**, promote thyroid function, increase the metabolic rate and support thermogenesis. All actions that promote fat breakdown and oxidation.

Studies have shown guggulsterones to have thyroid stimulating activity and increases thyroid efficiency by increasing the conversion of the less active T-4 to the more active T-3.[9899] The use of guggulsterones has been shown to result in a decrease in body fat, and to also lower cholesterol levels.[100]

LipoFlush also contains substantial amounts of natural phosphates, in the form of calcium and potassium phosphates, which have also been shown to prevent a decrease in T-3 and increase the BMR.

And there's more good news. The combination of guggulsterones and phosphates has been shown to optimize body composition in adults.[101]

Neurotransmitter Precursors

As mentioned above, dieting tends to decrease neurotransmitter levels in the central nervous system resulting in lowered metabolic rate, decreased activity, hunger and fatigue.

LipoFlush counters this by providing **tyrosine, DMAE, mucuna pruriens, and various choline compounds** including **choline** and **lecithin**, ingredients that increase neurotransmitter function and increase energy, activity and wellbeing as well as decreasing appetite. Tyrosine, an amino acid, is also a precursor for thyroid hormone. As well, **choline** and **inositol** act as lipotropic agents and help optimize fat metabolism.

Several of the ingredients in LipoFlush, including **mucuna pruriens**, **glycine**, **tyrosine**, **zinc**, and some of the other ingredients that decrease inflammation, **optimize growth hormone** secretion and activate the protein sparing, lipid burning effects that growth hormone has.

Methylcobalamin (Vitamin B12), Vitamin B6, Betaine and Folic Acid, for Increased Health and Energy.

LipoFlush contains high doses of **Folic acid, Vitamin B6** and **methylcobalamin**, the biologically active form of **B12** (not the cyanocobalamin, the synthetic and not as metabolically active form of B12 that is generally used), increases energy and health.

There is so much to say about the effects that this trio has on metabolism, macronutrient metabolism, energy systems, and on combating the adverse effects of pollution and mercury toxicity, that it would take a separate book to document it all.

Suffice it to say that the health effects of all three of these B vitamins have been extensively documented. And that several of the medical parameters, such as homocysteine, cholesterol and C - reactive protein, markers of heart disease and inflammation in the body, are decreased by the use of hefty doses of these vitamins, and by some of the other ingredients in LipoFlush, including **betaine** (trimethylglycine – three methyl groups attached to the amino acid glycine).

Besides acting as a precursor for methionine, choline and carnitine, betaine has other useful properties. **Betaine** has been shown to protect tissues under stress, regulate fatty acid metabolism, reduce body fat in animals, improve body composition, increase performance, and be useful in the prevention of chronic diseases.[102][103][104][105]

Betaine also acts as an important methyl donor. Methyl donors are important for the methylation reaction, which adds a methyl group (one carbon atom and three hydrogen atoms), on proteins, enzymes, chemicals, DNA, and amino acids like homocysteine. Methylation is important for maintaining many functions in the body including genetic expression, and neurological and musculoskeletal function.

LipoFlush contains a number of ingredients involved in methylation, including vitamin B12 (as **methylcobalamin** – the biologically active form of B12 that has an added methyl group – the synthetic B12, cyanocobalamin, a much cheaper form of B12 with a cyanide molecule, has to be metabolized to methylcobalamin in the body), **folic acid**, **B6**, **betaine**, **choline** and **lecithin**. These ingredients optimize macronutrient metabolism and help maximize muscle mass and decrease body

fat, often acting synergistically to achieve their effects.[106][107]. As well, they decrease serum levels of homocysteine, cholesterol and C-Reactive proteins, markers and mediators of heart disease and inflammation in the body.[108][109]

Calcium, Magnesium, Vitamin D

Calcium, while generally considered a key element for maintaining bone density and strength, also has other health benefits including reducing blood pressure,[110] and more importantly for both men and women losing weight, the prevention of any adverse effects of dieting on bone mass and a preventative effect on osteoporosis.[111]

For example, calcium can also help lower your cholesterol.[112] In this study it was found that people with cholesterol levels in the high range of 240 to 260 reduced their total cholesterol by 6 percent when they took in an extra 1,800 milligrams of calcium a day. And the best part is that LDL (low-density lipoprotein) cholesterol--the bad cholesterol that's implicated in coronary artery disease, dropped by 11 percent. As well, calcium has been inversely associated with the incidence of colorectal adenomas.[113]

But there's more. Calcium has also been shown to modulate the inflammatory response[114] and to increase weight loss. One study found that an increase in dietary calcium intake, together with a normal protein intake, increased fecal fat and energy excretion by about 350 calories per day.[115] This observation may help explain why a high-calcium diet produces weight loss, and it suggests that an interaction with dietary protein level may be important.

Several studies have shown that calcium plays a key role in body weight regulation and especially on fat metabolism (with possible effects on lipolysis, fat oxidation, lipogenesis, energy expenditure and appetite suppression) and thus is a useful supplement for those looking to decrease weight and body fat.[116117118119120121122123124125126]

For example, Zemel et al. looked at the effects of calcium supplements on obese adults who were dieting. They found that a high-calcium diet (1200-1300 mg/day) resulted in greater weight and fat loss in humans compared to a low-calcium diet (400-500 mg/day).

Another study found that a high intake of calcium may hinder weight and fat regain.[127] The study found that after putting mice on a low-calorie diet and producing weight and body fat loss, that those on a low calcium diet regained their weight after 6 weeks. However, for those on a high calcium diet it was a different story. They found that the high calcium diets produced significant increases in lipolysis, decreases in fatty acid synthase expression and activity, and reduced fat regain. They also found that increasing calcium through the use of dairy products had significantly greater effects on fat regain.

There also seems to be a synergy on fat loss if calcium is taken with vitamin D (**both in LipoFlush**).[128]

The bottom line is that increasing calcium intake is a boon to those who want to not only lose weight, but to lose fat, improve body composition, and keep that fat and weight from coming back.

Magnesium, besides complementing the effects of calcium on obesity[129] and other functions, also has important effects on its own. Low levels of magnesium promote inflammation[130131] and impact on the body's ability to handle stress.[132] These functions are useful in alleviating the release of pro-inflammatory cytokines, and decreasing both insulin resistance and inappropriate cortisol secretion.

Vitamin D is important for augmenting calcium dynamics. However, it also has other important effects,[133] for example on insulin resistance,[134] inflammation[135136] and obesity[137138139] (for more on this see below). Although getting adequate amounts of vitamin D is crucial to health, vitamin D deficiency is relatively common.[140141142] As such, supplementing with vitamin D is important to realize all the benefits that it has to offer. For more detailed information on vitamin D, especially its usefulness during the Covid-19 pandemic click on this link for my **recent article**.

Alpha lipoic acid

Alpha lipoic acid (**ALA**), an essential cofactor of mitochondrial respiratory enzymes, is also a potent antioxidant[143144145146] that can recycle other antioxidants such as vitamin C, vitamin E and glutathione.[147148] ALA also ALA was added to LipoFlush VI to increase insulin functioning and sensitivity[149150151] and decrease body fat by its actions on the pro-inflammatory cytokines[152153] and on secondary cortisol elevations. Interestingly enough a combination of ALA and CLA, also in LipoFlush, had a synergistic effect on increasing insulin sensitivity.[154]

Besides having potent antioxidant and anti-inflammatory effects, ALA also has significant anabolic effects secondary to its beneficial effects on insulin sensitivity, growth hormone and IGF-I secretion, and energy metabolism, all factors involved in maintaining, repairing and regenerating musculoskeletal tissues and improving body composition.[155,156,157,158,159160161] As well, it helps neutralize and remove various toxic metals, including mercury, from the body.[162163]

But there is more to ALA than its antioxidant and anti-inflammatory effects as ALA has also been shown to have significant anti-obesity effects. One study found that ALA decreases hypothalamic AMPK activity and causes profound weight loss in rodents by reducing food intake and enhancing energy expenditure.[164] More recent studies have also found that ALA significantly affects obesity and body composition in humans.[165166167168169] A recent study found that the combination of curcumin and alpha lipoic acid (**both in LipoFlush**) exhibit an additive effect in weight and fat loss.[170]

Biotin

Biotin is a water-soluble vitamin (also known as vitamin B7) that is indispensable for normal health including acting as a cofactor for several of the carboxylases involved in fatty acid synthesis, gluconeogenesis, and branched-chain amino acid (BCAA) metabolism.[171172173174175]

For example, Pyruvate carboxylase is a biotin-containing enzyme that functions in the anaplerotic carboxylation of pyruvate to form oxaloacetate, replenishing oxaloacetate withdrawn from the Krebs cycle for various pivotal biochemical pathways. PC is therefore considered as an enzyme that is crucial for intermediary metabolism and controlling fuel partitioning.[176177]

The ketogenic phase of my diets and any ketogenic/low carb diet increases biotin bioavailability and consumption, and hence, promotes energy production by gluconeogenesis and branched-chain amino acid metabolism, which can result in biotin deficiency. A recent paper concluded that “It is suggested that individuals that consume the ketogenic diet have an increased biotin requirement.”[178]

Interestingly, consuming large amounts of raw egg whites can contribute to biotin deficiency as it contains avidin that binds to biotin and prevents its absorption. This can also be the case when consuming raw eggs as the avidin affects the biotin that is contained in egg yolk.[179]

Pyruvate

Pyruvate as calcium pyruvate is an integral part of LipoFlush version VI and a recent meta-analysis revealed a statistically significant difference in body weight with pyruvate compared to placebo.[180] There is also evidence that pyruvate or pyruvate plus dihydroxyacetone increases exercise performance.[181] In this study the author states that “When infused in rats during prolonged treadmill running, pyruvate reduced run time to exhaustion by approximately 67%. However, when provided as an oral supplement for several days, it has enhanced aerobic endurance capacity.”

Quercetin

The bioflavonoid quercetin has many beneficial effects on health, body composition, weight loss and much more. Quercetin has been shown to have significant anti-inflammatory, antioxidative, anti-carcinogenic, anti-diabetic, and antihistaminic activity resulting in decreases of both acute and chronic inflammation and protective effects against toxins and the pro-inflammatory cytokines and inflammation-promoting pathways.[182 183184185186187188189190191192193194195196197198199200]

Several studies have shown the significant neuroprotective and anti-aging effects of quercetin.[201202203204205206207]

Quercetin has been shown to enhance exercise/sports performance, increase mitochondrial biogenesis, decrease mitochondrial dysfunction, and thus positively affecting energy metabolism and exercise/sports performance.[208209210211212213214215216] There is also evidence that quercetin is protective against intense exercise injury of the heart, especially ultrastructural damage and mitochondrial dysfunction.[217]

A review article concluded that there is evidence to suggest that flavonoids may be beneficial to connective tissue for several reasons, which include the limiting of inflammation and associated tissue degradation, the improvement of local circulation, as well as the promoting of a strong collagen matrix.[218]

Quercetin has favorable effects on body composition, reducing obesity and counter-productive obesity induced changes in skeletal muscle.[219220221] The combination of quercetin and resveratrol (**both in LipoFlush**) – resveratrol in grape seed extract) has been shown to reduce obesity by modulation of gut microbiota.[222]

Studies have found that quercetin works synergistically or additively with other anti-inflammatory and antioxidant compounds. For example, one study found that quercetin showed an increase in activity when combined with vitamin C.[223] The same study found that the in vitro antioxidant activity of quercetin was better than vitamin C. Quercetin has also been shown to have antimicrobial properties.[224]

Another study found that quercetin is even more effective for decreasing inflammation and loss of functional cells when used with high dose glucosamine.[225]

Piperine (Bioperine™ -also in LipoFlush) has been shown to enhance the beneficial effects of quercetin on stress and brain function.[226]

For all these reasons quercetin plays a prominent part in the beneficial effects that LipoFlush has on all aspects of health, body composition, fat loss, exercise, and anti-aging.

Citrus A**urantium**

Citrus aurantium (**not in LipoFlush Competition**) contains several compounds that increase fat breakdown and oxidation.

Citrus Aurantium is an effective replacement for ephedra in that it has the same effects on weight and fat loss but not the potentially severe adverse effects.[227] Thus in this formula, the **citrus aurantium,** plus **caffeine** and **white willow bark** make an effective alternative for the popular ECA stack that

proved popular for weight and fat loss before the use of ephedra in nutritional supplements was banned.[228],[229]

Citrus aurantium contains several adrenergic amines including synephrine, N-methyltyramine, hordenine, octopamine, and tyramine. It's widely used for stimulating the breakdown of fat, by causing the release of noradrenaline (a stress hormone) at beta-3 receptor sites creating chemical reactions that increase fat breakdown.

Beta-3 receptors in the body increase the rate at which fat is released from the body stores (lipolysis) and increase resting metabolic rate (thermogenesis). Physical activity will increase this thermogenic effect and further enhance the thermogenic effect of Citrus Aurantium towards healthy and permanent weight and fat loss.

Because these amines stimulate beta-3 cell receptors with minimal effect on other alpha and beta-receptors, citrus aurantium has reduced adverse effects on heart rate and blood pressure.

Stimulation of these beta-3 receptors by citrus aurantium elicits the breakdown of fat. Simultaneously, this stimulation causes an increase in the metabolic rate – thermogenesis – that burns calories. Citrus aurantium may also act as an appetite suppressant.

Citrus aurantium has several useful ingredients in it and represents more than just synephrine. It also contains other alkaloids such as N-methyl tyramine, tyramine, hordenine and octopamine that also increase fat breakdown. So, products that just use synephrine are not as effective as using citrus aurantium standardized for synephrine but also containing much more.

Citrus aurantium is widely used for stimulating the breakdown of fat, by causing the release of noradrenaline (a stress hormone) at beta-3 receptor sites creating chemical reactions that increase fat breakdown. Beta-3 receptors in the body increase the rate at which fat is released from the body stores (lipolysis) and increase resting metabolic rate (thermogenesis).

Physical activity will increase this thermogenic effect and further enhance the thermogenic effect of Citrus Aurantium towards healthy and permanent weight and fat loss. As well, citrus aurantium has been shown to increase the thermic effect of food, further increasing weight and fat loss.[230]

As well, the use of yohimbe and citrus aurantium provides a synergistic effect on thermogenesis and fat loss.[231]

Citrus aurantium has been shown to be exceedingly safe with no significant adverse effects.[232]

s widely used for stimulating the breakdown of fat, by causing the release of noradrenaline (a stress hormone) at beta-3 receptor sites creating chemical reactions that increase fat breakdown. Beta-3 receptors in the body increase the rate at which fat is

released from the body stores (lipolysis) and increase resting metabolic rate (thermogenesis) Physical activity will increase this thermogenic effect and further enhance the thermogenic effect of Citrus Aurantium towards healthy and permanent weight and fat loss.

Extracts from citrus aurantium contain a rare combination of five adrenergic amines: synephrine, N-methyltyramine, hordenine, octopamine, and tyramine. These amines stimulate beta-3 cell receptors with minimal effect on other alpha and beta-receptors. This could indicate that citrus aurantium increases metabolic rate without affecting heart rate or blood pressure.

Stimulation of these beta-3 receptors elicits the breakdown of fat. Simultaneously, this stimulation causes an increase in the metabolic rate – thermogenesis – that burns calories. Citrus aurantium may also act as an appetite suppressant.

Astaxanthin

Astaxanthin, a powerful lipid-based antioxidant complements with potent anti-inflammatory effects and adds to the many beneficial effects of LipoFlush on body composition, exercise performance, testosterone production, anti-aging, and overall health.[233]

Astaxanthin has been shown to have potential to improve health, enhance exercise performance, increase fat metabolism during exercise, decrease oxidative stress and muscle injury, delay exhaustion, improve body composition, enhance recovery, prevents redox imbalances, decrease obesity related disease, and attenuate muscle damage, counterproductive inflammation and fibrosis induced by rigorous physical training as well as immobilization.[234235236237238239240241242243244245246247248249250251252]

Some of the benefits of Astaxanthin deserve special attention. For example, astaxanthin has a protective effect on mitochondria, the cellular powerhouses that produce the energy we need to live and function optimally. Protecting the mitochondria is especially important during exercise since destructive free radical production increases almost exponentially and can damage not only the mitochondria, thus impairing energy systems, but also skeletal muscle as a whole impairing performance and recovery and increasing the chance of injury.[253]

But that's not all because astaxanthin, through its effects on decreasing mitochondrial damage in other parts of the body such as the testes, also increases testosterone production and thus increases the anabolic effects of exercise and has also been shown to have positive effects on sperm parameters and fertility.[254]

As far as testosterone production it's been found that mitochondrial function is paramount for the optimal functioning of Leydig cells, the cells in the testes that produce testosterone.[255] Oxidative stress, for example from exposure to hydrogen peroxide, acts directly on testicular Leydig cells impairs mitochondrial functioning and decreases steroidogenesis and thus impairs testosterone production.[256] Astaxanthin rescues Leydig cells from oxidative stress and thus restores normal testosterone production.[257]

It's also been shown that astaxanthin acts as an aromatase inhibitor, and thus decreases the effects of estrogen on the HPTA and thus acts to further increase testosterone levels. In one study a combination of astaxanthin and saw palmetto increased serum testosterone, and decreased estrogen and dihydrotestosterone (DHT) production.[258] The end result is increased testosterone levels as there is less testosterone being metabolized to estrogen and DHT.

Unlike some other antioxidants, astaxanthin not only has intrinsic antioxidant and anti-inflammatory properties but it also increases the endogenous production of natural antioxidant defense mechanisms such as SOD and heme oxygenase-1.[259]

As well it works synergistically with other ingredients in LipoFlush. For example, in horses it's been shown that continuous dietary administration of astaxanthin and L-carnitine (both in LipoFlush) attenuates exercise-induced muscle damage.[260]

For all these reasons astaxanthin plays a prominent part in the beneficial effects that LipoFlush has on all aspects of health, nutrition, exercise, weight loss, body composition and anti-aging.

Bioperine

Bioperine®, a patented preparation of the black pepper thermogen, piperine, has demonstrated the ability to improve the absorption of several nutrients including curcumin/turmeric, CoQ10, and Resveratrol.[261] The use of Bioperine results in less degradation of the active ingredients in LipoFlush; thereby ensuring higher percentages get through to increase their beneficial effects.

Bioperine improves bioavailability of ingredients in LipoFlush, but it also has several other beneficial properties, including thermogenic effects, reducing cholesterol, and protecting against neurodegeneration and cognitive impairment. As well, it has been shown that it may have immunomodulatory, anti-oxidant, anti-asthmatic, anti-carcinogenic, anti-inflammatory, anti-ulcer, and anti-amoebic properties.[262][263][264][265][266][267][268] A recent study found that a combination of piperine and curcumin (**both in LipoFlush**) has neuroprotective effects.[269]

For current information on the beneficial effects of piperine as the trademark Bioperine go to **https://www.bioperine.com/index.php/aboutbioperine**.

Other Ingredients

While the ingredients we've already mentioned far outclass any weight loss supplement on the market today, both in the science behind the product and effectiveness, LipoFlush has many other ingredients that act to further increase fat breakdown and oxidation, increase metabolic rate and thermogenesis, decrease appetite and provide you with nutrients that increase energy, wellbeing and health. We'll look at some of these below.

Cordyceps sinensis is a highly valued medicinal mushroom that helps increase stamina, energy levels, and endurance, and by these actions leads to increased fat loss.

Magnesium (oxide and **octadecanoate)** increases fat metabolism in rat liver and may have a similar effect in humans.[270]

Siler extract is a source for Bofu-tsusho-san, a compound with thermogenic and lipolytic properties.[271][272]

Caffeine (not in LipoFlush Competition), kola nut, ginseng, theobroma cocoa complex and green tea increase energy and thermogenesis, decrease appetite and increase fat oxidation. For example, green tea has been found to elevate energy expenditure in humans.[273] It's been shown that cocoa has a modulating effect on fat metabolism and increases thermogenesis.[274]

Potassium helps correct the potassium loss often seen with dieting. Loss of potassium can lead to fatigue and lethargy, which can be counterproductive to dieting.

Cellulose and **cellulose gum** act to decrease appetite and decrease fat absorption. Also, unlike soluble fibers, these insoluble fibers do not increase short chain fatty acids formation and absorption from the bowels.

Resveratrol (in grape seed extract), besides it's beneficial anti-inflammatory effects also influences weight loss and obesity measures.[275]

Several of the ingredients in LipoFlush, such as **cayenne**, **Hawthorne berry**, **ginger root**, and **quercetin**, are either thermogenic and/or supportive to weight loss either directly, or indirectly by providing certain health benefits.

Grape seed extract, green tea, and **quercetin** are potent antioxidants and help decrease the effects of restrictive diets on oxidant stress and on antioxidant status.

CLA, magnesium, zinc, green tea, alpha lipoic acid and **biotin** increase insulin sensitivity and thus decrease lipogenesis and increase fat breakdown.

Glycine has been shown to protect against increased circulating nonesterified fatty acids (NEFA), fat cell size and intra-abdominal fat accumulation.[276]

Where's the Proof?

Over the past three years I've conducted several clinical studies and have had feedback from hundreds of people who have used LipoFlush.

In one study I compared two 24-hour periods, one with LipoFlush and one without, in which I obtained minute by minute energy expenditure values on one woman. Physical activity and diet were almost exactly the same.

In a previous study, the test subject burned 2041.78 kcals/d without LipoFlush and 2279.27 kcals/d with LF. The difference at that time was 237.5 or 11.6%. The dose used was 2 tablets taken in the AM with her normal breakfast. The increase in metabolism lasted for close to 10 hours on the one morning dose. It also dramatically reduced her appetite. The data for this study is available at www.MetabolicDiet.com.

The follow-up to this study, using 2 tablets of LipoFlush twice a day showed a phenomenal 23.8% increase in the calories burned over the control state.

Other less formal clinical studies done on several groups of people found the same response to LipoFlush. In the first group that tried LipoFlush I didn't have them change their lifestyle, training or even their diet. All they did is use 4 tabs of LipoFlush twice a day.

The results were extremely interesting. All six lost weight, mostly body fat, without changing what they were doing except taking the LipoFlush. One chap lost 25 lbs. in four weeks but on questioning him further I found that he cheated. He felt the LipoFlush working, liked the way he felt, and wanted to help the process along. So, he trained harder and put himself on my Radical Diet, an extreme very low-calorie version of my Metabolic Diet.

The other five lost anywhere from 6 to 16 lbs. in the four weeks without appreciably changing what they did. Needless to say, they were really pleased with the results. There was one bias in this group of six people in that they were really charged up about going on the LipoFlush and expected great things from it. As such, it's difficult to remove the placebo effect from this group and they might have lost significant amounts of weight even without the LipoFlush. Ideally, I would have had two groups

who were nearly identical in everything except that one group would take the LipoFlush and the other pills that looked like LipoFlush but without any active ingredients.

The second group of people were slightly different and put on a protocol that was more hands on. All six were already training and were in a steady state, no change in body composition for at least a month prior to going on the LipoFlush. In this group I increased their training load and made some changes in the macronutrient content of their diet. I had them follow the Metabolic Diet at a slightly reduced calorie intake than what they were on before taking the LipoFlush. The 4-week results on these six people were as follows:

They showed an average of just over one pound of fat loss every three days for the full four weeks, with the total fat loss averaging out at 10 lbs. These changes were arrived at this through the use of body fat measurements and total body weight done once a week, usually Saturday morning.

Weight loss over the four weeks was interesting. At first there was an average weight loss of almost one pound a day for the first five days. After that most of the people didn't lose much more weight. In fact, the overall weight loss was less than 5 lbs., which means they gained muscle mass while at the same time losing weight.

Subjectively all six felt better, more energetic, and had better training sessions.

Now these are not dramatic weight and fat losses. But you have to keep in mind that all six of the subjects were in shape and didn't go on a strict weight loss diet, they just followed the Metabolic Diet as far as cycling their macronutrient intake with a daily calorie intake of only about 200 calories less than their diet prior to going on the LipoFlush.

Although all of this is informal, it’s obvious that LipoFlush can help you lose significant amounts of body fat, even if you don’t do anything else different. And even more important, it can help you lose a lot more if you diet and exercise.

Even more impressive are the several hundred unsolicited testimonials that people have sent me. People in all walks of life, men and women, teens, boomers and the elderly, including both men and women wanting to improve body composition and performance, elite power and endurance athletes, and both recreational and competitive bodybuilders, have found the targeted use of LipoFlush, alone and in combination to other supplements in my nutritional supplement lineup, to dramatically decrease their body fat, increase their energy levels, and improve body composition and performance.

On the other end of the scale, several women who gained weight after having a baby but were unable to take it off no matter what they did, found that LipoFlush was able to help them get their figures back.

Over the years I’ve had countless people tell me that LipoFlush did what no other diet and nutritional supplement was able to do for them. And that’s to effectively deal with problem areas, whether it was cellulite or an expanding waist line.

Going to Waist

I've had a lot of women and men complain that they're putting weight on and it's all going to their waistline. Besides being unattractive and limiting your ability to touch, and sometimes even seeing your toes, fat around your middle is more of a health hazard than body fat anywhere else.

Several new studies show that increasing waist size increases the risk for developing metabolic syndrome, diabetes, heart disease, and other illnesses. In fact, the size of your waist appears to be a better predictor of disease than either your weight, your BMI (your weight in relation to your height) or your waist-to-hip ratio.

Waist size is easy to measure using a tape, but most people are aware that their waist is expanding before then even think of measuring it. That's because you can tell by how your clothes fit and how you look in the mirror without clothes on. But for a more objective view, and as a way to measure your risk, it's a good idea to use a tape measure.

If you're of average height and your waist size is more than 36 inches, then it's time to do something about it. If it's more than 40 inches, then you're already at risk. That's because abdominal fat measured by waist circumference can indicate a strong risk for obesity, diabetes and other diseases whether or not the person is considered overweight or obese according to his BMI.

Several studies have shown a correlation between waist size and cholesterol, blood pressure, diabetes and other health risks. One study looked only at men's waist sizes relative to diabetes risk.[277] The authors of the study found that risk started to creep up when the belt size went higher than 35 inches, and that 80 percent of type 2 diabetes cases occurred in men with waists larger than 37 inches.

In a study based on data collected from 27,270 men tracked over 13 years through the Harvard Health Professionals Follow-Up Study,[278] men who had a waist size of 40 inches or more were 12 times more likely to develop the type of diabetes in which the pancreas either doesn't make enough insulin or doesn't respond properly to insulin than men with waist sizes of 34 or less. With a waist size of 34 to 36, the diabetes risk doubled; at 36 to 38 inches, the risk tripled; and at 38 to 40 inches, the risk for the disease was five times greater.

The bottom line is that an expanding waist line, while something to avoid for aesthetic reasons, is also a significant health risk.

Spider Bite Tale

Lately a woman in her mid-fifties complained to me that after being bitten by a spider she was put on a cortisone pill for the swelling. While she was on the cortisone, and especially after stopping it she complained of gaining weight, mostly around the belly, and that no matter how hard she dieted and exercised, she just couldn't budge that belly fat.

And I've heard this story before from many others. Not about being bitten by a spider or taking cortisone-type drugs, but about a spreading waistline. The problem, as I see it, is twofold. First of all, increasing cortisol levels by taking cortisone drugs, as in the woman who was bitten by the spider, or simply secondary to inflammation, can be an instigator for obesity in general and especially abdominal obesity.

Once you gain that fat, it only takes normal levels of corticosteroids to maintain it. But you would think that at least theoretically you should be able to lose this weight and fat gain by careful dieting and exercise.

Unfortunately, this is not the case with a lot of men and women because there are factors at play that may be responsible for their inability to lose weight. A lot of this is due to insulin resistance secondary

to the increase in pro-inflammatory cytokines and increase in cortisol, leading to a tendency for weight gain rather than weight loss.

There is definitely a link between the pro-inflammatory cytokines and both insulin resistance and excess local glucocorticoid activity. For example, it's been shown that an increase in pro-inflammatory cytokines results in an increase in insulin resistance, which in turn increases the formation of local cortisol production from cortisone by the enzyme 11beta-hydroxysteroid dehydrogenase.

In any case, the solution to weight gain and a spreading waistline is decrease the levels and thus effects of the pro-inflammatory cytokines, increase her insulin sensitivity, and decrease the formation of cortisol in the fat cells (see more on cortisol and its effects on body fat below). LipoFlush ver IV targets all of the above, plus much more.

Is Obesity an Inflammatory Condition?[279280281282]

We've already mentioned that gaining weight, especially around the middle, may be due to inflammation and the effects that inflammation has on the body. And that LipoFlush is formulated to fight this inflammation, as well as its adverse effects, especially insulin resistance and increased cortisol levels in adipose tissue.

To a lot of people this whole concept may sound farfetched. But it's not. Who would have even imagined a few decades ago that most chronic gastric ulcers were caused by bacteria? But they are. And today treatment involves the use of multiple antibiotics used along with various acid reducing medications.

Because it's not intuitive, at least at this point in our common understanding, we need to explore some of the current concepts linking inflammation and obesity.

Most of us equate inflammation with infections and injuries. Something we can see or feel. Like a boil on our skin, or a chest infection, or a swollen strained ankle. Or perhaps an ear infection in a child, with fever, aches and pains, and all the rest.

What we're actually seeing, however, in all of these cases are the results of inflammation secondary to injury of some sort, infectious or traumatic, and thus simply the body's response to the insult. The actual inflammatory process underlies it all and is much more than just what we see or feel.

In fact inflammation is a complex process that can be measured not only by the changes that take place with obvious infections, but also by measuring the markers in the body that uncover the fact that an inflammatory process is going on, even if the inflammation is not obvious or doesn't result in any symptoms.

Most of us, and certainly all of us as we get older, have some evidence of chronic inflammation. In most cases, although it's nothing we can put a finger on, there is something going on in our bodies

that are making it react as if it we are going through some sort of long term, low level, infection. We can detect this inflammation by measuring certain markers of inflammation in our bodies, including pro-inflammatory cytokines such as C-reactive protein (CRP), interleukin-1-beta (IL-1 beta), interleukin-6 (IL-6), and tumor necrosis factor alpha (TNF-alpha).

Low levels of inflammation, as shown by these and other inflammatory markers are linked to various diseases and conditions, including insulin resistance, the metabolic syndrome, diabetes, coronary

artery disease and arthritis. Obesity, and body fat, especially visceral adipose tissue (the fat around the belly) are both linked to low level inflammation in the body, again as measured by an increase in pro-inflammatory cytokines rather than overt signs and symptoms, and to various disease processes.[283284]

Body fat is an active endocrine tissue and is the source of several hormones and cytokines. It's also a site of active inflammation. Surprising isn't it to find out that a tissue that we all thought was a passive storage facility for excess calories, is actually a metabolic hotbed?

In fact, weight gain has been found to be associated with an increase in pro-inflammatory signals from adipose tissue.[285] These signals in turn may be responsible for further increases in weight and body fat. What we have is a vicious circle where fat begets more fat, inflammation leads to insulin resistance, increase in body fat which begins the cycle again. and soon begins to affect our health.[286287]

Several studies have shown links between inflammatory markers (such as C-reactive protein) and body fat – especially visceral adipose tissue.[288289290291292293294295296297298299 300301] These and others also show a link between the pro-inflammatory cytokines and both insulin resistance and excess local glucocorticoid activity. It's been shown that an increase in pro-inflammatory cytokines results in an increase in insulin resistance, which in turn increases the formation of cortisol from cortisone by the enzyme 11beta-hydroxysteroid dehydrogenase.

While the effects may not be measured systemically (blood cortisol levels are usually normal in obese people), the pro-inflammatory cytokines have been implicated in the local regulation of cortisol, by increasing its production in fat cells. For example, it's been shown that TNF-alpha causes insulin resistance and increased local cortisol production.[302] And to add to the problem, it's also been shown that body fat in obese people secretes more TNF-alpha than the equivalent amount of fat in lean people.

It's been shown that an increase in inflammatory mediators predicts the future development of obesity and diabetes and, interestingly enough, depression. It would seem that the link between obesity and increased body fat and increased inflammatory mediators might be considered as a cause-effect relationship. As such, decreasing levels of inflammation, and especially the pro-inflammatory cytokines may decrease body fat and weight gain by both direct, and by indirect effects. The indirect effects would be by decreasing inappropriate cortisol production and by increasing insulin sensitivity.

But there's more to the story. Reducing the pro-inflammatory cytokines results in an increase in levels of IGF-I, resulting in an increase in fat breakdown and oxidation of fatty acids, and anti-catabolic effects on muscle mass.[303304] The overall result is an increase in fat loss while maintaining skeletal muscle mass.

As we've seen above, LipoFlush contains several ingredients that reduce inflammation and the production and levels of pro-inflammatory cytokines, and aid in the overall process of fat loss while at the same time decreasing muscle catabolism.

What about Cortisol

Several of the new diet supplements target cortisol. They state that high cortisol levels are to blame for increased weight and body fat, especially for abdominal fat (known in the medical community as visceral adipose tissue – VAT).

As such, many preparations are marketed to alleviate this condition and contain a number of ingredients that are meant to decrease cortisol, with the aim of "curing" abdominal obesity and returning our abdominally fat challenged bodies to normal.

The problem is that their knee jerk reaction toward cortisol is more of a marketing point than anything else in that it assumes that it is the cortisol which is causing the increased VAT. But they're wrong in assuming that cortisol is the main problem when it comes to gaining body fat, both overall and the fat that's around the belly.

That's because cortisol levels are not necessarily elevated in overweight people unless they have a genetic predisposition or a condition that elevates cortisol levels pathologically.[305306307308] And secondly decreasing cortisol overall can be counterproductive.

We need baseline levels of cortisol and at times elevated levels to function normally. Cortisol provides a buffer for our daily stresses, and helps us to deal with inflammation, whatever the cause.

Lowering normal levels of cortisol can cause all kinds of health problems, including increasing inflammation in the body. And we know from the above discussion that increasing inflammation in the body will lead to increases in body fat and weight.

Not only that but healthy levels of cortisol help you to lose body fat since one of the functions of cortisol is to increase fat breakdown and use by the body.[309]

Having said that, it's also true that inappropriate increases in cortisol can be a problem in that it further potentiates increases in body fat. However, it's not systemic cortisol that seems to be the problem but levels of cortisol in the fat cells themselves and the differential actions of lipoprotein lipase and hormone-sensitive lipase in adipose tissues.[310311] That's because fat cells contain an enzyme that turns inactive cortisone to cortisol and thus increases local levels of cortisol, which in turn can increase fat formation and thus increases in body fat.

So, the answer to the cortisol dilemma is not to decrease cortisol levels in all parts of the body since normal levels of cortisol are vital to our health, but to decrease cortisol levels in fat tissue. And one of the most effective ways to do this is by decreasing the pro-inflammatory cytokines and subsequently insulin resistance, and thus the stimulus for increased cortisol levels.

LipoFlush Does It All

- **Decreases levels of inflammatory cytokines, increases insulin sensitivity and decreases local cortisol production.**
- **Decreases fat absorption.**
- **Increases body fat breakdown or lipolysis, releasing fat into the circulation.**
- **Decreases fat formation, or lipogenesis (fat creation).**
- **Reverses the effects that cutting back on calories has on the body by normalizing thyroid hormone and metabolic rate, increasing the uncoupling of oxidative phosphorylation, and decreasing hunger.**
- **Suppresses appetite.**
- **Keeps your metabolism going 24 hours a day so that you lose and burn fat even while you sleep.**
- **Keeps energy levels high by correcting any metabolic dysfunction and optimizing energy and macronutrient cycles.**
- **Increases energy output by increasing heat production.**
- **Flushes fat from your body, and decreases the number of fat cells, much like liposuction.**
- **Increases fat excretion in the bowels, taking some of some of the dietary fat out of the equation.**
- **Increases energy and subsequently the burning of fat by optimizing mitochondrial function and increasing TCA cycle flux for maximum fat burning.**
- **Has no significant side nervous system, heart of increased blood pressure side effects.**
- **Preserves or even increases muscle mass. Subsequently enhances fat oxidation to supply the energy needed for protein synthesis and metabolism.**
- **Decreases homocysteine levels in the body and thus decreases the tendency to cardiovascular disease.**
- **Reduces levels of C-reactive protein, a measure of stress and inflammation in the body.**
- **Increases insulin sensitivity and decreases insulin resistance and the associated possibility of developing diabetes.**
- **Increases systemic levels of B12, folic acid and B6 to offset any deficiencies in these vitamins, leading to increased mental and physical energy and feelings of wellbeing.**
- **Decreases cholesterol and triglycerides levels, while at the same time favorably affecting HDL (increasing) and LDL levels (decreasing).**
- **Increases calcium availability. Recent studies have shown that increased calcium, whether in the diet or by way of calcium supplements, results in lower body fat. LipoFlush contains over 400 mg of calcium in every dose.[312]**

The Bottom Line

LipoFlush represents a quantum leap in fat loss supplements. It's the first supplement that effectively decreases body fat by working at all the relevant metabolic, absorption and excretion levels, while at the same time providing substantial health benefits.

LipoFlush can be used by anyone who wishes to lose body fat. Most people who are just interested in losing weight while at the same time looking trim and toned will find LipoFlush ideal for them.

Athletes looking to maximize functional muscle mass and strength and minimizing body fat will find that LipoFlush is the perfect supplement to complement their training.

And bodybuilders looking to maximize muscle mass while taking body fat levels to the absolute minimum will find that LipoFlush is the perfect supplement to maximize their diet and training efforts, especially when in their cutting and pre-competition training phases.

The bottom line is that LipoFlush, with its unique emphasis on cutting edge research-based ingredients that target all of the pathways involved in weight and fat loss, and maximizing body composition, is by far the best fat loss supplement on the market today. **If you question this statement compare the ingredients in LipoFlush with ANY OTHER product on the market today (see page 3 and 4 above) and you'll be convinced.**

So, if you want maximum fat loss, maximum muscle retention, and a healthy and vibrant body and mind, then LipoFlush is the perfect supplement for you!

LipoFlush and the Radical Diet

The Metabolic Diet, the Radical Diet, and the Anabolic Solution series of book, go hand in hand with LipoFlush. And several recent studies have shown that the Metabolic Diet (the basis for all my phase shift diets and programs) will help you lose body fat better than any other diet out there.

LipoFlush Works Synergistically with the Radical Diet resulting in fast weight and fat loss. It, as well as the rest of my MD+ line of supplements, are formulated specifically for my revolutionary phase shift diets as well as monophasic ketogenic diets.

The Radical Diet, available in both soft cover book and eBook formats, is **a very low-calorie ketogenic diet** that is a quantum leap above all other diets. By changing you into a fat burning machine, the Radical Diet will help get the weight and fat off FAST, while at the same time preserving muscle.

Because the Radical Diet is streamlined to achieve one goal, fast weight and fat loss regardless of how much weight you want to lose, it has a no-nonsense approach that is simple to follow and highly effective.

As well, the Radical Diet specifically targets abdominal fat and reigns in that spreading waistline in the first few weeks that you're on the diet.

The Radical Diet Supplement Plans

The Radical Diet plans are available as beginners, intermediate and advanced plans. Each plan includes the Radical Diet eBook or book, and a number of supplements that work together to maximize fat loss and body composition.

RADICAL DIET BEGINNERS

This is the Beginners version of the 'Radical Diet Loss Plan'; the ultimate short-term diet plan meant for rapid weight loss.

Consists of the Radical Diet eBook or Book, LipoFlush extreme IV and the meal replacement shake, MRP LoCarb in either Vanilla or Chocolate.

RADICAL DIET INTERMEDIATE

This is the Intermediate version of the 'Radical Diet Loss Plan'; the ultimate short-term diet plan meant for rapid weight loss. This package is for those who have more weight and fat to lose or who want to lose it in the quickest possible time.

Consists of the Radical Diet eBook or Book, LipoFlush extreme version IV, Metabolic, Regulate, and the meal replacement shake, MRP LoCarb in either Vanilla or Chocolate.

RADICAL DIET ADVANCED

This is the Advanced version of the 'Radical Diet Loss Plan'; the ultimate short-term diet plan meant for rapid weight loss. This package is meant for those who are serious about getting their fat levels down to an absolute minimum, while maintaining maximum muscle mass and strength.

Consists of the Radical Diet eBook or Book, LipoFlush extreme version IV, Metabolic, ReNew, MVM, EFA+, Antiox, Regulate, the meal replacement shake, MRP LoCarb in either Vanilla or Chocolate, Myosin Protein in either flavor, Creatine Advantage and a pair of fat calipers. .

Inflammation and the Radical Diet

As I've mentioned, there is a definite link between inflammation and both obesity and body fat, especially fat in the waistline area. There's no doubt that adipose tissue secretes a number of adipokines that can adversely affect health.

As well, it's my contention that the inflammatory process itself, likely a result of a combination of causes including some fat accumulation, aging, clinical and subclinical infections, stress and a host of others that all increase inflammatory levels in the body, begets an increase in body fat and eventually obesity, as well as a number of diseases including diabetes and cardiovascular disease.

It is also my contention that decreasing the inflammation, increases insulin sensitivity, decreases local cortisol production in fat, and ultimately makes it easier to lose weight and body fat. The interaction between inflammation, insulin resistance and body fat is certainly one of the mechanisms involved in the pathogenesis of weight and fat gain.[313]

Although the exact cause and effect between insulin resistance, inflammation and obesity has still to be worked out, we do know that insulin resistance and elevated levels of cytokines go hand in hand.[314] For example in one study lowering interleukin-6, one of the pro-inflammatory cytokines, improved insulin action in obesity.[315]

LipoFlush is formulated to not only decrease inflammation, but also to work on other pathways with the goal of maximizing weight and body fat loss. Although it will work on its own, coupling it with the right kind of diet makes the whole process easier and faster.

The Radical Diet, a ketogenic diet, unlike my phase shift diets, presents an optimal diet that works synergistically with LipoFlush, as well as several other supplements in my MD+ supplement line.

The Radical Diet works because of a number of reasons, all explained in the book. However, one of the reasons is because it reduces inflammation in the body. One study looked at the adaptation that occurs to energy restriction at a molecular level and the benefits of very low caloric diets (VLCD) in humans and found it had beneficial effects on insulin resistance and inflammation.[316] Sound familiar? If not re-read the section on inflammation and LipoFlush above.

Although it can be used alone to get all the initial benefits of a low calorie pure ketogenic diet, it's also a good diet to use before transitioning to one of my phase shift diets. Going from the Radical Diet as the first diet to quickly lose excess weight and body fat, also allows you to skip the transitional phase of my phase shift diet because being on the Radical Diet you're already fat adapted.

References:

[1] Dulloo1 AG,Jacquet J, Montani1 JP. Pathways from weight fluctuations to metabolic diseases: focus on maladaptive thermogenesis during catch-up fat. International Journal of Obesity 2002; 26(Suppl 2):S46–S57.

[2] MacLean PS, Higgins JA, Johnson GC, Fleming-Elder BK, Donahoo WT, Melanson EL. Enhanced metabolic efficiency contributes to weight regain after weight loss in obesity-prone rats. Am J Physiol Regul Integr Comp Physiol. (2004) 287:R1306–15.

[3] Calonne J, Isacco L, Miles-Chan J, Arsenijevic D, Montani JP, Guillet C, Boirie Y, Dulloo AG. Reduced Skeletal Muscle Protein Turnover and Thyroid Hormone Metabolism in Adaptive Thermogenesis That Facilitates Body Fat Recovery During Weight Regain. Front Endocrinol (Lausanne). 2019 Feb 28;10:119.

[4] MacLean DB, Luo LG. Increased ATP content/production in the hypothalamus may be a signal for energy-sensing of satiety: studies of the anorectic mechanism of a plant steroidal glycoside. Brain Res. 2004 Sep 10;1020(1-2):1-11.

[5] Cha YS, Rhee SJ, Heo YR. Acanthopanax senticosus extract prepared from cultured cells decreases adiposity and obesity indices in C57BL/6J mice fed a high fat diet. J Med Food. 2004 Winter;7(4):422-9.

[6] Kakuda T, Sakane I, Takihara T, Ozaki Y, Takeuchi H, Kuroyanagi M. Hypoglycemic effect of extracts from Lagerstroemia speciosa L. leaves in genetically diabetic KK-AY mice. Biosci Biotechnol Biochem. 1996 Feb;60(2):204-8.

[7] Suzuki Y, Unno T, Ushitani M, Hayashi K, Kakuda T. Antiobesity activity of extracts from Lagerstroemia speciosa L. leaves on female KK-Ay mice. J Nutr Sci Vitaminol (Tokyo). 1999 Dec;45(6):791-5.

[8] Imparl-Radosevich J, Deas S, Polansky MM, Baedke DA, Ingebrutsen TS, Anderson RA, Graves DJ: Regulation of phosphorylase phosphatase (PTP-1) and insulin receptor kinase by fractions from cinnamon: implications for cinnamon regulation of insulin signaling. Horm Res 50:177–182, 1998

[9] Jarvill-Taylor KJ, Anderson RA, Graves DJ: A hydroxychalcone derived from cinnamon functions as a mimetic for insulin in 3T3–L1 adipocytes. J Am Coll Nutr 20: 327–336, 2001

[10] Qin B, Nagasaki M, Ren M, Bajotto G, Oshida Y, Sato Y. Cinnamon extract (traditional herb) potentiates in vivo insulin-regulated glucose utilization via enhancing insulin signaling in rats. Diabetes Res Clin Pract. 2003 Dec;62(3):139-48.
[11] Mousavi SM, Rahmani J, Kord-Varkaneh H, Sheikhi A, Larijani B, Esmaillzadeh A. Cinnamon supplementation positively affects obesity: A systematic review and dose-response meta-analysis of randomized controlled trials. Clin Nutr. 2019 Feb 15. pii: S0261-5614(19)30071-8.
[12] Marreiro DN, Geloneze B, Tambascia MA, Lerario AC, Halpern A, Cozzolino SM. [Participation of zinc in insulin resistance] Arq Bras Endocrinol Metabol. 2004 Apr;48(2):234-9.
[13] Cheng Z, Zheng L, Almeida FA. Epigenetic reprogramming in metabolic disorders: nutritional factors and beyond. J Nutr Biochem. 2018 Apr;54:1-10.
[14] Samblas M, Milagro FI, Martínez A. DNA methylation markers in obesity, metabolic syndrome, and weight loss. Epigenetics. 2019 Mar 27:1-24.
[15] Mhurchu CN, Poppitt SD, McGill AT, Leahy FE, Bennett DA, Lin RB, Ormrod D, Ward L, Strik C, Rodgers A. The effect of the dietary supplement, Chitosan, on body weight: a randomised controlled trial in 250 overweight and obese adults. Int J Obes Relat Metab Disord. 2004 Sep;28(9):1149-56.
[16] Gades MD, Stern JS. Chitosan supplementation and fat absorption in men and women. J Am Diet Assoc. 2005 Jan;105(1):72-7.
[17] Mhurchu CN, Dunshea-Mooij C, Bennett D, Rodgers A. Effect of chitosan on weight loss in overweight and obese individuals: a systematic review of randomized controlled trials. Obes Rev. 2005 Feb;6(1):35-42.
[18] Gades MD, Stern JS. Chitosan supplementation and fecal fat excretion in men. Obes Res 2003 May;11(5):683-8.
[19] Kik MJ, Huisman J, van der Poel AF, Mouwen JM. Pathologic changes of the small intestinal mucosa of pigs after feeding Phaseolus vulgaris beans. Vet Pathol. 1990 Sep;27(5):329-34.
[20] Lee YH, Pratley RE. The evolving role of inflammation in obesity and the metabolic syndrome. Curr Diab Rep. 2005 Feb;5(1):70-5.
[21] Kim MS, Lee MS, Kown DY. Inflammation-mediated obesity and insulin resistance as targets for nutraceuticals. Ann N Y Acad Sci. 2011 Jul;1229:140-6.
[22] Tomlinson JW, Moore J, Cooper MS, Bujalska I, Shahmanesh M, Burt C, Strain A, Hewison M, Stewart PM. Regulation of expression of 11beta-hydroxysteroid dehydrogenase type 1 in adipose tissue: tissue-specific induction by cytokines. Endocrinology. 2001 May;142(5):1982-9.
[23] Lee YH, Pratley RE. The evolving role of inflammation in obesity and the metabolic syndrome. Curr Diab Rep. 2005 Feb;5(1):70-5.
[24] Manoli I, De Martino MU, Kino T, Alesci S. Modulatory effects of L-carnitine on glucocorticoid receptor activity. Ann N Y Acad Sci. 2004 Nov;1033:147-57.
[25] Famularo G, De Simone C, Trinchieri V, Mosca L. Carnitines and its congeners: a metabolic pathway to the regulation of immune response and inflammation. Ann N Y Acad Sci. 2004 Nov;1033:132-8.
[26] Pertosa G, Grandaliano G, Simone S, Soccio M, Schena FP. Inflammation and carnitine in hemodialysis patients. J Ren Nutr. 2005 Jan;15(1):8-12.
[27] Glerup H, Mikkelsen K, Poulsen L, et al. Commonly recommended daily intake of vitamin D is not sufficient if sunlight exposure is limited. J Intern Med 2000;247:260–8.
[28] Chainani-Wu N. Safety and anti-inflammatory activity of curcumin: a component of tumeric (Curcuma longa). J Altern Complement Med. 2003 Feb;9(1):161-8.
[29] Satoskar RR, Shah SJ, Shenoy SG. Evaluation of anti-inflammatory property of curcumin (diferuloyl methane) in patients with postoperative inflammation. Int J Clin Pharmacol Ther Toxicol. 1986 Dec;24(12):651-4.
[30] Moghaddam NSA, Oskouie MN, Butler AE, Petit PX, Barreto GE, Sahebkar A. Hormetic effects of curcumin: What is the evidence? J Cell Physiol. 2019 Jul;234(7):

[31] Mousavi SM, Rahmani J, Kord-Varkaneh H, Sheikhi A, Larijani B, Esmaillzadeh A. Cinnamon supplementation positively affects obesity: A systematic review and dose-response meta-analysis of randomized controlled trials. Clin Nutr. 2019 Feb 15. pii: S0261-5614(19)30071-8.
[32] Shao W, Yu Z, Chiang Y, Yang Y, Chai T, Foltz W, Lu H, Fantus IG, Jin T. Curcumin prevents high fat diet induced insulin resistance and obesity via attenuating lipogenesis in liver and inflammatory pathway in adipocytes. PLoS One. 2012;7(1):e28784. doi: 10.1371/journal.pone.0028784.
[33] Mousavi SM, Milajerdi A, Varkaneh HK, Gorjipour MM, Esmaillzadeh A. The effects of curcumin supplementation on body weight, body mass index and waist circumference: a systematic review and dose-response meta-analysis of randomized controlled trials. Crit Rev Food Sci Nutr. 2020;60(1):171-180.
[34] Sanidad KZ, Sukamtoh E, Xiao H, McClements DJ, Zhang G. Curcumin: Recent Advances in the Development of Strategies to Improve Oral Bioavailability. Annu Rev Food Sci Technol. 2019 Mar 25;10:597-617.
[35] Sharma S, Raj K, Singh S. Neuroprotective Effect of Quercetin in Combination with Piperine Against Rotenone- and Iron Supplement-Induced Parkinson's Disease in Experimental Rats. Neurotox Res. 2020 Jan;37(1):198-209. doi: 10.1007/s12640-019-00120-z. Epub 2019 Oct 25. PMID: 31654381.
[36] Mousavi SM, Rahmani J, Kord-Varkaneh H, Sheikhi A, Larijani B, Esmaillzadeh A. Cinnamon supplementation positively affects obesity: A systematic review and dose-response meta-analysis of randomized controlled trials. Clin Nutr. 2019 Feb 15. pii: S0261-5614(19)30071-8.
[37] Sueoka N, Suganuma M, Sueoka E, Okabe S, Matsuyama S, Imai K, Nakachi K, Fujiki H. A new function of green tea: prevention of lifestyle-related diseases. Ann N Y Acad Sci. 2001 Apr;928:274-80.
[38] Yang F, de Villiers WJ, McClain CJ, Varilek GW. Green tea polyphenols block endotoxin-induced tumor necrosis factor-production and lethality in a murine model. J Nutr. 1998 Dec;128(12):2334-40.
[39] Mancini E, Beglinger C, Drewe J, Zanchi D, Lang UE, Borgwardt S. Green tea effects on cognition, mood and human brain function: A systematic review. Phytomedicine. 2017 Oct 15;34:26-37.
[40] Boon N. Health potential for functional green teas? Int J Vitam Nutr Res. 2008 Dec;78(6):275-81.
[41] Wang H, Wen Y, Du Y, Yan X, Guo H, Rycroft JA, Boon N, Kovacs EM, Mela DJ. Effects of catechin enriched green tea on body composition. Obesity (Silver Spring). 2010 Apr;18(4):773-9.
[42] Boschmann M, Thielecke F. The effects of epigallocatechin-3-gallate on thermogenesis and fat oxidation in obese men: a pilot study. J Am Coll Nutr. 2007 Aug;26(4):389S-395S.
[43] Westerterp-Plantenga MS. Green tea catechins, caffeine and body-weight regulation. Physiol Behav. 2010 Apr 26;100(1):42-6.
[44] Zheng G, Sayama K, Okubo T, Juneja LR, Oguni I. Anti-obesity effects of three major components of green tea, catechins, caffeine and theanine, in mice. In Vivo 2004; 18: 55–62.
[45] Henning SM, Niu Y, Lee NH, Thames GD, Minutti RR, Wang H, Go VL, Heber D. Bioavailability and antioxidant activity of tea flavanols after consumption of green tea, black tea, or a green tea extract supplement. Am J Clin Nutr. 2004 Dec;80(6):1558-64.
[46] Guardia T, Rotelli AE, Juarez AO, Pelzer LE. Anti-inflammatory properties of plant flavonoids. Effects of rutin, quercetin and hesperidin on adjuvant arthritis in rat. Farmaco. 2001 Sep;56(9):683-7.
[47] Morikawa K, Nonaka M, Narahara M, Torii I, Kawaguchi K, Yoshikawa T, Kumazawa Y, Morikawa S. Inhibitory effect of quercetin on carrageenan-induced inflammation in rats. Life Sci. 2003 Dec 26;74(6):709-21.
[48] Lin R, Liu J, Gan W. Protection of vascular endothelial cells from TNF-alpha induced injury by quercetin. Zhong Yao Cai. 2004 Aug;27(8):597-9.
[49] Haggag EG, Abou-Moustafa MA, Boucher W, Theoharides TC. The effect of a herbal water-extract on histamine release from mast cells and on allergic asthma. J Herb Pharmacother. 2003;3(4):41-54.

[50] Kahraman A, Erkasap N, Koken T, Serteser M, Aktepe F, Erkasap S. The antioxidative and antihistaminic properties of quercetin in ethanol-induced gastric lesions. Toxicology. 2003 Feb 1;183(1-3):133-42.
[51] Henson PM, Bratton DL, Fadok VA. The phosphatidylserine receptor: a crucial molecular switch? Nat Rev Mol Cell Biol. 2001 Aug;2(8):627-33.
[52] Hellhammer J, Fries E, Buss C, Engert V, Tuch A, Rutenberg D, Hellhammer D. Effects of soy lecithin phosphatidic acid and phosphatidylserine complex (PAS) on the endocrine and psychological responses to mental stress. Stress. 2004 Jun;7(2):119-26.
[53] Berges RR, et al. Randomized, placebo-controlled, double-blind clinical trial of beta-sitosterol in patients with benign prostatic hyperplasia. Lancet 1995;345:1529-32.
[54] Bouic PJ, Lamprecht JH. Plant sterols and sterolins: a review of their immune-modulating properties. Altern Med Rev. 1999 Jun;4(3):170-7.
[55] Kurano M, Hasegawa K, Kunimi M, Hara M, Yatomi Y, Teramoto T, Tsukamoto K. Sitosterol prevents obesity-related chronic inflammation. Biochim Biophys Acta Mol Cell Biol Lipids. 2018 Feb;1863(2):191-198.
[56] Hidayathulla S, Shahat AA, Ahamad SR, Al Moqbil AAN, Alsaid MS, Divakar DD. GC/MS analysis and characterization of 2-Hexadecen-1-ol and beta sitosterol from Schimpera arabica extract for its bioactive potential as antioxidant and antimicrobial. J Appl Microbiol. 2018 May;124(5):1082-1091.
[57] Bouic PJ, Clark A, Lamprecht J, Freestone M, Pool EJ, Liebenberg RW, Kotze D, van Jaarsveld PP. The effects of B-sitosterol (BSS) and B-sitosterol glucoside (BSSG) mixture on selected immune parameters of marathon runners: inhibition of post marathon immune suppression and inflammation. Int J Sports Med. 1999 May;20(4):258-62.
[58] Nagai K, Suda T. Immunoregulative effects of carnosine and beta-alanine. J. Physiol. Soc Jap 1986;48:564-571.
[59] Hoffman JR, Ratamess NA, Faigenbaum AD, Ross R, Kang J, Stout JR, Wise JA. Short-duration beta-alanine supplementation increases training volume and reduces subjective feelings of fatigue in college football players. Nutr Res. 2008 Jan;28(1):31-5.
[60] Smith AE, Walter AA, Graef JL, Kendall KL, Moon JR, Lockwood CM, Fukuda DH, Beck TW, Cramer JT, Stout JR. Effects of beta-alanine supplementation and high-intensity interval training on endurance performance and body composition in men; a double-blind trial. J Int Soc Sports Nutr. 2009 Feb 11;6:5.
[61] Kim KJ, Song HS, Yoon DH, Fukuda DH, Kim SH, Park DH. The effects of 10 weeks of ß-alanine supplementation on peak power, power drop, and lactate response in Korean national team boxers. J Exerc Rehabil. 2018 Dec 27;14(6):985-992.
[62] Huang HL, Hong YW, Wong YH, Chen YN, Chyuan JH, Huang CJ, Chao PM. Bitter melon (Momordica charantia L.) inhibits adipocyte hypertrophy and down regulates lipogenic gene expression in adipose tissue of diet-induced obese rats. Br J Nutr 2008; 99: 230-239.
[63] Fan M, Kim EK, Choi YJ, Tang Y, Moon SH. The Role of Momordica charantia in Resisting Obesity. Int J Environ Res Public Health. 2019 Sep 4;16(18):3251. doi: 10.3390/ijerph16183251. PMID: 31487939; PMCID: PMC6765959.
[64] Fan M, Lee JI, Ryu YB, Choi YJ, Tang Y, Oh M, Moon SH, Lee B, Kim EK. Comparative Analysis of Metabolite Profiling of Momordica charantia Leaf and the Anti-Obesity Effect through Regulating Lipid Metabolism. Int J Environ Res Public Health. 2021 May 24;18(11):5584. doi: 10.3390/ijerph18115584. PMID: 34073706; PMCID: PMC8197276.
[65] Habicht SD, Ludwig C, Yang RY, Krawinkel MB. Momordica charantia and type 2 diabetes: from in vitro to human studies. Curr Diabetes Rev. 2014 Jan;10(1):48-60.
[66] Mahwish, Saeed F, Arshad MS, Nisa MU, Nadeem MT, Arshad MU. Hypoglycemic and hypolipidemic effects of different parts and formulations of bitter gourd (Momordica Charantia). Lipids Health Dis. 2017 Nov 10;16(1):211.

[67] Perez JL, Jayaprakasha GK, Patil BS. Metabolite profiling and in vitro biological activities of two commercial bitter melon (Momordica charantia Linn.) cultivars. Food Chem. 2019 Aug 1;288:178-186.
[68] Liu Y, Mu S, Chen W, Liu S, Cong Y, Liu J, Jia N. Saponins of Momordica charantia increase insulin secretion in INS-1 pancreatic ß-cells via the PI3K/Akt/FoxO1 signaling pathway. Endocrinol Diabetes Nutr (Engl Ed). 2021 May;68(5):329-337. doi: 10.1016/j.endien.2021.08.004. PMID: 34556263.
[69] Neumann, G. Effects of L-carnitine on athletic performance. Seim, H. Loster, H. eds. Carnitine: Pathophysiological Basics and Clinical Applications 1996:61-71 Ponte Press Bochum, Germany.
[70] Wallace TC, Blusztajn JK, Caudill MA, Klatt KC, Natker E, Zeisel SH, Zelman KM. Choline: The Underconsumed and Underappreciated Essential Nutrient. Nutr Today. 2018 Nov-Dec;53(6):240-253.
[71] Leermakers ET, Moreira EM, Kiefte-de Jong JC, Darweesh SK, Visser T, Voortman T, Bautista PK, Chowdhury R, Gorman D, Bramer WM, Felix JF, Franco OH. Effects of choline on health across the life course: a systematic review. Nutr Rev. 2015 Aug;73(8):500-22.
[72] Sandage BW, Sabounjian L., White, R, Wurtman, RJ. Choline citrate may enhance athletic performance. Physiologist 1992; 35:236(abs.).
[73] American College of Sports Medicine (ACSM) 2018 Annual Meeting: Abstract 219. Presented May 30, 2018.
[74] Moretti A, Paoletta M, Liguori S, Bertone M, Toro G, Iolascon G. Choline: An Essential Nutrient for Skeletal Muscle. Nutrients. 2020 Jul 18;12(7):2144. doi: 10.3390/nu12072144. PMID: 32708497; PMCID: PMC7400816.
[75] Sachan DS, Hongu N. Increases in VO(2)max and metabolic markers of fat oxidation by caffeine, carnitine, and choline supplementation in rats. J Nutr Biochem. 2000; 11(10):521-526.
[76] Hongu N, Sachan DS. Carnitine and choline supplementation with exercise alter carnitine profiles, biochemical markers of fat metabolism and serum leptin concentration in healthy women. J Nutr. 2003; 133(1):84-9.
[77] DeLany JP, Blohm F, Truett AA, Scimeca JA, West DB. Conjugated linoleic acid rapidly reduces body fat content in mice without affecting energy intake. Am J Physiol 1999 Apr;276(4 Pt 2):R1172-R1179.
[78] Blankson H, Stakkestad JA, Fagertun H, Thom E, Wadstein J, Gudmundsen O. Conjugated linoleic acid reduces body fat mass in overweight and obese humans. J Nutr 2000; 130:2943-2948.
[79] Riserus U, Berglund L, Vessby B. Conjugated linoleic acid (CLA) reduced abdominal adipose tissue in obese middle-aged men with signs of the metabolic syndrome: a randomised controlled trial. Int J Obes Relat Metab Disord. 2001; 25(8):1129-35.
[80] Gaullier JM, Halse J, Hoye K, Kristiansen K, Fagertun H, Vik H, Gudmundsen O. Supplementation with conjugated linoleic Acid for 24 months is well tolerated by and reduces body fat mass in healthy, overweight humans. J Nutr. 2005 Apr;135(4):778-84.
[81] Park Y, Albright KJ, Storkson JM, Liu W, Pariza MW. Conjugated linoleic acid (CLA) prevents body fat accumulation and weight gain in an animal model. J Food Sci. 2007 Oct;72(8):S612-7.
[82] Chen SC, Lin YH, Huang HP, Hsu WL, Houng JY, Huang CK. Effect of conjugated linoleic acid supplementation on weight loss and body fat composition in a Chinese population. Nutrition. 2012 May;28(5):559-65.
[83] Madry E, Chudzicka-Strugala I, Grabanska-Martynska K, Malikowska K, Grebowiec P, Lisowska A, Bogdanski P, Walkowiak J. Twelve weeks CLA supplementation decreases the hip circumference in overweight and obese women. A double-blind, randomized, placebo-controlled trial. Acta Sci Pol Technol Aliment. 2016 Jan-Mar;15(1):107-113.
[84] Namazi N, Irandoost P, Larijani B, Azadbakht L. The effects of supplementation with conjugated linoleic acid on anthropometric indices and body composition in overweight and obese subjects: A systematic review and meta-analysis. Crit Rev Food Sci Nutr. 2019 Jan 22:1-14.

[85] Gaullier JM, Halse J, Høivik HO, Høye K, Syvertsen C, Nurminiemi M, Hassfeld C, Einerhand A, O'Shea M, Gudmundsen O. Six months supplementation with conjugated linoleic acid induces regional-specific fat mass decreases in overweight and obese. Br J Nutr. 2007 Mar;97(3):550-60.
[86] Onakpoya I, Posadzki P, Ernst E. Chromium supplementation in overweight and obesity: a systematic review and meta-analysis of randomized clinical trials. Obes Rev. 2013 Jun;14(6):496-507.
[87] Vincent JB. The potential value and toxicity of chromium picolinate as a nutritional supplement, weight loss agent and muscle development agent. Sports Med. 2003;33(3):213-30.
[88] Bhattacharya A, Rahman MM, McCarter R, O'Shea M, Fernandes G. Conjugated linoleic acid and chromium lower body weight and visceral fat mass in high-fat-diet-fed mice. Lipids. 2006 May;41(5):437-44.
[89] Sullivan AC, Hamilton JG, Miller ON, Wheatley VR. Inhibition of lipogenesis in rat liver by (-)-hydroxycitrate. Arch Biochem Biophys 1972;150:183–90.
[90] McCune SA, Foe LG, Kemp RG, Jurin RR. Aurintricarboxylic acid is a potent inhibitor of phosphofructokinase. Biochem J 1989; 259(3):925-27.
[91] Hellerstein MK, Xie Y. The indirect pathway of hepatic glycogen synthesis and reduction of food intake by metabolic inhibitors. Life Sciences 1993; 53(24):1833-45.
[92] Westerterp-Plantenga MS, Kovacs EM. The effect of (-)-hydroxycitrate on energy intake and satiety in overweight humans. Int J Obes Relat Metab Disord 2002; 26(6):870-2.
[93] Leonhardt M, Langhans W. Hydroxycitrate has long-term effects on feeding behavior, body weight regain and metabolism after body weight loss in male rats. J Nutr 2002; 132(7):1977-82.
[94] Haber SL, Awwad O, Phillips A, Park AE, Pham TM. Garcinia cambogia for weight loss. Am J Health Syst Pharm. 2018 Jan 15;75(2):17-22.
[95] McCarty MF, Gustin JC. Pyruvate and hydroxycitrate/carnitine may synergize to promote reverse electron transport in hepatocyte mitochondria, effectively 'uncoupling' the oxidation of fatty acids. Med Hypotheses 1999; 52(5):407-16.
[96] Dickel ML, Rates SM, Ritter MR. Plants popularly used for losing weight purposes in Porto Alegre, South Brazil. J Ethnopharmacol. 2007 Jan 3;109(1):60-71.
[97] Andersen T, Fogh J. Weight loss and delayed gastric emptying following a South American herbal preparation in overweight patients. J Hum Nutr Diet 2001; 14(3):243-50.
[98] Tripathi YB, Malhotra OP, Tripathi SN. Thyroid stimulating action of Z-guggulsterone obtained from Commiphora mukul. Planta Med 1984; 1:78-80.
[99] Tripathi YB, Tripathi P, Malhotra OP, Tripathi SN. Thyroid stimulatory action of (Z)-guggulsterone: mechanism of action. Planta Med 1988 Aug;54(4):271-7.
[100] Urizar NL, Moore DD. Gugulipid: A Natural Cholesterol-Lowering Agent. Annu Rev Nutr 2003; 26; 303-313.
[101] Antonio J, Colker CM, Torina GC, et al. Effects of a Standardized Guggulsterone Phosphate Supplement on Body Composition in Overweight Adults: A Pilot Study. Current Therapeutic Research 1999; 60(4):220-227.
[102] Craig SA. Betaine in human nutrition. Am J Clin Nutr. 2004 Sep;80(3):539-49.
[103] Cholewa JM, Wyszczelska-Rokiel M, Glowacki R, Jakubowski H, Matthews T, Wood R, Craig SA, Paolone V. Effects of betaine on body composition, performance, and homocysteine thiolactone. J Int Soc Sports Nutr. 2013 Aug 22;10(1):39.
[104] Cholewa JM, Guimarães-Ferreira L, Zanchi NE. Effects of betaine on performance and body composition: a review of recent findings and potential mechanisms. Amino Acids. 2014 Aug;46(8):1785-93.
[105] Waldman HS, Bryant AR, McAllister MJ. Effects of Betaine Supplementation on Markers of Metabolic Flexibility, Body Composition, and Anaerobic Performance in Active College-Age Females. J Diet Suppl. 2021 Sep 3:1-17. doi: 10.1080/19390211.2021.1973644. Epub ahead of print. PMID: 34477469.

[106] Holm PI, Ueland PM, Vollset SE, Midttun O, Blom HJ, Keijzer MB, den Heijer M. Betaine and folate status as cooperative determinants of plasma homocysteine in humans. Arterioscler Thromb Vasc Biol. 2005 Feb;25(2):379-85.
[107] Gao X, Wang Y, Randell E, Pedram P, Yi Y, Gulliver W, Sun G. Higher Dietary Choline and Betaine Intakes Are Associated with Better Body Composition in the Adult Population of Newfoundland, Canada. PLoS One. 2016 May 11;11(5):e0155403.
[108] de Maat MP, Trion A. C-reactive protein as a risk factor versus risk marker. Curr Opin Lipidol. 2004 Dec;15(6):651-7.
[109] Alfthan G, Tapani K, Nissinen K, Saarela J, Aro A. The effect of low doses of betaine on plasma homocysteine in healthy volunteers. Br J Nutr. 2004 Oct;92(4):665-9.
[110] McCarron DA, Reusser ME. Finding consensus in the dietary calcium-blood pressure debate. J Am Coll Nutr 1999; 18: 398S-405S.
[111] Bowen J, Noakes M, Clifton PM. A high dairy protein, high-calcium diet minimizes bone turnover in overweight adults during weight loss. J Nutr 2004; 134: 568-573.
[112] Denke MA, Fox MM, Schulte MC. Short-term dietary calcium fortification increases fecal saturated fat content and reduces serum lipids in men. J Nutr 1993; 123: 1047-1053.
[113] Hartman TJ, Albert PS, Snyder K, et al. The association of calcium and vitamin d with risk of colorectal adenomas. J Nutr. 2005 Feb;135(2):252-9.
[114] Febbraio MA. Signaling pathways for IL-6 within skeletal muscle. Exerc Immunol Rev. 2003;9:34-9.
[115] Jacobsen R, Lorenzen JK, Toubro S, Krog-Mikkelsen I, Astrup A. Effect of short-term high dietary calcium intake on 24-h energy expenditure, fat oxidation, and fecal fat excretion. Int J Obes Relat Metab Disord. 2005 Mar;29(3):292-301.
[116] Davies KM, Heaney RP, Recker RR, Lappe JM, Barger-Lux MJ, Rafferty K, Hinders S. Calcium intake and body weight. J Clin Endocrinol Metab 2000; 85: 4635-4638.
[117] Zemel MB, Shi H, Greer B, Dirienzo D, Zemel PC. Regulation of adiposity by dietary calcium. FASEB J 2000; 14: 1132-1138.
[118] Zemel MB. Effects of calcium-fortified breakfast cereal on adiposity in a transgenic mouse model of obesity. FASEB J 2001; 15: A598.
[119] Shi H, Dirienzo D, Zemel MB. Effects of dietary calcium on adipocyte lipid metabolism and body weight regulation in energy-restricted aP2-agouti transgenic mice. FASEB J 2001; 15:291–293.
[120] Zemel MB, Thompson W, Zemel P, Nocton AM, Morris K, Campbell P. Dietary calcium and dairy products accelerate weight and fat loss during energy restriction in obese adults. Am J Clin Nutr 2002; 75:342S
[121] Heaney RP. Normalizing calcium intake: projected population effects for body weight. J Nutr 2003; 133: 268S-270S.
[122] Melanson EL, Sharp TA, Schneider J, Donahoo WT, Grunwald GK, Hill JO. Relation between calcium intake and fat oxidation in adult humans. Int J Obes Relat Metab Disord 2003; 27:196-203
[123] Papakonstantinou E, Flatt WP, Huth PJ, Harris RBS. High dietary calcium reduces body fat content, digestibility of fat, and serum vitamin D in rats. Obes Res 2003; 11: 387-394.
[124] Shapses SA, Heshka S, Heymsfield SB. Effect of calcium supplementation on weight and fat loss in women. J Clin Endocrinol Metab. 2004 Feb;89(2):632-7.
[125] Zemel MB, Thompson W, Milstead A, Morris K, Campbell P. Calcium and dairy acceleration of weight and fat loss during energy restriction in obese adults. Obes Res. 2004 Apr;12(4):582-90.
[126] Subih HS, Zueter Z, Obeidat BM, Al-Qudah MA, Janakat S, Hammoh F, Sharkas G, Bawadi HA. A high weekly dose of cholecalciferol and calcium supplement enhances weight loss and improves health biomarkers in obese women. Nutr Res. 2018 Nov;59:53-64.
[127] Sun X, Zemel MB. Calcium and dairy products inhibit weight and fat regain during ad libitum consumption following energy restriction in Ap2-agouti transgenic mice. J Nutr. 2004 Nov;134(11):3054-60.

[128] Zhu W, Cai D, Wang Y, Lin N, Hu Q, Qi Y, Ma S, Amarasekara S. Calcium plus vitamin D3 supplementation facilitated fat loss in overweight and obese college students with very-low calcium consumption: a randomized controlled trial. Nutr J. 2013 Jan 8;12:8. doi: 10.1186/1475-2891-12-8. Erratum in: Nutr J. 2013;12:43. PMID: 23297844; PMCID: PMC3599592.
[129] Lelovics Z. Relation between calcium and magnesium intake and obesity. Asia Pac J Clin Nutr. 2004;13(Suppl):S144.
[130] Rayssiguier Y, Mazur A. R [Magnesium and inflammation:lessons from animal models.] Clin Calcium. 2005;15(2):245-248.
[131] Maier JA, Malpuech-Brugere C, Zimowska W, Rayssiguier Y, Mazur A. Low magnesium promotes endothelial cell dysfunction: implications for atherosclerosis, inflammation and thrombosis. Biochim Biophys Acta. 2004 May 24;1689(1):13-21.
[132] Consequences of magnesium deficiency on the enhancement of stress reactions; preventive and therapeutic implications (a review).
J Am Coll Nutr. 1994 Oct;13(5):429-46.
[133] Nagpal S, Na S, Rathnachalam R. Non-Calcemic Actions of Vitamin D Receptor Ligands. Endocr Rev. 2005 Mar 29;
[134] Chiu KC, Chu A, Go VL, Saad MF. Hypovitaminosis D is associated with insulin resistance and ß cell dysfunction. Am J Clin Nutr 2004;79:820–5.
[135] Rutter MK, Meigs JB, Sullivan LM, D'Agostino RB Sr, Wilson PW. C-reactive protein, the metabolic syndrome, and prediction of cardiovascular events in the Framingham Offspring Study. Circulation 2004;110:380–5.
[136] Rutter MK, Meigs JB, Sullivan LM, D'Agostino RB Sr, Wilson PW. C-reactive protein, the metabolic syndrome, and prediction of cardiovascular events in the Framingham Offspring Study. Circulation 2004;110:380–5.
[137] Parikh SJ, Edelman M, Uwaifo GI, Freedman RJ, Semega-Janneh M, Reynolds J, Yanovski J The relationship between obesity and serum 1,25-dihydroxy vitamin D concentrations in healthy adults. J Clin Endocrinol Metab. 2004; 89:1196–1199.
[138] Arunabh S, Pollack S, Yeh J, Aloia JF. Body fat content and 25-hydroxyvitamin D levels in healthy women. J Clin Endocrinol Metab; 2003 88:157–161.
[139] Shahar DR, Schwarzfuchs D, Fraser D, Vardi H, Thiery J, Fiedler GM, Blüher M, Stumvoll M, Stampfer MJ, Shai I; DIRECT Group. Dairy calcium intake, serum vitamin D, and successful weight loss. Am J Clin Nutr. 2010 Nov;92(5):1017-22.
[140] Glerup H, Mikkelsen K, Poulsen L, et al. Commonly recommended daily intake of vitamin D is not sufficient if sunlight exposure is limited. J Intern Med 2000;247:260–8.
[141] Thomas MK, Lloyd-Jones DM, Thadhani RI, et al. Hypovitaminosis D in medical inpatients. N Engl J Med 1998;338:777–83
[142] Weaver CM, Fleet JC. Vitamin D requirements: current and future. Am J Clin Nutr. 2004 Dec;80(6 Suppl):1735S-9S.
[143] Packer L, Witt EH, Tritschler HJ. Alpha–lipoic acid as a biological antioxidant. Free Radic Biol Med. 1995;19:227–250.
[144] Jones W, Li X, Qu ZC, et al. Uptake, recycling, and antioxidant actions of alpha-lipoic acid in endothelial cells. Free Radic Biol Med 2002;33:83-93.
[145] Bast A, Haenen GR. Lipoic acid: a multifunctional antioxidant. Biofactors. 2003;17(1-4):207-13.
[146] Rochette L, Ghibu S, Richard C, Zeller M, Cottin Y, Vergely C. Direct and indirect antioxidant properties of a-lipoic acid and therapeutic potential. Mol Nutr Food Res. 2013 Jan;57(1):114-25.
[147] Packer L, Tritschler HJ, Wessel K. Free Radic Biol Med. 1997;22(1-2):359-78. Neuroprotection by the metabolic antioxidant alpha-lipoic acid.
[148] Podda M, Tritschler HJ, Ulrich H, et al. Alpha–lipoic acid supplementation prevents symptoms of vitamin E deficiency. Biochem Biophys Res Commun. 1994;204:98–104.

[149] Faust A, Burkart V, Ulrich H, Weischer CH, Kolb H. Effect of lipoic acid on cyclophosphamide-induced diabetes and insulitis in non-obese diabetic mice. Int J Immunopharmacol. 1994; 16(1):61-6.
[150] Burkart V, Koike T, Brenner HH, Imai Y, Kolb H. Dihydrolipoic acid protects pancreatic islet cells from inflammatory attack. Agents Actions. 1993; 38(1-2):60-5.
[151] Lee WJ, Song KH, Koh EH, et al. Alpha-lipoic acid increases insulin sensitivity by activating AMPK in skeletal muscle. Biochem Biophys Res Commun. 2005 Jul 8;332(3):885-91.
[152] Packer L. Alpha lipoic acid: a metabolic antioxidant which regulates NF- kappaB signal transduction and protects against oxidative injury. Drug Metab Rev 1998;30:245–75.
[153] Lee HA, Hughes DA. Alpha-lipoic acid modulates NF-kappaB activity in human monocytic cells by direct interaction with DNA. Exp Gerontol. 2002 Jan-Mar;37(2-3):401-10.
[154] Teachey MK, Taylor ZC, Maier T, Saengsirisuwan V, Sloniger JA, Jacob S, Klatt MJ, Ptock A, Kraemer K, Hasselwander O, Henriksen EJ. Interactions of conjugated linoleic acid and lipoic acid on insulin action in the obese Zucker rat. Metabolism. 2003; 52(9):1167-74.
[155] Faust A, Burkart V, Ulrich H, Weischer CH, Kolb H. Effect of lipoic acid on cyclophosphamide-induced diabetes and insulitis in non-obese diabetic mice. Int J Immunopharmacol. 1994; 16(1):61-6.
[156] Burkart V, Koike T, Brenner HH, Imai Y, Kolb H. Dihydrolipoic acid protects pancreatic islet cells from inflammatory attack. Agents Actions. 1993; 38(1-2):60-5.
[157] Lateef H, Aslam MN, Stevens MJ, Varani J. Pretreatment of diabetic rats with lipoic acid improves healing of subsequently-induced abrasion wounds. Arch Dermatol Res. 2005 Jun 29 (Epub).
[158] Thirunavukkarasu V, Nandhini AT, Anuradha CV. Fructose diet-induced skin collagen abnormalities are prevented by lipoic acid. Exp Diabesity Res. 2004 Oct-Dec;5(4):237-44.
[159] Wang Y, Li X, Guo Y, Chan L, Guan X. alpha-Lipoic acid increases energy expenditure by enhancing adenosine monophosphate-activated protein kinase-peroxisome proliferator-activated receptor-gamma coactivator-1alpha signaling in the skeletal muscle of aged mice. Metabolism. 2010 Jul;59(7):967-76.
[160] Kucukgoncu S, Zhou E, Lucas KB, Tek C. Alpha-lipoic acid (ALA) as a supplementation for weight loss: results from a meta-analysis of randomized controlled trials. Obes Rev. 2017 May;18(5):594-601.
[161] Namazi N, Larijani B, Azadbakht L. Alpha-lipoic acid supplement in obesity treatment: A systematic review and meta-analysis of clinical trials. Clin Nutr. 2017 Jun 8. pii: S0261-5614(17)30212-1.
[162] Anuradha B, Varalakshmi P. Protective role of DL-alpha-lipoic acid against mercury-induced neural lipid peroxidation. Pharmacol Res. 1999 Jan;39(1):67-80.
[163] Patrick L. Mercury toxicity and antioxidants: Part 1: role of glutathione and alpha-lipoic acid in the treatment of mercury toxicity. Altern Med Rev. 2002 Dec;7(6):456-71.
[164] Kim MS, Park JY, Namkoong C, et al. Anti-obesity effects of alpha-lipoic acid mediated by suppression of hypothalamic AMP-activated protein kinase. Nat Med. 2004;10(7):727-33.
[165] Huerta AE, Prieto-Hontoria PL, Fernández-Galilea M, Escoté X, Martínez JA, Moreno-Aliaga MJ. Effects of dietary supplementation with EPA and/or a-lipoic acid on adipose tissue transcriptomic profile of healthy overweight/obese women following a hypocaloric diet. Biofactors. 2017 Jan 2;43(1):117-131.
[166] Li N, Yan W, Hu X, Huang Y, Wang F, Zhang W, Wang Q, Wang X, Sun K. Effects of oral a-lipoic acid administration on body weight in overweight or obese subjects: a crossover randomized, double-blind, placebo-controlled trial. Clin Endocrinol (Oxf). 2017 May;86(5):680-687.
[167] Kucukgoncu S, Zhou E, Lucas KB, Tek C. Alpha-lipoic acid (ALA) as a supplementation for weight loss: results from a meta-analysis of randomized controlled trials. Obes Rev. 2017 May;18(5):594-601.
[168] Namazi N, Larijani B, Azadbakht L. Alpha-lipoic acid supplement in obesity treatment: A systematic review and meta-analysis of clinical trials. Clin Nutr. 2018 Apr;37(2):419-428.

[169] Bobe G, Michels AJ, Zhang WJ, Purnell JQ, Woffendin C, Pereira C, Vita JA, Thomas NO, Traber MG, Frei B, Hagen TM. A Randomized Controlled Trial of Long-Term (R)-a-Lipoic Acid Supplementation Promotes Weight Loss in Overweight or Obese Adults without Altering Baseline Elevated Plasma Triglyceride Concentrations. J Nutr. 2020 Jul 21:nxaa203. doi: 10.1093/jn/nxaa203. Online ahead of print. PMID: 32692358
[170] Panzhinskiy E, Bashir R, Bagchi D, Nair S. Effect of Curcumin and a-Lipoic Acid in Attenuating Weight Gain and Adiposity. J Am Coll Nutr. 2019 Jan 8:1-6.
[171] McMahon RJ. Biotin in metabolism and molecular biology. Annu Rev Nutr 2002; 22: 221–239.
[172] Rodriguez-Melendez R, Zempleni J. Regulation of gene expression by biotin. J Nutr Biochem 2003; 14:680–690.
[173] Said HM. Biotin: biochemical, physiological and clinical aspects. Subcell Biochem 2012; 56: 1–19.
[174] Kuroishi T. Regulation of immunological and inflammatory functions by biotin. Can J Physiol Pharmacol 2015; 93: 1091–1096.
[175] Agrawal S, Agrawal A, Said HM. Biotin deficiency enhances the inflammatory response of human dendritic cells. Am J Physiol Cell Physiol. 2016 Sep 1;311(3):C386-91.
[176] Jitrapakdee S, St Maurice M, Rayment I, Cleland WW, Wallace JC, Attwood PV. Structure, mechanism and regulation of pyruvate carboxylase. Biochem J. 2008 Aug 1;413(3):369-87. doi: 10.1042/BJ20080709. PMID: 18613815; PMCID: PMC2859305.
[177] Adina-Zada A, Zeczycki TN, Attwood PV. Regulation of the structure and activity of pyruvate carboxylase by acetyl CoA. Arch Biochem Biophys. 2012 Mar 15;519(2):118-30. doi: 10.1016/j.abb.2011.11.015. Epub 2011 Nov 19. PMID: 22120519; PMCID: PMC3293938.
[178] Yuasa M, Matsui T, Ando S, Ishii Y, Sawamura H, Ebara S, Watanabe T. Consumption of a low-carbohydrate and high-fat diet (the ketogenic diet) exaggerates biotin deficiency in mice. Nutrition. 2013 Oct;29(10):1266-70.
[179] Bush L, HB White. Avidin traps biotin diffusing out of chicken eggyolk. Comp. Biochem. Physiol.1989.93, 543-547
[180] Onakpoya I, Hunt K, Wider B, Ernst E. Pyruvate supplementation for weight loss: a systematic review and meta-analysis of randomized clinical trials. Crit Rev Food Sci Nutr. 2014;54(1):17-23.
[181] Ivy JL. Effect of pyruvate and dihydroxyacetone on metabolism and aerobic endurance capacity. Med Sci Sports Exerc. 1998 Jun;30(6):837-43.
[182] Guardia T, Rotelli AE, Juarez AO, Pelzer LE. Anti-inflammatory properties of plant flavonoids. Effects of rutin, quercetin and hesperidin on adjuvant arthritis in rat. Farmaco. 2001 Sep;56(9):683-7.
[183] de Pascual-Teresa S, Johnston KL, DuPont MS, et al. Quercetin metabolites downregulate cyclooxygenase-2 transcription in human lymphocytes ex vivo but not in vivo, J Nutr 134 (2004) (3), pp. 552-557.
[184] Rinwa P, Kumar A. Quercetin along with piperine prevents cognitive dysfunction, oxidative stress and neuro-inflammation associated with mouse model of chronic unpredictable stress. Arch Pharm Res. 2013: 1–10.
[185] Yao P, Nussler A, Liu L, Hao L, Song F, Schirmeier A, Nussler N. Quercetin protects human hepatocytes from ethanol-derived oxidative stress by inducing heme oxygenase-1 via the MAPK/Nrf2 pathways. J Hepatol. 2007 Aug;47(2):253-61.
[186] Tang Y, Gao C, Xing M, Li Y, Zhu L, Wang D, Yang X, Liu L, Yao P. Quercetin prevents ethanol-induced dyslipidemia and mitochondrial oxidative damage. Food Chem Toxicol. 2012 May;50(5):1194-200.
[187] Morikawa K, Nonaka M, Narahara M, Torii I, Kawaguchi K, Yoshikawa T, Kumazawa Y, Morikawa S. Inhibitory effect of quercetin on carrageenan-induced inflammation in rats. Life Sci. 2003; 74(6):709-21.
[188] Lin R, Liu J, Gan W. Protection of vascular endothelial cells from TNF-alpha induced injury by quercetin. Zhong Yao Cai. 2004; 27(8):597-9.

[189] Jung WJ, Sung MK. Effects of major dietary antioxidants on inflammatory markers of RAW 264.7 macrophages. Biofactors. 2004;21(1-4):113-7.
[190] Haggag EG, Abou-Moustafa MA, Boucher W, Theoharides TC. The effect of a herbal water-extract on histamine release from mast cells and on allergic asthma. J Herb Pharmacother. 2003;3(4):41-54.
[191] Kahraman A, Erkasap N, Koken T, Serteser M, Aktepe F, Erkasap S. The antioxidative and antihistaminic properties of quercetin in ethanol-induced gastric lesions. Toxicology. 2003; 183(1-3):133-42.
[192] Boots AW, Wilms LC, Swennen EL, Kleinjans JC, Bast A, Haenen GR. In vitro and ex vivo anti-inflammatory activity of quercetin in healthy volunteers. Nutrition. 2008 Jul-Aug;24(7-8):703-10.
[193] Anand David AV, Arulmoli R, Parasuraman S. Overviews of Biological Importance of Quercetin: A Bioactive Flavonoid. Pharmacogn Rev. 2016 Jul-Dec;10(20):84-89.
[194] Khan F, Niaz K, Maqbool F, Ismail Hassan F, Abdollahi M, Nagulapalli Venkata KC, Nabavi SM, Bishayee A. Molecular Targets Underlying the Anticancer Effects of Quercetin: An Update. Nutrients. 2016 Aug 29;8(9). pii: E529.
[195] Kashyap D, Mittal S, Sak K, Singhal P, Tuli HS. Molecular mechanisms of action of quercetin in cancer: recent advances. Tumour Biol. 2016 Oct;37(10):12927-12939.
[196] Parvaresh A, Razavi R, Rafie N, Ghiasvand R, Pourmasoumi M, Miraghajani M. Quercetin and ovarian cancer: An evaluation based on a systematic review. J Res Med Sci. 2016 May 9;21:34.
[197] Marunaka Y, Marunaka R, Sun H, Yamamoto T, Kanamura N, Inui T, Taruno A. Actions of Quercetin, a Polyphenol, on Blood Pressure. Molecules. 2017 Jan 29;22(2).
[198] Marunaka Y. Actions of quercetin, a flavonoid, on ion transporters: its physiological roles. Ann N Y Acad Sci. 2017 Jun;1398(1):142-151.
[199] Eid HM, Haddad PS. The Antidiabetic Potential of Quercetin: Underlying Mechanisms. Curr Med Chem. 2017;24(4):355-364.
[200] Marunaka Y, Niisato N, Miyazaki H, Nakajima KI, Taruno A, Sun H, Marunaka R, Okui M, Yamamoto T, Kanamura N, Kogiso H, Ikeuchi Y, Kashio M, Hosogi S, Nakahari T. Quercetin is a Useful Medicinal Compound Showing Various Actions Including Control of Blood Pressure, Neurite Elongation and Epithelial Ion Transport. Curr Med Chem. 2018;25(37):4876-4887.
[201] Barreca D, Bellocco E, D'Onofrio G, Nabavi SF, Daglia M, Rastrelli L, Nabavi SM. Neuroprotective Effects of Quercetin: From Chemistry to Medicine. CNS Neurol Disord Drug Targets. 2016;15(8):964-975.
[202] Costa LG, Garrick JM, Roquè PJ, Pellacani C. Mechanisms of Neuroprotection by Quercetin: Counteracting Oxidative Stress and More. Oxid Med Cell Longev. 2016;2016:2986796.
[203] Ishisaka A, Ichikawa S, Sakakibara H, Piskula MK, Nakamura T, Kato Y, Ito M, Miyamoto K, Tsuji A, Kawai Y, Terao J. Accumulation of orally administered quercetin in brain tissue and its antioxidative effects in rats. Free Radic Biol Med. 2011 Oct 1;51(7):1329-36.
[204] Lee M, McGeer EG, McGeer PL. Quercetin, not caffeine, is a major neuroprotective component in coffee. Neurobiol Aging. 2016 Oct;46:113-23.
[205] Suganthy N, Devi KP, Nabavi SF, Braidy N, Nabavi SM. Bioactive effects of quercetin in the central nervous system: Focusing on the mechanisms of actions. Biomed Pharmacother. 2016 Dec;84:892-908.
[206] Kanter M, Unsal C, Aktas C, Erboga M. Neuroprotective effect of quercetin against oxidative damage and neuronal apoptosis caused by cadmium in hippocampus. Toxicol Ind Health. 2016 Mar;32(3):541-50.
[207] Grewal AK, Singh TG, Sharma D, Sharma V, Singh M, Rahman MH, Najda A, Walasek-Janusz M, Kamel M, Albadrani GM, Akhtar MF, Saleem A, Abdel-Daim MM. Mechanistic insights and perspectives involved in neuroprotective action of quercetin. Biomed Pharmacother. 2021 Aug;140:111729. doi: 10.1016/j.biopha.2021.111729. Epub 2021 May 25. PMID: 34044274.
[208] Davis JM, Carlstedt CJ, Chen S, Carmichael MD, Murphy EA. The dietary flavonoid quercetin increases VO(2max) and endurance capacity. Int J Sport Nutr Exerc Metab. 2010 Feb;20(1):56-62.

[209] Davis JM, Murphy EA, Carmichael MD, Davis B. Quercetin increases brain and muscle mitochondrial biogenesis and exercise tolerance. Am J Physiol Regul Integr Comp Physiol. 2009 Apr;296(4):R1071-7.
[210] Pelletier DM, Lacerte G, Goulet ED. Effects of quercetin supplementation on endurance performance and maximal oxygen consumption: a meta-analysis. Int J Sport Nutr Exerc Metab. 2013 Feb;23(1):73-82.
[211] Ay M, Luo J, Langley M, Jin H, Anantharam V, Kanthasamy A, Kanthasamy AG. Molecular mechanisms underlying protective effects of quercetin against mitochondrial dysfunction and progressive dopaminergic neurodegeneration in cell culture and MitoPark transgenic mouse models of Parkinson's Disease. J Neurochem. 2017 Jun;141(5):766-782.
[212] de Oliveira MR, Nabavi SM, Braidy N, Setzer WN, Ahmed T, Nabavi SF. Quercetin and the mitochondria: A mechanistic view. Biotechnol Adv. 2016 Sep-Oct;34(5):532-49.
[213] Lin Y, Liu HL, Fang J, Yu CH, Xiong YK, Yuan K. Anti-fatigue and vasoprotective effects of quercetin-3-O-gentiobiose on oxidative stress and vascular endothelial dysfunction induced by endurance swimming in rats. Food Chem Toxicol. 2014 Jun;68:290-6.
[214] Nieman DC, Williams AS, Shanely RA, Jin F, McAnulty SR, Triplett NT, Austin MD, Henson DA. Quercetin's influence on exercise performance and muscle mitochondrial biogenesis. Med Sci Sports Exerc. 2010 Feb;42(2):338-45.
[215] Patrizio F, Ditroilo M, Felici F, Duranti G, De Vito G, Sabatini S, Sacchetti M, Bazzucchi I.The acute effect of Quercetin on muscle performance following a single resistance training session. Eur J Appl Physiol. 2018 May;118(5):1021-1031.
[216] Bazzucchi I, Patrizio F, Ceci R, Duranti G, Sgrò P, Sabatini S, Di Luigi L, Sacchetti M, Felici F. The Effects of Quercetin Supplementation on Eccentric Exercise-Induced Muscle Damage. Nutrients. 2019 Jan 21;11(1). pii: E205.
[217] Gao C, Chen X, Li J, Li Y, Tang Y, Liu L, Chen S, Yu H, Liu L, Yao P. Myocardial mitochondrial oxidative stress and dysfunction in intense exercise: regulatory effects of quercetin. Eur J Appl Physiol. 2014 Apr;114(4):695-705.
[218] Teixeira S. Bioflavonoids: proanthocyanidins and quercetin and their potential roles in treating musculoskeletal conditions. J Orthop Sports Phys Ther 2002 Jul;32(7):357-63.
[219] Ahn J, Lee H, Kim S, Park J, Ha T. The anti-obesity effect of quercetin is mediated by the AMPK and MAPK signaling pathways. Biochem Biophys Res Commun 2008; 373:545–9.
[220] Dong J, Zhang X, Zhang L, Bian HX, Xu N, Bao B, Liu J. Quercetin reduces obesity-associated ATM infiltration and inflammation in mice: a mechanism including AMPKa1/SIRT1. J Lipid Res. 2014 Mar;55(3):363-74.
[221] Le NH, Kim CS, Park T, Park JH, Sung MK, Lee DG, Hong SM, Choe SY, Goto T, Kawada T, Yu R. Quercetin protects against obesity-induced skeletal muscle inflammation and atrophy. Mediators Inflamm. 2014;2014:834294.
[222] Zhao L, Zhang Q, Ma W, Tian F, Shen H, Zhou M. A combination of quercetin and resveratrol reduces obesity in high-fat diet-fed rats by modulation of gut microbiota. Food Funct. 2017 Dec 13;8(12):4644-4656.
[223] Geetha T, Malhotra V, Chopra K, Kaur IP. Antimutagenic and antioxidant/prooxidant activity of quercetin. Indian J Exp Biol. 2005; 43(1):61-7.
[224] Alvesalo J, Vuorela H, Tammela P, Leinonen M, Saikku P, Vuorela P. Inhibitory effect of dietary phenolic compounds on Chlamydia pneumoniae in cell cultures. Biochem Pharmacol. 2006 Mar 14;71(6):735-41.
[225] Cai X, Bao L, Ding Y, Dai X, Zhang Z, Li Y. Quercetin alleviates cell apoptosis and inflammation via the ER stress pathway in vascular endothelial cells cultured in high concentrations of glucosamine. Mol Med Rep. 2017 Feb;15(2):825-832.
[226] Rinwa P, Kumar A. Quercetin along with piperine prevents cognitive dysfunction, oxidative stress and neuro-inflammation associated with mouse model of chronic unpredictable stress. Arch Pharm Res. 2013: 1–10.

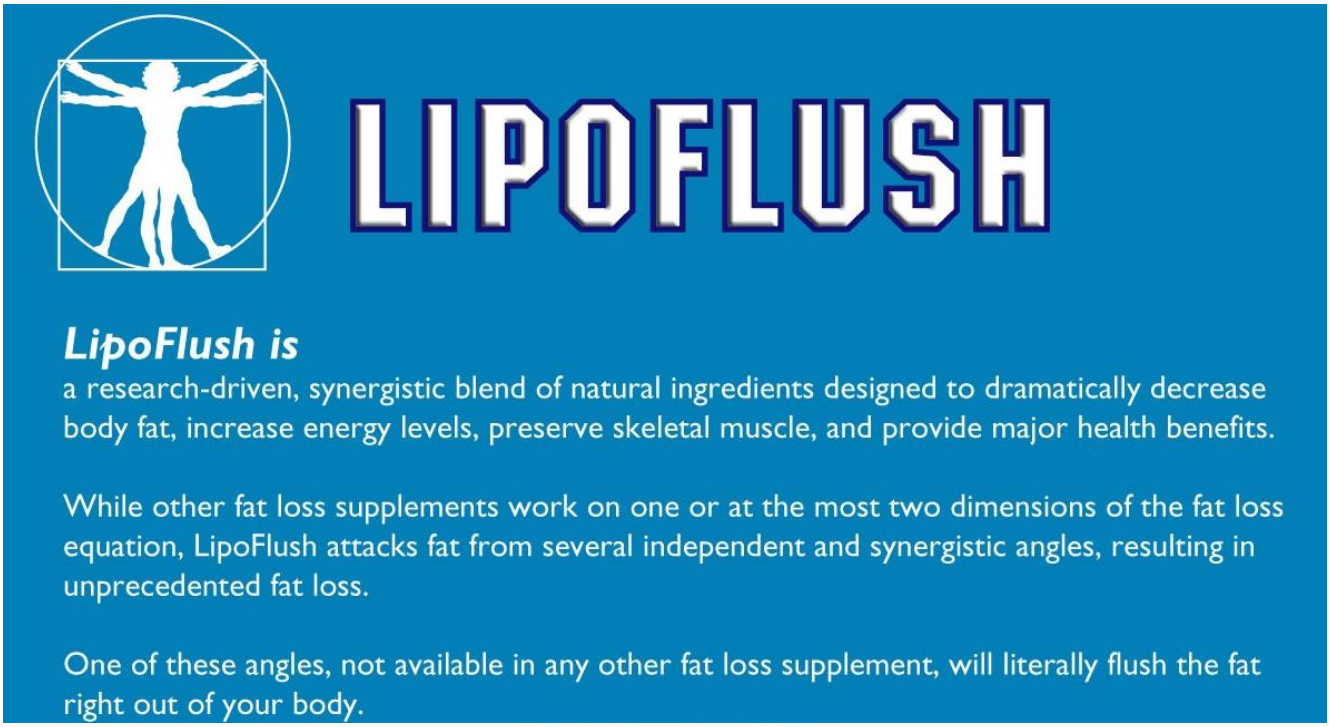
[227] Preuss HG, DiFerdinando D, Bagchi M, Bagchi D. Citrus aurantium as a thermogenic, weight-reduction replacement for ephedra: an overview. J Med. 2002;33(1-4):247-64.
[228] Coffey CS, Steiner D, Baker BA, Allison DB. A randomized double-blind placebo-controlled clinical trial of a product containing ephedrine, caffeine, and other ingredients from herbal sources for treatment of overweight and obesity in the absence of lifestyle treatment. Int J Obes Relat Metab Disord. 2004 Nov;28(11):1411-9.
[229] Greenway FL, De Jonge L, Blanchard D, Frisard M, Smith SR. Effect of a dietary herbal supplement containing caffeine and ephedra on weight, metabolic rate, and body composition. Obes Res. 2004 Jul;12(7):1152-7.
[230] Gougeon R, Harrigan K, Tremblay JF, Hedrei P, Lamarche M, Morais JA. Increase in the thermic effect of food in women by adrenergic amines extracted from citrus aurantium. Obes Res. 2005 Jul;13(7):1187-94.
[231] Berlan M, Galitzky J, Riviere D, Foureau M, Tran MA, Flores R, Louvet JP, Houin G, Lafontan M. Plasma catecholamine levels and lipid mobilization induced by yohimbine in obese and non-obese women. Int J Obes. 1991 May;15(5):305-15.
[232] Stohs SJ, Preuss HG, Shara M. The Safety of Citrus aurantium (Bitter Orange) and its Primary Protoalkaloid p-Synephrine. Phytother Res. 2011 Apr 8.
[233] Kidd P. Astaxanthin, cell membrane nutrient with diverse clinical benefits and anti-aging potential. Altern Med Rev. 2011 Dec;16(4):355-64.
[234] Aoi W, Naito Y, Takanami Y, Ishii T, Kawai Y, Akagiri S, Kato Y, Osawa T, Yoshikawa T. Astaxanthin improves muscle lipid metabolism in exercise via inhibitory effect of oxidative CPT I modification. Biochem Biophys Res Commun. 2008 Feb 22;366(4):892-7.
[235] Djordjevic B, Baralic I, Kotur-Stevuljevic J, Stefanovic A, Ivanisevic J, Radivojevic N, Andjelkovic M, Dikic N. Effect of astaxanthin supplementation on muscle damage and oxidative stress markers in elite young soccer players. J Sports Med Phys Fitness. 2012 Aug;52(4):382-92.
[236] Earnest CP, Lupo M, White KM, Church TS. Effect of astaxanthin on cycling time trial performance. Int J Sports Med. 2011 Nov;32(11):882-8.
[237] Fassett RG, Coombes JS. Astaxanthin: a potential therapeutic agent in cardiovascular disease. Mar Drugs. 2011 Mar 21;9(3):447-65.
[238] Ikeuchi M, Koyama T, Takahashi J, Yazawa K. Effects of astaxanthin supplementation on exercise-induced fatigue in mice. Biol Pharm Bull. 2006 Oct;29(10):2106-10.
[239] Liu PH, Aoi W, Takami M, Terajima H, Tanimura Y, Naito Y, Itoh Y, Yoshikawa T. The astaxanthin-induced improvement in lipid metabolism during exercise is mediated by a PGC-1a increase in skeletal muscle. J Clin Biochem Nutr. 2014 Mar;54(2):86-9.
[240] Polotow TG, Vardaris CV, Mihaliuc AR, Gonçalves MS, Pereira B, Ganini D, Barros MP.Astaxanthin supplementation delays physical exhaustion and prevents redox imbalances in plasma and soleus muscles of Wistar rats. Nutrients. 2014 Dec 12;6(12):5819-38.
[241] Yuan JP, Peng J, Yin K, Wang JH. Potential health-promoting effects of astaxanthin: a high-value carotenoid mostly from microalgae. Mol Nutr Food Res. 2011 Jan;55(1):150-65.
[242] Maezawa T, Tanaka M, Kanazashi M, Maeshige N, Kondo H, Ishihara A, Fujino H. Astaxanthin supplementation attenuates immobilization-induced skeletal muscle fibrosis via suppression of oxidative stress. J Physiol Sci. 2017 Sep;67(5):603-611.
[243] Kanazashi M, Tanaka M, Murakami S, Kondo H, Nagatomo F, Ishihara A, Roy RR, Fujino H. Amelioration of capillary regression and atrophy of the soleus muscle in hindlimb-unloaded rats by astaxanthin supplementation and intermittent loading. Exp Physiol. 2014 Aug;99(8):1065-77.
[244] Aoi W, Naito Y, Yoshikawa T. Potential role of oxidative protein modification in energy metabolism in exercise. Subcell Biochem. 2014;77:175-87.
[245] Choi HD, Kim JH, Chang MJ, Kyu-Youn Y, Shin WG. Effects of astaxanthin on oxidative stress in overweight and obese adults. Phytother Res. 2011 Dec;25(12):1813-8.
[246] Choi HD, Youn YK, Shin WG. Positive effects of astaxanthin on lipid profiles and oxidative stress in overweight subjects. Plant Foods Hum Nutr. 2011 Nov;66(4):363-9.

[247] Baralic I, Djordjevic B, Dikic N, Kotur-Stevuljevic J, Spasic S, Jelic-Ivanovic Z, Radivojevic N, Andjelkovic M, Pejic S. Effect of astaxanthin supplementation on paraoxonase 1 activities and oxidative stress status in young soccer players. Phytother Res. 2013 Oct;27(10):1536-42.
[248] Visioli F, Artaria C. Astaxanthin in cardiovascular health and disease: mechanisms of action, therapeutic merits, and knowledge gaps. Food Funct. 2017 Jan 25;8(1):39-63.
[249] Kishimoto Y, Yoshida H, Kondo K. Potential Anti-Atherosclerotic Properties of Astaxanthin.Mar Drugs. 2016 Feb 5;14(2).
[250] Wu H, Niu H, Shao A, Wu C, Dixon BJ, Zhang J, Yang S, Wang Y. Astaxanthin as a Potential Neuroprotective Agent for Neurological Diseases. Mar Drugs. 2015 Sep 11;13(9):5750-66.
[251] Zhang L, Wang H. Multiple Mechanisms of Anti-Cancer Effects Exerted by Astaxanthin. Mar Drugs. 2015 Jul 14;13(7):4310-30.
[252] Radice RP, Limongi AR, Viviano E, Padula MC, Martelli G, Bermano G. Effects of astaxanthin in animal models of obesity-associated diseases: A systematic review and meta-analysis. Free Radic Biol Med. 2021 Aug 1;171:156-168. doi: 10.1016/j.freeradbiomed.2021.05.008. Epub 2021 May 8. PMID: 33974978.
[253] Wolf AM, Asoh S, Hiranuma H, Ohsawa I, Iio K, Satou A, Ishikura M, Ohta S. Astaxanthin protects mitochondrial redox state and functional integrity against oxidative stress. J Nutr Biochem. 2010 May;21(5):381-9.
[254] Comhaire FH, El Garem Y, Mahmoud A, Eertmans F, Schoonjans F. Combined conventional/antioxidant "Astaxanthin" treatment for male infertility: a double blind, randomized trial. Asian J Androl. 2005 Sep;7(3):257-62.
[255] Hales DB, Allen JA, Shankara T, Janus P, Buck S, Diemer T, Hales KH. Mitochondrial function in Leydig cell steroidogenesis. Ann N Y Acad Sci. 2005 Dec;1061:120-34.
[256] Tsai SC1, Lu CC, Lin CS, Wang PS. J Cell Biochem. 2003 Dec 15;90(6):1276-86. Antisteroidogenic actions of hydrogen peroxide on rat Leydig cells.
[257] Wang JY, Lee YJ, Chou MC, Chang R, Chiu CH, Liang YJ, Wu LS. Astaxanthin protects steroidogenesis from hydrogen peroxide-induced oxidative stress in mouse Leydig cells. Mar Drugs. 2015 Mar 16;13(3):1375-88.
[258] Angwafor F 3rd, Anderson ML. An open label, dose response study to determine the effect of a dietary supplement on dihydrotestosterone, testosterone and estradiol levels in healthy males. J Int Soc Sports Nutr. 2008 Aug 12;5:12.
[259] Grimmig B, Kim SH, Nash K, Bickford PC, Douglas Shytle R. Neuroprotective mechanisms of astaxanthin: a potential therapeutic role in preserving cognitive function in age and neurodegeneration. Geroscience. 2017 Feb;39(1):19-32.
[260] Satoa F, Omuraa T, Ishimarua M, Endoa Y, Murasea H, Yamashitab E. Effects of Daily Astaxanthin and L-Carnitine Supplementation for Exercise-Induced Muscle Damage in Training Thoroughbred Horses Journal of Equine Veterinary Science Volume 35, Issue 10, October 2015, Pages 836–842
[261] https://www.bioperine.com/index.php/researchhighlight.
[262] Duangjai A, Ingkaninan K, Praputbut S, Limpeanchob N. Black pepper and piperine reduce cholesterol uptake and enhance translocation of cholesterol transporter proteins. J Nat Med. 2013 Apr;67(2):303-10.
[263] Khajuria A, Thusu N, Zutshi U. Piperine modulates permeability characteristics of intestine by inducing alterations in membrane dynamics: influence on brush border membrane fluidity, ultrastructure and enzyme kinetics. Phytomedicine. 2002 Apr;9(3):224-31.
[264] Vijayakumar RS, Surya D, Nalini N. Antioxidant efficacy of black pepper (Piper nigrum L.) and piperine in rats with high fat diet induced oxidative stress. Redox Rep. 2004;9(2):105-10.
[265] Park UH, Jeong HS, Jo EY, Park T, Yoon SK, Kim EJ, Jeong JC, Um SJ. Piperine, a component of black pepper, inhibits adipogenesis by antagonizing PPAR? activity in 3T3-L1 cells. J Agric Food Chem. 2012 Apr 18;60(15):3853-60.

[266] Meghwal M, Goswami TK.Piper nigrum and piperine: an update. Phytother Res. 2013 Aug;27(8):1121-30.
[267] Srinivasan K.Black pepper and its pungent principle-piperine: a review of diverse physiological effects. Crit Rev Food Sci Nutr. 2007;47(8):735-48.
[268] Chonpathompikunlert P, Wattanathorn J, Muchimapura S. Piperine, the main alkaloid of Thai black pepper, protects against neurodegeneration and cognitive impairment in animal model of cognitive deficit like condition of Alzheimer's disease. Food Chem Toxicol. 2010 Mar;48(3):798-802.
[269] Sharma S, Raj K, Singh S. Neuroprotective Effect of Quercetin in Combination with Piperine Against Rotenone- and Iron Supplement-Induced Parkinson's Disease in Experimental Rats. Neurotox Res. 2020 Jan;37(1):198-209. doi: 10.1007/s12640-019-00120-z. Epub 2019 Oct 25. PMID: 31654381.
[270] Debeer L. J. Mannaerts G., De Schepper P. J. Effects of octanoate and oleate on energy metabolism in the perfused rat liver. Eur J Biochem 1974; 47: 591–600.
[271] Yoshida T, Sakane N, Wakabayashi T, Umekawa T, Kondo M. Thermogenic, anti-obesity effects of bofu-tsusho-san in MSG-obese mice. Int J Obesity 1995, 19:717.
[272] Morimoto Y, Sakata M, Ohno A, Maegawa T, Tajima S. Effects of bofu-tsusho-san, a traditional Chinese medicine, on body fat accumulation in fructose-loaded rats. Nippon Yakurigaku Zasshi 2001; 117(1):77-86.
[273] Dulloo AG, Duret C, Rohrer D, et al. Efficacy of a green tea extract rich in catechin polyphenols and caffeine in increasing 24-h energy expenditure and fat oxidation in humans. Am J Clin Nutr 1999; 70:1040-5.
[274] Matsui N, Ito R, Nishimura E, Yoshikawa M, Kato M, Kamei M, Shibata H, Matsumoto I, Abe K, Hashizume S. Ingested cocoa can prevent high-fat diet-induced obesity by regulating the expression of genes for fatty acid metabolism. Nutrition. 2005 May;21(5):594-601.
[275] Mousavi SM, Milajerdi A, Sheikhi A, Kord-Varkaneh H, Feinle-Bisset C, Larijani B, Esmaillzadeh A. Resveratrol supplementation significantly influences obesity measures: a systematic review and dose-response meta-analysis of randomized controlled trials. Obes Rev. 2019 Mar;20(3):487-498.
[276] Hafidi ME, Perez I, Zamora J, Soto V, Carvajal-Sandoval G, Banos G. Glycine intake decreases plasma free fatty acids, adipose cell size, and blood pressure in sucrose-fed rats. Am J Physiol Regul Integr Comp Physiol. 2004 Dec;287(6):R1387-93.
[277] Wang Y, Rimm EB, Stampfer MJ, Willett WC, Hu FB. Comparison of abdominal adiposity and overall obesity in predicting risk of type 2 diabetes among men. Am J Clin Nutr. 2005 Mar;81(3):555-63.
[278] Koh-Banerjee P, Wang Y, Hu FB, Spiegelman D, Willett WC, Rimm EB. Changes in body weight and body fat distribution as risk factors for clinical diabetes in US men. Am J Epidemiol. 2004 Jun 15;159(12):1150-9.
[279] Ramos EJ, Xu Y, Romanova I, Middleton F, Chen C, Quinn R, Inui A, Das U, Meguid MM. Is obesity an inflammatory disease? Surgery. 2003 Aug;134(2):329-35.
[280] Monteiro R, Azevedo I. Chronic inflammation in obesity and the metabolic syndrome. Mediators Inflamm. 2010;2010:289645. doi: 10.1155/2010/289645. Epub 2010 Jul 14. PMID: 20706689; PMCID: PMC2913796.
[281] Crujeiras AB, Cordero P, Garcia-Diaz DF, Stachowska E, González-Muniesa P. Molecular Basis of the Inflammation Related to Obesity. Oxid Med Cell Longev. 2019 Feb 17;2019:5250816. doi: 10.1155/2019/5250816. eCollection 2019.
[282] Kawai T, Autieri MV, Scalia R. Adipose tissue inflammation and metabolic dysfunction in obesity. Am J Physiol Cell Physiol. 2021 Mar 1;320(3):C375-C391. doi: 10.1152/ajpcell.00379.2020. Epub 2020 Dec 23. PMID: 33356944; PMCID: PMC8294624.
[283] Wisse BE. The inflammatory syndrome: the role of adipose tissue cytokines in metabolic disorders linked to obesity. J Am Soc Nephrol. 2004 Nov;15(11):2792-800.

[284] Cottam DR, Mattar SG, Barinas-Mitchell E, Eid G, Kuller L, Kelley DE, Schauer PR. The chronic inflammatory hypothesis for the morbidity associated with morbid obesity: implications and effects of weight loss. Obes Surg. 2004 May;14(5):589-600.
[285] Weisberg SP, McCann D, Desai M, Rosenbaum M, Leibel RL, Ferrante AW Jr: Obesity is associated with macrophage accumulation in adipose tissue. J Clin Invest 2003; 112:1796-1808.
[286] Xu H, Barnes GT, Yang Q, Tan G, Yang D, Chou CJ, Sole J, Nichols A, Ross JS, Tartaglia LA, Chen H: Chronic inflammation in fat plays a crucial role in the development of obesity-related insulin resistance. J Clin Invest 2003; 112:1821-1830.
[287] Bastard JP, Maachi M, Lagathu C, Kim MJ, Caron M, Vidal H, Capeau J, Feve B. Recent advances in the relationship between obesity, inflammation, and insulin resistance. Eur Cytokine Netw. 2006 Mar;17(1):4-12.
[288] Yudkin JS, Stehouwer CD, Emeis JJ, Coppack SW. C-reactive protein in healthy subjects: associations with obesity, insulin resistance, and endothelial dysfunction: a potential role for cytokines originating from adipose tissue? Arterioscler Thromb Vasc Biol 1999; 19: 972–978.
[289] Hak AE, Stehouwer CD, Bots ML et al. Associations of C-reactive protein with measures of obesity, insulin resistance, and subclinical atherosclerosis in healthy, middle-aged women. Arterioscler Thromb Vasc Biol 1999; 19: 1986–1991.
[290] Lemieux I, Pascot A, Prud'homme D et al. Elevated Creactive protein: another component of the atherothrombotic profile of abdominal obesity. Arterioscler Thromb Vasc Biol 2001; 21: 961–967.
[291] Wajchenberg BL, Giannella-Neto D, da Silva ME, Santos RF. Depot-specific hormonal characteristics of subcutaneous and visceral adipose tissue and their relation to the metabolic syndrome. Horm Metab Res. 2002 Nov-Dec;34(11-12):616-21.
[292] Saijo Y, Kiyota N, Kawasaki Y, Miyazaki Y, Kashimura J, Fukuda M, Kishi R. Relationship between C-reactive protein and visceral adipose tissue in healthy Japanese subjects. Diabetes Obes Metab. 2004 Jul;6(4):249-58.
[293] Ferroni P, Basili S, Falco A, Davi G. Inflammation, insulin resistance, and obesity. Curr Atheroscler Rep. 2004 Nov;6(6):424-31.
[294] Hashimoto I, Wada J, Hida A, Baba M, Miyatake N, Eguchi J, Shikata K, Makino H. Elevated serum monocyte chemoattractant protein-4 and chronic inflammation in overweight subjects. Obesity (Silver Spring). 2006 May;14(5):799-811.
[295] McLaughlin T, Deng A, Gonzales O, Aillaud M, Yee G, Lamendola C, Abbasi F, Connolly AJ, Sherman A, Cushman SW, Reaven G, Tsao PS. Insulin resistance is associated with a modest increase in inflammation in subcutaneous adipose tissue of moderately obese women. Diabetologia. 2008 Dec;51(12):2303-8.
[296] Huber J, Kiefer FW, Zeyda M, Ludvik B, Silberhumer GR, Prager G, Zlabinger GJ, Stulnig TM. CC chemokine and CC chemokine receptor profiles in visceral and subcutaneous adipose tissue are altered in human obesity. J Clin Endocrinol Metab. 2008 Aug;93(8):3215-21.
[297] Verrijken A, Francque S, Mertens I, Talloen M, Peiffer F, Van Gaal L. Visceral adipose tissue and inflammation correlate with elevated liver tests in a cohort of overweight and obese patients. Int J Obes (Lond). 2010 May;34(5):899-907.
[298] Bigornia SJ, Farb MG, Mott MM, Hess DT, Carmine B, Fiscale A, Joseph L, Apovian CM, Gokce N. Relation of depot-specific adipose inflammation to insulin resistance in human obesity. Nutr Diabetes. 2012 Mar 5;2:e30.
[299] Yu JY, Choi WJ, Lee HS, Lee JW. Relationship between inflammatory markers and visceral obesity in obese and overweight Korean adults: An observational study. Medicine (Baltimore). 2019 Mar;98(9):e14740.
[300] Jin C, Flavell RA. Innate sensors of pathogen and stress: linking inflammation to obesity. J Allergy Clin Immunol. 2013 Aug;132(2):287-94.
[301] Cox AJ, West NP, Cripps AW. Obesity, inflammation, and the gut microbiota. Lancet Diabetes Endocrinol. 2015 Mar;3(3):207-15. doi: 10.1016/S2213-8587(14)70134-2. Epub 2014 Jul 22.

[302] Tomlinson JW, Moore J, Cooper MS, Bujalska I, Shahmanesh M, Burt C, Strain A, Hewison M, Stewart PM. Regulation of expression of 11beta-hydroxysteroid dehydrogenase type 1 in adipose tissue: tissue-specific induction by cytokines. Endocrinology. 2001 May;142(5):1982-9.
[303] Frost RA, Lang CH. Alteration of somatotropic function by proinflammatory cytokines. J Anim Sci. 2004;82 E-Suppl:E100-109.
[304] Strle K, Broussard SR, McCusker RH, Shen WH, Johnson RW, Freund GG, Dantzer R, Kelley KW. Proinflammatory cytokine impairment of insulin-like growth factor I-induced protein synthesis in skeletal muscle myoblasts requires ceramide. Endocrinology. 2004 Oct;145(10):4592-602.
[305] Strain GW, Zumoff B, Strain JJ, Levin J, Fukushima DK. Cortisol production in obesity. Metabolism. 1980; 29(10):980-5.
[306] Björntorp P, Rosmond R. Obesity and cortisol. Nutrition 2000; 16: 924-936.
[307] Incollingo Rodriguez AC, Epel ES, White ML, Standen EC, Seckl JR, Tomiyama AJ. Hypothalamic-pituitary-adrenal axis dysregulation and cortisol activity in obesity: A systematic review. Psychoneuroendocrinology. 2015 Dec;62:301-18.
[308] Greff MJE, Levine JM, Abuzgaia AM, Elzagallaai AA, Rieder MJ, van Uum SHM. Hair cortisol analysis: An update on methodological considerations and clinical applications. Clin Biochem. 2019 Jan;63:1-9.
[309] Manolopoulos KN, O'Reilly MW, Bujalska IJ, Tomlinson JW, Arlt W. Acute Hypercortisolemia Exerts Depot-Specific Effects on Abdominal and Femoral Adipose Tissue Function. J Clin Endocrinol Metab. 2017 Apr 1;102(4):1091-1101.
[310] Samra JS, Clark ML, Humphreys SM, MacDonald IA, Bannister PA, Frayn KN. Effects of physiological hypercortisolemia on the regulation of lipolysis in subcutaneous adipose tissue. J Clin Endocrinol Metab. 1998 Feb;83(2):626-31.
[311] Frayn KN, Coppack SW, Fielding BA, Humphreys SM. Coordinated regulation of hormone-sensitive lipase and lipoprotein lipase in human adipose tissue in vivo: implications for the control of fat storage and fat mobilization. Adv Enzyme Regul. 1995;35:163-78.
[312] Jacqmain M et al. Calcium intake, body composition, and lipoprotein-lipid concentrations in adults. Am J Clin Nutri 2003; 77:1448-52.
[313] McLaughlin T, Abbasi F, Lamendola C, et al. Differentiation between obesity and insulin resistance in the association with C-reactive protein. Circulation 2002; 106:2908-12.
[314] Lyon CJ, Law RE, Hsueh WA. Minireview: adiposity, inflammation, and atherogenesis, Endocrinology 2003; 144:2195-2200.
[315] Klover PJ, Clementi AH, Mooney RA. Interleukin-6 Depletion Selectively Improves Hepatic Insulin Action in Obesity. Endocrinology. 2005 Aug;146(8):3417-27.
[316] Viguerie N, Poitou C, Cancello R, Stich V, Clement K, Langin D. Transcriptomics applied to obesity and caloric restriction. Biochimie. 2005; 87(1):117-23.


LIPOFLUSH
LipoFlush is
a research-driven, synergistic blend of natural ingredients designed to dramatically decrease body fat, increase energy levels, preserve skeletal muscle, and provide major health benefits.
While other fat loss supplements work on one or at the most two dimensions of the fat loss equation, LipoFlush attacks fat from several independent and synergistic angles, resulting in unprecedented fat loss.
One of these angles, not available in any other fat loss supplement, will literally flush the fat right out of your body.