

"The Whey It Is"

By Will Brink© 2003



"...Read this article carefully, put it to memory, and you will be the resident whey expert in the gym..."

- Will Brink.

About the Author



Will Brink is a columnist, contributing consultant, and regular contributor to *MuscleMag International*. He is the author of the best selling book *Priming The Anabolic Environment: A practical and Scientific Guide to the Art and Science of Gaining Muscle*. Will graduated from Harvard University with a concentration in the natural sciences, and is a consultant to major supplement companies. For a copy of *Priming The Anabolic Environment*, call (905) 678-2314. For a copy of his new book ANABOLIC NUTRITION go to www.MuscleBuildingNutrition.com. For all other correspondence go to www.brinkzone.com. or send a self-addressed and stamped envelope to PO Box 812430Wellesley MA , 02482. E mail address: wbrink@earthlink.net.

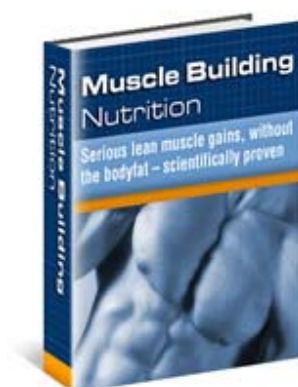
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Don't forget to check out Will's two superb ebooks



Diet Supplements Revealed - Learn which diet and weight loss supplements burn fat fast and which are no more than hype... And discover a scientifically proven, totally personalized fat loss diet all within the next 10 minutes, by sports nutrition and supplements expert Will Brink.



Muscle Building Nutrition Guide and Bodybuilding Supplements Review - Build serious lean muscle in record time with a proven muscle building nutrition plan and discover exactly which bodybuilding supplements work and which are no more than pure marketing hype, by sports nutrition and supplements expert Will Brink.

Feedback on Will's ebooks...



"I commend Will Brink on his efforts to debunk sports nutrition supplements. Will's **Muscle Building Nutrition** is a must read!"

- **Lee Labrada**, Founder of Labrada Nutrition, www.labrada.com, Former world champion professional bodybuilder, IFBB Mr. Universe, top 4 placed in the Mr.Olympia for seven consecutive years.



"Combine Will's nutrition and supplement information in Will's superb **Muscle Building Nutrition** with my training tips and advice, and success is virtually guaranteed."

- **Charles Poliquin**, www.charlespoliquin.net
Charles is recognized as one of the World's most successful strength coaches, coached Olympic medalists in 12 different sports.



"Will has been a major influence in my bodybuilding nutrition plan since I started to take this sport seriously. As an IFBB professional bodybuilder, I can't afford to waste time on worthless over hyped information. Will has always delivered quality information I can count on and **he is one of only a handful of people whose opinion on nutrition the pro's genuinely respect.**

- **Jamo Nezzar**,
<http://www.musclejam.com>
Pro Bodybuilder and Fitness Consultant

“I dropped from 52% body fat to 15% body fat using the diet supplements, principles and information in Will Brink's Diet Supplements Revealed”



"Here are my before and after pictures. The "after" was taken on my 48th birthday (today) after a workout. I've made more progress in 3 months following the principles in your information than the entire (almost) 3 years of dieting and exercise. I never would've thought a guy my age could've done this!"

- Many Thanks. Pat S.

“Not a quick fix but a steady and healthy reduction in bodyweight exactly as outlined in Will's Diet Supplements Revealed”



"I have lost over 100 pounds of fat in the past few years, while gaining muscle. I didn't do it as a crash, or quick fix diet, but as a steady healthy reduction in bodyweight as outlined in your great e-book "Diet Supplements Revealed". Your direction and knowledge of diet and supplements has been more than invaluable to my success."

- Thank you Will. Amy Fox.



Lee Apperson & Debbie Kruck

“...I learnt so much from Will about losing fat with the correct diet and supplements, I wouldn't be this lean and healthy without him. His knowledge is unparalleled. I strongly suggest you read what Will has to say - It's a must for any man or woman trying to lose body fat and shape up.”

- **Lee Apperson**, Trainer/Model



Dear Will,

“...Just a quick note to say thank you for the diet information. I've lost 18 pounds of fat in just over 8 weeks. I'm now 38 years old and 6% bodyfat. I would never have got this far without you.”

Thank You again.

- **Mike Serino**



**Actress and Model:
Laurie de Nuccio**

“...Will is a down-to-earth health visionary whose wisdom transcends the present-day medical mindset. The information was very empowering.”

- **Laurie de Nuccio**

"The Whey It Is"

by Will Brink.

If there is one thing that continues to perplex me, it is the disparity between how popular whey protein is (thanks in large part to yours truly) and how much confusion there is regarding this immensely popular supplement.

Why are people so confused about whey?

I have to conclude that it's part deceptive advertising by some unscrupulous supplement, companies, poorly researched articles put out by self proclaimed "guru" types, and the fact that whey is indeed a complicated protein. In this article I will endeavor to clear it all up once and for all. Lift the veil of secrecy, strip away the myths, and shatter the hyperbole surrounding this ultra popular supplement.

By the time you are through reading this article, you will know all that is needed to know regarding the differences in whey, such as concentrates vs. isolates, micro filtered vs. ion exchange, and many other answers to questions that seem to persist no matter how hard wise guy writers like me have tried to dispense with all the myths and misinformation/disinformation surrounding whey. Read this article carefully, put it to memory, and you will be the resident whey expert in the gym and amaze your friends at the next cookout if whey becomes a topic of discussion (man people go to some boring cookouts!).

What is whey?

When we talk about whey we are actually referring to a complex protein made up of many smaller protein subfractions such as: Beta-lactoglobulin, alpha-lactalbumin, immunoglobulins (IgGs), glycomacropeptides, bovine serum albumin (BSA) and minor peptides such as lactoperoxidases, lysozyme and lactoferrin. Each of the subfractions found in whey has its own unique biological properties. Up until quite recently, separating these subfractions on a large scale was either impossible or prohibitively expensive for anything but research purposes. Modern filtering technology has improved dramatically in the past decade allowing companies to separate some of the highly bioactive peptides from whey, such as lactoferrin and lactoperoxidase.

Some of these subfractions are only found in very minute amounts in cows milk, normally at less than one percent. For example, though one of the most promising subfractions for preventing various diseases, improving immunity and over all health, lactoferrin makes up approximately 0.5% or less of whey protein derived from cow milk (where as human milk will contain up to 15% lactoferrin). Over the past few decades, whey protein powders have evolved several generations from low grade concentrates to very high grade concentrates and isolates.

What's so great about whey?

Whey protein has become a staple supplement for most bodybuilders and other athletes and for good reason: it's a great protein for a wide variety of reasons. Whey has more recently caught on with the anti aging/longevity minded groups also, for it's effects on immunity.

A growing number of studies has found whey may potentially reduce cancer rates, combat HIV, improve immunity, reduce stress and lower cortisol, increase brain serotonin levels, improve liver function in those suffering from certain forms of hepatitis, reduce blood pressure, and improve performance, to name a few of its potential medical and sports related applications. Whey also has an exceptionally high biological value rating (though sellers of whey make FAR too big a deal of that fact) and an exceptionally high BCAA content.

One of whey's major effects is its apparent ability to raise glutathione (GSH). The importance of GSH for the proper function of the immune system cannot be overstated. GSH is arguably the most important water-soluble antioxidant found in the body.

The concentration of intracellular GSH is directly related to lymphocytes (an important arm of the immune system) reactivity to a challenge, which suggests intracellular GSH levels are one way to modulate immune function. GSH is a tri-peptide made up of the amino acids L-cysteine, L-glutamine and glycine. Of the three, cysteine is the main source of the free sulfhydryl group of GSH and is a limiting factor in the synthesis of GSH (though the effects of whey on GSH is more complicated than simply its cysteine content).

Because GSH is known to be essential to immunity, oxidative stress, general well being, and reduced levels of GSH are associated with a long list of diseases, whey has a place in anyone's nutrition program. Reduced GSH is also associated with over training syndrome (OTS) in athletes, so whey may very well have an application in preventing, or at least mitigating, OTS. Pertaining directly to athletes, some recent studies suggest whey may have direct effects on

performance and muscle mass, but this research is preliminary at best. Some studies have found oxidative stress contributes to muscular fatigue, so having higher GSH levels may allow you to train longer and harder, as some recent data suggests.

Different types of whey:

Most of the confusion surrounding whey, appears to be in understanding the different types of whey: concentrates, isolates, ion exchange, etc, etc. In the following sections, I will attempt to clear it all up for the reader.

Pro's and con's of concentrates:

First Generation whey protein powders contained as low as 30-40% protein and contained high amounts of lactose, fat, and undenatured proteins. They were considered a "concentrate" and were used mostly by the food industry for baking and other uses. Modern concentrates now contain as high as 70-80% plus protein with reduced amounts of lactose and fat. Many people are under the impression that a WPC is inherently inferior to an isolate.

This is simply untrue. Though WPCs will contain less protein on a gram for gram basis than an isolate, a high quality WPC contains all sorts of interesting compounds not found in the isolates. Good concentrates contain far higher levels of growth factors, such as IGF-1, TGF- β 1, and TGF- β 2. They contain much higher levels of various phospho lipids, and various bio active lipids, such as Conjugated Linoleic Acid (CLA), and they often contain higher levels of immunoglobulins and lactoferrin. Although data is lacking as to whether or not these compounds found in a good WPC will effect an athlete's muscle mass or performance, studies do suggest these

compounds can improve immunity, intestinal health, and have many other effects that both athletes and "normal" people alike may find beneficial.

The drawbacks of WPCs are they have slightly less protein gram for gram than an isolate, and contain higher levels of fat (though these fats may in fact have beneficial effects) and higher levels of lactose. People should not be under the impression that a well made WPC is inherently inferior to a WPI and may in fact be a superior choice, depending on the goals of the person. For example, some people don't tolerate lactose well or are trying to watch every gram of fat in their diet, etc. while other may want the potentially beneficial effects of the additional compounds found in a high quality concentrate.

The pro's and con's of isolates, and the micro filtered vs. ion exchange debate.

WPI's generally contain as much as 90-96% protein. Research has found that only whey proteins in their natural undenatured state (i.e. native conformational state) have biological activity. Processing whey protein to remove the lactose, fats, etc. without losing its biological activity takes special care by the manufacturer. Maintaining the natural undenatured state of the protein is essential to its anti-cancer and immune stimulating activity. The protein must be processed under low temperature and/or low acid conditions as not to "denature" the protein and this becomes an even greater concern when making high grade isolates vs. concentrates. WPI's contain >90% protein contents with minimal lactose and virtually no fat. The advantage of a good WPI is that it contains more protein and less fat, lactose, and ash than concentrates on a gram for gram basis. However, it should be clear to the reader by now that whey is far more complicated than simple protein content, and protein content per se is

far from the most important factor when deciding which whey to use. For example, ion exchange has the highest protein levels of any isolate. Does that make it the best choice for an isolate? No, but many companies still push it as the holy grail of whey.

Ion exchange is made by taking a concentrate and running it through what is called an "ion exchange" column to get an "ion exchange whey isolate." Sounds pretty fancy but there are serious drawbacks to this method. As mentioned above, whey protein is a complex protein made up of many sub fraction peptides that have their own unique effects on health, immunity, etc. Some of these subfractions are only found in very small amounts.

In truth, the subfractions are really what ultimately makes whey the unique protein it is. Due to the nature of the ion exchange process, the most valuable and health promoting components are selectively depleted. Though the protein content is increased, many of the most important subfractions are lost or greatly reduced. This makes ion exchange isolates a poor choice for a true third-generation whey protein supplement, though many companies still use it as their isolate source due to the higher protein content. Ion exchange isolates can be as high as 70% or greater of the subfraction Beta-lactoglobulin, (the least interesting and most allergenic subfraction found in whey) with a loss of the more biologically active and interesting subfractions. So, the pros of an ion exchange whey is for those who simply want the very highest protein contents per gram, but the cons are that the higher protein content comes at cost; a loss of many of the subfractions unique to whey. Not an acceptable trade in my view considering the fact that the actual protein differences between a micro filtered type isolate is minimal from that of an ion exchange.

This segues us nicely into looking at the micro filtered whey isolates. With the array of more recent processing techniques used to make WPI's - or pull out various subfractions - such as Cross Flow Micro filtration (CFM®) ultra filtration (UF), micro filtration (MF), reverse osmosis (RO), dynamic membrane filtration (DMF), ion exchange chromatography, (IEC), electro-ultrafiltration (EU), radial flow chromatography (RFC) and nano filtration (NF), manufacturers can now make some very high grade and unique whey proteins. Perhaps the most familiar micro filtered isolate to readers, would be CFM®*. Although the term "cross flow micro filtered" is something of a generic term for several similar ways of processing whey, The CFM® processing method uses a low temperature micro filtration techniques that allows for the production of very high protein contents (>90%), the retention of important subfractions, extremely low fat and lactose contents, with virtually no undenatured proteins. CFM® is a natural non-chemical process which employs high tech ceramic filters, unlike ion exchange, which involves the use of chemical reagents such as hydrochloric acid and sodium hydroxide. CFM® whey isolate also contains high amounts of calcium and low amounts of sodium.

To sum this section up:

- The pros of concentrates is there may be higher levels of various –and potentially beneficial – growth factors, lipids, phospholipids, and other potentially interesting compounds. The cons are lower protein gram for gram than isolates, and higher levels of fat and lactose that some people may wish to avoid. Like all whey proteins, not all concentrates are created equal in their levels of the above mentioned compounds of interest.
- The pros of Ion exchange isolates is extremely low fat and lactose levels, with the highest protein levels (on a gram for

gram basis). The cons –which outweigh the pros in my view – is the loss of important subfractions in favor of higher amounts of Beta-Lac.

- The pros of well made micro filtered isolates, is a high protein content (90% or above), low lactose and fat levels, very low levels of undenatured proteins, and the retention of important subfractions in their natural ratios. There really are no cons per se, unless the person wants the additional compounds (e.g., higher levels of growth factors, CLA, etc.) found in a well made concentrate.

* = CFM® is a trade mark process (hence the annoying trade mark sign next to when ever I write CFM) of Glanbia Nutritionals, a large dairy company out of Ireland with offices in the US.

New directions/the future for whey

There are several interesting directions in the development and processing of the next generation of whey proteins.

- Optimizing sub fraction ratios, etc: Another fairly new development in whey processing is the ability to isolate out certain bio active sub fraction proteins on a large scale from whey proteins, such as lactoferrin or Glycomacro peptide, using some of the processing methods mentioned above. This was not possible to do on a large scale just a few years ago but can be done today with modern filtering techniques employed by a small number of companies. This allows for a truly tailored protein supplement; the ability to add back in certain subfractions in amounts that can't be found in nature. Take for example the subfraction lactoferrin. In many whey products, it is

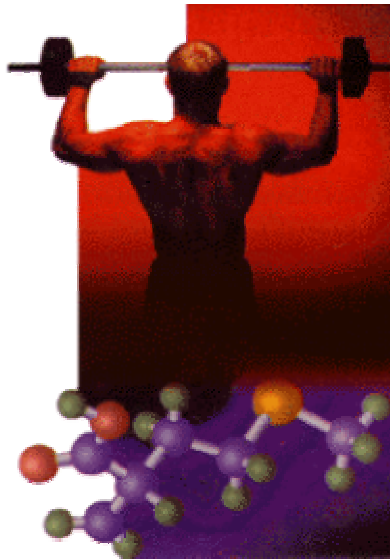
nonexistent due to the type of processing employed. The best whey products will contain less than 1% lactoferrin and more like .5% of this rare but important micro-fraction. Some companies are now able to add in a specific subfraction to get a truly "designer" protein. One company is also working on making an isolate that will have higher levels of the beneficial subfraction, alpha-lactalbumin, and lower levels of the more allergenic and less nutritive subfraction, Beta-lactoglobulin. "High alpha-lac" whey isolates would be potentially superior to what is currently on the market in large scale production.

On the concentrate front, there is a company that is producing a concentrate with much higher levels of the aforementioned growth factors (IGF-1, TGF- β 1, and TGF- β 2), and other bio active compounds, such as various phospho lipids, Conjugated Linoleic Acid (CLA), immunoglobulins, and lactoferrin and has a fat content of approx 15%, which is 5-10% higher in fat than most concentrates, but it's the fat that contains those compounds.

- Hydrolyzed proteins make a comeback: Most people remember hydrolyzed proteins were all the rage a few years ago, then dropped off sharply. "Hydrolyzed" basically means the protein has been 'broken down' partially into peptides of different lengths. Because the protein is already partially 'broken down' it is absorbed faster, which may have positive effects under certain circumstances, such certain metabolic conditions (i.e., burn victims or people with certain digestive disorders and pre term infants). Whether or not hydrolyzed proteins are truly an advantage to athletes has yet to be proven. The hype over hydrolyzed proteins was based pretty much on one rat study that found fasted rats given Hydrolyzed protein had higher

nitrogen retention than rats fed whole protein. Too bad no one ever followed up with a human study with athletes showing the same thing. Regardless, the reason Hydrolyzed protein supplements never became more popular was due to the fact they tasted awful, were expensive, and lacked enough data to really support its use. The way they were produced at the time also denatured the protein heavily. One company has a method for Hydrolyzing whey protein that uses an enzymatic process that tastes OK and does not denature the protein. It also appears to be fairly cost effective. This type of Hydrolyzed whey may have some interesting, albeit poorly researched, applications for bodybuilders and other athletes.

- Got milk minerals? Another potentially useful product to bodybuilders and other athletes, is a process for extracting milk minerals from the milk. This gives a highly bio available form of calcium without the fat and lactose of dairy products, and also contains other minerals and nutrients, such as magnesium, phosphorus, potassium, and zinc, needed for optimal bone formation and metabolism. Recent research suggests that higher calcium intakes are associated with lower blood pressure, and other positive effects on health. Most interesting to bodybuilders and other athletes however, is a growing body of research that has found higher calcium intakes leads to reduced bodyfat levels and may help shift the metabolism to increased lipolysis (fat breakdown) and decrease lipogenesis (formation of fat). Though bodybuilder types don't tend to suffer from bone density issues, many may not be getting an optimal intake of calcium to see changes in bodyfat levels. This new milk mineral product added to various protein formulas, might be just what the anabolic doctor ordered for athletes looking to minimize bodyfat and maximize muscle mass.



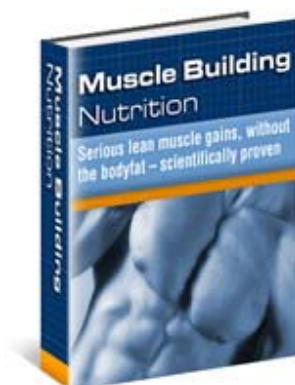
Conclusion

Well there you have it. I hope this article finally clears up the major confusion people have surrounding whey, so the reader can now be an educated consumer when they go to buy that next can of whey. Don't be fooled by the hype. Whey is great stuff for many reasons, but you won't "*add mounds of muscle in ultra short time*" from the simple addition of whey to your diet... I also suggest people keep an eye out for some of the newer developments I outlined above that will probably be finding their way into the next generation of whey based formulas.

Don't forget to check out Will's two superb ebooks:



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