



EXPOSING THE DIRTY SECRETS OF THE NUTRITIONAL SUPPLEMENT INDUSTRY

Volume 1 Whey Protein

As scientific evidence continues to mount in favor of the health promoting effects of higher protein intakes, increasingly health conscious consumers are demanding convenient and affordable ways of adding protein to their diet. The food and supplement industries, never one to miss an opportunity, have been eager to oblige, introducing a myriad of protein bars, powders, shakes, candies, puddings and other convenience foods to fill this demand. But consumers should realize that oftentimes the food industry, and its darling offspring, the nutritional supplement industry will go to any lengths to sell the cheapest (and potentially harmful) ingredients they can get away with. Nowhere is this truer than in the area of whey protein.



Slowly, whey protein supplements are shedding their reputation as mere muscle builders and their true health promoting value is beginning to become recognized. People are beginning to realize the value of this convenient, economical protein source for weight control, immune function, medical conditions such as HIV and cancer, but as demand rises so does the production of inferior low-grade products attempting to ride the wave of whey's popularity. As we shall see, many whey protein products on the market fail to offer the full spectrum of whey's benefits, and some may even be potentially harmful.

PROTEIN IS PROTEIN-OR IS IT?

In order to figure out what constitutes "quality" whey protein we need to take a look at some of the different products on the market, what their properties are, and how they are processed.

IT ALL STARTS WITH MILK

Whey is the watery part of milk separated from curds during cheese making. Cow's milk is comprised of approximately 80% casein and 20% whey. Unbeknownst to many, certain types of whey protein can impart phenomenal health benefits to a wide range of individuals. It is widely believed amongst many researchers that the health benefits of a properly prepared whey protein outshine the benefits of ALL other forms of protein supplementation (including the much touted soy.) Quality whey preparations have been shown to:

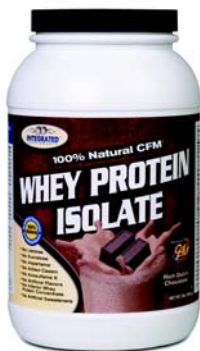


- 1) Raise glutathione, the body's premier endogenous antioxidant, which serves to neutralize toxins, heavy metals and other carcinogens. Whey protein has consistently been shown to raise glutathione better than any other protein.^{1,2,7,8,11} (Note: cancer cells have been shown to have higher levels of glutathione than normal cells, and whey has been shown to selectively *deplete* glutathione in cancerous cells making them more sensitive to chemotherapy.²⁶ See next point.)
- 2) Prevent and treat various types of cancer including breast cancer and prostate cancer.^{4,5,6,8}
- 3) Fight various types of infections through several different mechanisms.^{1,2,8,16}
- 4) Combat muscle atrophy, especially in wasting conditions such as HIV and cancer^{1,2,3,8}

Not all whey proteins are created equal, however. Sadly, most of the whey proteins currently available on the market wouldn't even begin to exhibit the biological activity listed above. In this article you will learn exactly what to look for in choosing top quality whey protein supplements which impart all of whey's incredible health-promoting and disease fighting benefits.

TWO TYPES OF WHEY

Interestingly enough, whey, a byproduct of the cheese making process, was not recognized until fairly recently as having any nutritional value for humans at all. Sweet dairy whey, which is the raw whey precipitate from cheddar-type cheeses, contains quite a bit of lactose, and fat making it not only unpalatable, but, in this state, a nutritionally poor food. It wasn't until about 25 years ago that the technology to extract the protein from sweet dairy whey was refined enough to produce an economically viable food product, and in more recent years, improvements in filters and processing techniques have continued to improve the quality of commercially available whey supplements. Thus, the different processing techniques that whey undergoes become quite important. **When a major food industry such as the dairy industry finds a way to sell you a product they would otherwise throw away, be VERY suspect of the foods' quality. Extreme care has to be taken to isolate and preserve the products' beneficial components, while ridding the product of undesirable elements.**



The different processing techniques that whey undergoes can make the difference between a product with remarkable health benefits, and one that is



decidedly damaging to health. First, let's start by separating all whey protein into 3 categories:

WHEY CONCENTRATE – A cheap whey protein with relatively high levels of lactose, fat, cholesterol, and denatured (non-functional) proteins.

WHEY ISOLATE – A more pure whey protein with lower levels of lactose, fat, cholesterol or denatured proteins.

HYDROLYZED WHEY – An enzymatically predigested whey protein, where larger whey peptides and microfractions are broken down.

Whey concentrate is the broad term that describes any whey which, after pasteurization and removal of some fat and solids from cheese manufacture, is Ultrafiltered to achieve protein content of anywhere between 25% to 85% actual protein. Some particularly deceptive companies have been known to use whey concentrates with as little as 50% protein in their nutritional products, but most of the Whey Protein used in the nutritional market is called WPC 80, or Whey Protein Concentrate 80% protein. Supplement companies LOVE to use this whey concentrate. It's among the cheapest dairy proteins, which puts more money in their pockets, and they can label it as "whey protein" and make a killing off of unsuspecting consumers. Interestingly enough, WPC 80 is not just popular

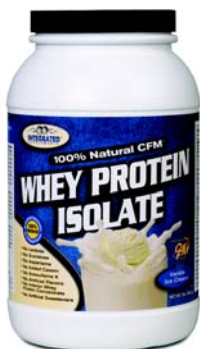


in nutritional supplements; it is also used for animal feed, pet foods, and as filler in many commercial baked goods. Often companies will go out of their way to tout that their products contain whey isolate, when in reality the product contains miniscule amounts of isolate and large amounts of concentrate. The problem is only compounded when companies hide significant amounts of low quality raw materials within so-called "proprietary blends" of ingredients. In truth, there are not a lot of reasons why a supplement company would use a high quality whey isolate instead of a low quality whey concentrate. The general supplement consumer simply is not discerning enough to tell the difference between the two. Hopefully this article will be a force in changing the way some of these supplement companies do business. Unfortunately, though, as it stands now, companies who formulate products with top quality in mind are the exception and not the rule. So, as supplement consumers what do we do to make sure we're not getting low quality whey? The take home rule is this: **Any protein supplement that lists whey concentrate anywhere in the ingredients should not be purchased. Period.**

Note: Some undenatured whey protein concentrates do exist which are carefully produced to maintain high amounts of immunoglobulin and lactoferrin, two potentially beneficial whey microfractions. Because these products are not used

for protein supplementation, but for immunomodulating effects mostly in a clinical setting, they are not the subject of this article. **These are NOT the whey concentrates used in typical protein supplements.**

WHEY CONCENTRATE'S DIRTY SECRETS



If you currently use one of the big tubs of whey on the market (the ones that are mostly comprised of whey concentrate) go look at the Supplement Facts box on the label. Scroll down until you see the cholesterol listed. How many milligrams are in a serving? **It is not at all uncommon for some of the cheaper whey products on the market to contain a whopping 25-55 (or more) mg of cholesterol in approximately a 30 gram serving.** So what you say? Well, compare that to a product that is all whey isolate. In the same size serving, a whey isolate product will deliver next to no cholesterol at all. A significant amount of cholesterol in any whey protein powder is indicative of the usage of whey concentrate, a crudely produced filler absolutely unfit for inclusion in health supplements. Many users of whey concentrate supplements unknowingly consume hundreds of milligrams of powdered cholesterol per day from products they believe to be health promoting.

In the past, some companies tried to pass off this rather inefficient processing as a benefit. Their reasoning was that many growth factors were contained in the fat and cholesterol portions of whey. But, as processing progressed, many of these microfractions of whey were able to be retained even as the fat and cholesterol were filtered out. In essence, it is now possible to derive a full spectrum of whey fractions through a whey isolate, which as noted earlier, will contain very little fat or cholesterol.

In defense of their low quality products, purveyors of whey protein concentrate containing products will be quick to point out that the amount of cholesterol in their proteins is less than that in commonly consumed foods like meats and eggs. This contention ignores what happens to cholesterol when it is delivered in powdered form. Cholesterol is highly prone to oxidation (or in layman's terms going rancid) when spray dried and left sitting on a shelf or in a warehouse for months, if not years at a time. **Oxidized cholesterol has significantly different biological effects than the non-oxidized cholesterol found in fresh, minimally cooked food;** in fact, there exists a pretty vocal constituent of researchers and health experts who warn against the dangers of this oxidized cholesterol. Take, for example, this quote from the article "The Oiling of America" by Mary Enig PhD and Sally Fallon of the Weston A. Price Foundation, in which they discuss the role oxidized cholesterol may have played in skewing the results of a particularly influential study done involving 70 male



prisoners, implicating dietary cholesterol with coronary heart disease. The authors state that, in fact, much of the research showing a correlation between dietary cholesterol intake and heart disease used oxidized cholesterol.

But the biggest flaw was that the subjects receiving cholesterol did so in the form of reconstituted powder—a totally artificial diet. Mattson’s discussion did not even address the possibility that the liquid formula diet he used might affect blood cholesterol differently than would a whole foods diet when, in fact, many other studies indicated that this is the case. The culprit, in fact, in liquid protein diets appears to be oxidized cholesterol, formed during the high-temperature drying process, which seems to initiate the buildup of plaque in the arteries.¹⁰ Powdered milk containing oxidized cholesterol is added to reduced fat milk—to give it body—which the American public has accepted as a healthier choice than whole milk. It was purified, oxidized cholesterol that Kritchevsky and others used in their experiments on vegetarian rabbits.⁹

How do you know if the cholesterol in your protein is oxidized? Any pasteurization and drying at high temperatures as well as exposure to oxygen will oxidize a portion of the cholesterol in a product (not to mention denature proteins.) It has also been proposed that cholesterol undergoes auto-oxidation simply under what would be considered simple storage conditions. Many companies, as previously mentioned, used the cheapest heat-treated whey available in their whey proteins. This fact alone makes me suspicious, and therefore, in my mind, the lower the cholesterol the better. The analysis of cholesterol oxidation products or COPs in protein powders and processed food is a relatively small, but growing field of study. There are many who assign COPs a major role in the initiation of arteriosclerosis and heart disease.

Lactose, or milk sugar, is another residual ingredient found in many cheaper whey protein concentrates. In fact only whey protein isolates are allowed to claim lactose free status. This is a big reason why whey isolates are so much easier to digest, as many people lack the enzyme needed to effectively digest lactose. Interestingly, even if you don’t consider yourself to be lactose intolerant, this disorder often goes unrecognized and can be the cause of many nagging health concerns. So, if you’ve ever experienced bloating or gas with a whey protein product, chances are it contained lower quality concentrates with substantial amounts of lactose.

So, aside from the detrimental effects of cholesterol and lactose, what about the protein itself? Is there a difference in





the protein quality among different types of protein? Absolutely. Whey concentrates often contain significant amounts of denatured proteins, and thus confer markedly reduced biological efficiency.

The whey portion of milk is relatively fragile (compared with casein.) As such many of the delicate whey fractions are altered during processing and pasteurization. When a protein is altered from its native structure as can happen by pasteurization, cooking, or pH conditions, it is said to be denatured. Not all protein denaturation is bad. Egg whites, for example, when cooked turn white, and inactivate the compound avidin which can reduce absorption of the vitamin biotin. But, whey protein is different. The many different proteins in whey need to be in their native state to confer the benefits of whey. Denatured whey proteins are not only a waste of money, but may also be toxic.¹⁹ **In animal studies metabolites of heat and chemically treated protein has been shown to damage kidney function.**²⁰

WHEY MICROFRACTIONS

Whey protein is not simply one protein, but a mixture of many. Individual whey proteins, known as microfractions, are responsible for whey's functional and biological benefits. If, as often happens in processing, these microfractions are altered or denatured, much of the health promoting value is lost. Some of the microfractions found in whey and their biological benefit are:

Beta-Lactoglobulin - Source of essential and branched chain amino acids.⁸

Alpha Lactalbumin - Primary protein found in human breast milk.
- Source of essential and branched chain amino acids.⁸

Glycomacropeptide - Can reduce appetite via stimulation of CCK
- Acts as a Prebiotic
- Immunomodulator²⁴

Bovine Serum Albumin – Contains abundant glutamylcysteine sequences, precursors to glutathione.²⁴

Immunoglobulins - Primary protein found in colostrums.
- Imparts immune system modulating benefits.⁸

Lactoperoxidase – Inhibits growth of bacteria.⁸

Lactoferrin – Antioxidant
- Antibacterial, antiviral, and antifungal
- Promotes growth of beneficial bacteria^{8,16}



Also, while we're on the subject, many ready-to-drink whey-based protein beverages on the market are subjected to such harsh processing as to make the protein nearly nutritionally worthless and potentially toxic.^{15,18,22,23} Retort and UHT (Ultra High Temperature) processes used in the manufacture of such drinks, has been shown to denature fragile whey proteins, and produce foreign protein structures.^{15,17,18,19,21,22}

Proper, low temperature, **whey isolate** processing produces a product with the lowest amount of denatured proteins, and the highest most balanced ratio of active microfractions.

WHEY ISOLATE

In general terms, **whey isolate** is any whey protein achieving 90%+ protein content. By definition, whey isolate will have more protein, less fat, less lactose, less cholesterol and less denatured proteins than the cheaper whey protein concentrates. Of course, the whey isolates will cost more than the cheaper concentrates, but the increase in price can definitely be worth it, if you know which *type* of isolate to choose. You see, there are two general types of processing which can produce a whey isolate. They are known as **ion exchange**, and **microfiltration**.



ION EXCHANGE

The **ion exchange** process of isolating whey protein was the first to yield protein contents of 90%+ while ridding the product of lactose, fat and cholesterol. Even today, after improved methods of whey extraction have been perfected, many unscrupulous supplement companies continue to tout Ion Exchange whey as a superior Whey Protein Isolate. The Ion exchange process involves separating the protein in whey from the undesirables on the basis of electrical charge. This method is able to extract the most protein, and the resultant product yields the highest protein percentage available. There is a big price to be paid for this seeming benefit, however. You see, a drastic shift in pH is required to drive the chemical reaction which isolates the protein. In so doing, the nature of the whey protein is compromised. The relatively allergenic Beta-Lacto Globulin fraction becomes predominant (instead of the more delicate Alpha-Lactalbumin) and many of the valuable microfractions of whey are lost or reduced including: glycomacropptides, immunoglobulins, lactoperoxidase and lactoferrin.²⁴ In essence, what is produced is a stripped down protein that doesn't deliver many of the benefits of filtered whey.



So, in the Ion-Exchange process, ratios and quantities of valuable protein fractions are altered to produce a protein which may impart less of a health promoting effect than that of a filtered whey.

MICROFILTRATION

As discussed earlier, when a filtered protein reaches 90% protein the resultant protein is known as a whey isolate. A well manufactured filtered whey isolate will provide undenatured, usable protein and retains a whole host of other microfractions in proper balance, giving whey functional benefits above and beyond just the amino acid profile.

The microfiltration process allows only soluble proteins to pass through the membrane, thus removing the highest level of lactose, fat, cholesterol, and denatured proteins (denatured proteins are relatively insoluble). A well made protein will then be spray dried at low temperatures to maintain the structural and biological integrity of the protein.

Low temperature Microfiltration using highly selective ceramic filters produces the highest quality whey isolate currently available. Not even all filtered whey isolates are the same. Many companies unfortunately use lower quality filters, not ceramic, and spray dry their protein at high temperatures, both of which potentially compromise the integrity of the finished product.

So many companies use the term “cross flow microfiltered” to describe both whey isolates and concentrates, this term has little to no real meaning anymore. Only one company has patented the original process by which the best isolate is produced. This company is Glanbia Nutritionals, and their trademarked process is called CFM[®] and their resultant whey isolate is called Provon[®]. Look for these ingredients and their trademarked logos on your protein supplements to be assured you’re getting the highest quality available.



So, to sum up the benefits of a properly produced filtered whey isolate:

- 1) Lower in cholesterol
- 2) Less allergenic
- 3) More immune boosting microfractions
- 4) More growth promoting microfractions



- 5) Less denatured proteins
- 6) Lactose free
- 7) Higher protein percentage
- 8) Better, cleaner taste than a concentrate
- 9) Mixes easily

The benefits of such a protein should now be overwhelmingly evident. There are still many, however, who are either ignorant of the health-promoting benefits of quality whey, or stands to gain financially from the sale of cheaper whey protein products. Many consumers are rightfully outraged when they learn the truth: that nutritional supplement companies often have no interest in producing health-promoting products. **When damaging lies of this sort are perpetrated against so many, for so long, under the guise of promoting health, it is not the charge of simple ignorance which must be levied against these companies, but that of absolute, calculated fraud.**

HYDROLYZED WHEY PROTEIN

A hydrolyzed protein is one in which the longer chains of amino acids (whole proteins) are broken up enzymatically into to smaller peptides (pieces of proteins.) This process can be performed to different degrees; that is, vastly different size peptides can be produced having different functional characteristics. Because of this, the consumer has no way of knowing exactly what sort of peptides (and of what size) may be present in their hydrolyzed whey.

You may also hear hydrolyzed whey referred to as pre-digested or partially pre-digested whey protein, because, in essence, the hydrolyzation process breaks down peptides enzymatically in a manner similar to digestion. This makes peptides and free amino acids from hydrolyzed whey very easily to assimilate, but this is not necessarily as good as it may seem.



The purveyors of hydrolyzed whey usually focus on two functional properties of hydrolyzed whey:

1. Reduced allergenicity
2. Faster absorption

The first of these is a legitimate benefit for individuals suffering from an allergy to certain whey proteins; the second is probably only an illusory benefit, as even intact whey is absorbed very rapidly in its own right. Most of the marketing of hydrolyzed whey is based around a single study which showed improved nitrogen retention in rats from hydrolyzed whey versus intact whey protein.²⁵



In the light of these supposed benefits, keep in mind that hydrolyzing whey destroys the protein structures and much of the functional benefit is lost. Whey's functional benefits have been shown to be related to the intact structure of whey microfractions, not just its amino acid profile.^{3, 12}

PROTEIN DENATURATION AND EXCITOTOXICITY

As stated earlier, the degree of hydrolysis of a protein dictates how many bonds of the protein have been enzymatically “broken.” Therefore, the greater the degree of hydrolysis, the smaller the protein fragments in a product become. The concept of hydrolyzing proteins arose to reduce the allergenicity of compounds such as dairy or soy. In fact you will often see hydrolyzed proteins used in baby formulas and enteric feeding formulas for sensitive or allergic individuals.

Free (non-protein bound) amino acids are not commonly found in unprocessed food, but may be liberated from native protein structures by certain types of processing, such as hydrolyzation. Somewhat surprisingly, free amino acids can have strikingly different metabolic effects in the body than those same amino acids consumed in whole food proteins. Considering that many amino acids act as precursors to, or are themselves, biogenic amines (brain chemicals), the effect of dietary free amino acids on the brain and nervous system can be significant. For example, Glutamic Acid (aka Glutamate), Aspartic Acid, and Cysteine, when in their free state, may act as excitotoxins. According Board-Certified Neurosurgeon Russell Blaylock M.D.:



*[An] excitotoxin [is] a substance added to foods and beverages that literally stimulates neurons to death, causing brain damage of varying degrees. [They] can be found in such ingredients as monosodium glutamate, aspartame (NutraSweet), cysteine, **hydrolyzed protein** and aspartic acid.¹³*

So, it's important to remember that undenatured, unaltered proteins contain amino acids as part of the native protein structure which the body can metabolize efficiently, whereas altered, denatured proteins and free amino acids can often have toxic effects, and in the case of excitotoxicity, amino acids can literally excite neurons to death. Excitotoxicity is a major field of study with researchers looking to unravel the mysteries of such neurological diseases as Alzheimer's, ALS (Lou Gehrig's Disease), Multiple Sclerosis among others. Keeping the above definition in mind, realize that whey contains abundant glutamic acid, aspartic acid, and cysteine. To hydrolyze such a protein and



potentially free these amino acids from the native protein structure is flirting with neurological disaster.

It's important to note that the research on the excitotoxic nature of hydrolyzed proteins is far from complete, but some evidence suggests there is serious reason for concern. In dairy-based infant formulas designed to reduce allergenic response to whey, for example, hydrolyzed whey proteins have been shown to contain significant amounts of potentially excitotoxic free amino acids Aspartic Acid and Glutamic Acid.¹⁴

Note: One purveyor of "natural" protein powder goes so far as to claim that his protein contains no MSG and that the glutamic acid present in his product is "inherent to whey protein" while using hydrolyzed whey in the formula. Putting aside the possibility that this individual is being blatantly misleading, he apparently is unaware that while MSG (monosodium glutamate) may not be *added* to the product, similarly excitotoxic free Glutamic Acid (or glutamate) is produced in the protein hydrolyzation process. This same individual also claims that there is not enough difference between a whey concentrate and isolate to justify the increased price of an isolate. It's just that sort of ignorance that this article is intended to combat.

Even if hydrolyzed whey were not toxic, the beneficial immunomodulating microfractions of whey are compromised with any significant hydrolyzation of the protein,¹² thus sacrificing one of whey's premiere benefits. In other words, the benefit of easier absorption of hydrolyzed whey comes at the expense of the glutathione-immune boosting properties of an intact whey protein. The vast majority of research literature on whey centers around the effects of various whey microfractions on immune function, and resistance to disease. Any practice which lessens these positive effects of whey shouldn't be embraced unquestioningly, especially considering the fact that intact whey is absorbed very rapidly in its own right.



The bottom line is that there are just too many unanswered questions when it comes to hydrolyzed whey, and too little research demonstrating any real benefit at all in healthy individuals. With hydrolyzed whey, you sacrifice much, if not all of the immune boosting effect that makes whey so valuable for growth and repair of the body's tissues, and depending upon the degree of hydrolysis, you potentially run the risk of exposing yourself to excitotoxic amino acids that could be produced during the hydrolyzation process.



CONCLUSION

It seems strange that as the research into whey's remarkable health-giving benefits continues to grow, the quality of the typical whey supplement continues to become worse and worse due mostly to demand for lower prices and higher profits. Most consumers, unless they know what to look for, can completely forget about receiving any health benefits from their low quality whey supplement, and should be more concerned with the potential **harm** such a supplement could be doing them. The solution, however, is a simple one. Chose only the highest quality ceramic filtered whey isolate and reap the full gamut of benefits which only quality whey can offer.

Like this one, the articles in this series will aim to give you, the supplement consumer, the information you need to make intelligent choices in the jungle that is the nutritional supplement industry. Integrated Supplements is committed not only to producing the highest quality nutritional supplements, but to providing the most reliable and honest consumer education in the industry. Integrated Supplements truly is: nutrition for your full human potential.

SPECIFIC RECOMMENDATION:

Integrated Supplements 100% Natural CFM Whey Protein Isolate uses only Provon whey isolate produced via the CFM method, the highest quality available. Absolutely no inferior proteins are used.





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