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REPORT

Unlocking the Secrets to Health & Fitness

WHEY PROTEIN

Protein is the building block of life. Essential to a balanced diet and strong muscles, both serious athletes and serious life extensionists use protein to enhance their health and performance.

Because so much evidence supports the benefits of whey as a fitness, strength and health enhancer, there should be every effort made to find the best. And it is whey protein that is increasingly coming to the public's attention as one of the most comprehensive forms of protein available.

In fact, in many aspects, whey protein, which is often mixed into a delicious shake, is even superior to soy.

Whey protein is a potent ally to the general immune system. The protein in whey has been shown to dramatically raise glutathione levels, which is an essential water-soluble antioxidant that protects cells and serves to neutralize toxins such as peroxides, heavy metals, carcinogens, and many others. In animal studies, whey protein concentrate consistently raised glutathione levels beyond those of any other protein studied, including soy (Bounous G. and Gold P., *Clin. Invest. Med.* 1991).

In fact, glutathione is so necessary to a healthy immune system that it appears immunity itself can be modulated by glutathione levels (Rosanne K., Fidelus and Min Fu Tsan. *Cellular Immunology*, 1986). Sufferers of diseases such as AIDS, atherosclerosis, Alzheimer's and Parkinson's often exhibit reduced glutathione levels; however, a small pilot study of HIV-positive men who ate whey protein found dramatic increases in glutathione levels, with two out of the three men reaching an ideal weight (Bounous G., Baruchel S., Faiutz J., Gold P., *Clin. Invest. Med.* 1992).

In its ability to enhance the immune system, whey protein also fights infections. Animals fed whey protein showed increased response from both the humoral and cellular immune systems to a variety of challenges, such as salmonella and streptococcus pneumonia (Bounous G., Konshavn P., Gold P. *Clin. Invest. Med.* 1988). Again, this effect was not seen with other proteins.

Perhaps the most exciting potential of whey protein is its ability to fight cancer. In vitro research has shown that the growth of breast cancer cells is strongly inhibited when exposed to low concentrations of whey protein (Baruchel S. and Vaiu G., *Anti Cancer Research* 1996).

Another recent clinical study showed a regression in some cancerous tumors when patients were administered 30 grams per day of whey protein powder (Kennedy R.S., Konok G.P., Bounous G., Baruchel S., Lee T.D., *Anti Cancer Research* 1995). Likewise, animals fed whey protein before being subjected to dimethylhydrazine (DMH), a strong cancer-causing agent, mounted a much more vigorous immune response than animals fed any other type of protein. More importantly, any resulting tumors were smaller and far fewer in number in the animals fed whey protein (Bounous G., *Clin. Invest. Med.* 1988).

This study was confirmed by additional research showing that rats subjected to DMH and fed whey protein showed fewer tumors and a reduced pooled area of tumors. The researchers concluded that whey protein offered "considerable protection to the host," compared with other proteins, including soy (McIntosh G.H., et al. *Journal of Nutrition* 1995).

It is interesting to note that the concentration of glutathione in tumor cells is often much higher than in surrounding normal cells, meaning that cancer cells will respond differently to nutrients and drugs that alter glutathione status. This discrepancy in glutathione status between normal cells and cancer cells also makes it harder to kill cancer cells with chemotherapy. Because the surrounding cells have lower levels of glutathione to begin with, anything that further suppresses glutathione puts normal healthy cells in danger long before cancer cells are affected.

Instead, cancer patients need a compound that can target cancer cells and deplete only their glutathione. Whey protein appears to be just such a compound. When introduced in studies, cancer cells responded to whey protein by losing glutathione, while normal cells actually increased in glutathione and cellular growth (Baruchel S. and Vaiu G., *Anti Cancer Research* 1996). No other protein reported the same effect. Even the mechanism by which whey protein acts is not fully understood. It appears that whey protein interferes with the cancer cells' ability to regulate glutathione.

Whey protein is effective because of its abnormally high biological value, which is a measure of the nitrogen retained for growth or maintenance, expressed as a percentage of the nitrogen absorbed (Renner E., 1983). Whey, with the highest biological value of any protein, is absorbed, utilized and retained in the body better than other proteins. This has caused athletes to make whey protein concentrate a best-seller. In fact, one recent pilot study found whey protein isolate corrected the immune suppression often seen in athletes suffering from over-training syndrome (C.M. Colker, D. Kalman, W.D. Brink, and L.G. Maharam. *Med. Sci. in Sports in Exercise* 1998)

And proteins with a high biological value are more tissue-sparing, making whey protein concentrate a good choice for people suffering from wasting diseases such as AIDS, cancer, and/or aging-related muscle losses.

In addition, some animal research suggests whey can prevent atherogenesis by preventing LDL cholesterol from oxidizing (M.Kajikawa et al. *Biochemica et Biophysica Acta* 1994). A complementary study found that whey may reduce LDL levels as well as triglycerides (Zhang X. and Beynen A.C. *Brit. J. of Nutri.* 1993). Whey also appears to have a direct in vitro effect on bone cell growth. It was found to stimulate protein synthesis, DNA content, and increased hydroxyproline contents of bone cells (Takada Y., Aoe S., Kumegawa M., *Biochemical Research Communications* 1996).

Coupled with the observation that animals fed whey protein powder had stronger bones, researchers concluded, "These findings suggest that whey protein contains active components that can activate osteoblast cell proliferation and differentiation. Also these active components can probably permeate or be absorbed by the intestines. We propose the possibility that the active component in the whey protein plays an important role in bone formation by activating osteoblasts."

Finally, whey is a highly complex protein that is made up of many sub-fractions, including beta-lactoglobulin, immuno-globulins, bovine serum albumin (BSA), lactoperoxidases, lysozyme, lactoferrin and others. Each of these subfractions has its own unique biological properties and benefits.

Even a brief discussion of lactoferrin, for instance, illustrates the many positive effects of this one sub-fraction. Lactoferrin is found in tiny amounts in the human body, yet appears to be a first-line immune system defense. It binds to iron so strongly that it inhibits the growth of iron-dependent bacteria (Oram, J., Reiter, B. *Biochem. Biophys. Acta*, 1968), and can block the growth of many pathogenic bacteria and yeast (Bellamy W. et al., *J. Appl. Bacteriol.* 1992). Its antimicrobial action may even improve antibiotics (Ellison, R.T., *Infect. and Immun.* 1988).

In the digestive tract, lactoferrin may help by stimulating intestinal cell growth (Hagiwara, T., et al., *Biosci. Biotech. Biochem.* 1995), and enhancing the growth of "good" intestinal microflora (Petschow, B., et al., *Pediat. Res.* 1991). A strong antioxidant, lactoferrin has positive immunomodulatory effects and scavenges free iron, which prevents uncontrolled iron-based free radical reactions (Eugene. P. et al., 1993) and protects certain cells from lipid peroxidation (Gutteridge et al., 1981).

It would be wise to incorporate whey protein into a supplement program just to receive the benefits of lactoferrin. But when these positive influences are combined with whey protein's many other strengths, including helping the immune system and fighting cancer, it should become a valuable element of any program.

Third Generation Whey Protein Supplement

The science of whey protein manufacturing and processing has been growing by leaps and bounds in the past several years. Whey has gone from a low-grade waste product that dairy farmers simply dispose of to a high-grade protein with many health-improving and disease-fighting abilities.

The Life Extension Foundation has kept up with these improvements in technology and has incorporated them into a new Enhanced Life Extension Protein.

Over the past few decades, whey protein powders have evolved through several generations. These early whey protein products contained as little as 30 to 40 percent 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.

Most products sold today would be considered second-generation whey protein supplements, including the former Life Extension Protein formula. Most second-generation formulas are a mix of whey concentrates and whey isolates. Today, however, whey concentrates contain as much as 70 to 80 percent protein, with small amounts of lactose and minimal fats, and generally contain as much as 90 to 96 percent undenatured proteins. This is important, because research has found that only whey proteins in their natural, undenatured state have biological activity.

Processing whey protein to remove the lactose and fats without losing the biological activity takes special care by the manufacturer. The protein must be processed under low temperature and/or low acid conditions so as not to "denature" the protein, which is essential to whey's anti-cancer and immune-stimulating activity.

Most second-generation whey products are mixed with a whey isolate to bring up the protein content per serving. Whey isolates contain more than 90 percent protein content with minimal lactose and no fat. Most isolates sold are made by taking a concentrate and running it through what is called an "ion exchange" column to get an "ion exchange whey isolate." It may sound impressive, but there are serious drawbacks to this method. Whey protein is a complex protein. It is made up of many sub-fraction peptides that have their own unique effects on health. Some of these sub-fractions are only found in very small amounts, but have amazing disease-fighting and health-promoting abilities.

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 sub-fractions are lost or greatly reduced. This makes ion exchange isolates a poor choice for a true third generation whey protein supplement (though most companies still use it as their isolate source).

With the amazing array of new manufacturing and processing techniques used to make whey isolates, manufacturers can now make what appears to be optimal whey isolates for health and disease prevention.

As you would expect, these high-tech whey isolates are more than twice the price per pound than the most expensive whey concentrates, which is why very few companies will sell these isolates alone but will mix them with large quantities of the much less-expensive concentrates.

Another new development in the processing of whey proteins is the ability to isolate out certain bioactive subfractions (peptides), such as lactoferrin or glycomacropeptide, from whey proteins. This was not possible to do on a large scale just a few years ago, but can be done today with modern filtering technique employed by a small number of companies.

This allows for a truly tailored protein supplement, and the ability to add back in certain sub-fractions in amounts that can't be found in nature. For example, the sub-fraction lactoferrin is nonexistent in many whey products due to the type of processing employed. The best whey products will contain less than 1 percent lactoferrin, and more like 0.5 percent of this rare but important micro fraction.

The new Enhanced Life Extension Protein supplement employs only third-generation technologies. It contains 100 percent whey isolates with added lactoferrin. The whey isolates are made using a process known as cross flow microfiltration (CFM), which produces an isolate that is greater than 90 percent protein, is greater than 99 percent undenatured, and retains all important sub-fractions in their natural ratios with no fat or lactose.

CFM is a natural non-chemical process that 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.

In addition, the Enhanced Life Extension protein contains added Bioferrin, which is a greater than 95 percent pure bioactive form of lactoferrin. Recent research has shown lactoferrin is a strong antioxidant, has antimicrobial and antiviral properties, and might be a powerful immune stimulant.

Because of the CFM process and the added Bioferrin, the Enhanced Life Extension Protein has up to 300 percent more lactoferrin than other whey protein supplements on the market, and is perhaps the only whey protein supplement with added lactoferrin.

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