

The Hidden Powers of Whey Protein Concentrate

Whey protein has been getting a considerable amount of press lately as a supplement for building muscle in the off-season and keeping muscle while dieting, and for good reason. It is simply the highest quality protein you can use for gaining muscle, but the benefits of whey protein don't stop there...

Building muscle is only a small part of this product's unique abilities. As a bodybuilder, you are mainly concerned with building bigger muscles, but maintaining and/or improving your health must also be one of your major goals. Hey, anything that improves your overall health is always a steppingstone to building more muscle, and that's the bottom line. Think about it. If you are sick less often, more resistant to certain diseases, and recuperate faster because you are in top physical health, won't

Will Brink

that lead to improvements in muscular gains in the long run? Of course it will! Besides the health-improving aspects of whey protein concentrate, its effect on muscle-wasting is also an important consideration for any persons (i.e. bodybuilders) concerned with maintaining hard-earned muscle tissue. If you are interested in obtaining more information about the muscle-building properties of whey protein concentrates, and how much whey protein you should take, see the article "Priming the Growth Environment" in the April 1995 issue of *MuscleMag* (154). (You do save your back issues of *MuscleMag*, don't you?)

Besides the publicity whey protein has been getting in the bodybuilding mags, a great deal of research has been taking place into the value of micro nutrients and other compounds for the purpose of preventing disease and extending human life. Recently, however, researchers have been taking a closer look at some of the macro nutrients (most notably certain types of proteins) and their ability to improve immunity, prevent disease, and possibly extend life. It has long been known that different types of proteins can have profound effects on the metabolism of humans and animals. Researchers have been turning their attention to one protein in particular - called whey protein concentrate (WPC) - which appears to have unique properties to improve health and stave off the ravages of aging. Here

is a small example of the powers of this extraordinary protein.

WPC RAISES GLUTATHIONE

Glutathione is arguably the most important water-soluble anti-oxidant found in the body. It is a naturally occurring sulfur amino-acid tripeptide (composed of L-cysteine, L-glutamic acid and glycine). An age-related decline in glutathione production is correlated with many diseases connected to free-radical damage of organs and various systems of the body. For example, the brains of people with Alzheimer's disease (a cause of accelerated aging) contain lower concentrations of glutathione and increased levels of lipid peroxidation, compared to nondemented elderly (1), but can have adequate levels of vitamin E (2). In the brain tissue of people with Parkinson's disease the severity of cellular deficit can be predicted accurately by the concentration of glutathione, while the levels of ascorbate in the brain were virtually no different from those of a control group (3). These are only several of many examples showing the importance of glutathione in diseases related to free-radical oxidative damage. In short, it appears a cell's ability to survive an oxidative assault is reflective of its ability to regenerate its stores of glutathione (4).

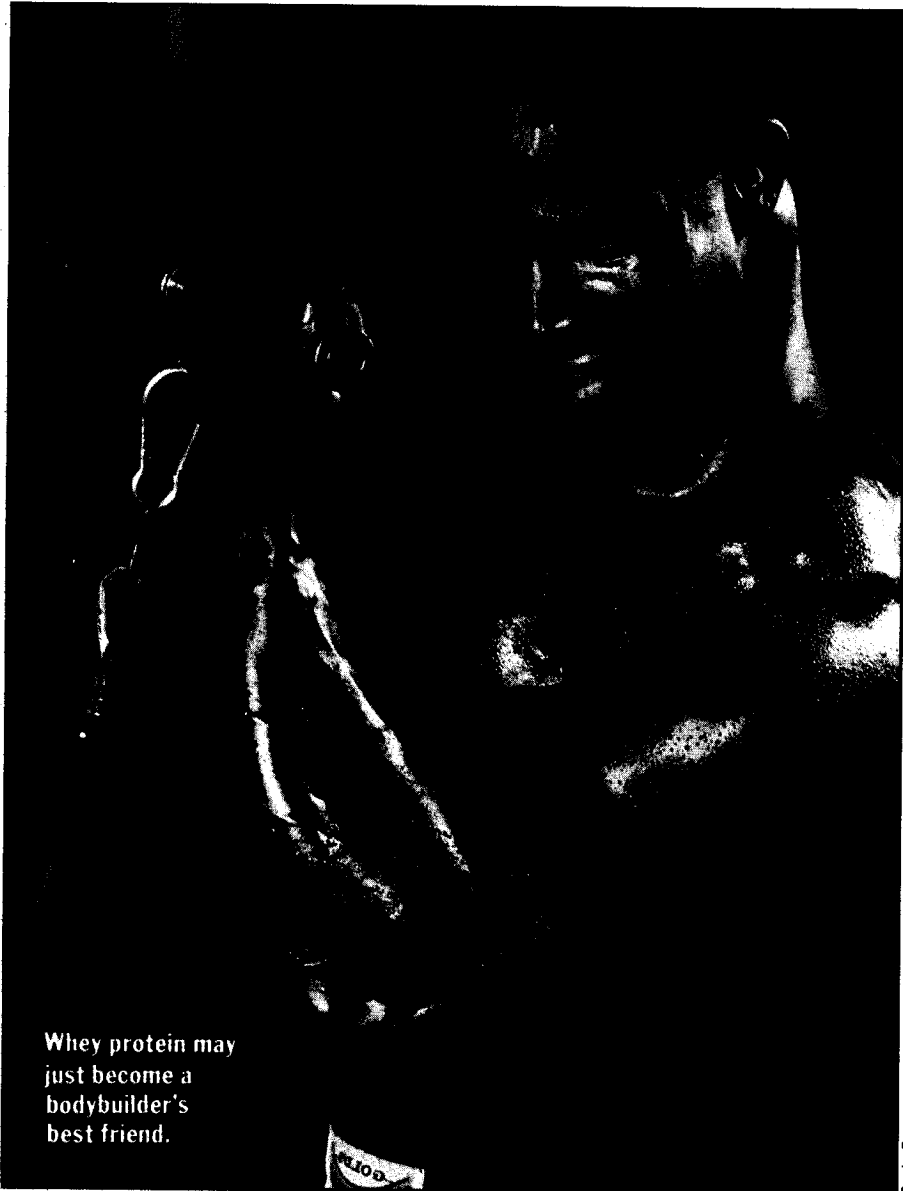
WPC was compared to all known commercially available purified proteins (e.g. casein, spirulina, soy, wheat, corn, scenedesmus, egg albumin, fish and beef) for their ability to raise glutathione levels to normal values. Mice fed these proteins at 20g protein/100g of feed did not show elevated levels of glutathione above normal, but when WPC was added to their diet, glutathione levels rose above normal values. The mice that were fed pure WPC (20g/100g feed) showed consistent and sustained increases in the levels of glutathione (5) as measured by the concentrations of glutathione found in their spleen, liver and heart. Also, mice fed the WPC diet lived an average of five to six months longer (corresponding to an increase from 55 years to 80 years of age for humans) than the mice fed any other type of protein (6). Interestingly, when sulfur-containing amino acids (which are substrates for glutathione synthetase) were added to the non-WPC protein diets, there was still no rise in glutathione above normal level.

These findings have wide-ranging implications for people interested in life extension and the prevention and possible control of many degenerative diseases. Dr. G. Bounous and colleagues have done the bulk of this research. Dr. Bounous states, "This discovery could provide a method for efficiently increasing cellular glutathione levels for any purpose for which elevated glutathione levels are desired, such as for drug detoxification, arteriosclerosis, Alzheimer's and Parkinson's diseases, cellular protection against oxygen and its metabolites such as peroxides, free radicals or foreign compounds, carcinogens, irradi-

ation, immunodeficiency states, etc." (*Clin Invest Med* Vol. 14 1991.)

There appear to be several important factors that lead WPC to have these unique properties. First and foremost the WPC must be at least 90 percent or more undenatured. When denatured WPC is used, there is no rise in glutathione above normal values (7). The normally high temperatures

to its undenatured state the WPC must have a high percentage of glutamylcysteine groups which are located primarily in the serum albumin, B-lactoglobulin, and immunoglobulin fraction of the protein. It is very interesting to note that intact glutamylcysteine groups with di-sulphide links are extremely rare in edible animal and plant proteins (Bounous, Gold, 1991). In



Whey protein may just become a bodybuilder's best friend.

that are used during the processing of whey protein and other proteins destroy the native conformation (the unique shape of the molecule) by destroying di-sulphide bonds of the protein. Di-sulphide bonds, among other intramolecular forces, are what give the protein its native three-dimensional shape that is necessary for its biological activity. Only WPC that is processed using low-temperature methods such as membrane filtration and ion-exchange filtration appear to survive the process undenatured. Unfortunately most WPC is produced through less expensive higher-temperature methods. The amino-acid profile will "spec" out the same (i.e. will have the same amino-acid sequence), but its biological activity is lost. In addition

Alq Gurley curls his way to big guns.

fact, a computer literature search revealed that they are limited only to whey proteins (which have substantial amounts of glu-cys groups) and the ovomucoid fraction of egg whites (8), but only minute amounts can be found in that fraction of the egg protein. It has been theorized that the undenatured (native) conformation of the WPC protects the glutamylcysteine groups and their di-sulphide links from the digestive enzymes of the stomach, and thus the peptides are able to pass through the intestinal mucosa into the bloodstream intact. This theory would explain the inability of denatured WPC to raise glutathione levels.

The incredible Mike Quinn.



World Gym NY, NY

WPC INCREASES IMMUNITY AND FIGHTS CANCER

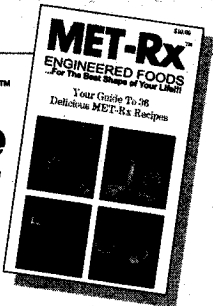
The ability of different proteins to enhance immunity against dimethylhydrazine (DMH)-induced tumors was investigated. DMH is known to be a powerful carcinogen. Again WPC demonstrated its ability to fight degenerative diseases. After 24 weeks of DMH treatment the size and incidence of tumors were substantially less in mice fed WPC than in mice fed all other proteins (9). WPC was also found to be highly effective against microbial infections such as salmonella and other microbial challenges (10). WPC appears to be effective at increasing both humoral and cellular

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Hard-training athletes need to make nutrition a priority. – Henderson Thorne.

immune responses. Mice given an antigenic challenge (injections of sheep red-blood cells) showed an immune response five times greater than normal when WPC was the source of protein (11) as opposed to any other type of protein (soy, beef, casein, etc.). Interestingly enough, every time WPC was mixed with the other proteins in the diets of mice, the immune response was improved above normal, but never as high as when WPC was the only source of protein. It is particularly important to note that the higher immune response to injections of sheep red-blood cells in WPC-fed mice represents a true enhancement of the immune response produced by dietary protein type, and not a shift in the timing of the peak response (Bounous, Kongshavn, Gold, 1988). The ability of WPC to improve



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Robert Kennedy

immunity against a wide range of challenges is believed to be a result of the rise in glutathione, but other mechanisms are still being investigated.

WPC RAISES IGF-1

Insulin-like growth factor (IGF-1) is the growth factor that is released during the destruction of growth hormone (GH) in the liver and is what actually causes the growth associated with GH (12). Studies have shown IGF-1 rises in direct proportion to the quality and quantity of protein in the diet (13). The quality of a protein is most

One of the best backs in the biz belongs to Aaron Baker.

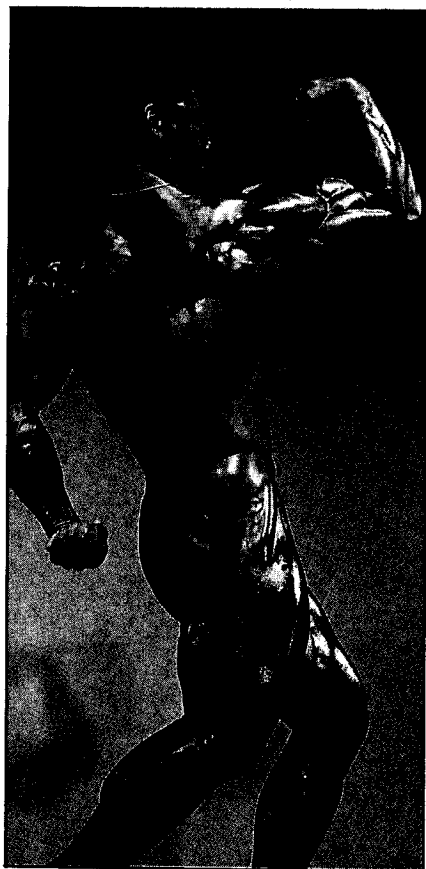
accurately assessed using the biological value (BV) rating for proteins, rather than the outdated protein efficiency ratio (P.E.R.). WPC has the highest known BV rating of any protein (14). Undenatured WPC has a BV rating of 104. Hydrolyzing the WPC, making di-, tri-, and oligopeptides (short and longer chains of amino acids) further increases its BV to 149 to 159, in contrast to egg white, which has a BV of only 88. Several recent studies have shown

intact peptides to be far superior for IGF stimulation and nitrogen retention to intact (whole) proteins or free amino acids (Leibovitz 1994). WPC also has the highest known percentage of branch-chain amino acids (BCAA) of any protein. Those are the amino acids that are primarily used (oxidized) during exercise and are anti-catabolic in muscle-wasting states.

The importance of this information should be self-evident to anyone concerned about muscle-wasting (athletes, AIDS patients, cancer patients, etc.) and people concerned with reduced GH levels that occur with age. The exact connections among GH, IGF, WPC, and aging are unclear at best, but a certain amount of healthy speculation seems warranted considering these findings. Obviously further research is needed for any definitive answers.

CONCLUSION

Believe it or not, there are other positive effects WPC has that are not covered here for lack of space. The type of processing and the quality of the starting material - there are different grades of whey protein - determine the amount of denaturation and the percent of glutamylcysteine groups of the WPC. This is an essential factor for the effectiveness of WPC. When searching for a commercial product, take into consideration this important information regarding whey protein concentrates. Improved health, performance and resistance to disease could be the result.



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