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REPORT

Fighting Cancer With Whey

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Recent studies on whey demonstrate it's an even better protein supplement than previously thought.

Although whey protein's health benefits have only recently been elucidated, the use of whey protein for medicinal purposes has been prescribed since the time of Hippocrates. In fact, there are two ancient proverbs from the Italian city of Florence that say, "If you want to live a healthy and active life, drink whey," and, "If everyone were raised on whey, doctors would be bankrupt."

In previous issues, we've chronicled the extensive research showing the many potential health benefits of whey protein concentrate. The majority of that research was done in the 1980s and early 1990s, and was extremely persuasive (see sidebar story). Recently, scientists have continued their research on whey proteins with even more impressive results. What follows is some of the more current, interesting and useful research on whey proteins.

WHEY AND CANCER

Additional studies have been done on animals regarding cancer-causing chemicals to see what effects whey protein concentrate would have on cancer prevention or treatment. Scientists fed rats various proteins and then subjected them to the powerful carcinogen dimethylhydrazine.

As with the previous research, the rats fed whey protein concentrate showed fewer tumors and a reduced pooled area of tumors (tumor mass index). The researchers found whey protein offered "considerable protection to the host" over that of other proteins, including soy.
(McIntosh G.H., et al., Journal of Nutrition, 1995)

Even more exciting, in vivo research on cancer and whey showed whey protein concentrate inhibited the growth of breast cancer cells at low concentrations (Baruchel S. and Vaiu G., Anti Cancer Research, 1996). Finally, and most importantly, a fairly recent clinical study with cancer patients showed a regression in some patient's tumors when fed whey protein concentrate at 30 grams per day.
(Kennedy R.S., Konok G.P., Bounous G., Baruchel S., Lee T.D., Anti Cancer Research, 1995)

WHEY AND GLUTATHIONE

This new research using whey protein concentrate led researchers to an amazing discovery regarding the relationship between cancerous cells, glutathione (GSH) and whey protein concentrate. It was found that whey protein concentrate selectively depletes cancer cells of their glutathione, thus making them more susceptible to cancer treatments such as radiation and chemotherapy.

It has been found that cancer cells and normal cells will respond differently to nutrients and drugs that affect glutathione status. What is most interesting to note is the fact that the concentration of glutathione in tumor cells is higher than that of the normal cells that surround it. This difference in glutathione status between normal cells and cancer cells is believed to be an important factor in cancer cells' resistance to chemotherapy.

As the researchers put it, "Tumor cell GSH concentration may be among the determinants of the cytotoxicity [poisonous to cells] of many chemotherapeutic agents and of radiation, and an increase in GSH concentration appears to be at least one of the mechanisms of acquired drug resistance to chemotherapy."

They further state, "It is well-known that rapid GSH synthesis in tumor cells is associated with high rates of cellular proliferation. Depletion of tumor GSH in vivo decreases the rate of cellular proliferation and inhibits cancer growth."

The problem is, it's difficult to reduce glutathione sufficiently in tumor cells without placing healthy tissue at risk and putting the cancer patient in a worse condition. What is needed is a compound that can selectively deplete the cancer cells of their glutathione, while increasing, or at least maintaining, the levels of glutathione in healthy cells.

This is exactly what whey protein appears to do. In this new research it was found that cancer cells subjected to whey proteins were depleted of their glutathione, and their growth was inhibited, while normal cells had an increase in GSH and increased cellular growth.

These effects were not seen with other proteins. Not surprisingly, the researchers concluded, "Selective depletion of tumor GSH may in fact render cancer cells more vulnerable to the action of chemotherapy and eventually protect normal tissue against the deleterious effects of chemotherapy." The exact mechanism by which whey protein achieves this is not fully understood, but it appears that it interferes with the normal feedback mechanism and regulation of glutathione in cancer cells.

It is known that glutathione production is negatively inhibited by its own synthesis. Being that baseline glutathione levels in cancer cells are higher than that of normal cells, it is probably easier to reach the level of negative-feedback inhibition in the cancer cells' glutathione levels than in the normal cells' glutathione levels.

Whey and LDL Cholesterol

The positive health benefits of whey protein concentrate does not end with its effects on immunity and cancer prevention and treatment. Whey protein concentrate also was found to be a potent inhibitor of oxidized low density lipoprotein cholesterol. Current research suggests that the conversion of LDL to oxidized LDL is the trigger that leads to atherogenesis...the formation of the plaque and lesions associated with atherosclerosis.

Therefore, any substance that prevents the oxidation of LDL is thought to be anti-atherogenic. Though animal-based proteins have traditionally been implicated as being pro-atherogenic, whey proteins appear to be an exception to the rule. whey protein is made up of several minor and major fractions, such as beta-lactoglobulin, alpha-lactalbumin, albumin, lactoferrin and immunoglobulin. It was discovered that the minor constituent responsible for the ability of whey protein concentrate to prevent the oxidation of LDL appears to be the lactoferrin fraction of the protein. (M. Kajikawa et al. Biochemica et Biophysica Acta, 1994)

LACTOFERRIN IN WHEY

When the lactoferrin was removed from the protein, the ability of the whey-protein concentrate to prevent LDL oxidation was greatly reduced, leading the researchers to speculate, "Our results suggest that LF (lactoferrin) is the main factor responsible for the inhibitory effect of whey protein (on LDL) and it may function synergistically together with other factors in the whey protein, for example, alpha-lactalbumin."

Another study using rats examined the effects of whey protein concentrate and casein on cholesterol and the risk factors of heart disease. Though casein (another milk-based protein commonly used in research) is known to raise cholesterol in humans and animals, whey protein has the opposite effect, leading the researchers to note, "At the high dietary protein level [300 gram per kilogram of feed] , whey protein significantly lowered plasma and liver cholesterol and also plasma triacylglycerols." *(Zhang X. and Beynen A.C. Brit. J. of Nutri., 1993)*

The cholesterol-lowering effects of whey protein concentrate in this study also was associated with a reduction in LDL cholesterol. Most interesting was the fact that this effect on cholesterol was not seen when the animals were fed amino acid mixtures that simulated whey protein, so it is clear that there are properties within the whey that have these effects beyond that of its amino acid profile.

WHEY AND BONE GROWTH

Finally, whey protein appears to play a direct role in bone growth. Researchers found that rats fed whey protein concentrate showed increased bone strength and bone protein such as collagen. This discovery led researches to test whether or not whey protein directly stimulated osteoblast (bone cell) growth in vitro.

Whey protein was found to stimulate, dose dependently, total protein synthesis, DNA content, and increased hydroxyproline contents of bone cells.
(Takada Y., Aoe S., Kumegawa M., Biochemical Research Communications, 1996)

It should be noted that not all whey protein concentrates are created equal. Processing whey protein to remove the lactose and fats without losing its biological activity takes special care by the manufacturer. The protein must be processed under low temperature and low acid conditions so as not to "denature" the protein. Maintaining the natural state of the protein is essential to its biological activity.

These research findings, combined with the previous decade of study on whey protein, should convince anyone that whey protein concentrate is truly the life-extension protein.

HIGHER GLUTATHIONE LEVELS AND WHEY:

A decade-and-a-half of findings on the benefits of whey protein are far-reaching. Previous studies include the following:

- Whey protein concentrate dramatically raises glutathione levels. Glutathione is an essential water-soluble antioxidant in the body that protects cells and serves as a primary detoxifier of harmful compounds such as peroxides, heavy metals, carcinogens and other toxins.
- Glutathione also is intimately tied to immunity, and reduced glutathione levels have been associated with disease such as AIDS, atherosclerosis, Alzheimer's disease and Parkinson's disease, to name only a few. In fact, glutathione levels appear to be one way of modulating immunity.
  (Rosanne K., Fidelus and Min Fu Tsan. Cellular Immunology, 1986)

- Whey protein concentrate was found to consistently raise this extremely important immune stimulating antioxidant beyond that of any protein studied (including soy) to higher than normal levels in multiple animal studies. *(Bounous G. and Gold P., Clin. Invest. Med. 1991)*

  A small pilot study with HIV-positive men who were fed whey protein concentrate found dramatic increases in glutathione levels of all the study participants, with two out of three men reaching their ideal body weight. *(Bounous G., Baruchel S., Faiutz J., Gold P., Clin. Invest. Med. 1992)*

  In fact, there have been several U.S. and international patents granted for the treatment of AIDS and improving immunity with whey protein concentrates.

- Whey protein improves immune function and fights infections. Animals fed whey protein concentrate consistently showed dramatic enhancement of both the humoral and cellular immune response to a variety of immune challenges, such as salmonella, streptococcus pneumonia (Bounous G., Konshavn P., Gold P., Clin. Invest. Med. 1988) and extreme cancer-causing chemicals. This effect on immunity was not seen with other proteins.
- Whey protein concentrate fights cancer. Animals fed whey protein

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