

# Whey Protein: Nutritional Powerhouse

Many consumers turn to nutrition supplements to enhance their diets and optimize their health. Health-conscious consumers include whey protein in their diets for this purpose. This white paper summarizes some of the known health benefits of whey protein and equips health professionals to:

- \* Answer questions about the health benefits of whey protein.
- \* Distinguish between the different types of products.
- \* Know where whey protein is sold.
- \* Know how much is needed to reap health benefits.

This white paper will allow health professionals to better inform clients how this popular protein supplement can fit into healthful diets.

## Introduction

In the past 20 years, whey protein has gone from being a waste product of cheese-making to a highly valued product rich in nutritional and functional properties. Whey is now used in many products—infant formulas, food supplements, energy bars, sport beverages—to meet a variety of health goals for people of all ages.

Whey is one of two proteins in dairy milk, and it makes up about 20 percent of total protein content. Whey is composed of various fractions that separate from the casein during cheese-making. These fractions are purified to different concentrations, depending on the end composition desired, and can vary in content of protein, lactose, carbohydrates, immunoglobulins, minerals and fat. Selection of a whey product will be determined by the nutritional applications and goals desired (see table). The most common forms used in high-protein bars, beverages and supplements are whey protein concentrate (WPC) or whey protein isolate (WPI).

Whey protein is a complete, high-quality protein with a rich amino acid (AA) profile. It contains the

full spectrum of AAs, including the nine essential AAs (EAAs) and three branched-chain AAs (BCAAs), which are important in tissue growth and repair. Leucine is a key BCAA in protein synthesis and may play a critical role in insulin and glucose metabolism. The EAAs and BCAAs in whey protein are not only present in higher concentrations than in other protein sources such as soy, corn and wheat, but they are also efficiently absorbed and utilized.

## Primary Health Benefits of Whey Protein

### Enhancing Body Composition

Elite athletes are looking for nutritional supplements that will maximize performance. The demand for BCAAs increases with exercise, making whey protein an ideal source of BCAAs to enhance protein synthesis and muscle growth during the recovery period. Whey protein is particularly effective at stimulating muscle protein synthesis rates because the AA profile in whey protein is almost identical to that of skeletal muscle<sup>1</sup> and the high levels of EAAs in whey protein are effective at stimulating protein synthesis in adult muscle.<sup>2</sup>

Recent studies suggest that whey protein can help improve lean body mass and enhance recovery in athletes:

- \* 10 grams of whey protein consumed prior to resistance exercise resulted in 122 percent greater muscle protein synthesis than equivalent amounts of casein, and 31 percent greater than soy protein, possibly due to the speed of digestion or differences in the leucine content of these proteins.<sup>3</sup>
- \* 10 grams of whey protein ingested with fructose stimulated a greater rise in muscle protein synthesis following exercise than a carbohydrate-only beverage in resistance trained young men.<sup>4</sup>



- \* Recreational bodybuilders who supplemented their normal diets with WPI (1.5 g/kg body weight/day) for 10 weeks achieved greater gains in lean mass, a reduction in fat mass and greater improvements in strength than a casein-supplemented group.<sup>5</sup>

- \* A review article concluded that an ideal supplement following resistance exercise should contain whey protein providing at least 3 grams of leucine per serving, in combination with a fast-acting carbohydrate source such as maltodextrin or glucose. Such a supplement post-workout would be effective in increasing muscle protein synthesis, resulting in greater muscle hypertrophy and strength.<sup>6</sup>

### Preventing Sarcopenia

By increasing—or even preserving—lean body mass, older adults can protect themselves against undesirable changes in body composition that can lead to compromised mobility, falls and reduced independence and quality of life.

Sarcopenia—muscle loss associated with aging—affects an overwhelming 30 percent of older Americans. Research in older adults suggests higher protein diets may help preserve muscle mass during aging: Those consuming the highest amounts of protein (1.1 grams protein/kg body weight/day) lose approximately 40 percent less lean mass compared to those consuming lower amounts.<sup>7</sup> Maintaining muscle mass with age also translates into stronger bones.

Whey protein in particular may be beneficial to sarcopenia prevention:

- \* Fifteen elderly people supplemented with whey protein had greater improvements in skeletal muscle protein beyond that due to its EAA content, indicating additional factor(s) in whey protein that stimulate muscle protein anabolism.<sup>8</sup>

- \* In a double-blind clinical trial in older women, 25 grams of whey protein twice daily for six months helped maintain muscle mass during weight reduction, which in turn enhanced many indices of physical function.<sup>9</sup>

- \* In elderly obese individuals on weight-reduction diets, providing EAA as whey protein-based meal replacement promoted fat loss and increased muscle protein synthesis as compared to other equal calorie meal replacements.<sup>10</sup>

### Weight Management and Satiety

Dietary protein can play an important role in weight management. In its report on macronutrients, the Institute of Medicine concluded that protein has a more powerful effect on satiety than either carbohydrate or fat.<sup>11</sup> Indeed, studies have found that diets high in protein (25 energy percent over six weeks) resulted in greater satiety levels.<sup>12</sup>

Whey protein in particular is being examined for its ability to increase satiety and thus promote weight loss:

- \* Adults given whey-supplemented breakfast yogurt had higher energy expenditures, better protein balance and reduced appetite than those fed a control breakfast.<sup>13</sup>

- \* Consuming low-dose whey protein-enriched water two hours before a lunch meal resulted in lower hunger ratings and increased satiety—short-term indicators of energy intake—but no resulting impact on food intake.<sup>14</sup> In a similar study, however, whey protein consumed before a meal was found to reduce food intake, post-meal blood glucose and insulin in healthy young adults.<sup>15</sup>

- \* A review article concluded that whey protein reduces short-term food intake relative to placebo, carbohydrate and other proteins, possibly through the action of whey protein fractions, bioactive peptides, specific AAs or other milk constituents, and that “whey protein has potential as a functional food component for people with obesity.”<sup>16</sup>

### Improving Chronic Disease Biomarkers

In the past few years, effects of whey protein on the heart, cardiovascular system and glucose metabolism have been identified that are promising but require additional research. It is not clear whether these potential beneficial health effects are due to whey protein itself, bioactive compounds, BCAA or other component(s) in milk and dairy foods.

- \* A clinical study found that supplementing the diets of overweight and obese individuals with whey protein for 12 weeks improved fasting lipids and insulin levels, as opposed to casein and glucose supplementation.<sup>17</sup> Blood pressure and vascular function were also improved.<sup>18</sup>

- \* Supplementing adult diets with whey protein caused a lower rise in blood lipids after eating a fat-rich meal, compared to other proteins, indicating long-term supplementation with whey protein may be beneficial in preventing cardiovascular disease.<sup>19</sup>

\* Giving 20 grams/day of whey protein to pre-hypertensive and stage I hypertensive adults resulted in lower blood pressure and improved lipid levels, indicating whey protein might be a viable treatment option for populations at risk for hypertension.<sup>20</sup>

\* A review of recently published intervention trials concluded that whey protein may beneficially affect glucose metabolism in addition to its well-known effect on muscle protein synthesis.<sup>21</sup>

## The Role of Health Professionals

Following are steps that health professionals can take to help clients benefit from whey protein:

- 1. Identify patients and clients who would benefit** from incorporating whey protein into their diets:
  - \* **Athletes and physically active individuals** – to improve lean body mass and performance and provide a high-quality protein source for muscle recovery. Consider teenagers involved in organized sports as well as adults who are active on a regular basis.
  - \* **Older adults** – to maintain muscle mass to optimize mobility, minimize sarcopenia, prevent falls and remain independent longer.
  - \* **Dieters** – to help with satiety and optimize fat lost on weight-reduction diets. Bariatric patients benefit from the high quality and easy digestibility and absorption of whey protein.
  - \* **Those at risk for heart disease, hypertension and diabetes** – while the research is still emerging in these areas, incorporating whey protein in daily diets may help lower blood pressure, regulate glucose metabolism and improve lipid levels, all of which are associated with lower risk for chronic disease.
- 2. Determine the level of whey protein needed** to reap the benefits, according to clients' clinical conditions and/or nutrition goals. For generally healthy individuals attempting to maintain a healthy weight, 20–25 grams per day of WPI or WPC is adequate. Athletes looking to speed muscle recovery require higher levels of protein and frequently consume twice this amount.
- 3. Teach clients how to identify high-quality whey protein** on product labels. Products labeled as WPI or WPC80 (which contains 80 percent concentrate) should be selected.
- 4. Identify areas where whey protein could be added** to diets with only minor changes in habits. Whey protein powder can easily be added to shakes, smoothies, yogurt, cottage cheese, juice or sport drinks, mashed potatoes, instant oatmeal and breakfast cereal. It can also be used as a protein fortifier in recipes such as meat loaf, soup, sauces and instant pudding. If clients consume energy bars, encourage whey protein-based bars.
- 5. Review whey protein products** that are readily available on the market today—bars, beverages and powders—and where whey protein can be purchased—typically in health food stores, at many grocery and discount stores and on the Internet.
- 6. Provide clients with The Power of Whey Protein** for a summary of the health benefits of whey protein.
- 7. Follow up with clients.**
  - For those who agree to adopt this dietary change, providing additional suggestions, encouragement and confirmation of the health benefits will help establish it as a long-term habit. Health benefits can be confirmed by quantifying end points such as body weight, body composition, blood pressure and lipid levels. Improvements in athletic performance can be assessed in a qualitative fashion by asking how their training plan is going.
  - Those not ready to make a change immediately may be more receptive at a later date. Assessing clients' readiness to change dietary habits is critical to implementing change. Knowing whether they are at the pre-contemplative, contemplative, preparation, action or maintenance phase will determine how much and what type of information to share with them. By moving them further along the continuum, eventually they will be ready to move ahead with health professional recommendations.
- 8. Document clients' progress** and be ready to share success stories with others (ensuring confidentiality). The more that health professionals learn and share individual results, the more others can benefit as well!

## Call to Action

The variety and availability of products incorporating whey protein as a primary ingredient will continue to increase as research substantiates the health benefits and consumers become increasingly aware of these benefits. By staying abreast of this research and being informed of the specific types of whey protein products, health professionals will be in a strong position to make the

most appropriate recommendations to meet the needs and goals of individual clients and patients.

## Additional Resources

For additional information on health benefits of whey protein and products containing whey protein, contact the Whey Protein Institute at [www.wheyoflife.org](http://www.wheyoflife.org) or 1.866.949.9439.

Table: Definitions and Uses of Different Types of Whey Protein

(percentages are by weight)

Product	Protein concentration	Lactose	Fat	Notes and applications
Whey powder	11–14.5%	63–75%	1–1.5% fat	Produced by taking whey directly from cheese production, clarifying, pasteurizing and drying. Used in breads, bakery goods, snacks, dairy foods.
Whey protein concentrate (WPC)	25–89% (most commonly available as 80%)	4–52%	1–9% fat (as protein concentration increases, fat, lactose and mineral content decrease)	The most common and affordable form of whey protein. Used in protein beverages and bars, bakery goods, dairy, confectionary products, other nutritional food products.
Whey protein isolate (WPI)	90–95%	0.5–1%	0.5–1%	Used in protein supplementation products, protein beverages, protein bars, other nutritional food products.
Hydrolyzed whey protein concentrate	>80% (hydrolysis used to cleave peptide bonds)	<8%	<10% (varies with protein concentration)	Used in sports nutrition products.
Hydrolyzed whey protein isolate	>90%	0.5–1%	0.5–1%	Highly digestible form containing easy-to-digest peptides that reduce risk of allergic reaction in susceptible individuals. Commonly used in infant formulas and sports nutrition products.

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