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## REPORT

### How Whey Promotes Weight Loss

By Will Brink



As millions of Americans struggle to shed the excess weight that threatens their health and longevity, exciting new research indicates that the milk-derived compound known as whey may be a valuable weight-loss aid.

These emerging findings demonstrate that whey modulates several critical pathways related to weight management, such as supporting satiety, improving insulin sensitivity, and optimizing muscle mass. Moreover, research suggests that whey may help reduce stress, moderate cortisol, and support healthy serotonin levels, thus imparting feelings of well-being. These findings add to whey's already well-established benefits, which include boosting glutathione levels, facilitating immune function, and aiding in the fight against cancer.

This multifaceted nutrient may thus help to improve whole-body wellness by supporting healthy weight, mood, and biochemistry.

#### WHAT IS WHEY?

The term “whey” actually refers to a complex, milk-derived substance made up of a combination of protein, lactose, and minerals, with trace amounts of fat. Protein is the most abundant component of whey and includes many smaller protein subfractions and minor peptides. Each of these subfractions has unique biological properties. Modern filtering technology has improved dramatically in the past decade, allowing companies to isolate some of whey's highly bioactive peptides, such as lactoferrin and lactoperoxidase, which occur in only minute amounts in cow's milk.

Studies indicate that whey may boost weight-loss efforts via several mechanisms of action. In this article, we will briefly explore a few possible pathways by which whey may assist people seeking to shed pounds and maintain an optimal body weight.

#### HORMONES AND HUNGER SIGNALS

Human hunger and appetite are regulated by a remarkably complex set of overlapping feedback networks that involve numerous hormonal, psychological, and physiological influences. This is currently an intensive area of research, as major pharmaceutical companies seek a “magic bullet” weight-loss product to bring to market.

Scientists looking for solutions to the obesity epidemic are keenly interested in the hormone cholecystokinin as a regulator of appetite. During the digestion of food, the gastrointestinal tract secretes cholecystokinin, a small peptide with multiple functions in both the central and peripheral nervous systems. Several decades ago, researchers found that cholecystokinin was largely responsible for the feeling of fullness or satiety experienced after a meal, and that it helped partially control appetite, at least in the short term.

Additional hormones involved in satiety and appetite include insulin, leptin, glucagon-like peptide 1, and others. Dietary factors—particularly the amount and composition of proteins, fats, and carbohydrates ingested—determine which hormones are released and in what amounts.

## WHEY INFLUENCES FOOD INTAKE

New studies suggest that whey may uniquely influence food intake through its effects on cholecystokinin and other pathways. While many studies have shown that protein is the most filling or satiating macronutrient, all proteins may not be equal in this regard. Two human studies conducted at the University of Surrey in England compared the effects of whey and casein (another milk-based protein) on appetite and satiety-related hormones, including cholecystokinin.<sup>1</sup>



In the first study, participants consumed a liquid meal containing equivalent amounts of either whey or casein. Ninety minutes later, they were allowed to eat freely at a buffet. The whey group consumed significantly fewer calories at the buffet than did the casein group.<sup>1</sup>

In the second study, investigators examined the effects of the whey and casein beverages on plasma levels of amino acids and satiety-related hormones. Compared to the casein drink, the whey beverage produced a 28% increase in plasma amino acid concentrations over three hours, along with 60-65% increases in two hormones associated with satiety, cholecystokinin and glucagon-like peptide 1. The whey group also reported a greater sense of fullness and satisfaction than the casein group. The researchers concluded, **“These results implicate post-absorptive increases in plasma amino acids together with both [cholecystokinin and glucagon-like peptide 1] as potential mediators of the increased satiety response to whey and emphasize the importance of considering the impact of protein type on the appetite response to a mixed meal.”**<sup>1</sup>

Taken together, these two studies indicate that whey consumption promotes feelings of satisfaction and fullness that lead to reduced appetite and decreased food intake. Whey may thus provide valuable assistance for those seeking to lose weight by helping to limit their caloric intake.

## WEIGHT LOSS AND INSULIN SENSITIVITY

High-protein diets have been found to reduce body weight and increase insulin sensitivity. Scientists at Australia’s University of Adelaide sought to determine whether particular types of dietary protein influence these outcomes.<sup>2</sup>

In this study in rats, the test subjects consumed a high-fat diet for nine weeks, and then switched to a diet containing either moderate or high amounts of whey or beef protein for six weeks. The scientists found that high dietary protein intake reduced energy intake, possibly due to the satiating effects of protein as compared to carbohydrates or fats. The high-protein diets also decreased body fat in the test subjects.<sup>2</sup>

Additionally, the whey-fed rats demonstrated increased insulin sensitivity and a 40% reduction in plasma insulin concentration compared to the beef-fed rats. Increased insulin sensitivity and reduced plasma insulin concentration are both associated with improved blood sugar control and reduced fat storage. Increasing the dietary density with whey protein also led to reduced body-weight gain.<sup>2</sup>

According to the researchers, “These findings support the conclusions that a high-protein diet reduces energy intake and adiposity, and that whey protein is more effective than red meat in reducing body-weight gain and increasing insulin sensitivity.”<sup>2</sup> Whey thus appears to be an ideal protein source for promoting healthy blood sugar regulation and supporting weight loss.

## BURNING FAT, BUILDING LEAN MUSCLE

Consuming whey before exercise supports fat burning and may help those who exercise to gain or maintain lean body mass, according to a study conducted in Paris, France.<sup>3</sup>



Scientists have long known that the composition of a before-workout meal helps determine what material the body burns as fuel during exercise. The balance of carbohydrates, fats, and proteins consumed prior to exercise may accordingly influence long-term changes in body weight and composition.

The French scientists studied male rats that exercised for two hours daily for more than five weeks. One group of rats exercised in the fasting state, with no food before exercise. Three other groups of rats exercised one hour after consuming a meal enriched with either glucose, whole-milk protein, or whey protein.<sup>3</sup>

The results were quite telling. Compared to fasting, the glucose meal increased glucose oxidation and decreased lipid oxidation during and after exercise. This indicated that the glucose-fed rats burned sugar over body fat as an energy source.<sup>3</sup>

By contrast, the whole-milk protein and whey meals preserved lipid oxidation and increased protein oxidation, indicating that fat burning was maintained and that protein was also used as a fuel source. The whey meal increased protein oxidation more than the whole-milk protein meal, perhaps because whey's excellent solubility allowed for its rapid absorption and use as fuel.<sup>3</sup>

One of the study's most interesting findings relates to body weight, which increased in the group receiving food and supplements compared to the fasting group. In the groups that received either glucose or whole-milk protein, the increase in weight was from body fat. However, in the whey-fed group, the weight increase reflected an increase in muscle mass and a decrease in body fat.<sup>3</sup> Whey thus appears to be the preferable choice for supporting improvements in body composition.

The researchers believe that whey's ability to rapidly deliver amino acids during exercise and to preserve fat burning enables it to enhance the adipose tissue-reducing effects of exercise training.<sup>3</sup> Whey thus offers promise for those hoping to add muscle mass and lose fat.

## EFFECTS ON MOOD, CORTISOL, AND SEROTONIN

Whey may also support weight loss by modulating levels of the crucial neurotransmitter serotonin. Serotonin is involved in a wide range of psychological and biological functions, and influences mood, anxiety, and appetite. Healthy levels of serotonin are correlated with relaxation, calm, and an improved ability to cope with stress, whereas lower levels are associated with depression, anxiety, and poor appetite control.

Since serotonin is derived from the dietary amino acid tryptophan, scientists have speculated that increasing dietary tryptophan might increase serotonin levels. A recent study conducted in the Netherlands examined whether supplementing the diet with whey-derived alpha-lactalbumin, a tryptophan-rich whey constituent, would influence plasma tryptophan levels, reduce depression, or modulate concentrations of cortisol, the so-called "stress hormone."

The Dutch investigators examined 29 highly stress-vulnerable subjects and 29 relatively stress-invulnerable subjects using a double-blind, placebo-controlled study design. After consuming a diet enriched with either whey-derived alpha-lactalbumin or sodium caseinate, the participants were exposed to experimental stress. Following the stressor, the scientists assessed diet-induced changes in plasma tryptophan and its ratio to other large neutral amino acids, as well as changes in mood, pulse rate, and cortisol concentrations.<sup>4</sup>

In those fed the whey-derived alpha-lactalbumin diet, the ratio of plasma tryptophan to other amino acids was 48% higher than in those on the casein diet. In stress-vulnerable subjects, this was accompanied by a decrease in cortisol levels and reduced feelings of depression. The investigators found that supplementing stress-vulnerable subjects with whey-derived alpha-lactalbumin "**improved coping ability, probably through alterations in brain serotonin.**"<sup>4</sup>



## SYNERGY WITH OTHER DAIRY CONSTITUENTS

Calcium, another component of dairy products, has been associated with reductions in body weight and fat mass. Calcium may influence energy metabolism by helping to regulate lipid metabolism in fat cells and by modulating triglyceride storage.<sup>5</sup>

Several studies have demonstrated that dairy sources of calcium are superior to non-dairy sources of calcium for accelerating fat loss and reducing weight gain. Researchers believe that the whey fraction of dairy products may be responsible for this effect, noting that "**dairy sources of calcium markedly attenuate weight and fat gain and accelerate fat loss to a greater degree than do supplemental sources of calcium. This augmented effect of dairy products relative to supplemental calcium is likely due to additional bioactive compounds, including the angiotensin-converting enzyme inhibitors and the rich concentration of branched-chain amino acids in whey, which act synergistically with calcium to attenuate adiposity.**"

Thus, numerous components in whey may act in synergy to support healthy body composition.<sup>5</sup>

## BENEFITS OF WHEY GO WAY BACK

The health-promoting properties of whey have been valued for centuries. According to an expression from Florence, Italy, circa 1650, "Chi vuol viver sano e lesto beve scotta e cena presto," which translates as, "If you want to live a healthy and active life, drink whey and dine early."

Not to be outdone, another Italian aphorism from the following century, circa 1777, commented, "Allevato con la scotta il

## CONCLUSION

Solid research suggests that by supporting satiety, reducing caloric intake, promoting fat burning, and boosting lean body mass, whey may benefit individuals striving to achieve or maintain a healthy weight. Whey may also support a healthy response to stress and help maintain healthy levels of the brain's neurotransmitters.

Evidence suggests that consuming whey before meals may help limit subsequent hunger and food intake, and that ingesting whey before exercise may enhance the fat-burning effects of the workout. Since the effects of whey appear to last approximately two to three hours, some nutritional experts suggest staggering whey intake throughout the day. A healthy breakfast could include one or two scoops of whey in a bowl of oatmeal, while a mid-afternoon snack might be a whey-based shake. Recommendations for using whey protein as part of a training program can be found in the e-book, *Muscle Building Nutrition*, and other sources of sports nutrition and bodybuilding information.<sup>6</sup>

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