

about the  
AUTHOR

Debra Wein is a recognized expert on health and wellness and has designed award winning programs for both individuals and corporations around the US. She is president and founder of Wellness Workdays, Inc., ([www.wellnessworkdays.com](http://www.wellnessworkdays.com)) a leading provider of worksite wellness programs. In addition, Debra is the president and founder of partner company, Sensible Nutrition, Inc. ([www.sensiblenutrition.com](http://www.sensiblenutrition.com)), a consulting firm of RD's and personal trainers that provides nutrition and wellness services to individuals.

Megan Miraglia is a registered dietitian at Wellness Workdays and Sensible Nutrition, Inc. where she conducts nutrition and wellness seminars, classes and one-on-one counseling with clients. Previous to Wellness Workdays, she worked in research focused on the prevention of childhood obesity. She completed a dietetic internship at Frances Stern Nutrition Center and earned a Master's degree at Tufts University.

# Whey Protein vs. Casein Protein and Optimal Recovery

Protein supplements are invading grocery store aisles and health food stores promising greater strength, faster recovery time and bigger muscles. Is a supplement what athletes need or can they get by with just a glass of milk? The answer lies within the glass. When athletes eat, and what ratio of carbohydrates to proteins they eat after a workout can significantly improve the recovery period after exercise (4).

## Post-workout recommendations

Timing is everything, especially when it comes to what athletes eat after engaging in strength and conditioning training. Eating a combination of carbohydrates and protein within 30mins post-workout helps maximize muscle synthesis, muscle function and decreases muscle breakdown. This occurs because this is the time that muscles experience a heightened sensitivity to insulin (4,7). Additionally, consuming the right combination of carbohydrates to protein, in a 4:1 ratio, is associated with faster glycogen replenishment in the muscles, better muscle protein synthesis, reduced muscle soreness and improved muscle strength and body composition (2,4). Thus, the recipe for optimal post-exercise recovery is taking advantage of the 30-min recovery window and choosing foods that portray the 4:1 ratio of carbohydrates to protein. Chocolate milk is a quick and easy post-recovery drink that naturally contains carbohydrates and proteins in the correct ratio. See Table 1 for other post-exercise snack options.

## Whey vs. casein

Cow's milk is composed of carbohydrates and two main dairy proteins: casein and whey. When milk is coagulated, it automatically divides out the proteins into semi-solid lumps and a liquid portion. Casein is found in the lumps, or curds, whereas the whey protein is found in the liquid portion (5). The ratio of protein within a glass of milk is about 20% whey to 80% casein, which provides an optimal composition of readily available nutrients to replenish body fuel post-workout and keep energy levels up (5).

Whey is known as the "fast-acting" protein, meaning that the body can break it down and absorb the nutrients relatively quickly (1). In some cases, manufacturers break down whey even further into whey protein isolate, whey concentrate or whey powder, which are then sold in different forms as supplements. These lactose-free, concentrated protein supplements are absorbed at a quicker rate than casein. Additionally, whey is high in indispensable (essential), branched-chain amino acids that the body cannot produce on its own and must derive from food (1). This allows for quick uptake by the body (6). Some studies have found that whey protein supplements may be associated with an increase in muscle mass size and strength in some individuals as well (7).

Casein, often referred to as the "slow-acting" protein, takes slightly longer to digest as it slowly releases amino acids into the bloodstream (6). It contains a different amino acid profile than whey and is particularly high in the conditionally indispensable amino acid, glutamine (1). This is beneficial because, when the body is put under physiological stress, such as with endurance exercise, the body needs to derive glutamine from an outside source of food (1). The bottom line, however, is that both whey and casein are needed for proper nutrition.

Some supplements contain both whey and casein to allow the body to take full advantage of the different absorption rates (1,8). Additionally, the combined efforts are beneficial because whey works to stimulate protein synthesis whereas casein inhibits the breakdown of protein (9). Therefore, individual, isolated supplements of either whey or casein may not be the best option.

## Milk: Full or low-fat?

Research shows that low-fat dairy is more effective at protein synthesis and replenishing net muscle protein balance than high-fat dairy (6). One theory is that the fat is digested at a slower rate than carbohydrates and protein, and thus the fat slows down the delivery of carbohydrates and protein to tissues (6). Furthermore, chronic use of

**Table 1. Carbohydrate and Protein Content of Post-exercise Snack Options (10).**

Food Item	Carbohydrates (grams)	Protein (grams)
Non-fat chocolate milk, 8oz	26	8
Non-fat, fruit on the bottom yogurt, 6oz	28	6
1 mozzarella string cheese stick, 5 whole grain crackers, 10 grapes	26	8.5
1 cup of Cheerios® and ½ cup of milk	27	7
¼ cup of hummus, ½ cup of carrots	15	5
1 slice of whole-grain bread, 1oz turkey with mustard and 1 cup of apple juice	35	9

low-fat milk as a post-exercise resistance training meal has been associated with a greater reduction in overall body fat, increased muscle growth and greater muscle mass maintenance than soy-based proteins (3,9). Table 1 lists whole-food examples of post-exercise snack options that provide the optimal balance of carbohydrates to proteins. Eat these snacks within 30mins after completing an exercise session for optimal glycogen and protein uptake.

### Bottom line

The combination of whey and casein protein found in cow’s milk provides reliable nutrition to restock glycogen stores, promote protein synthesis and repair muscles while providing beneficial nutrients such as calcium, vitamin D and vitamin A (6). Whole foods, such as low-fat milk, can be equally effective, if not more effective than supplement drinks in restoring the body to optimal performance levels and naturally provide all the essential nutrients in a ratio the body needs (6). Choose whole foods that contain a 4:1 ratio of carbohydrates to protein and consume them within 30mins after exercise to support muscle recovery, strength and build muscle mass. ■

### References

- Dunford, M, and Doyle, JA. Nutrition for sport and exercise. Belmont: Thomson Wadsworth, 2008.
- Gilson, SF, Saunders, MJ, Moran, CW, Moore, RW, Womack, CJ, and Todd, MK. Effects of chocolate milk consumption on markers of muscle recovery following soccer training: A randomized cross-over study. *Journal of the International Society of Sports Nutrition* 7(19): 1 – 10, 2010.
- Hartman, JW, Tang, JE, Wilkinson, SB, Tarnopolsky, MA, Lawrence, RL, Fullerton, AV, and Phillips, SM. Consumption of fat-free fluid milk after resistance exercise promotes greater lean mass accretion than does consumption of soy or carbohydrates in young, novice, male weightlifters. *American Journal of Clinical Nutrition* 86: 373 – 381, 2007.
- Kerksick, C, Harvey, T, Stout, J, Campbell, B, Wilborn, C, Kreider, R, Kalman, D, Ziegenfuss, T, Lopez, H, Landis, J, Ivy, JL, and Antonio, J. International Society of Sports Nutrition Position Stand: Nutrient Timing. *Journal of the International Society of Sports Nutrition* 5(17): 2008.

- Lusignan, MF, Bergeron, A, Lafleur, M, and Manjunath, P. The major proteins of bovine seminal plasma interact with caseins and whey proteins of milk extender. *Biology of Reproduction*, 2011.
- Roy, BD. Milk the new sports drink? A review. *Journal of International Society of Sports Nutrition* 5(15): 2008.
- Thomas, DT, Wideman, L, and Lovelady, CA. Effects of a dairy supplement and resistance training on lean mass and insulin-like growth factor in women. *International Journal of Sport Nutrition and Exercise Metabolism* 21(3): 181 – 188, 2011.
- Tipton, KD, Elliott, TA, Cree, MG, Wolf, SE, Sanford, AP, and Wolfe, RR. Ingestion of casein and whey proteins result in muscle anabolism after resistance exercise. *Medicine and Science in Sports and Exercise* 36(12): 2073 – 2081, 2004.
- Wilkinson, S, Tarnopolsky, MA, MacDonald, MJ, MacDonald, JR, Armstrong, D, and Phillips, SM. Consumption of fluid skim milk promotes greater muscle protein accretion after resistance exercise than consumption of an isonitrogenous and isoenergetic soy-protein beverage. *American Journal of Clinical Nutrition* 85(4): 1031 – 1040, 2007.
- U.S. Department of Agriculture and U.S. Department of Health and Human Services. Dietary Guidelines for Americans. (7th ed.) Washington, DC: U.S. Government Printing Office; 2010.