



READ

Accelerate Your Recovery: The 4:1 Carb-to-Protein Ratio and the 20 Minute Post-workout Window

Consider your post workout recovery nutrition as important to your results as your physical training itself. Your workout isn't finished until you've refueled.

The key to recovery: the 4:1 carbs-to-protein ratio

Timing and macronutrient ratio are two critical factors to consider when refueling post-workout. Research supports that a 3:1 to 4:1 ratio of carbohydrates to protein is the most effective combination of macronutrients to support glycogen replenishment immediately post-workout.¹ Glycogen is a form of carbohydrate, which is stored in your liver and muscle tissues. Comprised of bonded polysaccharides, or sugar molecules, glycogen can be stored or used, depending on the timing of carbohydrate consumption.

Functional Sugar: Why should I use it before, during, or after a workout?

Like fat, sugar gets a bad rap – and as with fat, negative blanket judgments about sugar don't tell the whole truth about its character or usefulness, especially in the context of sport. While an excess of refined sugars hidden in processed food is certainly the bane of the average North American trying to eat healthier, in the right form at the right time, sugar is an essential functional fuel – before, during, and after your workouts.

When sugars – especially simple ones like glucose and fructose – are consumed pre and mid-workout, their primary purpose is to fuel working muscles immediately. When consumed post-workout, these simple sugars (glucose in particular) play an important role in restoring muscle glycogen reserves, or stored carbohydrate. This replenishment reduces post-exercise fatigue and supports the restoration of muscle tissue.²

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When should I refuel with carbs?

In the 20 minutes immediately following your workout, your body is most open to restocking lost glycogen. Aim to consume a 3:1 to 4:1 ratio of carbs-to-protein, in a snack or beverage within 20 minutes post-workout to optimize recovery benefits (studies suggest that the window for replenishment is quite small – by as early as the two-hour post-workout mark, muscle glycogen resynthesis is 50% less effective than in the first 20 minutes).³

Refueling with a liquid option allows you to achieve the goals of both glycogen replenishment and rehydration, though solids can be just as effective. Your choice can depend on convenience and texture preferences – just make sure to focus on high glycemic, glucose-rich carb sources, such as dates (fructose alone won't help replenish muscle glycogen).

Muscle glycogen replenishment also impacts your rate of protein synthesis, which triggers the development of new muscle tissue.⁴ Neglecting to replenish glycogen first (and going straight for a high-protein option immediately post-workout) is not as effective for the purpose of muscle tissue development. However, it's not all about the carbs. A small portion of protein (the 1 in the 4:1 ratio) helps not only to speed muscle glycogen replenishment compared to post-workout carbs alone – this combination of carbs with a little protein also helps enhance protein synthesis, too.

When should I eat protein?

In either endurance or strength training, if your goal is to develop stronger muscles in order to maximize efficiency, power and/or stamina, overlooking the 20 minute window for replenishment with the optimized ratio of carbs-to-protein for recovery will be counterproductive to your goals. Higher protein post-workout options can certainly be beneficial, but it's best to wait 20 to 40 minutes after consuming your 3:1 to 4:1 carb-to-protein post-workout snack for best results. You'll still get your post-workout, muscle-building protein within an hour of your workout, but you'll have given your body time to make the most of the carbs to restock its fuel stores as a reward for your patience.

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Example: Optimal timing of post-workout carb and protein intake:

Within 20 minutes of finishing your workout:

Option 1

1/4 cup of nut butter with 3/4 cup of apple and banana slices (use a squeeze of lemon juice to prevent the fruit from spoiling if you're packing this on-the-go)

Option 2

Vega Sport Recovery Accelerator

45 to 90 minutes post-workout:

Option 1

High protein salad with plenty of fibrous vegetables, and high protein seeds, pseudograins and legumes (such as quinoa, peas, lentils and pumpkin seeds). Use a homemade dressing using hemp or flax oil (or Vega's Antioxidant Omega Oil)

Option 2

High protein shake with a plant-based protein supplement, such as Vega Sport Performance Protein. Simply shake with an unsweetened milk alternative, or blend with ice, avocado, and 1 cup of leafy greens (spinach or kale). Frozen berries can be used for flavor and texture.

For more food and beverage options optimized for the 3:1 to 4:1 carbohydrate to protein ratio, refer to the Endurance post-workout meal and snack recipes in this chapter.

For more high protein meal suggestions, refer to these recipes developed specifically for athletes.

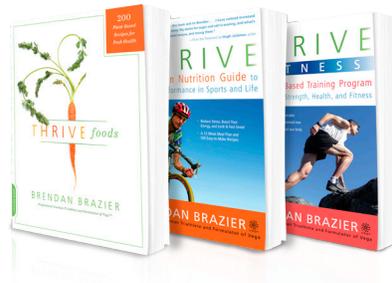
¹ Kerkick, Chad et al. (2008). International Society of Sports Nutrition position stand: Nutrient timing. *Journal of the International Society of Sports Nutrition*. 5:17. Retrieved from: <http://www.ijsn.com/content/5/1/17>

² American College of Sports Medicine, American Dietetic Association, and Dietitians of Canada.(2009) Joint position statement: Nutrition and Athletic Performance. *Medicine and Science in Sports and Exercise* 41(3). Retrieved from: http://journals.lww.com/acsm-msse/Fulltext/2009/03000/Nutrition_and_Athletic_Performance.27.aspx

³ Ivy, J et al. (2002). Early postexercise muscle glycogen recovery is enhanced with a carbohydrate-protein supplement. *Journal of Applied Physiology*.

⁴ Levenhagen, DK. (2001). Postexercise nutrient intake timing in humans is critical to recovery of leg glucose and protein homeostasis. *American Journal of Physiology - Endocrinology and Metabolism*. 280(6):E982-E993 Retrieved from: <http://ajpendo.physiology.org/content/280/6/E982.full.pdf+html>

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Thrive Foods, Thrive: The Vegan Nutrition Guide, and Thrive Fitness
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