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POST WORKOUT PROTOCOL

GOAL?

- Restore muscle glycogen levels
- Repair muscle damage, resynthesize protein

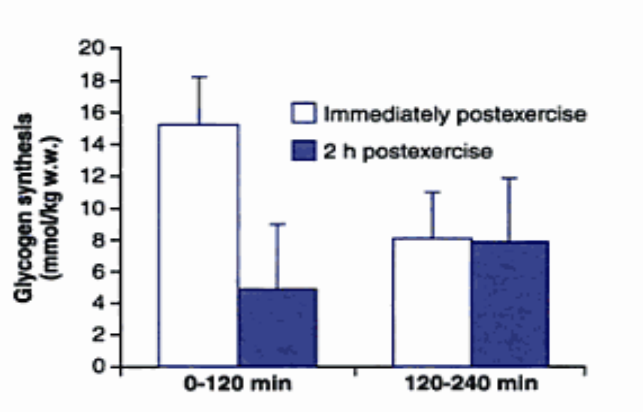
WHAT KIND OF FUEL?

Consuming carbohydrates post workout is the single most important factor for restoring muscle glycogen levels. Adding protein can help with synthesis and repair of muscle protein. Coingestion of protein might accelerate glycogen synthesis, especially when carbohydrate amounts aren't high enough.

Additionally, a new study just came out in April 2012 showing that chocolate milk (which contains both carbohydrates and protein) was better for recovery both in terms of muscle glycogen and protein turnover vs. a carbohydrate-only solution. Chocolate milk is an excellent and relatively inexpensive recovery drink; it contains fast acting sugars (carbohydrates) as well as protein (8 grams per cup) which are easily digested and utilized for glycogen restoration.

TIMING?

Athletes should fuel immediately post workout - known as the "recovery window" - for maximum benefit, as this is when the muscles and cells are most sensitive and reactive. Ivy and colleagues found that subjects stored twice as much muscle glycogen when they consumed carbohydrates immediately post workout, vs. 2 hours later (Ivy 1988).



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Glycogen restoration takes about 24 hours to complete, however, the majority of glycogen resynthesis occurs within the first 4-6 hours. Therefore, athletes should refuel A) immediately post workout, and again b) 2 hours later. A consistent and balanced diet is important in order to continue the process of glycogen restoration.

HOW MUCH?

Studies show that about **1-1.2 grams of carbohydrates per kilogram body weight is recommended**, as this seems to yield the highest amount of glycogen resynthesis. Studies have shown that giving 1.6 g/kg carbohydrates post workout did not show any further improvement (Van Loon, Jentjens & Jeukendrop 2003, Howarth 2009)

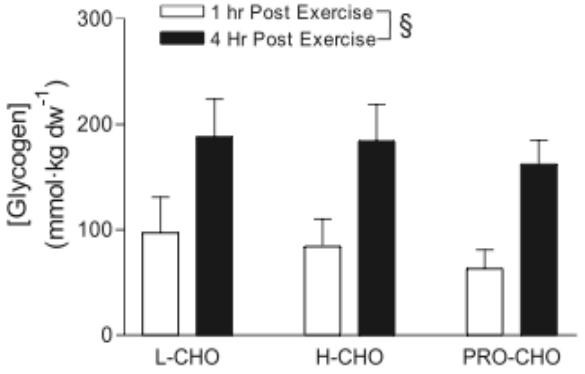

Fig. 5. Muscle glycogen concentration over 4 h of recovery from prolonged exercise while ingesting either 1.2 g CHO·kg^{-1}·h^{-1} (L-CHO), 1.6 g CHO·kg^{-1}·h^{-1} (H-CHO), or 1.2 g CHO + 0.4 g protein·kg^{-1}·h^{-1} (PRO-CHO). Values are means ± SE; $n = 6$. §Main effect for time, $P < 0.05$. dw, dry wt.

However, such a high volume of carbohydrate is often not tolerable for athletes. Athletes may complain of bloating and fullness which of course can then negatively affect performance. Therefore, lower carbohydrates, with added protein may be more realistic.

Recommendations for protein post workout are about **0.2-0.4 g/kg**, with research from Moore et al showing that there is a maximal threshold reached with about 20 g of protein. This means that consuming more than 20 grams of protein post workout provides no further benefit (Moore et all 2009). Excess protein will be stored as fat, and this is especially important for athletes who may be watching their weight or looking to lose body fat. It is interesting to note that 2 scoops of whey protein has about 50 grams of protein, and many popular shakes contain 30, 40, even 50 g protein!

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RECOVERY STEP ONE: <30 min after practice *Choose one*

- Chocolate Milk and Banana
- Trail mix + Gatorade
- Apple + PB
- Greek yogurt + granola
- Smoothie
- Granola Bar + Fruit

RECOVERY STEP TWO: 1-2 hours later -> DINNER *Choose one*

- Chicken, rice, green beans, milk
- Burrito with meat, or beans
- Turkey Sandwich + yogurt + fruit
- PBJ + milk + fruit
- Fish + Couscous + Salad + broccoli
- Burger, avocado, salad/dressing, corn
- Pasta and meatballs, spinach
- Vegetarian choice: Tofu, rice, green beans with almonds, milk