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PERFORMANCE POINT

RECOVERY NUTRITION: WHY THE BIG DEAL?

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After hard training (endurance, sprint, resistance) the muscle fuel glycogen - the storage form of carbohydrate - will be depleted and both protein synthesis and protein breakdown will be stimulated. Glycogen is essential to keep your muscles working. When you exercise you burn through glycogen, and as it runs out you become slow and tired. The harder you train, the more glycogen you use and the lower your glycogen stores become.

In the absence of food, protein breakdown is greater than protein synthesis and glycogen re-synthesis will be limited – so, forgetting to eat after exercise is definitely not a high performance strategy if you want to maximize your training and adaptation to get stronger and faster!

Replacing glycogen loss after exercise is essential to improve performance within the same day or on following training days.

POST EXERCISE NUTRITION IS CRITICAL TO:

- Replenish glycogen stores
- Help prevent muscle protein breakdown
- Improve cellular rehydration
- Help keep immune system function high
- Improve exercise performance within the same day or on following training days

The purpose of rehydration is simple: restore the fluids (and electrolytes) lost in sweat.

YOUR RECOVERY FOCUS: THE THREE 'Rs'

- Replenish glycogen
- Recondition the muscle – synthesize protein
- Rehydrate

REPLENISHING GLYCOGEN

To be able to train at your best day after day after day, glycogen MUST BE REPLENISHED after exercise. In a review of over 165 studies it has been found that the most effective replenishment of glycogen happens when you eat or drink about 1.2 g of carbohydrate per kg of body weight (range 0.8 – 1.5 g/kg BW) immediately after exercise for as many as four to six hours after exercise. As well as stimulating glycogen synthesis, eating or drinking carbohydrate in recovery inhibits the muscle protein breakdown that occurs after training.

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Always eat after training. Forgetting to eat will result in lowered muscle glycogen resynthesis by up to 50%.

The amount of carbohydrate needed right after training or competition depends on your body weight, how hard/long the training/competition is and if you eat or drink protein rich foods or fluids along with your carbs. When you train multiple times in a day, have back-to-back events or engage in high volume or intensity training, an efficient post-training glycogen recovery plan becomes essential. If you skip the carbs in favour of protein, delay eating after training or forget to eat all together, the result will be lowered muscle glycogen resynthesis by up to 50%. Essentially, you're giving your competition the edge before the race even starts!

RECONDITIONING THE MUSCLE

Essential amino acids (EAA), found in protein rich foods and supplements, do two really cool things: (1) increase protein synthesis; and (2) decrease protein breakdown. Protein eaten before, during or soon after exercise will cause a greater increase in muscle protein stimulation, repair and growth. Muscle protein synthesis seems to plateau at about 20–25g (0.35–0.3 g/kg body weight). The type of protein matters as well. Whey protein seems to cause the greatest immediate increases. So if you are looking to maximize muscle protein synthesis, liquid whey is your best bet. If you can't consume whey protein right away after exercise, plan to eat other high quality animal-based proteins.

REHYDRATING

The purpose of rehydration is simple: restore the fluids (and electrolytes) lost in sweat. A dehydrated athlete is more prone to fatigue (especially when exercising in the heat) and exercise feels harder. To make sure you are well hydrated, monitor the amount and color of your urine and follow a hydration plan.

Excreting a large amount of lemonade coloured urine? You are doing a good job. Dark yellow and small amounts? You are probably dehydrated and need to drink more throughout the day and after exercise.

- Start drinking as soon as you wake up
- Plan for a beverage at each meal and snack
- Carry a water bottle and sip fluids throughout the day. Refill as needed.
- Drink during and after training – set yourself the goal of at least one full water bottle during and after each training session.
- In some sports or conditions over-hydrating is not helpful. Work with your sport dietitian or physiologist to find out the right hydration level for you.
- If you are waking up to go to the bathroom more than once per night you are either overhydrating or drinking too much too close to bed.

Athletes typically lose between 0.5–1.2 L of sweat per hour in cool conditions and 1.0–2.0 L per hour in hot.

A FEW OTHER NUTRIENTS ESSENTIAL TO RECOVERY

Sodium

Sodium losses will depend on sweat loss. However, after training or competition, the sodium content of a recovery drink plus the sodium found in all follow-up meals and snacks should be sufficient to replace any losses. If you know that you are a "salty sweater" plan on salting your food.

Fat

Fat may slow the digestion and absorption of carbohydrates and proteins so it is best to limit fat in immediate recovery and instead save it for meals at other times during the day. Stick to fats found in fatty fish, walnuts, almonds, chia seeds, hemp hearts and pumpkin seeds. These sources of omega 3s and/or antioxidant nutrients may reduce inflammation.

Antioxidants

Antioxidants are essential in minimizing the effects of the free-oxygen radicals produced during exercise and to protect cell membranes and the immune system. High intensity training or competition may lead to a temporary increase in production of free radicals. There is no consistent evidence that antioxidant supplementation will enhance your performance so EAT your antioxidants - choose high quality, colorful, unprocessed plant-based foods.

RECOVERY TIMING

Are you taking part in high intensity training, competition or regular workouts more than once per day? If so, consume a post-workout recovery drink or snack containing both carbohydrates and protein as soon as possible (within 30 minutes) after intense training or competition. This means being prepared! Pack recovery foods and fluids to enjoy while engaged in active recovery - stretching, doing an easy spin on a bike …etc., or for the drive home. Easily digested carbohydrates and whey protein are ideal during this time. See table on next page.

THE NEXT SIX HOURS

Follow up your immediate recovery nutrition with a high quality meal and fluids as soon as you feel hungry or eat within the next 30–90 minutes even if you do not feel very hungry. When you have limited time between training sessions, aim to eat frequently after training or at least every two hours for the next two meals.

MEAL SHOULD INCLUDE

HIGH QUALITY CARBS: quinoa, brown rice, barley, multigrain pasta, sprouted or whole grain breads, oatmeal, multi or whole grain cereals, fresh and dried fruits, dairy products, and legumes.

LEAN PROTEINS: eggs, fish, lean beef, bison, chicken, turkey, legumes, milk products, and milk alternatives.

HIGH QUALITY FATS: olives, flax, olive and canola oil, avocados, fish, nuts, and seeds.

ANTIOXIDANTS: fresh or frozen veggies and fruits – as large a variety as possible.

CARBOHYDRATE, PROTEIN AND FLUID GUIDELINES FOR RECOVERY

TRAINING SESSION	WORKOUT EXAMPLE	TIME FOR RECOVERY	CARBOHYDRATES	PROTEIN	SAMPLE RECOVERY FOOD
AEROBIC TRAINING/ STEADY STATE or **ANAEROBIC CAPACITY**	100 minutes steady state 15 x 1:1 building rate to max	Overnight < 4 hours	0.8 - 1.2g/kg BW/hr in small doses for as many as 4 – 6 hours after exercise i.e ~280g carb spread out over 4 hours for a 70kg athlete 1.2-1.5 g/kg BW/hr–in doses over 2hrs i.e ~168 - 210g carb spread out over 2 hours for a 70kg athlete	20–30+g/2 hrs solids/fat ok 20–30g whey as liquid if possible and then as solid proteins as able to digest	• Elevate Me Bar & favorite sport drink • Chocolate milk or soy milk • Smoothie made with skim milk or juice, berries, tested whey protein isolate • Skim or 1% white milk and PBJ sandwich • Kashi Go Lean Crunch + milk • Kashi Go Lean made into trail mix with a few nuts/pumpkin seeds and a handful of cranberries • Egg whites (or eggs), whole grain toast, fruit
EXPLOSIVE TRAINING	Weights	Leading into a second intensity or aerobic training session Overnight	0.5 g/kg BW may tolerate more if next session aerobic and lean mass gain is desired 0.5 g/kg BW/hr in the first hour after weights and then follow up with a meal	20–25+g whey as a liquid if possible 20–25+g whey and/or other lean animal proteins Take before or immediately after training	• Chocolate milk • Infinit recovery products from infinitnutrition.ca • ElevateMe bars or other higher protein sport bars • For other real food options see notes section below *Click on the Canadian Sport Institute logo at the bottom of the web page above or purchase through Canadian Sport Institute.*
FLUIDS	**Very individual**: Begin drinking as soon as training/racing is finished. Continue to sip on fluids (some with salt and electrolytes) or drink fluids with meals throughout the day. Aim for lemonade colored urine. Athletes typically lose between 0.5–1.2 L per hour in cool conditions and 1.0–2.0 L per hour in hot.				
NOTES	• The more intense the training and the shorter the recovery time the more carbohydrates are needed. • Check labels for carbohydrate and protein amounts in food or check out http://www.cscpacific.ca/Images/PDFs/Carbs_and_Protein_Recovery.pdf • Short recovery window? Consider recovery drinks such as Infinit Revive, Recharge, Explode or chocolate milk since the easily digested nutrients found in these fluids are rapidly absorbed enhancing glycogen resynthesis. Drinks are also a great way to rehydrate. A follow up meal containing high quality grains, starches and lean proteins further enhances recovery.				

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