

Carbohydrates and the Body

Carbohydrates are the sugars, starches, and fibers found in fruits, grains, vegetables, and milk products. They are an essential fuel for the brain and body. Carbohydrates are broken down to provide glucose for the brain, muscles, and liver.



Consuming enough carbohydrates throughout the day helps to:

- Fuel higher-intensity training
- Prolong endurance activity
- Support daily energy demands
- Maximize muscle gain
- Maintain concentration and alertness
- Delay physical and mental fatigue

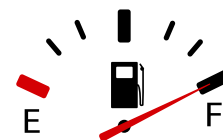
The ability for the body to store carbohydrate, which is done in the form of glycogen, is limited in humans. Therefore, when training one or more times daily, muscle glycogen stores may need replenishing immediately after exercise and throughout the day.

Signs and Symptoms of Low Carbohydrate Intake

- Difficulty Concentrating
- Low energy levels
- Decreased performance
- Headache
- Nausea
- Constipation
- Bad Breath

How Much Do You Need?

The amount of carbohydrate needed in meals and snacks depends on the intensity and duration of exercise. If training is longer, more intense, or if you are performing multiple sessions per day, increase carbohydrate intake.



Training Type	Carbohydrate Recommendations	150lb (68kg) Athlete	180lb (82kg) Athlete
Pre-Exercise (30-90 minutes prior to training)	0.5-2g/kg bodyweight	34-136g	41-164g
Low -Intensity or skill-based activities	3-5 g/kg/day	204-340g	246-410g
Moderate (~1 hour/day)	5-7g/kg/day	340-476g	410g-574g
Endurance (1-3 hour/day)	6-10g/kg/day	408-680g	492g-820g
Ultra-endurance (>4-5 hours/day)	8-12g/kg/day	544-816g	656g-984g
Post-Exhaustive Exercise (30-60 minutes after training)	0.5-1g/kg bodyweight	34-68g	41-82g



What Sources of Carbohydrate Should You Choose?

At Meal Times:

- Aim for carbohydrate sources from whole grains (quinoa, brown rice, whole wheat pasta, oats, whole grain breads and cereals), starchy vegetables (corn, peas, sweet potatoes, pumpkin) and fruit.
- These carbohydrates are higher in fiber, vitamins and minerals and help optimize digestion, gut health, and fueling the body and brain.

Pre-Exercise Fueling:

- 30-90 minutes before training, focus on carbohydrate-rich snacks to provides fuel for the upcoming training session or event.
- To utilize these carbohydrates efficiently, the sources should be:
 - Easily digestible carbohydrate sources without much fiber or fat
 Examples: Fruit, white rice or pasta, pretzels, granola, cereal, rice cakes, energy chews/gels

Post-Exercise Recovery:

- To replenish muscle fuel stores, include sources of carbohydrates as part of a recovery meal or snack.
- If time between events is limited, choose quicker carbohydrate sources for faster digestion and fuel replacement (see examples under Pre-Exercise Fueling)

Common Carbohydrate Food Sources:

Carbohydrate Rich

Food:	Serving Size:	Carbohydrate/Serving
Grains	2 slices whole wheat bread	26g
	1 cup cooked rice	45g
	1 cup cooked penne pasta	43g
	1 cup cooked oatmeal	25g
Starchy Vegetables	1 medium potato/sweet potato	27g
	1 cup cooked corn	30g
	1 cup green peas	22g
	1 cup butternut squash	16g
Beans, legumes	1 cup black beans	40g
	1 cup lentils	40g
	1 cup shelled edamame beans	15g
Fruit	1 medium apple	19g
	1 medium banana	27g
	1 orange	16g
	1 cup strawberries	12g
Dairy	1 cup non-fat milk	12g
	5.3 oz. Greek yogurt cup	6g
	4 oz. low-fat cottage cheese	5g

1 cup cooked oatmeal with 1 banana and 2 tbsp. nut butter

Snack:

5.3 oz. Greek yogurt with 1/3 cup granola and 1 cup berries

Lunch:

Turkey sandwich with 2 slices whole grain bread, turkey, ½ avocado. Served with fruit and side salad

Snack:

1 apple with trail-mix

Dinner:

Grilled salmon with 1 cup roasted veggies and 1 cup brown rice

Athlete Recommendation: