Carbohydrate-loading diet

By Mayo Clinic staff

Definition

A carbohydrate-loading diet, also called a carb-loading diet, is a strategy to increase the amount of fuel stored in your muscles to improve athletic performance. Carbohydrate loading generally involves greatly increasing the amount of carbohydrates you eat several days before a high-intensity endurance athletic event. You also typically scale back your activity level during carbohydrate loading.

Purpose

Any physical activity you do requires carbohydrates to provide you with fuel. For most recreational activity, your body uses its existing energy stores for fuel. But when you engage in long, intense athletic events, your body needs extra energy to keep going. The purpose of carbohydrate loading is to give you the energy to complete an endurance event with less fatigue, improving your athletic performance.

Carbohydrate loading is most beneficial if you're an endurance athlete — such as a marathon runner, swimmer or cyclist — preparing for an event that will last 90 minutes or more. Carbohydrate loading isn't necessary for shorter athletic activities, such as recreational biking or swimming, weightlifting, and five- or 10-mile (eight- or 16-kilometer) runs.

Diet details

The role of carbohydrates

Carbohydrates, also known as starches and sugars, are your body's main energy source. Complex carbohydrates include legumes, grains and starchy vegetables, such as potatoes, peas and corn. Simple carbohydrates are found mainly in fruits and milk, as well as in foods made with sugar, such as candy and other sweets.

During digestion, your body converts carbohydrates into sugar. The sugar enters your bloodstream, where it's then transferred to individual cells to provide energy. Some of the extra sugar is stored in your liver and muscles as glycogen — your energy source.

Increase your energy storage

Your muscles normally store only small amounts of glycogen — enough to support you during recreational exercise activities. If you exercise intensely for more than 90 minutes, your muscles may run out of glycogen. At that point, you may start to become fatigued, and your performance may suffer.

But with carbohydrate loading, you may be able to store up enough energy in your muscles to give you the stamina to make it through longer endurance events without overwhelming fatigue — although you still will need to consume some energy sources during your event.

Two steps to carbohydrate loading

Traditionally, carbohydrate loading is done in two steps the week before a high-endurance activity:

* Step 1. About a week before the event, adjust your carbohydrate intake, if needed, so that it's about 50 to 55 percent of your total calories. Increase protein and fat intake to compensate for any decrease in carbohydrates. Continue training at your normal level. This helps deplete your carbohydrate stores and make room for the loading that comes next.
* Step 2. Three to four days before the event, increase your carbohydrate intake to about 70 percent of your daily calories. Smaller athletes should consume about 4.5 grams of carbs per pound (kilogram) of body weight, while larger athletes should consume about 3.5 grams per pound of body weight to get adequate carbohydrate intake. Cut back on foods higher in fat to compensate for the extra carbohydrate-rich foods. Also scale back your training to avoid using the energy you're trying to store up. Rest completely the day before your big event.

Sample carbohydrate-loading meal plan

Here's a sample carbohydrate-loading meal plan for an athlete who weighs 170 pounds (77 kilograms). Based on 4 grams of carbohydrates per pound of body weight, the meal plan consists of about 70 percent carbohydrates. You can tweak this sample carbohydrate-loading meal plan to suit your own tastes and nutritional needs. Keep in mind that 1 gram of carbohydrates has 4 calories.

Sample carbohydrate-loading meal plan

Item (amount)	Carbohydrates (grams)	Total calories
Breakfast		
Milk, fat-free (12 ounces)	18	125
1 oat bagel (4 1/2-inch diameter)	70	334
Peanut butter (1 tablespoon)	3	94
Honey (1 tablespoon)	17	64
Morning snack		
2 fig bars (3-inch bars)	40	198
Grape juice, unsweetened	37	152
Raisins (1 1/2 ounces)	34	129
Lunch		
Milk, fat-free (8 ounces)	12	83
4 slices whole-wheat bread	95	512
Chicken breast, roasted without skin	0	142
Romaine lettuce, shredded (1/4 cup)	1	2
4 thin tomato slices	2	44
Mayonnaise-type salad dressing	7	76
Tortilla chips, low-fat, baked (1 ounce)	23	118
12 baby carrots	10	48
Afternoon snack		
Low-fat fruit yogurt (8 ounces)	47	250
10 wheat crackers	13.5	91
1 medium apple	25	95
Cranberry juice (12 ounces)	46	174
Dinner		
Salmon, baked (3 ounces)	0	155
Brown rice (1 1/2 cups)	69	328
Broccoli, steamed (1 cup)	11	55
Milk, fat-free (12 ounces)	18	125
Lettuce salad (1 1/4 cups)	7	33
Reduced fat Italian salad dressing	1	22
Walnuts (1/4 cup)	4	196
Wheat dinner roll (1 ounce)	13	76
Evening snack		
Strawberry slices (1/2 cup)	6	27
Frozen yogurt, fat-free chocolate	55	299
Total	**684.5**	**4,047**

Results

Carbohydrate loading may give you more energy during an endurance event. You may feel less fatigued and see an improvement in your performance after carbohydrate loading. But carbohydrate loading isn't effective for everyone. Other factors can influence your athletic performance or interfere with the effectiveness of your carbohydrate-loading strategy, including your fitness level and the intensity level of your exercise. Even with carbohydrate loading, you still may feel muscle fatigue. You may not perform as well as you'd hoped, or you may even have to drop out of your event before finishing it.

If you're a man, a carbohydrate-loading diet can increase the levels of glycogen stored in your muscles from 25 to 100 percent of your normal amount. However, carbohydrate loading may not be as effective if you're a woman. Fewer research studies exist about carbohydrate loading in women, and they've yielded mixed results. A woman may need to consume more calories than usual during carbohydrate loading to get the same benefits as a man does. A woman's menstrual cycle also may affect the effectiveness of carbohydrate loading for reasons not yet clear.

Even if you've practiced carbohydrate loading, you still need to replenish your body's energy during the event to maintain your blood sugar levels. You can do this by periodically consuming sports drinks, gels or bars, fruit, or even a candy bar during your event at the rate of 30 to 60 grams an hour. And don't forget to eat carbohydrate-rich foods after your endurance event, too, to replenish your glycogen stores.

Risks

Carbohydrate loading isn't right for every endurance athlete. It's a good idea to consult your doctor or a registered dietitian before you start carbohydrate loading, especially if you have diabetes. You may also need to experiment with different amounts of carbohydrates to find something that works best for your situation.

A carbohydrate-loading diet can cause some discomfort or side effects, such as:

* Weight gain. Much of this weight is extra water, but if it hampers your performance, you're probably better off skipping the extra carbs.
* Digestive discomfort. You may need to avoid or limit some high-fiber foods one or two days before your event. Beans, bran and broccoli can cause gassy cramps, bloating and loose stools when you're loading up on carbohydrates.
* Blood sugar changes. Carbohydrate loading can affect your blood sugar levels. Monitor your blood sugar during training or practices to see what works best for you. And talk to your dietitian or doctor to make sure your meal plan is a safe one for your situation.