



Fueling the Distance Runner

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Pre-run fueling concerns:

- 1) Maximize glycogen stores
- 2) Top-off tank: 3-4 hours before: 200-300 grams of carbohydrates + 12 fl.oz of sports drink or water
0-1 hour before: 15-50 grams of carbohydrates + 12 fl.oz of sports drink or water

*For morning workouts consider a liquid meal replacement with 50 grams of carbohydrates

During-run fueling concerns:

- #1 = HYDRATION:
1. Maximize fluid absorption:
Sweat rate can exceed gastric emptying (0.5 - 2.5 liters/hour vs. 1 liter/hour)
>8% slows the rate of gastric emptying
< 6% to be better than water
Fructose added to other carbs may improve fluid absorption
 2. Replenish electrolyte losses:
Sodium ~118-207mg/8oz cup
Potassium ~30-50mg/8oz cup
Magnesium
(See sports drink comparison chart)
 3. Replenish energy (carbs):
Maximum rate of utilization = 60g/ hour

You can absorb approximately 1 liter of liquid per hour so this would require your beverage to be at least 6% carb solution (not more than 8%)

To take advantage of multiple carb transport mechanism there should be various sources within your beverage:

Glucose	
Sucrose	<i>all primary sources</i>
Maltose	
Maltodextrins (less sweet)	
Fructose (gastric distress)	<i>all secondary sources</i>
Galactose	

2) Alternative energy (carb) replacement:

Gu, Gel, or Boom must be taken with 4-8oz of water
Each contain ~ 30-45 grams of carbs per packet (2/hour is needed)
They contain some electrolytes but not enough to substitute for sports drink

Post-run recovery concerns:

- 1) "window of opportunity" =
 - 30 minutes post workout
 - 4:1 carb:protein combo
 - ~ 300 calories
 - 20 oz of sports drink per pound lost
- Then enjoy a normal mixed meal of carbs, protein, and fat about 2 hours after workout/race.

Other nutrition concerns of the distance runner:

- Antioxidants
- Calcium
- Iron
- Omega Fatty acids

Nutrient Analysis of Popular Sports Drinks

Beverage name Per 8 fluid oz	Percentage of carbohydrate	Grams of carbohydrate	Type of carbohydrate	Calories	Sodium (mg)	Potassium (mg)
Gatorade Thirst Quencher Gatorade Company	6%	14	Sucrose, Glucose, Fructose	50	110	30
All Sport PepsiCo, inc.	8%	20	High fructose corn syrup	70	55-80	50
Cytomax Cytosport, Inc.	6%	15	High fructose corn syrup, Maltodextrin, Lactate	80	70	77
Met-Rx ORS Met-Rx, inc.	8%	19	Fructose, Glucose	75	125	40
Powerade Coca-cola company	8%	19	High fructose corn syrup, glucose polymers	72	53	33
PowerBar Perform PowerBar, Inc.	7%	16	Glucose, Fructose, Maltodextrin	60	110	35
Ultima Ultima Replenisher	2%	4	Maltodextrin	16	8	16

Non-sports drinks:

Coca-cola Coca-cola Company	11%	27	High fructose corn syrup, sucrose	100	35	0
Orange juice	11%	27	Sucrose, glucose, fructose	112	7	446

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7. NUTRIENT CONTENT OF POPULAR ENERGY BARS

Name and Manufacturer	Size	Flavor*	Calories	Carbohydrate (g)	Protein (g)	Fat (g)	Calcium (mg)	Iron (mg)
Balance Bar Bio Foods, Inc Santa Barbara, CA	1.76 oz (50 g)	Toasted crunch	180	19	14	6	250	3.6
BumbleBar (organic) BumbleBar Vashon, WA	1.58 oz (45 g)	Chocolate crisp	230	20	6	15	200	5.4
Clif Bar Clif Bar, Inc Berkeley, CA	2.4 oz (68 g)	Apple cherry	250	52	4	2	40	1.45
Harvest Bar PowerBar, Inc Berkeley, CA	2.3 oz (65 g)	Cherry crunch	240	45	7	4	150	2.7
Met-Rx High Protein Food Bar Met-Rx USA, Inc Irvine, CA	4.41 oz (125 g)	Chocolate roasted peanut	380	57	30	7	1,000	9
Mountain Lift Energy Bar Optim Nutrition Salt Lake City, UT	2.1 oz (60 g)	Chocolate	220	34	12	5	350	6.3
PowerBar PowerBar, Inc Berkeley, CA	2.3 oz (65 g)	Chocolate	230	45	10	2	300	6.3
PR Bar PR Nutrition, Inc San Diego, CA	1.76 oz (50 g)	Granola crunch	180	21	14	6	250	7.2
ProPortion Rexall Boca Raton, FL	1.4 oz (40 g)	Chocolate peanut butter	160	17	12	6	100	9
Source One Met-Rx USA, Inc Irvine, CA	2.2 oz (62.5 g)	Peanut butter and jelly sandwich	190	22	15	3	500	4.5
Zone Perfect Eicotech Corporation Beverly, MA	1.76 oz (50 g)	Honey peanut	200	22	14	7	400	2.7

*For most brands, several flavors are available. Nutrient content may vary by flavor.

Source: Manufacturer data

*From: Sports Nutrition Christine Rosenbloom, editor;
The American Dietetic Association, 2000*

Nutrient Deficiencies that Impair Exercise Tolerance

Deficiency	Physiological Consequences	Primary Exercise Capacity Affected	Food Sources of Vitamin or Mineral
Thiamin	Nerve conduction impairment, myopathy, cardiac dysfunction	Aerobic capacity, muscle strength, power, and endurance	Pork, nuts, wheat germ, pasta, rice, enriched cereals
Vitamin B-12	Central and peripheral nervous system dysfunction	Muscle strength and power	Meat, tuna, clams, crab eggs, milk, fortified soy protein
Vitamin D	Muscle contractile dysfunction and atrophy	Aerobic capacity, muscle strength, power, and endurance	Fortified milk, salmon, whole eggs, sunlight
Calcium	Muscle contractile dysfunction, cardiac conduction disturbance	Aerobic capacity, muscle strength, power, and endurance	Milk, cheese, yogurt, tofu, canned salmon, broccoli, spinach, oranges
Iron	Decreased oxygen-carrying capacity	Aerobic capacity	Red meat, chick peas, enriched breads, fortified cereals, lentils, black beans, spinach, broccoli, apricots
Magnesium	Muscle contractile dysfunction, cardiac conduction disturbance	Aerobic capacity, muscle strength, power, and endurance	Tofu, chili with beans, cocoa powder, raisin bran, spinach
Potassium	Muscle contraction dysfunction, cardiac conduction disturbance	Aerobic capacity, muscle strength, power, and endurance	Bananas, potatoes, pumpkin, spinach, broccoli, yellow-orange fruits and vegetables, milk