

The 3 Essential "Ns" in CoNditioNiNg

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It is universally accepted that conditioning is essential to achieving peak athletic performance. But what is often overlooked or placed at the bottom of the priority list are the three essential Ns that are part of conditioning-Performance Nutrition, Pre-exercise Nutrition, and Post-exercise Nutrition for recovery. Since nutrition provides the fuel that supplies energy to perform, nutrition is not to be taken lightly but rather it must be a crucial part of conditioning.

The 3 Ns

Athletes have heightened energy needs during pre-season training and in-season. To best support a conditioning program, skill training, and competitive performance serious athletes need to establish a daily meal pattern that insures a consistent supply of energy and nutrients. In addition to meeting energy needs, it is also important that the diet has the *right balance* of the energy-producing macronutrients, carbohydrate, protein, and fat. Since *timing* of nutrient intake is important, athletes are advised to include three meals and two to three snacks each day.

Recommended quantities of macronutrients in the diet will be relative to a number of individual factors, including the athlete's weight and the type and intensity of the activity.

Applying general guidelines for including macronutrients in the diet let's look at the range of macronutrients for a 150 lb. athlete

- Carbohydrate (CHO) is the preferred muscle fuel for intense physical work and the flame that allows the body to burn stored fat for endurance exercise. Two thirds of the meal should be filled with complex forms of carbohydrate.
 - ♦ **Performance Nutrition:** 340g-682g CHO daily
 - ~100g CHO at meals and snacks
 - **Pre- & Post-Exercise:** ~70g CHO
- Proteins, being part of the structure of all molecules, are necessary for tissue growth, proper metabolism and immune function, respiratory and nerve function, and more. Include high-quality protein from protein-rich foods at each meal with small amounts pre- and post-exercise.
 - ♦ **Performance Nutrition:** 95g-123g protein daily
 - 4oz-6oz lean meat, poultry, fish at meals
 - 8 oz milk or yogurt 3 or more times a day
 - **Pre- & Post-Exercise:** ~10 g protein + carbohydrate
- Fat is a major source of energy and essential fatty acids, is necessary for the absorption and delivery of nutrients, helps maintain body temperature, and enhances the flavor and texture of foods. The proportion of fat in the diet of athletes depends on numerous factors, but it is generally recommended that athletes' diets contain between 15%-30% of total calories.
 - ♦ **Performance Nutrition:** 70g-136g fat per day
 - Nuts, seeds, oils, nut butters, vegetable oil spreads, avocado, olives
 - Some fat is in dairy products, meats, poultry, and fish
 - **Pre- & Post-Exercise:** fats should be kept low before and after exercise

What about vitamins and minerals?

Since athletes' energy demands are high, a diet that is *adequate and balanced* in macronutrients from a wide variety of food is likely adequate in most micronutrients-vitamins and minerals. Due to demanding schedules and limited food choices, *adequate and balanced* may not be the case. For some micronutrients, it is more difficult to meet recommended intakes. Unless athletes have 3 or more 8-oz servings of milk or yogurt daily, their calcium and vitamin D intakes may be too low, placing

them at higher risk for injury.

Nutrient-Rich Snacks That Do a Body Good

Pre- and post exercise food and fluid are essential to achieving utmost conditioning gains, peak performance, and speedy recovery. Several factors, including convenience, loss of appetite, digestibility, and access to appropriate food, make pre- and post nutrition especially challenging for athletes and limit the choices of foods and beverages for pre- and post-exercise snacks.

Pre- and post-exercise snacks need to supply fluids, plus carbohydrates, and protein. Since fluid replacement is essential to both conditioning and peak performance, the first thing that a snack must provide is fluid. In order to increase muscle tissue, athletes need to be well hydrated. Furthermore, athletes must insure complete rehydration with *each bout of exercise* in order to avoid progressive dehydration. As little as 2% dehydration can have a detrimental effect on performance, starting with mental function. For a 150 lb. athlete, that is a loss of 48 oz of fluid.

Carbohydrate-rich foods supply the fuel that powers muscle work therefore, pre- and post-exercise foods need to contain ample easy-to-digest, low-fiber, carbohydrate foods. Liquids leave the stomach more quickly than solids and thus are ideal for pre- and post-exercise snacks.

Small amounts of protein both pre- and post-exercise have been shown to enhance the growth of new protein. A snack that supplies 10-20 grams of protein from a high-quality food source helps to maximize protein synthesis in response to resistance training.


Timing is Key

When it comes to pre- and post-exercise nutrition, timing is key. The goal of a pre-exercise snack, is to top off fluids and supply carbohydrates and a modest amount of protein to help fuel the body and supply nutrients that will help recovery. A small snack 1-2 hours prior to exercise can be digested before exercise begins.

A post-exercise snack needs to continue supplying fluids to speed rehydration, replenish glycogen stores that have been used during exercise, and provide the building blocks for new protein. The first 15 minutes to one hour post-exercise is the *window of opportunity* when muscles are most receptive to building new tissue. It is important to consume a snack immediately after exercise that supplies fluids, and calories from carbohydrate, and protein to maximize recovery.

- **Liquid foods** that supply carbohydrate and protein in approximately a 3:1 ratio are among the best pre- and post-exercise choices. Consider the following when choosing a liquid food:
 - After exercise when appetite is suppressed, fluids are easier to consume than solids.
 - Flavored milk's nutrient profile makes it a superior recovery food and an excellent source of calcium and vitamin D.
 - Milk supplies much-needed fluids for recovery and is easily digested and absorbed. For the same reasons, it is an ideal food for pre-exercise as well.
 - Milk is a source of fast- and slow-acting proteins and branched chain amino acids. Milk's protein profile contributes to enhanced muscle growth and helps minimize the onset of delayed onset muscle soreness.
 - One of the most nutrient-rich foods, milk can be incorporated into meals as well as snacks, contributing further to daily calcium and vitamin D intakes. Even lactose intolerant athletes can take advantage of the nutrition power by choosing a lactose-free product.
 - A liquid food that does not require refrigeration is convenient and easy to carry with you.

Take-away Points

- Conditioning, training, and performance must be fueled, and the right blend of fuel yields the best results.
- Nutrient-rich foods and beverages make the best use of calories.
- Pre- and post-exercise snacks, an important part of an athlete's diet, need to supply fluids, carbohydrates, and protein.
- Convenience and portability often make the difference in whether or not an athlete consumes an appropriate pre- or post-exercise snack.
- Nutrient-rich liquid foods help athletes meet their nutritional needs. 

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NUTRITION AWAY FROM HOME

Targets:

- Balanced diet
- High carbohydrate, adequate protein and fat
- Adequate fluid intake
- Minimal chance of a gastrointestinal problem

You worked hard to get here — don't blow it at the dinner table

BEST CHOICES	USE SPARINGLY
BREAKFAST	
Cereal	Cream
Yogurt - low fat plain or fruit	
Fruit	
French toast and pancakes	Butter or margarine
Egg dishes - not fried	Fried eggs
Ham and steak - if lean/not fried	Bacon, sausage
Fish - not fried	Fried fish/fish sticks
Potato - not fried	French fried/hash browns
Rice - not fried	Fried rice
Toast	Donuts, Danishes, pastries
Muffins/bagels - try jam or jelly	Croissants
Beverages - Drink plenty of fluid!	
Bottled water	
Fruit Juice - fresh, cans, cartons	Fruit drinks
Low fat milk/fortified soy beverage	
LUNCH AND DINNER	
Fruit & Vegetables - fresh, canned	
Soups - use broth-based	Cream soups
Meat, Fish, Poultry - broiled, roasted, baked, barbecued, poached. (Sensible portions. Trim fat. Remove skin from chicken)	Fried meat, fish, poultry
Soy products	Deep-fried, battered
Vegetables - steamed, boiled, baked	Buttered, sautéed, creamed, fried, soufflé
Potatoes - baked, boiled, mashed	Fried potatoes
Rice - steamed, plain	Fried, butter, or cream sauce
Pasta/Noodles - plain/vegetable sauce	Butter or cream sauce
Bread - rolls, crackers, all breads	
Deli meats - turkey, chicken, lean beef, lean ham	Paté, sausages, processed meats, liverwurst
Salads - bean, fresh peeled vegetables, fruit salad, cottage cheese	Potato and macaroni salad, creamy coleslaw, salad dressing
Desserts - fruit, yogurt, custards, puddings	Pies, ice cream, pastries, cakes
Cheese - in moderation	

Food safety guidelines:

Foods that are to be eaten as hot (temperature) dishes, (e.g., meat, casseroles, rice) should not be served lukewarm. Foods that are to be eaten cold (e.g., deli meats, salads, sandwiches, milk, custard, etc.) should be served at a cold temperature. Bacteria reproduce quickly at room temperature. If the venue meals have been unrefrigerated, do NOT eat the mayo salads (e.g. macaroni, potato, or coleslaw)! Foods should be served either hot or cold and should be consumed within one hour.



Guidelines for travel in foreign countries:

- Eat only in restaurants recommended by Games Organizers.
- Choose fruit that can be peeled; the skin can contain bacteria and infectious agents. Don't cut through to the centre of the fruit until after it has been peeled and the knife has been washed.
- Avoid raw vegetables unless peeled.
- Avoid food served by street vendors.
- Bread is the best way to "put out the fire" in your mouth caused by a spicy dish.
- AVOID all raw fish, raw or partially cooked meat or poultry.
- If you choose to eat at fast food restaurants, be aware that many food choices in these restaurants are high in fat.

At each meal, choose from at least three of the following groups:

Grain products	Vegetables and fruit
Milk products	Meat and alternatives

Pre-competition meal/snacks:

GOALS: Physical comfort Mental alertness

Purpose:

1. To prevent hunger before and during the event.
2. To ensure adequate blood sugar level.
3. To maximize fluid levels, particularly if risk of dehydration is high.
4. To supply food that is quickly and easily digested.
5. To allow foods athletes perceive will provide an advantage.

Try new foods or combinations during training, not before competition.

Size and composition of the meal and/or snack:

The size and items will vary according to the time between the meal/snack and the competition. Allow time for digestion. High calorie meals, especially those high in fat content, take longer to leave the stomach than lighter snacks.

Generally allow:

- 3-4 hours for a large meal to digest
- 2-3 hours for a smaller meal
- 1-2 hours for a small snack or blender/liquid meal or, whatever your own tolerance indicates.

1. Select foods that are well liked and familiar.
2. Choose foods that are rich in carbohydrate like pasta, cereal, dry cookies, bread, fruit.
3. Drink 400 – 600 mL of fluid 2 to 3 hours before exercise.
4. Drink 150 – 350 mL about 15 minutes before exercise.
250 mL = 1 cup = 8 fluid ounces

Be cautious when consuming these types of foods in your pre-competition meal/snack:

- Fat-rich foods, spicy foods, fibre-rich foods, gas producing foods, foods containing caffeine, alcoholic beverages.

If you will be competing within the next **two hours**:

- Small quantities of carbohydrates are the best choices – e.g., fruit, fruit/vegetable juices, bread, bagels, yogurt, pasta, etc.
- Drink water (when travelling, use bottled water).

Recovery:

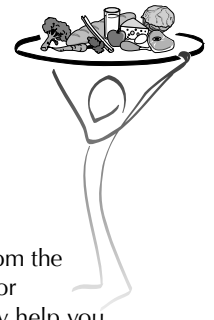
As soon as possible after your competition for the day, re-hydrate, select high carbohydrate foods with some protein. Within 15 minutes is best.

- Drink beyond thirst. Exercise dulls the thirst mechanism.
- Select items such as fruit juice, sweet drinks, breads, fruit, yogurt.

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From Training Diet to Meal Plans



The amount of food in your everyday meal plan varies according to your energy needs. The more you train, the more food you need for energy. By including food from all four food groups in your meals and snacks, you will consume the nutrients you need for top performance.

From the **Training Diet – Everyday Eating: Action Plans** chart, choose the Action Plan that matches your sport. Notice the number of servings suggested from each food group. Because athletes use carbohydrate as fuel, you will see that the number of servings from the carbohydrate-rich grain products and vegetable and fruit food groups increase more quickly than the number of servings from the protein-rich milk products and meat and alternative food groups.

Divide the number of servings from each food group into three meals and several snacks. For example, if Action Plan #2 is closest to your needs and suggests 8 to 14 servings of grain products, you might try the lowest number of servings (8). That would allow 2 servings of grain product at each meal and 2 servings for your snacks. If you are always hungry, you might try 14 servings of grain throughout the day, with 3 servings at each meal and 5 grain servings divided into 2-3 snacks.

A balanced **meal** has several servings from the carbohydrate-rich grain products and from the vegetables and fruit food groups. Fewer servings are needed from higher protein foods – about one serving from the milk products group and about one from the meat and alternatives group. Most meals include some oil or fat, either as part of the food (peanut butter, nuts/seeds, cheese) or added to one or more foods (margarine/butter, salad dressing). Many meals include fluid in the form of juice, milk, or water.

Your planning formula for each everyday meal:

- 2-6 servings of grain products
- 2-6 servings of vegetables and fruit
- ½-1 servings of milk products
- ½-1 servings of meat and alternatives
- oil or fat
- fluid

If you can't eat all of your food in a meal, try to save your drinks towards the end of your meal – this way you won't fill up on liquids first! Athletes who need a very large amount of energy may need to drink most of their fluid between meals rather than as part of their meal.

As an athlete, you need frequent meals and snacks throughout the day to top up your energy supply and keep your energy level steady. You can increase the total energy in your menu by increasing the number of servings of a food or by adding another food from the same or another food group. You can add variety and interest by choosing different foods within each food group throughout the week.

Here is a sample menu that can be expanded from the energy needed in Action Plan #1 to the energy for Action Plan #3. The food group designations may help you substitute different food choices to add variety to your diet.

BREAKFAST:	FOOD GROUP
Orange juice	Vegetables and fruit
Whole wheat pancake with blueberries	Grain products
Scrambled egg	Vegetables and fruit
Milk	Meat and alternatives
Maple syrup	Milk products
	Other foods

SNACK	FOOD GROUP
Low-fat muffin	Grain products
Apple and/or banana	Vegetables and fruit

LUNCH:	FOOD GROUP
Pita bread stuffed with tuna salad	Grain products
Raw vegetable cup – carrots, cauliflower, zucchini	Meat and alternatives
Milk/fruit smoothie	Vegetables and fruit
	Milk products
	Vegetables and fruit

SNACK	FOOD GROUP
Multigrain date bread	Grain products
Milk	Milk products

SUPPER	FOOD GROUP
Beef and Broccoli stir-fry	Meat and alternatives
Brown rice with mushrooms and celery	Vegetables and fruit
Peaches with yogurt topping	Grain products
	Vegetables and fruit
	Vegetables and fruit
	Milk products

SNACK	FOOD GROUP
Oatmeal cookie	Grain products
Milk-based hot chocolate	Milk products

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From Training Diet to Meal Plans, page 2

Check the following chart to understand how much of each food you would need, depending on whether you use Action Plan 1, 2, or 3.

The chart below uses the following abbreviations:

GP = Grain products **VF** = Vegetables and fruit **MP** = Milk products **MA** = Meat and alternatives **OF** = Other foods **Servings** = Number of food group servings

ACTION PLANS TO MEAL PLANS

Food	Action Plan #1		Action Plan #2		Action Plan #3	
	Amount	Servings	Amount	Servings	Amount	Servings
Breakfast:						
10 cm whole wheat pancake	1 pancake	1 GP	3 pancakes	3 GP	6 pancakes	6 GP
Orange juice	125 mL	1 VF	125 mL	1 VF	250 mL	2 VF
Blueberries	125 mL	1 VF	125 mL	1 VF	250 mL	2 VF
Milk	125 mL	½ MP	250 mL	1 MP	250 mL	1 MP
Scrambled egg with milk	1 egg 60 mL	½ MA ¼ MP	2 eggs 100 mL	1 MA ½ MP	3 eggs 150 mL	1½ MA ½ MP
Maple syrup on pancakes	15 mL	1 OF	30 mL	2 OF	60 mL	4 OF
Margarine/butter			15 mL	1 OF	30 mL	2 OF
Snack						
Low-fat muffin (small)					1 muffin	2 GP
Apple/banana	1 fruit	1 VF	2 fruit	2 VF	2 fruit	2 VF
Lunch						
Pita bread	1 pita	2 GP	1.5 pita	3 GP	2 pita	4 GP
Raw vegetable cup	125 mL	1 VF	250 mL	2 VF	500 mL	4 VF
Milk	125 mL	½ MP	250 mL	1 MP	250 mL	1 MP
Tuna salad	50 mL	½ MA	100 mL	1 MA	100 mL	1 MA
Mayonnaise in tuna salad	10 mL	1 OF	15 mL	1 OF	15 mL	1 OF
Salad dressing veggie dip					30 mL	2 OF
Snack						
Multigrain date bread	1 slice	1 GP	2 slices	2 GP	3 slices	3 GP
Milk (#3 for fruit smoothie)	250 mL	1 MP	250 mL	1 MP	250 mL	1 MP
Fruit for smoothie					250 mL	2 VF
Supper:						
Bread roll					1 roll	2 GP
Cooked brown rice	125 mL	1 GP	250 mL	2 GP	375 mL	3 GP
Mushrooms and celery	60 mL	½ VF	125 mL	1 VF	125 mL	1 VF
Broccoli for stir-fry	125 mL	1 VF	250 mL	2 VF	250 mL	2 VF
Vegetable juice					250 mL	2 VF
Beef for stir-fry	100 g	1 MA	100 g	1 MA	100 g	1 MA
Peaches	125 mL	1 VF	250 mL	2 VF	250 mL	2 VF
Yogurt topping	100 mL	½ MP	100 mL	½ MP	175 mL	1 MP
Oil for stir-fry	10 mL	1 OF	15 mL	1 OF	15 mL	1 OF
Margarine/butter					10 mL	1 OF
Snack						
Oatmeal cookie	15 g	½ GP	30 g	1 GP	60 g	2 GP
Milk-based hot chocolate	125 mL	½ MP	125 mL	½ MP	250 mL	1 MP

Food Group	Action Plan #1	Action Plan #2	Action Plan #3
Grain Products	5½ servings	11 servings	22 servings
Vegetables and Fruit	6½ servings	11 servings	19 servings
Milk Products	3¼ servings	4½ servings	5½ servings
Meat and Alternatives	2 servings	3 servings	3½ servings
Other Foods	3	5	11



From Training Diet to Meal Plans, page 3

OTHER FOODS

The other foods category of Canada's Food Guide to Healthy Eating includes the foods that are not part of the four food groups. These foods add variety and taste to your diet. Fat, sugar, and many beverages are categorized as other foods.

There are no defined serving sizes for other foods. As a guideline, 5-15 mL of fat and/or sugar is suggested in the menu as a possible portion.

Fat: All diets require some fat. If you are an athlete who needs a great deal of energy, you may need some concentrated energy sources higher in dietary fat to help you to "fill up". Check [Training Diet – Everyday Eating: Fat – Get the Essentials](#) for more detail about fat.

Sugar: Sugar adds carbohydrate to help maintain energy. Sugar does not provide other nutrients like vitamins and minerals so cereals, breads, vegetables, and fruit are better quality sources of carbohydrate than sugars.

Alcohol: Like sugar, alcohol provides energy with few other nutrients. As well, alcohol interferes with your recovery from exercise, slowing the replacement of protein and carbohydrate in your body.

Remember, your everyday eating is important for optimal performance. The more energy you need to participate in your sport, the more carbohydrate-rich foods you need to include in your menu plans.

Timing: Planning Meals and Snacks Relative to Workouts

As an athlete, you need balanced meals and snacks throughout the day to supply energy and nutrients. Before, during, and after your workouts, some nutrients may need more emphasis than others. By the end of the day, all the food group servings and nutrients should have been consumed.

BEFORE a workout	Focus on fluid and carbohydrate
DURING a workout lasting less than an hour	Focus on fluid
DURING workouts longer than 60 minutes	Focus on fluid and carbohydrate
Immediately AFTER a workout	Focus on fluid, carbohydrate, and protein

BEFORE

Whether your workout is a training session or a competitive event, the pre-exercise meal is part of your balanced [Action Plan](#). Fluid is emphasized to ensure you are well hydrated before beginning your activity. Also, your pre-exercise meal may be higher in carbohydrate than everyday meals.

Generally allow:

- 3-4 hours for a large meal to digest
- 2-3 hours for a smaller meal
- 1-2 hours for a small snack or blender/liquid meal or, whatever your own tolerance indicates

Your fluid intake before exercise tops up your fluid level and helps prevent dehydration. Foods rich in carbohydrate are important fuel for your brain and nervous system, allowing you to focus on your skills as well as to perform physical feats. Your pre-exercise meal

prevents hunger and provides energy before and during your training or competition. For comfort, choose foods that are quickly and easily digested, especially before a competition. In some cases, liquid meals may be needed if there is little time before your event or if you tend to have a nervous stomach.

If you have a "nervous stomach" before events, choose lower-fibre grain products, juice, or pureed foods (toast or crackers, applesauce or apple juice, soup, yogurt, fruit smoothie, etc.).

CAUTION: Spicy, gas producing, fatty and/or fibre-rich foods may cause discomfort. Products containing caffeine may also be problematic.

Legumes (e.g. baked beans) are fibre-rich and can be gas-producing. **Unless you eat legumes regularly, they may have too much fibre for comfort.**

For some pre-exercise food suggestions, check the [Fluids and Foods BEFORE Training/Competition](#) tip sheet.

DURING

During most exercise sessions lasting up to one hour, your main concern is replacing fluid lost from sweating and breathing hard. Hot and/or humid weather can cause you to lose more than one litre per hour of sweat. During cold weather, there is little water vapour in the air and a substantial amount of fluid can be lost from breathing. Even athletes who train and compete in the water (e.g. swimmers) lose fluid from sweating.

Training or competitions lasting longer than an hour may cause you to use up all your carbohydrate (glycogen) energy stores. Consuming carbohydrate in a drink (e.g. sport drink) will help maintain your energy and focus.

For suggestions during exercise, check the [Fluids and Foods DURING Training/Competition](#) tip sheet.

AFTER

After an exercise bout, to replace your lost fluids, you need to drink 1.5 litres of fluid for every kilogram of body weight you lost. Sodium in your beverage helps restore your electrolyte losses and keep the fluid in your body.

Research has shown that carbohydrate consumed in the minutes after exercise moves readily through the blood stream and into muscles to replace the glycogen (muscle energy) that was used during exercise. Restoring glycogen helps to prepare you for your next exercise session. Similarly, amino acids from dietary protein (broken down in the digestive tract) are transported by the blood stream to muscles and move into the muscles to repair damaged tissue. Only a small amount of protein is needed.

To maximize recovery, check the suggestions included in the [Fluids and Foods AFTER Training/Competition](#) tip sheet.

During multi-event days like tournaments, the meal or snack after one game or event may be the pre-event meal/snack for the next competitive session. The amount and type of food will vary based on the length of time you have between the meal/snack and the next competition or training session. If the recovery fluid and food intake after one exercise session is your pre-exercise nutrition for the next activity, think "fluid" and "carbohydrate". Be sure you have time for digestion. Meals may need to be kept small if time between events is limited. You may find that "sipping" and "nibbling" work well for your sport. For more hints regarding food on multi-event days check the [Tournament Tips](#) tip sheet.



From Training Diet to Meal Plans, page 4

BALANCING THE NUTRIENTS

Protein-rich foods are digested more slowly than carbohydrates, delaying hunger during a long event but causing an upset stomach during an intense event. Low-fat milk, yogurt, lean meat, skinless chicken, non-breaded fish, eggs, and/or legumes (beans, peas, and lentils) are protein-rich foods that help delay hunger. If your only protein choice is a higher fat food (peanut butter, nuts/seeds, cheese), use only a small amount with your carbohydrate choice (bread, crackers, fruit, etc.).

Fat is digested very slowly. Before most training and competition situations, low fat food is best. French fries, chips, breaded chicken or fish, hot dogs, greasy hamburgers, cream or cheese sauces, margarine/butter, salad dressing, cheese, peanut butter, nuts, seeds, and chocolate contain a substantial amount of dietary fat.

Although you may have fewer servings of protein-rich foods and less fat/oil in meals just before an exercise session, meals after exercise or during the day (or week) should make up for this temporary imbalance by adding a little extra.

SPLITTING MEALS/SNACKS AROUND TRAINING OR COMPETITION

If your training or competition is near a mealtime, your meal can be divided into two smaller meals/snacks with some food consumed before the exercise session and the remaining part of the meal eaten after the training or competitive session. Look for foods to carry with you or food outlets where you can buy part or all of a meal. Pack snack items to have on hand. Some snacks can be part of your next meal.

BEFORE a *breakfast* training session or competition:

Toast	Grain products
with jam	Other food
Fruit juice	Vegetables and fruit
Water	Fluid

AFTER a *breakfast* training session or competition:

Cereal	Grain products
Berries	Vegetables and fruit
Milk	Milk products
Toast	Grain products
with egg or peanut butter	Meat and alternatives

Food outlet option for *breakfast*

English muffin	Grain products
Fruit juice	Vegetables and fruit
Milk or Latté	Milk products
Egg	Meat and alternatives

BEFORE a *lunchtime* training session or competition:

For lunchtime competitions or training sessions, eat a hearty breakfast and top-up with a high carbohydrate snack a few hours before the event.

Small toasted bagel	Grain products
Fruit	Vegetables and fruit
Water	Fluid

AFTER a *lunchtime* training session or competition:

Bread for sandwich	Grain products
Salad or raw vegetables	Vegetables and fruit
Yogurt	Milk products
Lean meat or fish for sandwich	Meat and alternatives
Mustard	Other foods
Fresh or canned fruit	Vegetables and fruit

Food outlet option for *lunchtime*:

Whole grain bread roll	Grain products
Salad or raw vegetables	Vegetables and fruit
Milkshake	Milk products
Sliced meat or chili	Meat and alternatives

BEFORE a *dinnertime* training session or competition:

For dinnertime competitions or training sessions, eat a hearty lunch several hours before the event and top-up with a high carbohydrate snack a few hours before.

Small bowl of pasta	Grain products
Tomato sauce	Vegetables and fruit
with skinless chicken breast	Meat and alternatives
Water	Fluid

AFTER a *dinnertime* training session or competition:

Rye or multigrain bread	Grain products
Baked potato	Vegetables and fruit
Canned beans in tomato sauce	Meat and alternatives
Yogurt	Milk products
with fresh peaches	Vegetables and fruit

Food outlet option for *dinnertime*

Submarine sandwich	Grain products
Minestrone soup	Vegetables and fruit
Milk or chocolate milk	Milk products
Tuna filling in the sub	Meat and alternatives

Late night *RECOVERY* nutrition:

After an evening training session or competition, it is never too late to eat your recovery meal.

AFTER an *evening* training session or competition:

Cereal	Grain products
Fruit	Vegetables and fruit
Milk	Milk products

Food outlet option for *evening*

Bread for sandwich	Grain products
Juice	Vegetables and fruit
Lean meat in the sandwich	Meat and alternatives

FOOD SAFETY CONSIDERATIONS

To avoid getting sick, keep your foods at the right temperature. Foods that are to be eaten as hot (temperature) dishes, (e.g. meat, casseroles, rice) should not be served lukewarm. Foods that are to be eaten cold (e.g. deli meats, salads, sandwiches, milk, custard, etc.) should be served at a cold temperature.

Avoid bacterial contamination of meals and snacks. Keep cold foods cold and hot foods hot. Bacteria reproduce quickly at room temperature.



Fluids and Foods *BEFORE* Training/Competition



Pre-exercise nutrition provides:

- Energy
- Physical comfort
- Mental alertness

Targets:

- Optimal fluid intake
- High carbohydrate, moderate protein, and low fat

Why?

- To start exercise with optimal fluid levels.
- To prevent dehydration.
- To supply food that is quickly and easily digested.
- To ensure energy to train or compete.
- To prevent hunger before and during exercise.

Timing and meal/snack size are related.

Generally allow:

- 3–4 hours for a large meal to digest
- 2–3 hours for a smaller meal
- 1–2 hours for a small snack or blender/liquid meal or, whatever your own tolerance indicates

CAUTION: Spicy, gas producing, fatty, and/or fibre-rich foods may cause bloating or discomfort. Products containing caffeine have a laxative effect.

BEFORE exercise:

- Drink 5–7 mL of fluid per kg body weight (about 300–500 mL) 4 hours prior.
- Drink 3–5 mL of fluid per kg body weight (about 150–350 mL) fluid about 2 hours before exercise, if you have not produced any urine or if your urine is still bright yellow.
- Eat a meal or snack, high in carbohydrate, 2 to 4 hours prior. Ideal carbohydrate foods include vegetables, fruit, juices, whole grains, milk, yogurt, soy drinks, and legumes. Legumes are fibre-rich and can be gas-producing.

- Include foods that contain some salt or choose a beverage with 0.5–0.7 g/L to help promote thirst and to retain the fluid.
- If you have a “nervous stomach” before events, choose juice, pureed foods (e.g. applesauce, mashed potatoes), lower-fibre grain products (cereal bar), or a meal replacement beverage.

Experiment with fluids and foods in training to find out what, and how much, is comfortable for you.

Never try new foods or drinks before or during competition.

CONVERSION: 250 mL = 1 cup = 8 oz.

BEFORE – Focus on Fluid and Carbohydrate

Meal ideas – from home or on the go:

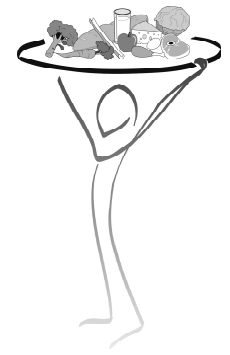
The amount and type of food will vary according to the amount of time available between the meal/snack and the start of training or competition. Allow time for digestion.

- Toast/bagel with jam, peanut butter, juice, yogurt
- Oatmeal/cereal, milk, raisins, juice
- Pancakes with a little syrup/spread, ham, juice
- Grilled chicken sandwich, juice
- Lean meat sandwich, carrots, milk, oatmeal raisin cookie, fruit
- Minestrone soup, cheese, crackers, vegetable juice
- Chili, bagel, milk
- Pasta with tomato/lean meat sauce, applesauce, chocolate milk
- Lentil soup, crusty roll, salad with a little dressing, soy beverage

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Fluids and Foods *BEFORE* Training/Competition



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Snack ideas:

- Fruit (fresh, canned, or juice)
- Fruit yogurt
- Low-fat muffin, juice, or applesauce
- Yogurt, social tea biscuits, juice
- Pita with hummus, vegetable juice
- Fig or oatmeal cookies, fruit, milk

Snacks for backpack or car:

- Dried fruit
- Juice boxes or fruit cup
- Dry cereal
- Cereal, sport, or energy bars
- Crackers
- Trail mix with added raisins or cereal

From these guidelines, make a list of the drinks and foods that work for you.

- Plan ahead and be prepared.
- Carry pre-exercise food.

Avoid bacterial contamination of meals and snacks. Keep cold foods cold and hot foods hot. Bacteria reproduce quickly at room temperature.

Before exercise, choose foods which are higher in carbohydrate and lower in protein and fat. This will allow quick absorption of carbohydrate energy from the food into the body. Include protein and fat sources during meals and snacks at other times during the day.

For information on planning your meals and snacks, see these CAC resources:

- For an overview of your nutrition needs during training, refer to [Training Diet: Everyday Eating](#).
- For a list of examples of high carbohydrate foods, refer to [Energize with Carbohydrate!](#)
- To learn how to meet your fluid needs during exercise, review [Fluids for Athletes](#).
- To create a meal plan for your training needs, see [From Training Diet to Meal Plans](#).

For help with planning your snacks before exercise, contact the dietitian at your [Canadian Sport Centre](#) or someone listed under the [Sport Nutrition Registry](#) on the CAC website. If there is no dietitian with expertise in sport listed in your area, [Dietitians of Canada](#) may list a dietitian near where you live.



Fluids and Foods *DURING* Training/Competition



During exercise, nutrition provides:

- Energy
- Physical comfort; absence of hunger
- Mental focus for best technique and skill execution

Targets:

- Optimal fluid and electrolyte intake
- Carbohydrate to maintain blood glucose

Why?

- To prevent excessive dehydration.
- To prevent excessive changes in electrolyte balance.
- To avoid drinking more fluid than needed to replace sweat loss.
- To ensure energy to train or compete.

Fluid needs vary with your sweat rate, sport, and environment (temperature, humidity, altitude). Monitor your body weight changes during training and competition sessions to estimate sweat loss.

To find out how much is optimal and comfortable, test the amount and type of fluid and food in training – never during competition!

DURING exercise:

- Drink freely from 0.4–0.8 Litres per hour.
- Drink more on days when you train harder.
- Drink more during hot, humid weather.
- Drink some fluid when training in cold weather.
- When training or competing for more than an hour, consume some carbohydrate (e.g. a sport drink or snacks).

Carbohydrate beverages: For sessions longer than an hour, carbohydrate helps maintain focus, technique, and energy. Aim for 0.7 g carbohydrate per kg body weight per hour (about 30–60 g carbohydrate per hour), taken at 15–20 minute intervals.

The recommended beverage for optimal fluid absorption during exercise has 40–80 g carbohydrate/L and 0.5–0.7 g sodium/L.

- Sport drinks provide water, carbohydrates, (40–80 g/L) and electrolytes (e.g. sodium, potassium).
- Fruit juice (100–160 g/L carbohydrate) needs to be diluted by half for rapid absorption and sufficient hydration during exercise.
- Energy drinks and soft drinks are too concentrated for rapid absorption and will slow rehydration during exercise.

You can make your own sport drink by mixing:

- 500 mL unsweetened orange juice
- 500 mL water
- 1.5 mL salt

One litre = 54 g (5.4%) carbohydrate and 0.5–0.7 g sodium.

Salt: Sport drinks contain salt (sodium), which is helpful for athletes training or competing for several hours and consuming large amounts of fluid.

CONVERSION: 250 mL = 1 cup = 8 oz.

DURING EXERCISE – Focus on Fluid and Carbohydrate

Water is an effective fluid replacement drink for short (less than one hour) exercise sessions.

Athletes consume more when the fluid:

- Is easy to access (right beside them).
- Is a flavour they like.
- Is chilled (about 10 degrees C).
- Has sodium added (0.5–0.7 g/L enhances flavour and thirst).

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Fluids and Foods *DURING* Training/Competition



Snack ideas *DURING* prolonged exercise:

For training sessions lasting several hours and during competition, emphasize fluid and carbohydrate-rich snacks during rest breaks.

The amount you consume will vary according to the amount of time available between the snack and the next bout of exercise. Allow time for digestion.

During exercise or for short exercise breaks (less than 1 hour):

- Diluted fruit juice or a sport drink
- Fruit (dried, fresh, canned, or pureed)
- Bread, pretzels, or crackers and vegetable juice
- Cereal, sport, or energy bars
- Arrowroot, fig, oatmeal, or similar low-fat cookies
- Plain or chocolate milk or meal replacement beverage
- Fruit yogurt or fruit smoothie

For a longer break in exercise (1 to 2 hours):

- Juice and a bagel with peanut butter
- Yogurt, fruit, and water
- vegetable juice and a lean meat sandwich
- Fruit, cookies, and chocolate milk

For a small meal between practices or events (about 3 hour break):

- Fruit, cereal, and milk
- Fruit, vegetable soup, lean meat sandwich and milk
- Steamed vegetables, juice, rice, chicken or fish, yogurt

Avoid bacterial contamination of meals and snacks. Keep cold foods cold and hot foods hot. Bacteria reproduce quickly at room temperature.

During short breaks between exercise sessions, choose foods that are higher in carbohydrate and lower in protein, fibre and fat. This will allow for quick digestion and absorption of fluid and carbohydrate into the body, helping prepare you for the next bout of exercise.

- Plan ahead and be prepared.
- Carry snack items, or know where you can buy them.

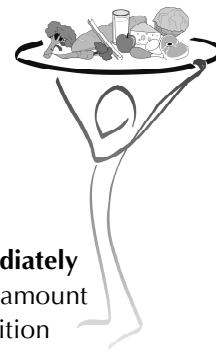
For information on planning your meals and snacks, see these CAC resources:

- For an overview of your nutrition needs during training, refer to [Training Diet: Everyday Eating](#).
- For a list of examples of high carbohydrate foods, refer to [Energize with Carbohydrate!](#)
- To learn how to meet your fluid needs during exercise, review [Fluids for Athletes](#).
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Fluids and Foods *AFTER* Training/Competition



Post-exercise, nutrition provides:

- Energy and nutrients to replenish fuel stores
- Rehydration for faster recovery
- Building blocks for muscle building

Targets:

- Optimal fluid and electrolyte levels
- Carbohydrate to restore muscle glycogen
- Protein to repair muscle damage
- Nutrients to support health and a strong immune system

Why?

- To replace lost fluid
- To replenish fuel stores
- To boost immune system
- To improve strength and endurance at the next event.

For rapid glycogen replacement, consume fluid and carbohydrate-rich foods as soon as possible after exercise, preferably within 30 minutes. Carbohydrate consumed in the hours after exercise moves readily into muscles to replace glycogen. Eating carbohydrate immediately after exercise also helps the body's immune system recover faster.

AFTER exercise:

- Drink 1 ½ L of fluid for every kg of body weight lost.
- Consume some salty fluids and food for electrolyte (sodium) replacement and better fluid retention.
- Aim for 1.5 g carbohydrate/kg body weight within 2 hours after exercise.
- Choose a carbohydrate food that has a high glycemic index*.
- Have some lean protein food.
- Avoid skipping meals. Be sure to eat your next regular meal (breakfast, lunch, or dinner) within 2 hours.

* For information about the glycemic index of food, refer to [Training Diet: Carbohydrate – Go Food](#).

The amount of food you consume immediately after exercise will vary according to the amount of time between your training or competition and your next scheduled meal or snack.

Late night *RECOVERY* nutrition:

It is never too late to eat your recovery meal. After an evening training session or competition, have a carbohydrate-based meal such as cereal with milk and fruit or a lean meat sandwich with juice.

CONVERSION: 250 mL = 1 cup = 8 oz.

AFTER EXERCISE – Focus on Fluid, Carbohydrate, and Protein

After exercise, eat a snack immediately, followed by a balanced meal within 2 hours. Choose from all four food groups:

Vegetables and fruit	Grain products
Milk and alternatives	Meat and alternatives

Meal ideas – at home or on the go:

Plan foods to carry with you or food outlets where you can buy part or all of a meal.

- Fruit juice, bagel (with jam), yogurt
- Banana, juice, hot or cold cereal, milk
- Juice, english muffin with an egg and ham
- Carrot sticks, fruit, lean meat sandwich or sub, milk, oatmeal cookie,
- Minestrone soup, vegetable juice, bagel, cheese
- Baked potato, chili, milk
- Applesauce, juice, pasta, vegetables and meat sauce, bread roll
- Bean burrito with vegetables, chocolate milk
- Fruit, vegetarian pizza, milk

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Fluids and Foods *AFTER* Training/Competition



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Snack ideas: Pack snack items to have on hand. Some snacks can be part of your next meal.

- Fruit, cereal/cereal bar, milk/yogurt
- Tomato or fruit juice, pretzels
- Bagel, peanut butter, jam, chocolate milk
- Juice, yogurt, crackers or cookies
- Raw vegetables with hummus, milk
- Vegetable juice, canned beans and pita
- Fruit smoothie (fruit, milk, yogurt) and toast
- Fruit, sport or energy bar, chocolate milk

Snacks for backpack or car:

- Juice boxes or fruit cups
- Dried fruit, puree fruit cups
- Dry cereal
- Cereal, sport, or energy bars
- Crackers
- Tuna or beans in cans with pull-off tops
- Trail mix with cereal

Avoid bacterial contamination of meals and snacks. Keep cold foods cold and hot foods hot. Bacteria reproduce quickly at room temperature.

Try recovery fluid and food in training to find out what is comfortable for you. Never try new food or drinks if you will be competing within the next 48 hours.

For information on planning your meals and snacks, see these CAC resources:

- For an overview of your nutrition needs during training, refer to [Training Diet: Everyday Eating](#).
- For a list of examples of high carbohydrate foods, refer to [Energize with Carbohydrate!](#)
- To learn how to meet your fluid needs during exercise, review [Fluids for Athletes](#).
- To create a meal plan for your training needs, see [From Training Diet to Meal Plans](#).

For help with planning your snacks before exercise, contact the dietitian at your [Canadian Sport Centre](#) or someone listed under the [Sport Nutrition Registry](#) on the CAC website. If there is no dietitian with expertise in sport listed in your area, [Dietitians of Canada](#) may list a dietitian near where you live.



TOURNAMENT TIPS

FLUIDS AND FOODS FOR MULTI-EVENT/MULTI-TRAINING DAYS



On multi-event/multi-training days, nutrition provides:

- Sustained energy
- Physical comfort; absence of hunger
- Mental focus for best technique and skill execution

Targets:

- Adequate fluid and electrolyte intake
- High carbohydrate, adequate protein, and low fat

Why?

- To replace fluid levels, preventing excessive dehydration.
- To prevent excessive changes in electrolyte balance.
- To provide energy before and during training or competition.
- To prevent hunger.
- To supply food that is quickly and easily digested.
- To ensure energy and nutrients to recover and prepare for the next training session or competitive event.

Timing and meal/snack size are related.

The amount and type of food you consume will vary based on the time you have between the meal/snack and the next competition or training session. Recovery fluid and food intake after one exercise session may be your pre-exercise nutrition for the next event. Think fluid and carbohydrates.

Eat a high-carbohydrate meal or snack, 2 to 4 hours before your event. Allow time for digestion:

- 3–4 hours for a large meal
- 2–3 hours for a smaller meal
- 1–2 hours for a small snack or blender/liquid meal or whatever your own tolerance indicates

CAUTION: Spicy, gas producing, fatty and/or fibre-rich foods may cause discomfort. Products containing caffeine may also be problematic.

Unless you eat legumes regularly, they may have too much fibre for comfort.

Targets may vary depending on your sport:

- Start exercise with optimal hydration levels. If you have not produced any urine or if your urine is still bright yellow, drink 3–5 mL of fluid per kg body weight (about 150–350 mL) fluid about 2 hours before exercise.
- If you have a “nervous stomach” before events, choose lower-fibre grain products, juice, or pureed foods.
- Drink 0.4 – 0.8 Litres per hour during exercise.
- Drink fluid with carbohydrate after your event.

Fluid needs vary with your sweat rate, sport, and environment. Monitor your body weight changes during training and competition sessions to estimate sweat lost. To find out what fluid consumption is feasible and comfortable during your sport, **test different amounts and types of fluid in training – never during competition!**

For more information about your specific food and fluid needs, refer to “[Fluids and Foods BEFORE Training/Competition](#)”, “[Fluids and Foods DURING Training/Competition](#)”, “[Fluids and Foods AFTER Training/Competition](#)”, and “[Fluids for Athletes](#)”.

CONVERSION: 250 mL = 1 cup = 8 oz.

DURING Multi-training Days and Tournaments – Focus on Fluid and Carbohydrate

Fluids Water, juice, low fat milk, and/or sport drinks.

High carbohydrate foods come from vegetables and fruit, grain products, milk and yogurt. Look for fruit, juice, vegetables, breads, cereals, rice, pasta, low-fat crackers or cookies, milk, yogurt, and sport drinks. Include foods that contain some salt to promote thirst and to help retain fluids.

Protein-rich foods are digested more slowly than carbohydrates, delaying hunger during a long event. Low-fat milk, yogurt, lean meat, skinless chicken, eggs, non-breaded fish, and/or legumes (beans, peas, and lentils) are protein-rich foods. If your only protein choice is a higher fat food (peanut butter, nuts/seeds, cheese), use only a small amount with your carbohydrate choice (bread, crackers, fruit, etc.).

Fat is digested very slowly. Before most training and competition situations, low fat food is best. French fries, chips, breaded chicken or fish, hot dogs, greasy hamburgers, cream or cheese sauces, margarine/butter, salad dressing, cheese, peanut butter, nuts, seeds, and chocolate contain a substantial amount of dietary fat and may cause discomfort during exercise.

Meal ideas: Plan foods to carry with you or food outlets where you can buy part or all of a meal.

- Fruit juice, toast, yogurt, egg
- Banana or raisins, fruit juice, oatmeal/cereal, milk
- Juice, pancakes with a little syrup/spread, ham
- Fruit, lettuce, tomato, and tuna sandwich, oatmeal raisin cookie, milk

- Minestrone soup, bagel, milk
- Applesauce, juice, pasta with vegetable sauce
- Peas, rice, and chicken casserole, milk
- Fruit, pita wrap with vegetables and turkey, yogurt or a granola bar

Snack ideas:

- Fruit (fresh, canned, juice) and/or crackers
- Fruit juice or fruit cup, low-fat muffin
- Fruit bars, juice, yogurt or arrowroot cookies
- Vegetable juice, pita with hummus
- Vegetable soup, crusty roll
- Hot chocolate made with milk, bagel
- Fruit, cereal or sport bar, sport drink
- Juice, pretzels
- Jam and peanut butter sandwich, chocolate milk

Snacks for backpack or car:

- Dried fruit
- Juice boxes or fruit cup
- Dry cereal
- Cereal, sport or energy bars
- Crackers
- Tuna or beans in cans with pull off tops
- Cereal with nuts and raisins

Food Safety Guidelines: If you carry food with you, store it to prevent bacterial contamination. If you are buying food at the competition, remember that foods which are to be eaten as hot (temperature) dishes, (e.g. meat, casseroles, rice) should not be served lukewarm. Foods that are to be eaten cold (e.g. deli meats, salads, sandwiches, milk, custard, etc.) should be served at a cold temperature.

Experiment with fluids and foods during training to find out what and how much is comfortable for you.

Never try unfamiliar foods or drinks before or during competition.

For information on planning your meals and snacks, see these CAC resources:

- For an overview of your nutrition needs during training, refer to “[Training Diet: Everyday Eating](#)”.
- For a list of examples of high carbohydrate foods, refer to “[Energize with Carbohydrate](#)”.
- To create a meal plan for your training needs, see “[From Training Diet to Meal Plans](#)”.

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