

## Nutrition/Hydration Recommendations

Goal: Maximum whole-body hydration and glycogen accumulation prior to the start of each game.

Principles narrative: Assuming adequate hydration and glycogen stores entering the first game, the subsequent battle will be to completely replenish each player, even after some have potentially worked to exhaustion or at least failure. I think it's most reasonable to break the intervening 24 hours into 3 periods:

1. Pre-game (morning of the day's game)
2. Immediate post-game
3. Subsequent post-game (late afternoon, dinner)

The pre-game meal should focus on a mix of simple and complex carbohydrates capable of providing short-term and sustained energy. This would include fruits, cereals, breads, yogurts, etc... with only moderate total consumption. There should be less emphasis on proteins/fats in this meal – it's designed to provide energy for the upcoming event. This meal should also continue the hydration theme with a balance of water and sport-drinks.

The meal should be finished by about 2.5 hours before the game. Gastric emptying time is about 2 hours for easily-digestible foods, and you want all of the solid material out of the stomach prior to the game. One of the factors regulating gastric efflux is the amount of solutes in the gastric fluid. Solid food left in the stomach will significantly slow the passage of fluids out of the stomach and into the intestine where they can be absorbed. Therefore, a stomach empty of solids provides better fluid absorption during the contest. I would recommend drinking moderate amounts of either water or sports drink between the 2.5 hours and the start of the contest to help with subsequent hydration as well as avoiding feeling hungry.

For the immediate post-game, the most important factors are replacement of carbohydrates and fluids. Information indicates that bodies have an accelerated rate of carbohydrate and fluid absorption immediately following cessation of exercise, probably within the 30min. – 90min. window. Therefore, recommendations would focus on fluids/foods with high fluid/carbohydrate content and reasonable levels of electrolytes.

Simple carbohydrates are preferable so fruits are a great choice for this period. Liquid carbohydrate supplement drinks are also available and provide very concentrated sources of carbs, thereby providing energy and fluid replacement. Current recommendations are for 50-100 grams of carbohydrates following strenuous, sustained exertions and concentrated carbohydrate supplement drinks can help reach this goal. Fluids are of critical importance during this period and should be a mix of water, fruit juices, or sports drinks. The athlete has some flexibility depending on personal taste.

Confounding factors may be lack of appetite or upset stomach following strenuous exercise. Liquid carbohydrate supplementation drinks can help with this. Also, the

athletes shouldn't drink so much of other fluids (water, sports drink) that they cannot eat or drink enough to address their energy deficits. If they fill-up their stomach with relatively poor carbohydrate fluids (water, sports drink) they will not attend to their energy replacement requirements. This will make it more difficult to replace glycogen stores, resulting in lack of energy for the next day. The lack of appetite issue can also be mitigated through offering a variety of different fruits. This will be easy in Hawaii!

For the subsequent post-game (dinner, +/- snack), the most important factors would appear to be continuing the hydration process, and a more balanced nutrition delivery of complex carbohydrates, proteins and some fat. Previous meals have made some sacrifices to achieve maximum energy levels for the contest, and those must be addressed in the evening meal/snack. Foods would move away from simple carbohydrates to more complex carbs such as pastas, breads, potatoes, beans, etc... Protein and fat requirements must be addressed in this meal so protein sources (either meat or vegetable) are a critical component. Some muscle breakdown will occur during strenuous exertions and this meal must provide the protein required for rebuilding of the muscle fibers. Some amount of fat is also recommended during this period because aside from being the most concentrated source of calories, fat also contains some vitamins and minerals which are important for general physiologic maintenance.

Another important consideration for this meal is the overall amount of calories consumed. In short, more is better. Stress that their output the next day depends on their ability to replenish their depleted muscles, and that process depends on what they eat. They will have partially addressed this in the immediate post-game period but a big meal at night will help replenish glycogen stores in the liver which will be very important for the second half of the next day's game. Desserts are a good thing!

Recommendations for fluids would be for a balanced intake of water, sports drink, and/or milk (milk has a good balance of several different components and chocolate milk is generally well-tolerated unless lactose intolerance exists). Fluid intake should be sustained but not so much that it precludes intake of solid foods.

One other consideration is self-monitoring. Each person can monitor their own hydration and energy replacement using a few small cues. Hydration can be monitored in a couple different ways. Well-hydrated people produce fairly large amounts of pale-colored urine and their mucous membranes (lips, mouth, eyes) are very moist. Limited urine production and dry mouth, lips, or eyes indicate mild dehydration. For energy replacement, athletes can monitor their own energy level as well as how their muscles feel. Well-hydrated muscles with high energy stores generally feel a bit heavy and slow (they are in fact heavier) but this should go away during warm-ups and their muscles should feel strong and ready at the start of the game. If they unexpectedly "run out of gas" during the contest then they need to do a better job of energy replacement before the next game.

## Recommendations

1. One-week prior: Must fill up your glycogen stores so that you begin your competition with a full fuel supply. This especially important if you are competing in an endurance sport like soccer. The way to increase your glycogen stores is to increase carbohydrate intake. Eat plenty of complex carbohydrate foods, especially those with a low/medium glycaemic load index to help boost your glycogen store. For the last three to four days try to eat a small meals or snack every two or three hours.

Here is a list of food items with low/medium Glycaemic Load (GL) Index (food type / GL index)

Low GL 0 – 10: Nopal 0 Strawberries 1 Peanuts 1 Carrots 3 Chana dal 3 Watermelon 4 Cantaloupe 4 Pears 4 Beets 5 Oranges 5 Peaches 5 Red lentils 5 Apples 6 Sucrose (table sugar) 7 Pineapple 7 Kidney beans 7 Popcorn 8 Grapes 8 All-bran cereal 8 Chick peas 8 Whole wheat flour bread 9 Sweet corn 9 Pinto beans

Medium GL 11 to 19: Wheat flour bread 11 Apple juice 11 Pearled barley 11 New potatoes 12 Bananas 12 Orange juice 12 Navy beans 12 Shredded wheat 15 Cheerios 15 Sourdough wheat bread 15 Life cereal 16 Buckwheat 16 Parboiled rice 17 Wild rice

### Breakfast Options:

- Waffles with fruit and light syrup, scrambled egg, 8-oz orange/apple juice
- Oatmeal with fruit and low-fat (chocolate) milk, two links of low-fat sausage 8-oz orange/apple juice
- Cheerios with fruit and low-fat (chocolate) milk, wheat bagel, 8-oz orange/apple juice

### Lunch Options:

- Ham/Turkey sandwich on wheat, Large apple, Oatmeal-raisin cookie and juice, low-fat milk, or Gatorade
- Peanut butter and jelly on bagel/wheat bread, Banana, Granola bar, and juice, low-fat milk, or Gatorade

### Dinner Options:

- Pasta, Poultry, Meat, Fish with salad (green or fruit), wild rice and vegetables

### Foods you should avoid:

High fatty, deep fried anything, refined, fast food restaurants, donuts, white bread, pop, energy drinks (that are caffeine loaded), avoid high loaded food (e.g. some cereals, candy, etc.) Read food labels!!

2. Pre-game:
  - Combination of simple and complex carbohydrates such as fruits, yogurt, cereals (warm or cold), breads (toast, bagels), etc...
  - Proteins are fine but in relatively small quantities.
  - Fluids should include a balance of water, sports drink, and/or milk (if tolerated).
3. Immediate post-game:
  - One bottle of high carbohydrate supplementation drink (e.g. Carboforce, Ultrafuel), then fruit juices or sports drink in the first 30 mins.
  - Offer simple carbohydrates (e.g. fruits – a variety is better) immediately after drinking the supplementation drink for the next 1-2 hours.
4. Subsequent post-game:
  - The game timing suggests that this will be dinner +/- a snack. Options should focus on complex carbohydrates such as pasta, potatoes, rice, breads, beans, etc... Of critical importance is protein (meats, eggs, dairy) or vegetable (tofu, soybean, nuts, etc...). Most of the daily protein requirements have to be provided in this meal so it's important. Some fat should also be included in this meal – a good excuse for dessert! Eat lots for this meal. Fluid intake should be water, milk (if tolerated), perhaps sports drink if desired. Don't drink so much that it interferes with appetite for solid foods.

Snack Options - Pre/Post Game:

- 50/50 % of Water/Gatorade
- Gatorade Energy Bars
- Assorted fruits
- Bagels
- Quaker Chewy Granola bars
- String Cheese
- Trail Mix