Hydration and the Body

Hydrated cells are critical to get the most out of daily training and facilitate recovery. The effects of significant dehydration can take hours and even days to recover from. Athletes should develop strategies to monitor and adapt an individual hydration plan according to changes in:

- Intensity of training
- Duration of training
- Frequency of training
- Fitness level
- Environmental conditions (e.g. heat, altitude, plane travel, surgery, illness, hard training)

Performance can be negatively impacted by as little as 2 to 3% body weight loss from sweat (e.g. 3-4 lb. for 150 lb. athlete)

Importance of Hydration on Performance

- Enhances the body’s ability to regulate temperature and cool efficiently while avoiding unnecessary elevation in heart rate
- Improves ability to recover quickly from training and competition
- Minimizes muscle cramps
- Enhances mental function, decision making, concentration, and motor control
- Supports effective immune defenses

Signs and Symptoms of Dehydration

- Lack of concentration
- Early fatigue in training session
- High perceived exertion in training
- Trouble tolerating heat
- Delayed recovery
- Muscle cramps
- Headaches
- Nausea and vomiting
- Heart rate elevated above normal response

Three Indicators of Dehydration

You are likely dehydrated if two or more of these markers are outside the normal range.

1. Color of morning urine (dark in color)
2. Waking body weight (lower than usual)
3. Thirst (greater than usual)

It can take up to 24 hours for the body to regain fluid balance after dehydration.
How much fluid is enough?

Fluid needs are very individual. These are general guidelines and a starting point.

<table>
<thead>
<tr>
<th>When</th>
<th>How much</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before training</td>
<td>2-3 hours before: &gt;16 oz. 15 minutes before: 8 oz.</td>
</tr>
<tr>
<td>During training</td>
<td>Enough to limit dehydration to &lt;2% body weight loss</td>
</tr>
<tr>
<td>After training</td>
<td>16-24 oz. for every pound lost</td>
</tr>
</tbody>
</table>

Drink Up! Fluid needs are higher during:

- Heat
- Humidity
- Hard training
- Travel
- Altitude
- Illness

Note: If you are a salty sweater, eat salty foods like pretzels and soup after training to help replace sodium losses.

Monitoring Daily Hydration Status

Use the urine color chart and aim for a morning urine color of 2 - 3 (pale yellow, lemonade color). Dehydration is indicated by a urine color of > 4.

<table>
<thead>
<tr>
<th>USG</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1.009</td>
<td>Well-hydrated</td>
</tr>
<tr>
<td>1.009-1.020</td>
<td>Hydrated</td>
</tr>
<tr>
<td>1.021-1.025</td>
<td>Minimal dehydration</td>
</tr>
<tr>
<td>1.026-1.030</td>
<td>Significant dehydration</td>
</tr>
<tr>
<td>≥1.031</td>
<td>Severe dehydration</td>
</tr>
</tbody>
</table>

The color of urine is associated with urine specific gravity (USG). USG measures the concentration of particles in the urine with >1.020 indicating dehydration. USG should be assessed at the first morning urine void.

% Body Weight Loss Calculation

% Body weight loss = (wt before – wt after)/wt before
Ex: 2.6 % body weight loss = (150-146)/150

Goal is to drink more during to minimize weight loss
After training, drink ~8 cups (64 oz.) to replace fluid

Water vs. Sport Drinks

The best fluid to consume is water, which should be consumed throughout the day, during training, and at meal times.

If training is >60-90 minutes, choose a sport drink to help replenish fluids and electrolytes lost in sweat and provide a quick energy source to sustain performance during intense and longer duration training sessions.

Simple ways to increase fluid intake

- Carry a water bottle at all times to increase water consumption throughout the day
- Aim to drink at least 2 cups of water at all meals
- Fruit and veggies have high water contents
  - Snack on oranges, berries, melons, pineapple
  - Top a rice bowl with eggplant, bell peppers, zucchini, shredded carrots
- Make a fruit smoothie for breakfast or a snack
- Drink 8 oz. of 100% fruit juice for breakfast
- Begin lunch or dinner with veggie soup
- Drink a glass of milk after training or before bed
- Brew a cup of herbal tea in the evening

Athlete Recommendations:
Why is Recovery Important?

As a high performance athlete, you’ve chosen a career where taking care of your body is your job. When you are training and competing, there are several physiological consequences that occur which make you fitter, faster, stronger and/or improve your skill level. A sound recovery nutrition protocol will ensure you can optimize training adaptations and perform at 100% of your body’s potential in the next training bout or in preparation for competition.

Are you practicing the 4 R’s of recovery?

Re-plenish muscle glycogen (carbohydrate stored in muscle) after practice. Eat 0.5 g/lb BW.

Re-pair and regenerate muscle with high quality protein. Eat 15 – 25 g (higher end for larger athletes).

Re-inforce muscle cells and immune system with colorful and anti-oxidant rich foods (e.g. fruits, veggies, whole grains, fish, nuts, olive oil). Eat at least 2 cups of fruit and 3 cups of veggies daily.

Re-hydrate with fluid and electrolytes based on sweat loss in training (3 cups fluid/lb of sweat loss). Use urine color as a hydration guide pre-training.

Recovery nutrition depends on:

✓ Type of training session
✓ Training volume
✓ Training intensity
✓ Timing of your next training session
✓ Body weight
✓ Whether you are training or competing

Nutrition within 30 – 60 minutes after training or competition can enhance recovery due to:

- Increases in heart rate and blood pressure which enhances nutrient delivery to muscles
- Faster glycogen replenishment and initiation of tissue repair
- The body’s hormonal switch from muscle breakdown to muscle building earlier in the recovery timeline
Key Considerations

Moderate to Hard Training Session
High volume or intensity, heavy lifting, competition, multi-day training bouts
- Timing and balance of nutrients is critical
- Refueling with the 4 R's will facilitate training adaptations
- If 2 - 3 sessions/day, eat recovery snack post-training, then eat again in 2 hours

Light Training Session
Skills/drills, yoga, stretch, recovery day, weight loss phase
- The next meal or small post-training snack is sufficient

Recovery is an all-day process!
It takes 24 - 48 hours to fully replace your glycogen stores if they’ve been completely depleted, and your muscles are responsive to protein for 24 - 48 hours after a resistance training session.

Continue eating well-balanced meals and snacks throughout the rest of the day for optimal recovery.

Successful recovery will only occur with proper planning! Think about your training sessions ahead of time in order to plan and pack the appropriate fuels.

Recovery Snack Ideas

Choose a food from protein column + food from carb column based on training session!

<table>
<thead>
<tr>
<th>Protein: 15-20 g</th>
<th>Protein: 20-25 g</th>
<th>Carbohydrate: 15-30 g</th>
<th>Carbohydrate: 45-60 g</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 c milk (cow's, soy)*</td>
<td>3 c milk (cow's, soy)*</td>
<td>1 piece or cup fresh fruit</td>
<td>2-3 piece or cups fresh fruit</td>
</tr>
<tr>
<td>¾ -1 c Greek yogurt*</td>
<td>1 ½ c Greek yogurt*</td>
<td>¼ - ½ c dried fruit</td>
<td>¾ - 1 c dried fruit</td>
</tr>
<tr>
<td>¼ c cottage cheese</td>
<td>1 ⅛ c cottage cheese</td>
<td>1 c fruit juice</td>
<td>2 c fruit juice</td>
</tr>
<tr>
<td>2 string cheeses</td>
<td>3 string cheeses</td>
<td>1 c chocolate milk</td>
<td>2 c chocolate milk*</td>
</tr>
<tr>
<td>1 c firm tofu</td>
<td>1 ¼ c firm tofu</td>
<td>½ c oatmeal</td>
<td>1-1 ¼ c oatmeal</td>
</tr>
<tr>
<td>2-3 cooked eggs</td>
<td>3-4 cooked eggs</td>
<td>1-2 slices sandwich bread</td>
<td>3-4 slices sandwich bread</td>
</tr>
<tr>
<td>2-3 oz deli meat</td>
<td>3-4 oz deli meat</td>
<td>½ bagel</td>
<td>1 bagel</td>
</tr>
<tr>
<td>1 ½ c Kefir*</td>
<td>2-2 ¼ c Kefir*</td>
<td>1 english muffin</td>
<td>2 english muffins</td>
</tr>
<tr>
<td>1 ½ oz jerky</td>
<td>2-2 ½ oz jerky</td>
<td>1 granola or cereal bar</td>
<td>4 fig bar cookies</td>
</tr>
<tr>
<td>2-3 oz fish</td>
<td>¾ -1 c nuts or seeds*</td>
<td>2 x 6” tortillas or wraps</td>
<td>2 x 8” tortilla or wrap</td>
</tr>
<tr>
<td>½ - ¾ c nuts or seeds*</td>
<td>1 c edamame</td>
<td>½ - ¾ c rice or farro</td>
<td>1-1½ c rice or farro</td>
</tr>
<tr>
<td>½ - ¾ c edamame</td>
<td>1-1½ c beans or lentils*</td>
<td>½ -1 c quinoa, beans, lentils*</td>
<td>1½ -2 c quinoa, beans, lentils*</td>
</tr>
<tr>
<td>4 Tbsp nut butter*</td>
<td>1 scoop whey protein</td>
<td>¾ c cooked pasta</td>
<td>¾ c pasta</td>
</tr>
<tr>
<td>1 c beans*</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Key: * Protein source contains at least 15 g of carbohydrate. Carbohydrate source contains at least 10 g of protein.

Athlete Recommendations: