

HEAT AND HYDRATION

RISK FACTORS FOR EXERCISE ASSOCIATED HYPONATREMIA

Athlete Risk Factors

- Excessive drinking of plain water with little/no consumption of salty drinks or food
- Weight gain during exercise
- Lower body weight individuals

Environmental or Match Risk Factors

- > 4 hours of exercise
- Unusually hot conditions

As little as a 2% loss in body weight, due to dehydration, can have a major negative effect on muscle strength and power.

Post-training or match hydration has three major purposes:

- Replace fluid volume to an equal or slightly greater extent than the volume lost while sweating
- Drink liquid carbohydrates to aid in glucose uptake to the muscles
- Replace electrolytes lost during sweating

Many tennis players go into practice and/or competition already dehydrated. This results in the possibility of problems during play, but it also slows recovery.

It is recommended to consume smaller volumes of fluid in a more regular basis during recovery. An example would be if you were to drink 32oz of fluid in the 60 minutes following a two hour match, it would be recommended to consume 4-8oz every 10 minutes, rather than consume one or two larger doses of fluid.

Athletes drink more fluid if it is flavored. Studies have shown as much as 30% more fluid is consumed with flavored drinks as opposed to plain water. Flavored, carbohydrate-electrolyte drinks are more effective in promoting post-exercise re hydration than plain water, or low-electrolyte diet cola.

Many athletes do not consume enough sodium in their regular diet to support strenuous physical activity, especially in early stages of training and in hot and/or humid environments. Having recovery drinks and food that contain sufficient levels of sodium is helpful for a number of purposes:

- Replaces the sodium that is lost in sweat
- Stimulates glucose (energy) absorption by the muscles
- Increases the athletes drive to drink
- May reduce the symptoms of exertional heat cramps, exertional heat exhaustions and exertional hyponatremia.



During multi-day tournaments or practice, it is common for players to experience a subtle but gradual sodium deficit and this can result in heat and hydration related problems (exhaustion, cramping etc) towards the later rounds of tournament.

HYPONATREMIA

Athletes may be susceptible to a rare but dangerous condition called hyponatremia if recovery following single or repetitive exhaustive tennis matches does not take into account proper fluid and salt intake. Hyponatremia exists when sodium levels are below a normal range in the body and is typically the result of sweating out sodium, while drinking high volumes of plain water. This results in a dilution of the sodium in the blood and can cause serious health problems.

PRACTICAL SUMMARIES

If a tennis player has to follow-up a practice or match within one to two hours, it is recommended that a sports drink be consumed with between 600-900mg of sodium per 32oz of fluid.

To prevent post match hydration problems, it is recommended that pre and post-match hydration is appropriate (see USTA Heat and Hydration Booklet for more information)

Heart rate, body temperature and hydration level are interrelated, and it is important to reduce core temperature and lower heart rate during recovery to help speed the recovery process along with the hydration components.

HEAT AND HYDRATION RECOVERY BEST PRACTICES

AFTER PRACTICE OR MATCH

Consume approximately one regular size bottle (20oz) of fluid per pound of bodyweight lost within the previous match. Adding carbohydrates and protein in the recovery fluid can also aid in recovery (see nutrition section).

AT THE END OF A TOURNAMENT DAY

Continue to hydrate and check your urine color to ensure you have color in the range of 1, 2 or 3.

AFTER A TOURNAMENT

Check urine color the day proceeding the tournament and make sure that urine color is appropriate.

To improve recovery aspects, hydration strategies should seek to optimize hydration status continuously, and not solely around competition schedules.

AM I HYDRATED? URINE COLOR CHART

1		<p>If your urine matches the colors 1, 2, or 3, you are likely properly hydrated. Continue to consume fluids at the recommended amounts. Nice job!</p>
2		
3		
4		<p>If your urine color is below the RED line, you may be DEHYDRATED and at greater risk for heat illness!!</p>
5		
6		<p><u>YOU NEED TO DRINK MORE!</u></p>
7		
8		<p>Speak to a Health Care Provider if Your Urine is this Dark and is Not Clearing Despite Drinking Fluids</p>

NUTRITIONAL ASPECTS OF RECOVERY

The major goals of nutritional recovery include:

- *Replenish glycogen (muscle and liver energy) stores*
- *Restore appropriate fluid and electrolyte levels*
- *Create new muscle proteins*
- *Restoration of the immune system*

As little as 10 grams of essential amino acids before and after physical training may help jump start protein synthesis and repair. In prolonged exercise, such as tennis play greater than 90 minutes, fatigue is closely associated with low muscle glycogen and blood glucose levels.

The American College of Sport Medicine position statement on nutritional requirements for athletes suggests consuming between 30-60 grams (120-240 calories) of carbohydrates per hour of exercise. If consuming a standard carbohydrate/electrolyte sport drink, this would equate to between 600-1200ml/hour (20-40oz/hour), or this amount could also be consumed with a combination of fluid and solid food such as nutritional bars. The timing of on-court nutrition during practice or competition should be in small regular intervals every 10-20 minutes at changeovers.



Consuming high glycemic carbohydrates (simple sugars) during recovery can result in a 50% greater rate of muscle glycogen resynthesis than the ingestion of low glycemic carbohydrates.

Nutrient Timing

Researchers have shown a nutritional window of opportunity where glycogen resynthesis and protein repair occurs at a greater rate. This window is within 45 minutes of completing physical training or competition; during this time frame it is vital that tennis players consume high glycemic carbohydrate fuels with a reasonable amount of protein (including essential amino acids) to help speed glycogen resynthesis, as well as protein rebuilding. Research has shown that replacing fuel within this window, as opposed to waiting two or three hours after physical activity, reduces recovery time and improved fuel stores. This difference could be as high as 47%.

Ingesting between 6-20 grams of protein is recommended during this recovery window. A 4:1 carbohydrate to protein ratio is also a good general recommendation for the food/fuel source during the recovery period.



NUTRITION RECOVERY BEST PRACTICES

1. Optimize Nutritional Status

Regularly checking nutritional status via blood, body composition and urine analysis by a trained professional is recommended at least once per year.

2. Carbohydrate Intake

Consume 30-60 grams of carbohydrates per hour of play.

3. Protein Intake

Consume 6-20 grams of protein immediately post-training or competition.

4. Timing is Important

Start your nutritional recovery within 45 minutes of finishing your training session or tournament match.

5. Hydrate Appropriately and Often

6. Extremely Cautious

With Ergogenic Aids or Supplements.

7. Seek Professional Assistance

As a qualified tennis coach it is important to provide knowledgeable instruction about technique and tactics. A qualified physician, sport scientist or sport nutritionist with a strong tennis-specific nutritional background should aid in providing of individual nutritional advice.

AFTER PRACTICE OR MATCH

Consume approximately 200-400 calories of a carbohydrate:protein drink or snack with an approximate 4:1 carbohydrate to protein ratio. Good sources of this are chocolate milk, a commercial recovery shake, or a 6-inch sandwich with meat/fish. Follow this recovery snack within three hours with a more substantial meal (i.e. chicken, rice and salad, pasta with chicken/fish and vegetables)

AT THE END OF A TOURNAMENT DAY

Continue to hydrate and check your urine color to ensure you have adequately hydrated. Consume a good dinner with a high carbohydrate, medium protein, low-medium fat meal. Some good examples include pasta with chicken/fish and vegetables, steak/chicken/fish and potatoes, rice, beans and salad, eggs and potatoes.

After dinner and before bed, it may be important to consume a light snack of slow releasing carbohydrate and a moderate amount of protein. Some good examples include a commercial low sugar shake, some tuna and crackers, a glass of milk.

AFTER A TOURNAMENT

Consume similar foods to during a tournament scenario, but it is advisable to increase the fruit content of the diet. Specifically foods that contain high amounts of vitamin C and antioxidants (oranges and variety of berries).

FOOD SOURCE

GRAMS OF CARBOHYDRATES

SPORT DRINK – 16oz

30 grams

SPORT GEL – 1 pack

20-38 grams

SPORT BAR – 1

25-55 grams

SPORT BEANS/SHOTS – 1oz

25 grams

BANANA – 1 medium

28 grams