

HYDRATION ISSUES FOR ATHLETES

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HYDRATION IN ATHLETES

- Fluid balance is essential for:
 - Cardiovascular function
 - Thermoregulation
 - Injury prevention
 - Performance- up to 33% greater stamina in those who are adequately hydrated
 - Recovery from activity

PERFORMANCE AND HEALTH ISSUES

- Flawed hydration plans lead to overdrinking or underdrinking and either can lead to health problems and impaired performance
- Need to educate athletes to drink to replace losses. One bottle doesn't fit all
- Be proactive- drink right to train well
- Need to monitor weight loss in training sessions to develop a drinking strategy

FACTORS THAT INFLUENCE FLUID CONSUMPTION

- Concentration of dissolved solutes
- Previous expectations regarding a beverage
- Product advertising/packaging
- Frequency/regularity of eating episodes
- Level of dehydration
- Dryness or unpleasant taste in the mouth
- Stomach fullness/distention
- Accessibility
- Tolerance
- Intensity of training

WHAT ELSE INFLUENCES HYDRATION?

- Fad diets
- Rapid weight loss
- Glycogen depletion
- Supplements
- Illness
- Temperature/altitude

POINTS TO CONSIDER

- Every liter of sweat loss translates to 8 beats/minute increase in heart rate
- Body water loss of > 2% impairs performance
 - 185 pound cornerback will see a decrease in performance with 2 kg Body Mass loss during training/competition
- Dehydration impairs mental functioning:
 - Decrease in sustained attention
 - Increase in error rate
 - Decrease in response time and task accuracy

POINTS TO CONSIDER

- Dehydration reduces the gastric emptying rate
- Chronic dehydration that often accompanies weight class sports can impair the athlete's ability to optimally train for performance
- Athletes **NEED** to have an individualized prescription for fluids including **WHAT** and **HOW MUCH** to drink based on his/her sweat rate, salt losses and genetic makeup

Myths and Misconceptions

- Thirst is a good indicator of fluid needs
- May be true for non-athletes but not always
- New IOM guidelines for fluid:
 - 3.7 liters (15, 240 ml glasses for men)
 - 2.7 liters (11, 240 ml glasses for women)

DRINK WHEN THIRSTY

- Issues for athletes:
 - Inaccurate thirst mechanism
 - Need for fluids is Not stressed enough
 - Lots of other things going on
 - Logistical limitations
 - Choice of fluid
- Voluntary fluid consumption is **INSUFFICIENT** to meet fluid needs!
- Behavior, not thirst is primarily responsible for determining fluid intake

Hydration Status

- Athletes constantly risk dehydration
- It takes just a 2% body weight loss (e.g., 1.5 kg for a 68 kg athlete) to hinder performance
- Important to stress to athletes that weight lost during training, practice, or game is fluid loss, not fat loss

Are You Hydrated?

No



Measuring Hydration Status

- USE URINE COLOR AS A GUIDE

1		<i>If your urine matches the colors 1, 2, or 3, you are properly hydrated. Continue to consume fluids at the recommended amounts.</i>
2		
3		
4		<i>If your urine color is below the BLUE line, you are DEHYDRATED and at risk for cramping / a heat illness!</i> <i>YOU NEED TO DRINK MORE WATER / SPORTS DRINK!</i>
5		
6		
7		
8		

PRE WORKOUT HYDRATION

- Optimizes hydration and allows time to eliminate excess fluid
- Just before exercise: 240-480 ml fluid if thirsty
- Monitor urine color

FLUID GUIDELINES FOR EXERCISE

- 600 ml 1 hour before exercise
- At least 400-600 ml/hr of practice/conditioning
- 20 oz per pound lost during exercise
- Gulps over sips
- Swallow instead of spit
- In, not on

FLUID GOALS DURING EXERCISE

- Minimum of 14-40 oz of fluid/hour of exercise
- Most athletes consume 8 oz/hour
- Larger fluid intake during exercise leads to:
 - Greater cardiac output
 - Greater skin blood flow
 - Lower core temperature
 - Reduced perceived effort of exertion

HYDRATION AFTER EXERCISE

- At least 500-750 ml for every .45 kg lost
- Carbohydrate + fluid + electrolytes
- Mix of carbohydrate sources: sucrose, glucose, fructose, maltodextrins
- Metered rehydration is preferred over large volumes to conserve fluid volumes and is preferred unless regular access to fluid is limited

TYPES OF FLUID

- Water
- Carbonated beverages/seltzer
- Coffee or tea or herbal teas
- Milk
- Juices
- Sports drinks
- Energy drinks

OTHER BEVERAGES

- Low sugar sports drinks- may be appropriate for those who need to reduce body fat but still need the sodium
- Fitness water- may not have enough carbohydrate
- Vitamin water- may not have enough electrolytes and too many or too few grams of carbohydrate

COCONUT WATER

- Per 330 ml
 - Calories: 60
 - Carbohydrate: 15 grams
 - Sugar: 14 grams
 - Protein: 1 grams
 - Fat: 0 grams
 - Sodium: 60 milligrams
 - Potassium: 670 milligrams

CHOCOLATE MILK?

- CARB/PRO content is similar to recovery beverages
- Less expensive
- Still provides fluid as well as electrolytes
- Must be kept cold

CAFFEINE

- Not a diuretic
- Muscle glycogen sparing effect in endurance exercise
- Varying doses in energy drinks
- Caffeine + fluid, i.e. coffee, tea, energy drink or caffeine alone- 5 hour energy

CAFFEINE

- Caffeine- IS a central nervous system stimulant
- >200 mg may cause:
 - Jitteriness, increased anxiety, restlessness
 - Insomnia
 - Upset stomach
 - May be addicting

CAFFEINE IN BEVERAGES

- Espresso
 - Coffee
 - Cola
 - Black tea
 - Green Tea
 - Red Bull
 - Monster
 - Rockstar
 - Wired energy drink
- 100 mg
 - 375 mg
 - 30-50 mg
 - 50 mg
 - 30 mg
 - 80 mg
 - 400 mg
 - 275 mg
 - 505 mg

“Energy” Drinks

- Red Bull
- Monster
- Most contain high levels of caffeine, equivalent to at least 2 cups of strong coffee
- Some contain carbohydrates
- **Nothing more than expensive coffee**



HOW TO CONSUME FLUID

- Large volume of fluid empties more rapidly than small amounts
- 1 liter of fluid empties from the stomach and is absorbed by the intestine within 1 hour
- Maximum 2 liters/hour
- Large bolus of fluid followed by repeated ingesting of additional fluids

TEMPERATURE OF FLUID

- Cold fluid may attenuate increased core temperature rise and improve exercise performance in the heat
- May be more palatable than room temperature beverages and increase the drive to drink
- In cold weather activities, warm fluids may be better tolerated

WATER VS SPORTS DRINK?

- Source of additional fuel
- Glucose stimulates sodium and water absorption
- More fluid is absorbed from carbohydrate/electrolyte beverages than plain water
- Higher the carbohydrate content, the slower the rate of gastric emptying

ALCOHOL

- May dehydrate in susceptible individuals
- May delay muscle glycogen resynthesis
- Can cause liver disorders
- May delay recovery from injury
- Can be significant source of calories
- What is a drink?
 - 360 ml beer
 - 240 ml malt liquor
 - 120-150 glass of wine
 - 30 ml of liquor

ALCOHOL

- Vasodilator
- Interferes with sound sleep
- Depletes Vitamins B1, B12, Folic acid and zinc
- Consuming 5 or more drinks in one night can affect the brain and body's activities for up to three days

ELECTROLYTES

- Sodium consumption during and following dehydrating exercise will maintain or restore blood volume more completely than plain water
- Some athletes are salt losers and must be more vigilant with regards to sodium intake
- All athletes lose salt in sweat and performance may be impaired when salt intake is too low
- 5g sodium/day recommended in the Dietary Guidelines may NOT be enough for certain athletes

SODIUM NEEDS OF ATHLETES

- Sweat loss: 1-4 liters
- Sodium loss: 1150-3220 mg
- Football- may be as high as 8000 mg sodium loss during 2 a days
- Tennis- losses can exceed 10,000 milligrams in a match

SODIUM

- Sodium added to a rehydration beverage will aid in fluid retention but will not adversely affect blood pressure in young individuals
- Sodium
- Advances
- The Level
- Of Training

MUSCLE CRAMPING

- May be many causal factors in the development of muscle cramps
- A strategy that works for many athletes is an increase in fluid and sodium
- Bananas or other high potassium foods will NOT help in the prevention/treatment of cramps

HYPONATREMIA

- Blood sodium < 136 mEq/L
- CAUSES:
 - Increased total body water
 - Reduced urine output
 - Inadequate sodium intake
 - Large sodium loss

WATER INTOXICATION AND HYPONATREMIA

- Need to know sweat rates of athletes
- Formulate a hydration plan
- Don't worry about caffeinated beverages
- Palatability of fluids is key
- NOT just water alone
- Extra salt for the salty sweaters
- Recommend that athletes weigh in/out

OTHER ISSUES ASSOCIATED WITH HYPONATREMIA

- In animal models- bone may release sodium during hyponatremia
- 30% of sodium is stored in bone
- Outcome: bone loss

Who is at risk?

- Heavy, salty sweaters “ cake sweat”
- Females
- Slower runners
- Athletes on low sodium diets
- Water-only drinkers
- Drinking more fluids than needed
- Exercise duration > 4 hours
- Low body weight (BMI < 20)
- Exercising in Extreme environmental conditions

SWEAT RATE EQUATION

$$\begin{aligned} & \text{Pre-weight} - \text{Post Weight} \\ & \quad + \\ & \text{Fluid Intake During Activity} \\ & \quad \div \\ & \text{Number of hours of activity} \\ & \quad = \\ & \text{Your Individual Sweat Rate} \end{aligned}$$

MEETING SODIUM NEEDS

- Salt added to foods
- Salty condiments: Soy sauce, marinades
- Salty beverages
- Salty foods: pickles, pretzels, crackers, snack mixes
- Cooking with saltier items, ie. Bouillon or broth
- Adding salt to every meal
- Adding $\frac{1}{4}$ tsp salt to 600 ml of sports drink or $\frac{1}{2}$ tsp added to 960 ml sports drink

SODIUM NEEDS

- For “ salt losers” emphasize:
 - Pretzels
 - Salted nuts
 - Chex mix
 - Sports drink
 - Pickles
 - Crackers
 - Tomato or vegetable juice
 - Soy sauce

Assessing Fluid Losses with Body Weight

- Have athletes weigh themselves pre- and post-workout
- The difference in body weight is from fluid losses
- Drink 500 – 750 mL of non-alcoholic fluids for every 0.45 kg lost

Tips for Staying Hydrated

1. Carry a water bottle during training sessions.
 - Aim for ~250 mL every 15 minutes during training
2. Hydrate regularly throughout the day, not just pre/post training
3. Sports drinks are typically unnecessary for activities less than 60 minutes
4. Cold water rehydrates more effectively than warm water

Tips for Staying Hydrated

5. Drink to replace fluid losses, but don't over drink
6. Drink before, during, and after play
7. Plain water can adequately rehydrate the body for activities less than 60 minutes
8. Alcoholic drinks don't effectively rehydrate

ITEMS OF INTEREST

- Glycerol to hyperhydrate not recommended:
 - May increase body weight
 - Does not improve performance
 - Can lower blood sodium concentration
 - Can cause bloating, lightheadedness, headaches, dizziness and nausea
- CHO mouth rinse- may delay fatigue but will not help with hydration

ASSESSING FLUID NEEDS

- Morning urine may not be best indicator
- Ask questions:
 - Are you thirsty throughout the day?
 - Do you feel weak, dizzy or lightheaded?
 - Is strength, speed, stamina decreased?
 - Do you regularly have headaches?
 - Is your mouth dry?
 - Do you have nausea, burning in stomach?

BOTTOM LINE

- We need to help athletes become fluid smart
- Individualize requirements
- Have athletes bring water/sports bottle to practice and have cups available
- Encourage athletes to hydrate during the day
- Work with the coach(es) to enforce a hydration policy