GATORADE OR PICKLE JUICE:
Hydration 101

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INTRODUCTION

- Fluid losses are affected by air temperature, humidity, sun, wind exposure, clothing/equipment worn, type of activity, body size, time spent participating, other factors.

- So recommendations will be discussed, but these factors should be considered.
In the United States, “the loss of human life due to overheating during hot spells in summer exceeds that caused by all other weather events combined, including lightning, rain, floods, hurricanes and tornadoes” (Klinenberg, 2002).
DEHYDRATION

- When 2% of body weight is lost as water
- Goal of drinking fluids during exercise is to prevent dehydration
- Dehydration can increase cardiovascular strain due to reduced blood volume and limit blood flow to skin to cool body
- Severe dehydration can lead to heat stroke, no longer able to produce sweat
FLUID BALANCE
WATER REPLACEMENT

- Losses of 1-2% of body weight will impair athletic performance.
- Thirst is triggered at 1-2% body weight loss.
- IOM recommends letting thirst guide fluid intake, which is not appropriate for active people, especially older exercisers.
PREVENTING DEHYDRATION

- Intake of 2 cups of water at about 2 hours before exercise is recommended.
- Rate of loss during exercise can be estimated by weight change with exercise; 1 pint equals 1 pound.
- If urine specific gravity can be measured, indicates hydration status, very unlikely
URINE COLOR

- Urine color assessment is often subjective.
- But a rule of thumb is that if the color of urine is more like apple juice than lemonade, dehydration is likely.
- There are examples online that you can look at.
# Urine Color Chart

<table>
<thead>
<tr>
<th>What Color?</th>
<th>Are You Hydrated?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pale yellow to clear</td>
<td>Pale yellow to clear is normal and indicates that you’re well-hydrated.</td>
</tr>
<tr>
<td>Light yellow and transparent</td>
<td>Light yellow and transparent is also normal and indicates an ideal hydration status.</td>
</tr>
<tr>
<td>A pale honey, transparent color</td>
<td>A pale honey, transparent color indicates normal hydration, but it may mean that you need to rehydrate soon.</td>
</tr>
<tr>
<td>A yellow, more cloudy color</td>
<td>A yellow, more cloudy color means your body need water.</td>
</tr>
<tr>
<td>A darker yellow, amber color</td>
<td>A darker yellow, amber color isn’t healthy. Your body needs water.</td>
</tr>
<tr>
<td>Orangish yellow and darker</td>
<td>Orangish yellow and darker: You’re severely dehydrated. Contact your doctor immediately.</td>
</tr>
</tbody>
</table>
WATER REPLACEMENT

- 13-32 ounces (400-1000 ml) every hour during exercise consumed in frequent small amounts
- 3-8 ounces (100-250 ml) every 15 minutes
- 1 cup = 240 ml
- If exercise is less than one hour, water alone is OK (subject to conditions)
WATER REPLACEMENT

- Adding carbohydrate and electrolyte to fluid replacement is typically advised, especially if the activity is for an hour or more.
- Flavored water helps to encourage fluid intake, as does eating food with the fluid.
- This is especially true for children.
SWEAT RATE BY SPORT (L/H)

- Waterpolo – 0.79 (Swimming – 0.37)
- Basketball – 1.4
- Soccer – 1.4
- Football – 2.1 (reports of >8L/D)
- Tennis – 1.6
- Half-marathon – 1.5
- Cross-country running – 1.8
ELECTROLYTE REPLACEMENT

- Blood becomes concentrated in sodium as we sweat.
- Dilute solutions of sodium (50 mg/8 oz) are recommended during activity.
- In prolonged fluid loss and during recovery from activity, dilute sodium solutions may enhance blood volume replenishment.
HYPONATREMIA

- Low blood sodium levels - life threatening (less common than dehydration but more dangerous)
- Occurs when drink water only when sweating
- Difficult to distinguish heat exhaustion from hyponatremia, both exhibit symptoms of dizziness, headache, weakness, nausea
- But those with heat exhaustion typically respond quickly to fluid replacement, while fluids aggravate hyponatremia
- More common in women than men
HYPONATREMIA

- Most at risk - those who cramp easily
- Most at risk - heavy sweaters (large volume of high sodium sweat)
- Must replace sodium along with water during sweating to minimize risk
- Those at risk may need high concentrated solutions, since typical sport drinks may not be adequate
# Electrolyte Solutions

**mg Sodium/8 oz**

<table>
<thead>
<tr>
<th>Drink</th>
<th>Sodium (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orange Juice</td>
<td>3</td>
</tr>
<tr>
<td>CocaCola</td>
<td>9</td>
</tr>
<tr>
<td>Gatorade</td>
<td>110</td>
</tr>
<tr>
<td>Gatorade Sports Fuel</td>
<td>220</td>
</tr>
<tr>
<td>PowerAde</td>
<td>100</td>
</tr>
<tr>
<td>Vitamin Water</td>
<td>0</td>
</tr>
<tr>
<td>Chocolate milk</td>
<td>147</td>
</tr>
</tbody>
</table>
ELECTROLYTE REPLACEMENT

- Foods can also replace electrolytes
- Bananas and oranges are excellent sources of potassium
- Salty snacks such as pretzels can be an excellent source of sodium
- Consuming sodium helps maintain thirst so improves hydration
Carbohydrates can be included in beverages to provide energy.

It is recommended that carbohydrates be included at 6-8% solution, which is an appropriate balance to provide adequate hydration while providing some fuel.

Should be slightly less than 8% to not slow gastric emptying.
CAFFEINE AND ALCOHOL

- Both act as diuretics
- However, IOM states that both beverages can contribute to daily water needs
- Caffeine should be limited to <180mg/d
- So active people can consume both and not have compromised hydration
- But they should avoid during training/competition, especially alcohol
SUMMARY

- Individualize hydration program if possible
- Prehydrate with 2 cups of water 2 hrs prior to activity
- Replenish fluids, electrolytes and carbohydrate in solution with frequent drinks in small amounts
- Don’t forget about food as part of the program
HELPFUL REFERENCES