

RU Thirsty?

Justin Robinson, MA, RD, CSSD, CSCS
www.RehabUnited.com

The Plan for Tonight

- Background & "Sciencey-Stuff"
 - Fluid
 - Energy (Carbohydrates)
 - Electrolytes
- Nutrient Timing
- Ergogenic Aids/Supplements
- Practical Stuff
 - Meeting your Individual Needs
 - Calculating Sweat Rate

Just get one thing!

Fluid – aka Water

- Cell Protoplasm
- Shock Absorption/Protection
- Function of Senses (hearing, seeing)
- Digestion/Nutrient Breakdown
- Nutrient Transport (Blood)
- Waste Removal (Blood)
- Temperature Regulation

Signs & Symptoms

Dehydration

- Headache
- Lethargy
- Cramping
- Increased HR
- Dark Urine
- Decreased Urine Production

Hyponatremia

- Headache
- Lethargy
- Confusion
- Vomiting
- Edema/Swelling

Dehydration more common than hyponatremia

How Can I Tell?



Dehydration



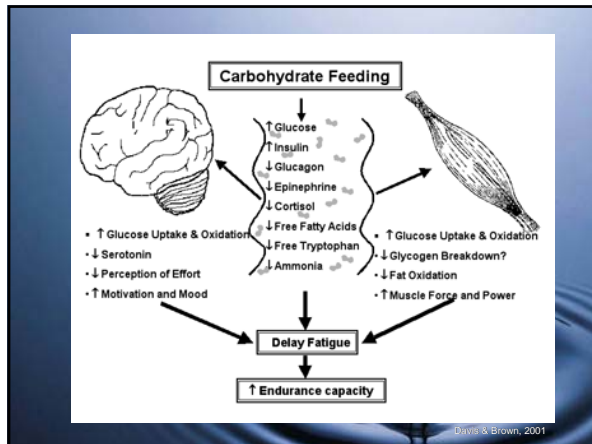
Euhydration

Energy

- Feed the Muscles & Brain
- Macronutrients:

	Density	Cost (O ₂)
Carbs	4 kcal/g	Low
Protein	4 kcal/g	High
Fat	9 kcal/g	High

Carbohydrate Preferred Source During Exercise




Electrolytes

- Sodium (Na)
 - Fluid Regulation, Osmotic Pressure, Muscle Contraction, Acid-Base Balance, Stimulates Thirst
- Chloride (Cl)
 - Fluid Regulation, Muscle Contraction
- Potassium (K)
 - Fluid Retention, Muscle Contraction, Energy Conversion
- Magnesium (Mg)
 - Muscle Contraction, Glucose Metabolism
- Calcium (Ca)
 - Muscle Contraction

Digestion – Gastric Emptying

- Composition/Density
 - **Slow:** Pro, Fat, Fiber, Dense
 - **Fast:** Carbs, Liquid
- Osmolality
 - < 300
- Volume
 - Emptying Proportional to Volume
- Others
 - Temp, Viscosity



Common Questions

1. If I'm not thirsty, do I really need to drink?
2. Is plain water good enough?
3. If I over-hydrate just before a workout will this keep me well-hydrated throughout my training or event?
4. What do I do if I'm training twice in one day and am dehydrated after my morning session?

If I'm not thirsty, do I really need to drink?

- Thirst is not the best indicator of hydration status
- Indication of thirst may equal early dehydration
- 2% weight loss from dehydration can significantly decrease performance
- Sweat rate, environment determine amount of fluid needed

Is plain water good enough?

- Water adequate for events < 60 min
 - Still benefits of sports drinks in short-duration events
- Sports drinks contain fuel and electrolytes
 - Sometimes other ergogenic aids
- Extreme amounts of water (drinking for 3-4 hours) can lead to hyponatremia

Water or Sports Drinks?

Health doctors suggest drinking water during work outs and sports drinks after. This is because the work outs make tiny incisions to the muscle. The water allows you to keep hydrated during your work out. The sports drinks have special additives to them to be able to repair the muscle tears.

Hope this helps; I learned this in a health class.

If I over-hydrate will it keep me well hydrated?

- No benefits of hyper-hydration
 - Frequent trips to bathroom
- Carbohydrate loading can increase water in muscles
 - Increase carbs & decrease exercise intensity
 - Increase sodium intake
- Preload 2-4 hours before event
 - Top off water 10-20 min prior

What do I do if I'm training twice in one day?

- Replace with up to 50% more fluids than you lost
 - Accounts for all water losses
- Sip fluids for multiple hours
 - Better than gulping large amount
- Replace energy and electrolytes as well

Nutrient Timing

Preload
Prolong
Recover

Prolong

*Want to win the Race/Game?
Postpone the Inevitable.*

*Continued Exercise is all about the Body's
Ability to Uptake, Deliver, and Utilize
Nutrients (Oxygen).*

*We don't need a "Plan B" – we just need to
know how to tweak "Plan A" –Gary Gray*

Preload

- Increase Amount of Stored:
 - Water: 2-3 mL/lb (3-4 hours Prior)
 - Fuel (Muscle and Liver Glycogen)
 - Electrolytes
- Top Off
 - Water, Fuel, Electrolytes
 - Caffeine?
- Timing
 - 10 minutes into the first half I'm fine

Prolong - Goals

- Maintain Hydration
 - Match Sweat Rate
 - 0.3-2.4 liters/hour (as much as 4 L)
- Maintain Blood Sugar
 - Major Cause of Fatigue
- Maintain Electrolytes
 - Helps Maintain Hydration

Prolong - Tweaks

- Sodium
 - ~1 g/L
 - 200 mg – 2,000 mg/hour
- Carbohydrate
 - 30-60 g/hour
 - Gel + Water = Sports Drink
- Solid Food
 - As Tolerated
 - In Between Games – On the Bike

Calculating Sweat Rate

Starting Weight (lbs)	165 lb
Ending Weight (lbs)	163 lb
Difference	-2 lb
x 16 oz per lb.	32 oz
+ Fluid Drank (oz)	16 oz
- Urine Output (oz)	0
Sweat Rate	48 oz/hour

Recover

You loose what you used . . . so replace it!

- Replace:
 - Fluid
 - Energy
 - Electrolytes
- Fluid Replacement
 - 20-24 oz/lb Lost
 - Make up for Deficit

Recover

- Energy Replacement
 - **Immediate:** Glycogen (Carbs)
 - **2-3 Hours:** Muscle Tissue (Protein)
 - 30-60 g/Carbohydrate
 - 10-15 g/Protein
- Electrolyte Replacement
 - Individual
 - Salty Foods: Baked Chips, Pretzels

Tidbits

- Focus on FLUIDS, ENERGY, ELECTROLYTES
- Replenish, Refuel, Rehydrate
- During exercise, sweat loss ranges from 0.3-2.4 L per hour
 - Some athletes even >4.0 L
- Dehydration is far more common than hyponatremia
- Base fluid intake on sweat rate – don't guess!

References

1. ACSM Position of the American Dietetic Association, Dietitians of Canada, and the American College of Sports Medicine: Nutrition and Athletic Performance, *Journal of the American Dietetic Association*, 109, 2009
2. Davis, M. and A. Brown. Carbohydrates, hormones, and endurance performance. *Sports Sci Ex*: 14, 2001.
3. Leiper, J., et al. Improved Gastric emptying rate in humans of a unique glucose polymer with gel-forming properties. *Scand J. of Gastro*, 11, 2000.
4. Jentjens, R, et al. High oxidation rates from combined carbohydrates ingested during exercise. *Med Sci Sports Exerc*, 36, 2004.