HOW TO MEASURE HYDRATION STATUS

Hydration status is very important, yet often difficult to assess accurately and reliably in athletic settings. Measurement techniques can indicate changes in hydration status, but should not be used to diagnose hypohydration. An athlete's hydration state is in constant flux and depends on many factors, so multiple indicators are needed for adequate assessment.

For the best estimate of hydration status in an athlete, three simultaneous measures are recommended:

- Thirst sensation
- First morning urine color (chart below)
- Body weight

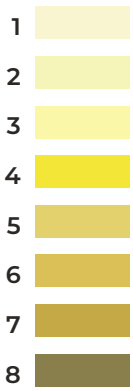
All of the above can be obtained in an athletic training facility and are reliable indicators of hydration status. Body weight is best measured at the same time each morning for valid comparisons.

Thirst

Normally, thirst increases when 2% hypohydration is approached and decreases when fluid balance is restored to a loss of less than 2%.

Urine Color

Urine color is a popular assessment technique because it is noninvasive, inexpensive, and reliable. It also allows for athletes to pay attention to their hydration status on a regular basis.



To assess the status of hydration, match urine color to the color on the chart.

1-3: Well or optimally hydrated

4: Normally hydrated or slightly dehydrated

5-6: Dehydrated

7-8: Extremely dehydrated

National Athletic Trainer Associations Fluid Replacement for the Physically Active Position Paper

Body Weight

Measuring acute body weight changes using a valid and reliable floor scale is an efficient hydration assessment technique. Body mass is considered a valid measure of hydration status only when losses are acutely observed, pre-exercise/practice versus post-exercise/practice, or compared with a valid euhydrated (optimal) baseline.

A valid baseline generally requires three consecutive days of euhydrated weight assessments to establish the normal body weight that may be subject to variations in an athlete's diet, digestion, fluid intake and bowel habits. Body weight assessment for hydration status is best used to show short-term changes between pre-exercise and post-exercise, or changes in status from baseline, or in conjunction with other hydration measurements.

Calculate Hydration Status

To individualize hydration recommendations, you can calculate your sweat rate to help reduce the risk of dehydration during training and practices. This method of calculating hydration uses the body weight method and further shows you how to determine how much you should be drinking based on your individual body weight loss in exercise.

A valid baseline body weight generally requires three consecutive days of euhydrated weight assessments to establish the normal body weight pre-exercise. Measuring body weight for three consecutive days post-exercise can provide an average of how much weight is lost in training and practices. You also need to measure how much fluid you have consumed from weigh-in to weigh-in on each day in order to plug into the calculation. From there, sweat rate can be calculated as shown on following page.

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SWEAT RATES	
SWEAT RATE CALCULATIONS:	**CALCULATION EXAMPLES:**
Pre-exercise weight – Post-exercise weight = Pounds lost	Pre-exercise weight = 155 lbs Post-exercise weight = 152 lbs 155 lbs - 152 lbs = 3 lbs lost
Multiply pounds lost by 16 to get into ounces	3 lbs x 16 oz = 48 oz
Add fluid consumed during exercise	Ounces drank during exercise = 32 oz
Result = How many total ounces of fluid were lost during exercise	32 oz drank + 48 oz lost = 80 total oz of fluid lost during exercise
Take total number of exercise minutes and divide into 15-20 minute segments	Athlete exercising for 2 hours = Six 20-minute hydration intervals
Divide total ounces needed by 15-20 minute segments to calculate how many ounces should be consumed at each hydration interval	80 oz / drinking 6 times in 2-hour workout = ~13 oz every 20 minutes

Urine Specific Gravity (USG)

Urine specific gravity compares the concentration of a urine sample with that of distilled water. Typically, a refractometer is used to project light into the sample and determine the urine's density. This type of test is more reliable than the dipstick method, in which a stick is placed in the urine to measure how much it sinks or floats.

The urine specific gravity test assesses the ratio of the density of urine to the density of water.

To put it another way, the specific density of water would be 1.000. Ideally, urine specific gravity results will fall between 1.005 and 1.030 if an athlete's kidneys are functioning normally.

Specific gravity results above 1.010 can indicate mild dehydration. The higher the number, the more dehydrated an athlete may be. From here, athletic trainers and physicians can make specific hydration recommendations to athletes.

Journal of Athletic Training 2017;52(9): 877–895 National Athletic Trainers' Association Position Statement: Fluid Replacement for the Physically Active

Journal of Athletic Training 2002;37(3): 329–343 National Athletic Trainers' Association Position Statement: Exertional Heat Illnesses

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