

DEHYDRATED ATHLETES HAVE BLUNTED TESTOSTERONE RESPONSES TO EXERCISE

Contributed by Robbie Durand
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Water certainly does not suck! In fact, hydration may be more important for anabolic processes than previously thought. One day I asked pro bodybuilding legend Lee Labrada, what was the most effective performance enhancing bodybuilding supplement? His answer was shocking: Water! It's interesting that most supplements marketed toward anabolism and muscle hypertrophy have a cell volumizing ingredient. Creatine has long been suspected to increase muscle hypertrophy by enhancing cell volumization which leads to greater anabolic processes. Proteins, carbs, vitamins, minerals, fats, are necessary muscle growth and recovery but that are not going to work very well without one special ingredient...water! All biochemical reactions occur in water, and water is an active participant in those reactions. Water is the most important nutrient for ensuring optimal bodily functions. It is also the most overlooked. Without exception, every function of the body is tied to an optimum flow of water. A well-hydrated cell is a healthy cell and will result to overall greater anabolic processes. Water dilutes, dissolves and helps eliminate toxins and trash that could otherwise inhibit immune function, muscle recovery and growth.

Coach Klein: Gatorade not only quenches your thirst better, it tastes better too.

Bobby Boucher: No, you people are drinkin the wrong water.

Coach Klein: Gatorade.

Bobby Boucher: H2O.

Coach Klein: [singing] Water sucks. It really, really sucks. Water sucks.

Memorable quote for The Waterboy

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Are Americans Dehydrated?

Many researchers have suggested that the increased use of caffeine, tea, coffee, and alcohol have caused Americans to be in a state of chronic dehydration. A survey of 3,003 Americans, conducted at The New York Hospital-Cornell Medical

Center and the International Bottled Water Association reveals that America's do not consume the recommended water recommendation. One in 10 respondents say they wait until they are thirsty before drinking a beverage. They do not realize that thirst lags far behind the body's need for water and does not adequately signal the body's hydration needs¹. Dr. F. Batmanghelidj released a book titled, "Your Bodies Many Cries for Water: Your Not Sick, Your Thirsty" which suggest that Americans suffer from Unintentional Chronic Dehydration which contributes and even produces pain and many degenerative diseases that can be prevented and treated by increasing water intake on a regular basis. In an industry where many supplements contain caffeine and Ketogenic diets and protein supplements are prevalent, it safe to probably say that bodybuilders are going to need more water than the average person on the street. What should be concerning to bodybuilders is that even slight dehydration results in diminished physical performance⁶.

Dehydration Reduces Resistance Exercise Performance:

"Even a change of as little as one per cent in body water can impair exercise performance and adversely affect recovery," warns Dr. Jeff Volek. Assistant Professor in the Human Performance Laboratory at the University of Connecticut, Storrs.

A couple of issues back you may have read in the Research Update section a news brief that dehydration did not affect maximal strength but it reduced exercise performance. In the study, subjects were exercised until they were mildly or moderately dehydrated. After this period, they were fed but reframed from any liquids and allowed to go home and sleep. They returned to the lab the next morning and weighed to make sure they were still within the dehydration parameters. They then performed a series of power exercises: vertical jump height, peak lower-body power (assessed via jump squat), and isometric back squat. Interesting, peak power in the vertical jump and jump squat were not affected. In the second part of the study, the subjects were asked to perform six sets of 10 repetitions of back squats at 80% of a 1-RM. The subjects that were mildly and moderately dehydrated had a decrease in the amount of reps they could crank out in the back squat when they were dehydrated.

Dehydration Causes Increased Muscle Damage

Dehydration causes a rise in muscle temperature; increasing muscular temperature during exercise overload exercise sessions such as eccentric contractions impairs muscle function and induces greater damage skeletal muscle. One study demonstrated that downhill running produces muscle soreness but that dehydrated participants have more symptoms of muscle soreness than do well hydrated participants⁷. The researchers discovered that dehydration exacerbated the skeletal muscle damage to exercise causing greater muscle soreness. The bottom line is that if you are exercising hard and not drinking water, the effects of dehydration exacerbate the signs and symptoms of muscle damage. It gets much worse…Hydration status; a key determinant of exercise performance is also capable of modifying the response of many hormones during exercise.

Dehydration Increases Catabolic Hormones

If gaining muscle is your goal, then you should care about cell volumization, or the hydration state of your muscle cells. In a well-hydrated muscle cell, protein synthesis is stimulated and protein breakdown is decreased. On the other hand, muscle-cell dehydration promotes protein breakdown and inhibits protein synthesis. Cell volume has also been shown to influence genetic expression, enzyme and hormone activity, and metabolic regulation. Not having enough water sets up a disaster for muscle growth. Not being adequately hydrated leads to an exaggerated cortisol and adrenaline response to exercise. For example, despite completing identical exercise protocols athletes that were dehydrated caused a significant decrease in the Testosterone: Cortisol ratio (a marker of anabolism). These results suggest that dehydration may increase the catabolic state of the body-mainly by increasing cortisol².

Breaking News: Dehydration Blunts Testosterone Responses to Exercise

Researchers from the University of Connecticut examined how hydration affects the anabolic hormone (testosterone and GH) to resistance exercise. Subjects were divided into three groups: hydrated, mildly dehydrated, and moderately dehydrated (the researchers wanted to mimic the dehydrated states of wrestlers cutting water to make weight.) The subjects then performed six sets of squats at 80% of a 1-RM. GH was not affected by dehydration, but mild dehydrated caused a reduced in testosterone response to exercise by 11% and 16% in the moderately dehydrated group. As previously reported, mild and moderate dehydration increased cortisol, epinephrine, and norepinephrine, the primary stress hormones. Thus dehydration blunted the anabolic response (testosterone) response to exercise and increase catabolic hormones (cortisol, epinephrine, and norepinephrine)³. Who would have thought that even mild dehydration can blunt the testosterone response to resistance exercise.

Catecholamine's do Not Increase Testosterone

Another interesting finding was the study disproved a long questioned hypothesis of whether catecholamine or adrenaline stimulated testosterone release. Previous researchers thought that high intensity exercise increases catecholamine's but also testosterone^{4, 5}. Researchers therefore hypothesized that catecholamine's may increase testosterone. This study rejects the hypothesis that catecholamines increase testosterone because the subjects in the study that were dehydrated had an increase in catecholamine's but a blunted testosterone response.

Hydration is more anabolic than most bodybuilders realize. If you following a high protein diet, taking Thermogenic supplements, or have to work outside; all of these cause for increased water intake. Remember, relying on thirst is not a reliable indicator of hydration. If you are thirsty, you are already dehydrated, so consume water on a regular basis especially during exercise. Under resting conditions, dehydration is normally balanced and prevented by increases in thirst-driven drinking, which adequately stimulates fluid intake. During exercise, however, the human thirst mechanism may be insufficient. During exercise the enhanced thirst signal may not sufficient to promote fluid intake to maintain water balance, a phenomenon known as "voluntary dehydration"⁹. Several studies have reported that despite free access to fluids, exercising subjects voluntarily replace only 66–75% of their net water loss¹⁰. Carry around that water jug may be more anabolic than previously thought!

Key Points:

- Dehydration Causes Increased Muscle Damage
- Dehydration Increases Catabolic Processes
- Blunts Testosterone Responses to Exercise
- Thirst is not an accurate indicator of hydration.

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