

PULSE Science of Exercise

PULSE GENERATOR PERIODICAL: EXPLORING THE SCIENCE BEHIND EXERCISE AND PHYSICAL ACTIVITY

The Science of Exercise

This year the Pulse Generator is focussing on the scientific evidence as a basis for exercise and health. Throughout the next few months we will be producing a number of articles, events & tools that you can use to improve your health and well being. Stay tuned for many great topics and activities.



HYDRATION

where do you fit within the guidelines?

DID YOU KNOW



that different people require different amounts of water each day to stay properly hydrated?

How does water benefit our physiology?

Our body uses **water** in all its cells, organs and tissues to help regulate its temperature and maintain other bodily functions.



Heart - Blood Volume

Your heart is constantly working, pumping about

2,000 gallons of blood a day. By staying hydrated – i.e. drinking more water than you are losing – you are helping your heart do its job. Proper hydration increases blood volume, which in turn, decreases the strain on your heart as it can pump blood more easily. The circulation of blood is important to carry necessary oxygen, nutrition and remove waste from every cell. When dehydration occurs our blood volume decreases retaining more sodium. The heart beats faster to circulate blood through the body.

Symptoms: Decreased energy, weakness, dizziness, heart palpitations.

Health Benefit: Your heart does not have to work so hard. Lower HR

Benefit to Athletic Performance: Increased endurance.

Hydration-

How much water do you really need?



Digestion - Water and other liquids keep the food you eat moving through your intestines. These organs

break down food so that your body can absorb the nutrients. Hydration is important to keep them smooth & flexible. One of the most accurate signs of good hydration is both color and volume of your urine. If you are concerned that you are not drinking enough water, check your urine. If your urine is usually colorless or light yellow, you are well hydrated. If your urine is a dark yellow or amber color, you may be dehydrated.

Symptoms: Upset stomach, muscle cramping, constipation, bad breath, sweet cravings, dark urine.

Health Benefit: Healthier skin complexion, regular bowel movements.

Benefit to Athletic Performance: Absorption of nutrition provides building blocks for good recovery, muscular development & healthy bones.



Joint Mobility

Water helps keep joints lubricated. A component of synovial fluid, water helps to prevent joint friction. Synovial fluid lubricates and cushions the joints and cartilage surrounding them, keeping bones from rubbing together.

Water helps **build muscle** to further protect the joints. Muscle tissue consists of about 75 percent water, which helps to form protein in muscles, stabilizing and protecting joints. Dehydration can reduce muscle tone by preventing muscles from contracting.

Symptoms: Stiffness, achy joints

Health Benefit: movement with ease and without pain.

Benefit to Athletic Performance: Fluid movement.



Body Temperature Regulation

Water has the capacity to regulate the internal

temperature of the body in response to the external temperature. Sweat is the main means by which water prevents the human body from overheating when the temperature outside it is very high. The evaporation of sweat brings a loss of calories, in the form of heat. This release of energy enables our internal temperature to remain constant. Without this mechanism it would rise in conditions of hot weather or fever.

To maintain stable body temperature, we have to both **sweat and allow the sweat to evaporate!** During exercise in the heat, sweat output often exceeds water intake which results in a body water deficit and electrolyte losses.

Symptoms: Increased muscle fatigue, disorientation & dizziness.

Health Benefit: safety, movement stabilization, lower stress.

Benefit to Athletic Performance: Improved focus, increased

Water's the best choice

Fruit and vegetable juices, milk and herbal teas add to the amount of water you get each day. Even caffeinated drinks (ie: coffee, tea and soda) can contribute to your daily water intake. A moderate amount of caffeine (200 to 300 mgs) is not harmful for most people. 2 to 4, 8-ounce cups of coffee. It's best to limit caffeinated drinks.



Nervous System

When you are well hydrated, your body allows your brain to

function optimally. Staying hydrated helps your nervous system easily communicate with your body.

Symptoms: Increased sensation of effort.

Health Benefit: Improves cognition, reducing confusion, increases alertness, improves memory, focus and attention.

Benefit to Athletic Performance: Improved hand eye coordination.

HOW DO OUR BODIES LOSE WATER?



Respiration (breathing)



Perspiration (sweating)



Digestive Function – waste elimination & urine

We need to replenish what is lost.

Water is best for staying hydrated. Other drinks and foods contain water and can help you stay hydrated. Some, however, may add extra calories from sugar to your diet.

6 Unusual Signs of Dehydration

1. Bad Breath

Saliva has antibacterial properties, but dehydration can prevent your body from making enough saliva.

2. Dry or Flushed Skin

You may think that people who are dehydrated are really sweaty, but in fact, as you go through various stages of dehydration, you can have very dry skin which may appear flushed as well.

3. Muscle Cramps

As your muscles are working hard, they can seize up. Changes in the electrolytes, such as sodium and potassium, can lead to muscle cramping.

4. Fever and Chills

A high fever can increase dehydration. Unless your body temperature decreases, your skin will lose its cool clamminess and then become hot, flushed and dry to the touch.

5. Food Cravings (Especially for Sweets)

When you're dehydrated, it can be difficult for organs such as the liver, which uses water, to release glycogen [stored glucose] and other components of your energy stores, this can initiate cravings for food. Although you may crave anything from chocolate to a salty snack, cravings for sweets are more common. This occurs when your body is having difficulty breaking down glycogen to release glucose into the bloodstream to use as fuel.

6. Headaches

Although various factors besides dehydration can cause headaches, drinking a full glass of water and sipping more fluids during the day is an easy way to ease your pain if, in fact, dehydration is a culprit.

WHAT TO CONSIDER

A PLACE TO BEGIN

A common recommendation is to drink six or eight 250 mL (8 fl oz) glasses of water or other fluid every day.

In reality, the amount of fluid a person needs depends on several unique factors.



Size. A larger person needs more fluid to maintain hydration than a smaller person.



Activity Level. An individual who works out or is very active requires more fluid than someone who sits at a desk all day.



Environment. A hot and humid environment causes people to sweat. Sweating removes fluid and electrolytes from the body, which often need to be replaced to prevent dehydration.



Diet. A person who eats oranges, salads, soups, watermelon or other “water-filled” foods may get as much as 20 percent of his or her daily fluid through food.

STAY
Hydrated

Create a Long Term Change

Try a 2 week water challenge to monitor the effects that increased water consumption has on your health & maybe even your attitude. Use a consistent water bottle for this challenge that you can measure the volume. Put a piece of masking tape on the bottle to record each time you fill it. Record daily, the volume you drink, how often you go to the bathroom, note physical/mental changes. I.e: maybe your skin complexion improves, perhaps the dark circles under your eyes are lighter, memory may improve.

If you can commit to two weeks, you will have a really good idea about how much water you need to enjoy each day.

Simple but beneficial changes to your health.

Sweat and Dehydration

How you sweat plays an important role in staying hydrated. Try this easy calculation:

- Weigh yourself before and after a moderate workout, wearing the same clothing.
- In ounces, determine the difference between pre- and post-workout weight. 1 pound = 16 ounces.
- Add this number to how much fluid you drank during your workout.
- Divide this by the length of your workout (number of hours).
- The resulting number is your hourly sweat rate.

Now you know how much you need to drink every hour to replace your lost sweat!

Simple ways to monitor



Assess Skin Turgor:

When pinched, the skin of a dehydrated person may remain “tented” and take some time to return to its normal, flat appearance. Test the skin below the clavicle or on the abdomen, sternum, or forearm. This is not an method to assess older adults as we lose skin elasticity as we age.



Assess capillary refill:

by applying pressure to a fingernail for 5 seconds. Release the pressure and observe the time (usually 1 to 3 seconds) it takes for the color to return to normal. If it takes longer, you may be dehydrated.

Monitor Urine:

Light yellow, you are well hydrated. If your urine is a dark yellow or amber color, you may be dehydrated.



WELL HYDRATED DEHYDRATED SEVERELY DEHYDRATED