

# Balance of Body Fluid & Hydration

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**Abstract:** Water is necessary for all life on Earth. Humans can survive about 4 to 6 weeks without food but only for a few days without water. Intense sweating can increase the requirement for electrolyte replacement. Water-electrolyte imbalance produces headache and tiredness, and sometimes even death if severe. Water intoxication, i.e. the process of consuming too much water too quickly, can be fatal. Water deficiency in the body results into volume contraction and dehydration. Fluid balance is an aspect of the homeostasis of organisms in which the amount of water in the organism needs to be controlled through osmoregulation and behavior in such a way that the concentration of electrolytes (salts in solution) in the various body fluids are kept within a healthy range. The main principle of fluid balance is the amount of water lost from the body must equal the amount of water intake.

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**Introduction:** Euvolemia is the state of normal body fluid volume, which include blood volume, interstitial fluid volume and intracellular fluid volume. A body fluid refers to any fluid produced by a living organism. In human beings, the body fluid can be classified into two major sections based on location, they are:

- (1) intracellular fluid
- (2) extracellular fluid.

The interstitial fluid, fills up the spaces between cells and is the major constituent whereas the transcellular fluid is the fluid which fills up the spaces of chambers formed from the linings of the epithelial cells. In humans, intracellular fluid makes up 67% of the total body water composition. It is composed of water, dissolved ions, and other molecules.

The extracellular fluid is the body fluid located outside the cell making upto 26% of the total body water composition in humans. Intravascular fluid (blood plasma), interstitial fluid, lymph and transcellular fluid make up the extracellular fluid.

### **Fluid balancing whilst sporting:**

Drinking enough water each day regulates body temperature, keeps the joints lubricated, prevent infections, deliver nutrients to cells, and also keeps the organs functioning properly. Being well-hydrated also improves sleep quality, cognition, and mood. Experts suggests drinking roughly about 11 cups of water per day for the average woman and 16 for men, not all of those cups have can be plain water some can be water flavored with fruit or vegetables or from coffee or tea.

Major sporting events are commonly staged in hot environments where the average daytime temperature is generally in the range of 29 to 31°C with the average relative humidity ranging from 80 to 95%. Exercising capacity and exercise performance is reduced when the ambient temperature is high and it has major implications for competitors, spectators and officials as well. Prolonged exercise leads to progressive water and electrolyte loss from the body as sweat is secreted to promote heat loss. The rate of sweating depends on many factors and increases in proportion to work rate and environmental temperature and humidity. Sweating rates are highly variable and can exceed for prolonged periods in high heat. Since dehydration impairs exercise capacity and can pose a risk to health, the intake of fluid during exercise to offset sweat losses is highly important & recommended. Carbohydrate-electrolyte fluid ingestion during exercises has the dual role of providing a source of carbohydrate fuel to supplement the body's limited stores and of supplying water and electrolytes to replace the losses incurred by sweating. The composition of fluids to be taken will be influenced by the relative importance of the need to supply fuel and water, which, in turn depends on the intensity and duration of exercise activity, the ambient temperature, and humidity. Carbohydrate-electrolyte solutions are more effective in improving performance than plain water. There is no advantage to fluid intake during exercise of less than 30-minute duration.

Complete restoration of fluid balance after exercise is an important part of the recovery process and becomes even more important in hot, humid conditions. If a second set/pattern of exercise has to be performed after a relatively short interval then the speed of rehydration becomes utmost

importance. Rehydration after exercise requires not only replacement of volume losses, but also replacement of some electrolytes, basically sodium. Rehydration after exercise can be achieved only if sweat electrolyte losses as well as water are replaced. Drinks with low sodium content are ineffective at rehydration and they will only reduce the stimulus to drink. Addition of small amounts of carbohydrate to the rehydrating drinks may improve the rate of intestinal uptake of sodium and water thus improving the palatability. The volume of the rehydration beverage consumed should be greater than the volume of sweat lost to provide the ongoing obligatory urine losses. Palatability of the beverage is a major issue when a large volume of fluid has to be consumed. Drinking fluid during exercise helps to prevent a drop in performance caused by dehydration, and fluid after exercise will re-hydrate you.

The amount of fluid and the timing of drinks depend on the individual and the sport. Kick-start the exercise always well hydrated this lowers the risk of becoming dehydrated during sport. There is minimal performance benefit to being over-hydrated as drinking excessive amounts of fluid before exercise causes increased urination and feeling bloated. Develop a plan for drinking during exercise based on your own sweat rates. Immediately after exercise monitor your weight change to estimate your final fluid deficit. During recovery, you will continue to lose fluids through sweating and urine losses, so plan to replace this fluid deficit over the next 2-6 hours. Drink fluids with your recovery snacks and the following meal to achieve the goal.

### **Fluid Guidelines Summary :**

The detrimental effects of dehydration on performance include: loss of coordination, impaired ability to make a decision, increased rate of perceived exertion and increased risk of heat stress. Ensure that you drink at a rate that is comfortable. Practice your competition fluid intake plan in training sessions. Estimate your sweat rate by weighing yourself before and after the training sessions as well as competitions. Water is an excellent fluid for low intensity and short duration sports. Sports drinks are ideally suited to high intensity stop-n-go and endurance sports. Always assess the detrimental effects on your recovery.

**Conclusion:** Different sports pose different challenges and opportunities for optimal hydration. For team and racquet sports there are formal breaks between play, with substitutions and time-outs, all offering an opportunity to drink. Some individual sports require drinking on the move.

Be smart and practice strategies to get maximum benefit from fluid intake with minimal discomfort. Try special squeeze bottles, or hands free drink pouches. Thirst is not an effective indicator of hydration status while exercising. There is usually a significant fluid loss before you feel thirsty. When drinking, your thirst will be satisfied well, before, these losses have been fully replaced. Aim to match your sweat rate with fluid intake as closely as possible.

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