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Today we will address a very important part of performance-- Hydration. So many times the only little thing, which makes you lose focus, leave you behind, and get you injured, is dehydration. When your body is not hydrated well, and you don't drink appropriate fluids to replace lost fluids your performance is compromised. Lets understand more of hydration and the consequences of dehydration, so as learn working practices.

### What is Hydration?

Our body is made of four different compartments: muscle, fat, bone and water. The largest part, 70%, of our body is water.

#### Water makes up

- 82% of blood
- 75% of muscle
- 25% of bone
- 76% of brain tissue
- 90% of lung tissue

### Why do we need to have enough water in our body?

There is no life without water. You probably heard, that while one can go without food for almost a month, without water the body lasts for 3 days. The following list can show you just how important water is. Water:

- Hydrate your skin, reduce wrinkles and clarify your complexion
- Lubricate your joints
- Promote normal digestion and nutrient absorption and transport
- Promote normal bowel movements
- Reduce fatigue
- Aid in weight loss by promoting a feeling of fullness
- May help to stop dehydration-related headaches
- Boost your immune system
- Give you more energy
- Flush out unwanted toxins
- Important for temperature regulation

### How do we lose and take in water?

Our actual water level in the body depends on how much water we lose and take in. Our body loses fluid through urine, breathing, sweat and feces. On the other hand we replace our fluids by drinking water, drink and eating food.

It is also evident that athletes lose the most fluid through sweat. If you don't replace the lost water in your body you will experience, fatigue, then headaches and overheating and finally will collapse.

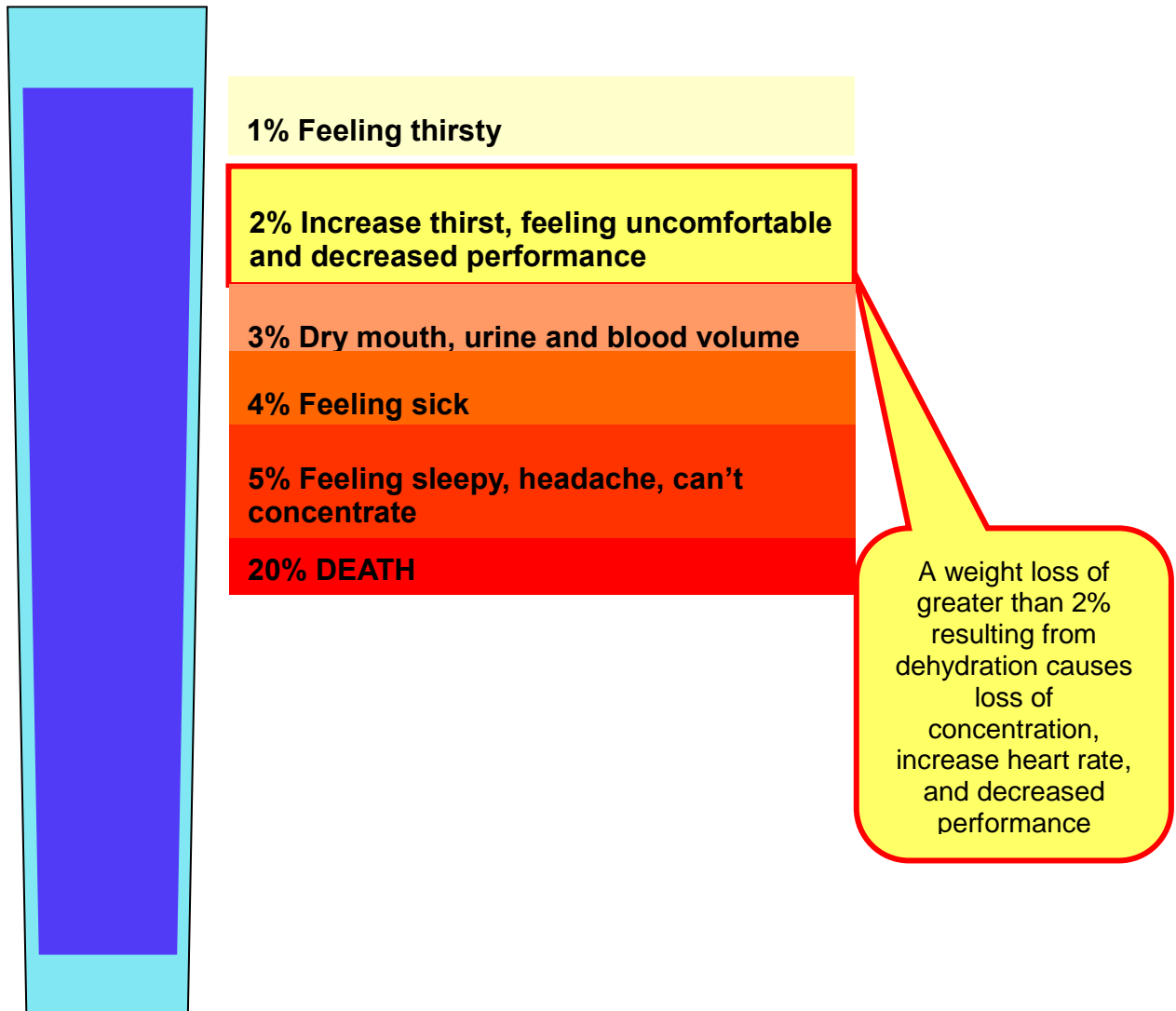
### Why do we sweat?

It is not only athletes who sweat a lot, but also those who are involved in heavy physical activity. When you workout you feel hot, because the heat is the byproduct of energy production. The more energy the body needs for exercise, the more heat will be produced. Sweating is a normal physiological change to exercise or energy production. High energy and heat production is followed by immediate cooling mechanism through sweating. I am sure everyone experienced to sweat more when training long hours, train high intensity. Sweating is even more profuse when you train outside in hot weather and further more when the humidity is high. In hot but dry weather, or in air-conditioned place the sweat can evaporate form the skin, but in humid weather the air molecules are full of water and the water/ sweat remains on the skin. Imagine the amount of sweat those athletes produce who need to wear helmet and protective gear, e.g. like those in fencing, archery, and motor sports.– and their

sweat remains almost fully in their protective gear. Their cooling mechanism is compromised all together.

**What happens when we lose water and become dehydrated?**

Do you think if anything happens to this 70% portion of your body, would you feel it? Obviously yes, and check out the following table.



Overheating is one important signal that you must drink. There was a study where scientists tracked body temperature during a 6-hour-walking in athletes who used different hydration methods. Athlete A replaced water regularly. His body temperature raised only slightly and that stayed on that level during

the 6 hours. This athlete performed also the best. Athlete B drank only when he felt thirsty. His body temperature rose higher initially and kept on rising. Athlete's B performance was worse than athlete A. Athlete C did not drink water at all, had very large increase in body temperature initially which continued to rise rapidly to critical levels--just like having a fever. This athlete struggled to finish the walk.

The take home message is that when you feel even a little tired you must drink immediately.

### **What is sweat?**

Sweat is largely consist of water. I m sure you have tasted sweat and it tasted salty. When you sweat you dont only lose water, but important minerals too. These minerals are: Sodium, Magnesium, Potassium and Calcium. All are important elements – electrolytes for the body, which needs replacement.

### **What kind of fluid de we need to drink?**

There are so many different drinks on the market and they all are marketed one way or another that you shall drink that for better energy or performance. A bottom line is to kow your performance, as drinks formulated for athletes and they are too high in sugar for someone who doesnt exercise at all.

Here is the bare truth about fluids and what is the best for you to keep your body hydrated.

- Mineral water
- Water based soup (not creamed)
- Juice diluted w water
- Herbal Tea
- Electrolyte drink -- during exercise if exercise is 45 minutes or longer, or after exercise (high mineral, sodium, potassium, magnesium containing water). You may take a ¼ tsp Himalaya salt with 200ml water at awake for all they good hydration.
- Sport Drink – Only during exercise if exercise is 90 minutes or longer and after exercise. There are many different Sport drinks on the market, the home-made version is: 300 ml grape or mango juice+ 700ml water + 3 tbs sugar+ pinch Himalayan salt

The best tasting fluid what absorbs the fastest is between 5-10 °C. Drinks should not be freezing cold, but chilled yes. All drinks taste better for our taste buds when chilled, therefore it allows to drink more.

The rule of thumb is to drink water before exercise training. All other sugary drinks will compromise your performance and moreover inhibit your fat burning, which is a common goal for anyone who reads this article.

### **Why do we need to take salt for Hydration?**

As we mentioned earlier, sweat contains sodium. Largest amount of mineral what we lose out of the body while sweating heavily, is sodium. Sodium has a very important role in the blood. That is to keep water inside the blood. If your blood loses too much water, becomes thick, and cant circulate in the blood vessels.

If you sweat heavily and drink only water, you experience that you need to go to the bathroom and urinate quickly. The reason for this, that you only have so little amount of sodium in the blood to maintain so called „osmotic pressure”. And drinking plain water after excessive sweating will dilute the remainig little sodium, hence drops the osmotic pressure. The reacton of the body to get rid of the water from the blood, is to eliminate water through urine. Makes sense now why you need to run to the toilett so fast after drinking plain water. The answer likely, that your sodim level is too low and your body can hold water inside. This is really harmful for the body as even when you drink, your body stays dehydrated.

### **How much water do you have to drink?**

A normal non-exercising adult needs 2-2.5L water a day. This number is calculated using that an average adult will generate 2000-2500Kcal of activity a day, and the water intake is 1-1.5ml per expended Kcal.

If you have an athlete, for example a football player who generates 2910Kcal energy expenditure he needs to drink  $2910 \times 1.5 = 4.4$  L water. This amount of water is necessary if the exercise took place in normal environmental temperature. Once exercising in heat and sweat production increases the athlete will need lot more fluid. Rule of thumb: “drink by plan and not by thirst”.



**What is a drinking plan?**

Lets be very specific and show you 2 differnt drinking plans, which allows you to drink the amount of water necessary for your performance.

Plan 1. Is an ordinary average adult or anyone with light training.

- Awake: 200 ml water
- Breakfast 200 ml water /low fat milk
- Mid Morning 200 ml water
- Lunch: 200 ml water / diluted juice  
200 ml clear soup
- Afternoon 400 ml water/ herbal tea
- Training 500 ml water
- After training: 200ml water or electrolyte
- Dinner: 200 ml water/ clear soup
- Night: 200 ml herbal tea / hot chocolate
- **TOTAL: 2.5 L**

Plan 2. Is for athletes

- Awake: 200 300ml water
- Breakfast 200 300ml water
- Training morning: 1000 1500ml water + sport drink
- After training: 500ml water
- Lunch: 200 300 ml water – or clear soup
- Afternoon sleep 700 1000 water
- Afternoon snack 200 300 ml water
- Training afternoon 1000 1500ml water + sport drink
- After training: 500ml
- Dinner: 200 300ml water
- Night: 200 300ml water
- **TOTAL: 4.9 L 6.8L**

**How to Calculate sweatloss?**

Calculating your sweatloss will be a very important task for any serious athlete. In order to know exactly how much fluid they have to drink after training or competition.

Calculate sweatloss by tracking your bodyweight, while wearing dry undergarment only. Measure your body weight before training and after training.

If you were drinking fluid during training, you need to substract the amount of liquid in kg to your body weight (If you drank 500ml =0.5L – that is 0.5kg). The number you get here is the amount of sweat you lost.

Then urinate and measure your bodyweight again. The differnce of the weightafter training and after urination is the amount of fluid lost in urine.

Add the sweatloss and urine loss together and multiply by 1.5, and you get the exact amount of fluid you need to drink the next 2 hours to replace the lost fluid and rehydrate your body, so as to speed up recovery.

I will show you this calculation in an example here. BW- (Body weight)

BW before training: 54.5 kg  
 +  
 Consumed fluid: 0.5 L  
 -  
 BW after training: 53.5 kg  
**Total sweat loss: 1.5 L**

Bathroom – urination

BW after urination: 53.2 kg

**Urine volume:**

BW after training – BW after urination: **0.3L = 300 ml**

**TOTAL FLUID LOSS: 1.5+ 0.3 = 1.8 L**

**What to drink before during and after training?**

Pre training	Water	
During training	Water if exc less than 45 min Electrolyte drink if exercise 45-60 min Sport drink and water if exercise 90 min or longer	Drink every 10 minutes during exercise  You must be prepared t drink 1L fluid per hour of training!
After training	Electrolyte drink Sport drink	

**How do you know that you are hydrated?**

Easiest way to track hydration is through the color of the urine. We can classify hydration status by the color of the urine. See the color codes here.



- 1 - 3 = Optimally Hydrated
- 4 - 6 = Slightly dehydrated. Should drink more
- 6 - 8 = Dehydrated. Must drink more



Hydrated

Dehydrated

The urine on the right is a awake urine sample from a dehydrated athlete.

We took the same amount of urine in the left container and diluted with water until it reached hydrated state.

Our intention was to demonstrate how much less water the dehydrated athlete had in his urine, hence in his body.

This explained why was this athlete constantly injured with muscle pulls and tears.

Dehydrated muscle tears much easier.

If you take a wet cloth, it's quite difficult to tear, however the same cloth dry can be ripped easily.

Another easy way to recognize dehydration is when you look into the toilet bowl after urination and see if the yellow color is even in the water. If the urine color is concentrated in the center and you see a ring of water around, you can need to drink fluid.

#### What is Urine Specific Gravity (USG)?

USG is metric unit for urine concentration. Urine concentration is measured using an instrument called the refractometer. The morning and bed-time urine sample can be used to estimate overall hydration status. In this method a few drops of urine is placed on the instrument and the urine specific gravity can be seen on a vertical scale -- as the measurer looks through the view window of the instrument which is held against the light. The specific gravity of clear water is 1.000. Hydrated urine contains large amount of water, and much lighter on the scale. Urine specific gravity below 1.010 is a hydrated urine. Urine from an athlete, who is minimally dehydrated contains less water and the urine specific gravity is higher-- between 1.010 to 1.020. As the dehydration status increases the urine contains less water hence the specific gravity raises. Athletes with urine specific gravity of 1.020 to 1.030, are significantly dehydrated. Serious dehydration starts from urine specific gravity of 1.030 and above. All these methods are used to ensure athletes are always in a good hydration status before and after training or competition.

#### How does alcohol affect the body?

Alcohol is a major dehydration agent. Even in small amounts it is poison for the body. In order to get alcohol out of the body, large amount of water is used. Therefore **alcohol makes you dehydrated.**

**Alcohol makes you lose focus, lose power and strength, lose accuracy, makes you get tired faster in endurance race and makes you prone to injury.**

**Consuming alcohol after training makes recovery process slower**, not only because it keeps you dehydrated, but also as your carbohydrate storage in the body can't get refilled.

If you got hurt during training or sport game and had alcohol after the game, your injury or swelling will stay much longer, as alcohol contributes to increased edema.

The rule of thumb, that one shall stay clear from alcohol 24 hrs before and after training and competition.

Learn to celebrate with non-alcoholic drink, as mocktails frozen sport drink, ice slush. You shall decide in your head what is important for you and if you are addicted to alcohol then shall look into the emotional factors of your anxiety, why you need alcohol to calm down.