

HYDRATION 101



FOREWORD

In this eBook we're going to give you some information about how your body naturally works, what sweating really does for you (and takes from you), and some suggestions for how to take this knowledge and turn it into an advantage on the playing field. We know some folks will want to jump into the details (so a couple of those are here), but most of us just want to know what the difference is between the \$20 and \$100 shirt, or whether there is any difference between tap water and Gatorade. In this series, we'll give you the information you need to decide the best plan for you.

First, the basics – we call it Hydration 101.



INTRODUCTION

Body Temperature

Methods

The Problem with Evaporation

Wicking

Convection, Conduction, and Evaporation

Replenishment

The Pulse Point Concept

Conduction and Core Performance

Staying Sharp

An Internet search about fitness can be overwhelming, and a lot of folks already have their own plan depending on their activity. But all the science around exercise pretty much boils down to this: we take in a certain amount of energy through food and drink, and we use a certain amount of energy to perform.

The winners are those who figure out how to both take in and use this energy most efficiently.

It used to be that a cotton t-shirt, a pair of shorts, and a couple sips of water beforehand were all that athletes needed to compete. But those days are gone – now everything from the amount of protein in your breakfast to the stitch compression of your socks can be adjusted. Winning is now about efficiency as much as effort; it's not just about being a better athlete, it is about maximizing and sustaining your athletic output. At the center of this is hydration, which we'll get to in a second. But here's the challenge: if there's one thing that we as humans are usually out of tune with, it's how hydrated we are.



Body Temperature

Our body uses energy for a lot of things, and one of the primary ones that we don't even really think about is to keep its temperature constant. These mechanisms are mostly automatic. While most of us are pretty familiar with the 98.6 degree number that is the average human body temperature at rest, the thing that really matters is if we are above or below that. Above, we use energy to cool ourselves, below, we use energy to warm ourselves. But keeping temperature near 98.6 is the real key. We're going to talk mainly about offloading heat, as this can happen no matter what the temperature is outside when you're working hard. In order to do this, we have to continually provide our body the energy it needs to offload heat and regulate itself.

Methods

There are only four ways your body gets rid of heat. Here's a quick look at those and a simple example:



Evaporation

Water leaves your body and turns from a liquid to a gas (sweating)



Conduction

Heat transfer from your body to another solid surface (touching something colder to your body)



Convection

Air or water currents absorbing energy as they move over your body (standing in front of a fan).



Radiation

Infrared heat transfer from your body to the surrounding environment (standing still)

In order to cool down faster, the body has to use one of these mechanisms more efficiently. The main problem for most of us is that Evaporation has been the only tool our body could use to do this. Radiation is fairly constant, a fan of a large enough size is prohibitive to transport for Convection, and when you're outdoors, nothing (with the notable exception of Qore Performance systems, which we will get to in a bit) has been designed to use Conduction in a space-efficient package that doesn't interfere with performance in some other way. So when you're exercising, your body speeds up Evaporation to adjust to the increased heat your muscles generate.





The Problem with Evaporation

Evaporation is a brilliant biological process. Faced with the need to offload heat, your body pumps heated blood from the core to find a way out. Your blood vessels open up through a process called vasodilation; these widening blood vessels are the reasons your skin turns red when you heat up. As the heated blood arrives near the vast surface area of your skin, your body's water stores move to accept the heat and evaporate into a salty steam.

As you have probably already realized, though, this mechanism isn't without its drawbacks, the most imminent of which is that it is very dehydrating. It makes perfect sense – water evaporated from your skin into the environment will result in less water inside you. Without constant replenishment, your body's water will quickly run low, both diminishing the effectiveness of the sweating process and also reducing the amount of water the body has to do other things, like keeping blood the right consistency. In fact, the less water in your bloodstream, the harder your heart has to work to pump the blood to your muscles. Believe it or not, this has an even larger impact on bigger people, as the

blood has to travel longer distances! So Evaporation, while brilliant, can only get you so far.

There are two other problems with Evaporation. First, it's a process that is far and away most efficient when the air is dry and your skin is exposed. If the air is saturated with water (or humid), then the atmosphere simply can't accept more liquid and your sweat stays in your clothing and on your skin. Second, when clothing, uniforms, and armor cover the skin, they get in the way and trap heat, no matter how much we sweat.

Wicking

Wicking fabrics, frequently incorporated into technical base layers, can help in the evaporative process, especially relative to traditional cotton. The idea here is that these fabrics are hydrophobic, meaning that when water comes into contact with them, they will actively push water away. The result is that it becomes harder for sweat to pool in specific areas of the garment, instead moving the moisture from the wet areas to the drier areas and keeping the evaporative process working (think of boiling away a big pot of water [traditional cotton] versus drying a damp cloth [wicking garment]).

These days, just about every high performance garment should have moisture wicking as a component; it has become standard issue for top athletes. Qore Performance apparel includes it as standard in everything we make. But we know also know that the effect is limited, and it is a particularly passive approach. The best we can reasonably hope for is for sweating to work as well with clothing on as it does when clothing is absent.

Unfortunately, put even the most effective moisture-wicking clothing into a humid environment and you will quickly see it isn't enough. The problem is the same: when everything is saturated, the evaporative process doesn't work.

What if you stop offloading heat?

A normal-functioning body will keep trying to reduce its heat via sweating (and thus dehydrate itself) no matter how humid the environment is. So in order to limit this, other mechanisms are necessary, primarily conduction, which we will cover in the last section. But the consequences of retaining heat are dire, starting with decreased cognitive performance and getting worse from there.

Since even the most hardcore user rarely measures their internal core body temperature, the first trigger that your temperature is rising is thirst. But even there, the body tells you a little late – often you have already lost about 2% of your body weight in water by the time your thirst kicks in. Replenishment (by drinking water and taking in nutrients) and slowing down the rate of dehydration (via one of the four mechanisms listed above) is critical at this point, as performance falls off a cliff soon after – in fact, for most of us, an 8% body water weight loss would result in complete collapse and an extended recovery timeframe, and even half of that would result in severely diminished mental and physical performance.



Convection, Conduction, and Evaporation

The Sideline Version

A normal-functioning body will keep trying to reduce its heat via sweating (and thus dehydrate itself) no matter how humid the environment is. So in order to limit this, other mechanisms are necessary, primarily conduction, which we will cover in the last section. But the consequences of retaining heat are dire, starting with decreased cognitive performance and getting worse from there.

Since even the most hardcore user rarely measures their internal core body temperature, the first trigger that your temperature is rising is thirst. But even there, the body tells you a little late – often you have

already lost about 2% of your body weight in water by the time your thirst kicks in. Replenishment (by drinking water and taking in nutrients) and slowing down the rate of dehydration (via one of the four mechanisms listed above) is critical at this point, as performance falls off a cliff soon after – in fact, for most of us, an 8% body water weight loss would result in complete collapse and an extended recovery timeframe, and even half of that would result in severely diminished mental and physical performance.



The Pulse Point Concept

Pulse Points are unique places on the body – they are where you get a lot of blood flow close to the skin. This is the reason it's easy to feel your heart's rhythm at these points. But more than that, the Pulse Points serve as unique access points to your body's transportation system – the blood.

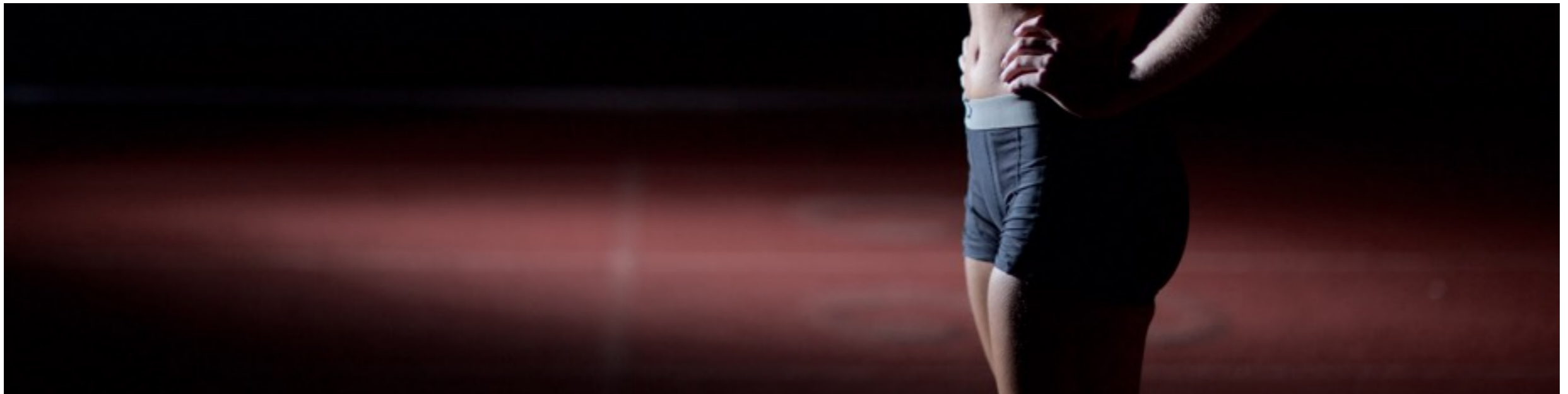
Your blood typically cycles through your body about once per minute. This means that warmed blood is going to and from your extremities routinely. This blood is passing through the pulse points. There, you have the intersection of just what you need for maximum efficiency: a high volume of blood, close to the surface. This makes the pulse points ideal spots for conductive heat offload, and the bloodstream will then naturally carry the benefit throughout your entire body.

Replenishment

Gatorade or water? Each have their place, but understanding the function of each can help you make the right decision for how to pre-load and replenish.

The [Gatorade Sports Science Institute](#) and [Osmo Nutrition](#) have some excellent content on their websites about the right balance of fluid intake that are worth looking through after this.

But to summarize, when you sweat you lose more than just water, you also lose important sodium stores that buffer you from injury.



Conduction & Qore Performance

Staying in the Action

On a hot and humid day, we know a lot of you don't have the option of staying in. And you don't want to, either – you want to get out there and compete. You now know the limitations, and the importance, of keeping the body hydrated. You know the pulse points are efficient places to offload heat. So you're ready and willing to take action to stay ahead of dehydration. Here is where Qore Performance comes in.

Qore Performance Systems provide efficient conductive heat offload at the pulse points. Conduction occurs as the Inserts absorb your heat. The efficiency comes in by offloading heat directly from the blood, which naturally distributes the benefits throughout your body.

The math and science comes down to this: when you can offload more heat through conduction, you use less energy fighting to cool yourself through Evaporation. Your body will respond with appreciation, and reward you with automatically applying every ounce of energy saved directly towards your mission or competition.

Qore Performance Systems are game-changing because they are designed completely for proactive and on-field use. You're free to (and they are built to enable you to) wear them whenever you want, but during your activity is where you're going to realize the most benefit. It's beyond the scope of this eBook to talk about the specifics of the fit or the materials—and a truckload of thought and engineering has gone into those as well – but now you know how valuable this portable method of conduction can be. From sprinting to hurdling to diving for a line drive, these super-durable Inserts and base-layers are now a key part of the well-hydrated athlete's toolkit.

Staying Sharp

A lot of top athletes are completely in tune with their body. An inch out of alignment, a stride a half beat too short, the slightest hesitation can turn a winner into an also-ran. These are things that can only be achieved through practice. But the more variables come into play, the harder it is to stay on point. A solid regimen of preparation, in-game discipline, and recovery is important to staying hydrated and at your best.

For more information, visit
www.qoreperformance.com

