Stanford is Building a Body-Cooling Glove that is Safer and More Effective than Using Steroids for Athletes

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By Dr. Mercola

Stanford biologists have created a glove-like device that they say works “better than steroids” in terms improving athletic performance.

In one case, a colleague who used the device, dubbed “the glove,” for six weeks went from doing 180 pull-ups to over 620 – a rate of physical performance improvement the biologists called “unprecedented.”

What is perhaps even more astounding is the mechanism by which the glove works... it’s so simple, it’s downright brilliant.

“The Glove” Quickly Cools Core Body Temperature

Virtually all mammals have hairless areas of the body that contain networks of veins called AVAs (arteriovenous anastomoses), which help with quickly managing body temperatures. Bears, for instance, have them on the pads of their paws and their nose, and these small patches of skin appear to be nearly solely responsible for keeping bears from overheating in the summer.

When just the right amount of cooling, neither too much nor too little, is applied, it has drastic effects on altering core body temperatures quickly. On humans, there are AVAs on the palms of the hands, and this is the area the Stanford researchers chose to target while looking for a model to study heat dissipation. The results they achieved came quite by accident, but that makes them no less intriguing. Stanford University reported:[1]

> *“The newest version of the device is a rigid plastic mitt, attached by a hose to what looks like a portable cooler. When [Stanford biologist Dennis] Grahn sticks his hand in the airtight glove, the device creates a slight vacuum. The veins in the palm expand, drawing blood into the AVAs, where it is rapidly cooled by water circulating through the glove's plastic lining.*
>
> *The method is more convenient than, say, full-body submersion in ice water, and avoids the pitfalls of other rapid palm-cooling strategies. Because blood flow to the AVAs can be nearly shut off in cold weather, making the hand too cold will have almost no effect on core temperature.”*

Why Cooling Off Drastically Improves Athletic Performance

As Grahn stated, "temperature is a primary limiting factor for performance." This is because when your muscle cells increase in activity, it causes them to heat up. If the temperature were to get too high, the cell would be destroyed, so they have a built-in fail-safe, an enzyme called muscle pyruvate kinase, or MPK, that is necessary for a muscle to generate energy, but which shuts down when the temperature gets too high.

> *“When you cool the muscle cell, you return the enzyme to the active state, essentially resetting the muscle's state of fatigue,”* Stanford noted.

In other words, the rapid cooling the glove provides appears to virtually erase muscle fatigue, and is also being considered for use with hyperthermia and heat stress. Stanford continued:

> *“The researchers applied the cooling method to other types of exercise – bench press, running, cycling. In every case, rates of gain in recovery were dramatic, without any evidence of the body being damaged by overwork – hence the "better than steroids" claim. Versions of the glove have since been adopted by the Stanford football and track and field teams, as well as other college athletics programs, the San Francisco 49ers, the Oakland Raiders and Manchester United soccer club.”*

Why You Might Want to Take a Cold Shower After Your Workout

There are more benefits to cooling your body than just improved athletic performance. Exposure to cold temperatures via cold water

and ice baths, otherwise known as cold water immersion or "cryotherapy," may offer wide ranging health benefits, including speeding your recovery after exercise and reducing delayed-onset muscle soreness.

Cold works by lowering the damaged tissue's temperature and locally constricting blood vessels. Using targeted cold therapy, such as an ice pack, immediately after an injury helps prevent bruising and swelling from the waste and fluid build-up. Cold also helps numb nerve endings, providing you with instant, localized pain relief.

On a whole-body scale, immersing yourself in a cold tub of water brings down your heart rate and increases your circulation, minimizing inflammation and helping you recover faster. Cold-water baths appear to be significantly more effective than rest in relieving delayed-onset muscle soreness, which typically occurs one to four days after exercise or other physical activity.[2]

Can Cold Water Increase Your Body's Tolerance to Stress and Disease?

Interestingly, exposing your whole body to cold water for short periods of time is used to promote "hardening." Hardening is the exposure to a natural stimulus, such as cold water, that results in increased tolerance to stress and/or disease. This was demonstrated by a study involving 10 healthy people who swim regularly in ice-cold water during the winter.[3] Following exposure to the cold water, researchers noted a:

- **"Drastic" decrease in uric acid levels:** High levels of uric acid are normally associated with gout, but it has been long known that people with high blood pressure, kidney disease and people who are overweight, often have elevated uric acid levels. When your uric acid level exceeds about 5.5 mg per deciliter, you have an increased risk for a host of diseases including heart disease, fatty liver, obesity, diabetes, hypertension, kidney disease and more.
- **Increase in glutathione:** Glutathione *is* your body's most powerful antioxidant, which keeps all other antioxidants performing at peak levels.

What Else Can You do to Boost Athletic Performance?

"The glove" is still being tweaked for commercial use, so what are your other options to give your fitness abilities a boost? There are several other notable strategies to consider, all of them natural and safe:

- **Optimize your vitamin D levels:** Research shows that vitamin D increases the size and number of Type II (fast twitch) muscle fibers.[4] And many cross-sectional studies show that vitamin D levels are directly associated with musculoskeletal performance in older individuals.
- **Try astaxanthin:** One of the benefits of astaxanthin that has piqued the interest of researchers is its ability to enhance athletic performance. Whether you are an elite athlete or just interested in increasing your tolerance for yard work, this carotenoid antioxidant may help.
- **Avoid drinking too much water:** Overhydrating will actually *worsen* athletic performance, not improve it. As you begin to consume too much water, your cells will start to swell, leading to such symptoms as gastrointestinal upset, dizziness, soreness and others.
- **Eat foods that contain carnosine**, i.e. animal protein such as organic grass-fed beef or free-range chicken, eggs and whey protein. Carnosine is a dipeptide composed of two amino acids, beta-alanine and histadine, found in many tissues but most notably in your muscles. It serves several important roles, two of which are:

    1. Buffering acids in your muscle
    2. Serving as a potent antioxidant

    Carnosine appears particularly useful for improving anaerobic high-intensity exercise performance.[5] If you are considering using carnosine as a supplement it is important to realize that carnosine itself is probably not that useful because enzymes rapidly break it down to its constituent amino acids (beta-alanine and histidine), which are then absorbed by your muscles and re-formed back into carnosine.

    If you do decide to take a supplement, instead of taking carnosine I recommend taking its primary precursor, beta-alanine, based on the science in this area. Beta-alanine has also been shown to be helpful for preventing muscle soreness when working out.

[+] Sources and References