

**ACE-Sponsored
STUDY**

This study was funded solely by the American Council on Exercise (ACE) and conducted by Jennifer Otto, B.S., Heidi Felker, M.S., John P. Porcari, Ph.D., and Carl Foster, Ph.D., of the University of Wisconsin-La Crosse.



Mind Over Body

By John Porcari, Ph.D., and Carl Foster, Ph.D.

What if athletes didn't know that super-oxygenated water had no special effect on performance?

Can the mind trick the body into performing better? Scientists have long known about the placebo effect, but can it be used to make a person run faster? A new ACE-sponsored study measured what happens when athletes think they're getting an extra boost in the form of "super-oxygenated" water.

A Little Background

In 2001, ACE sponsored a study to test the claims made by manufacturers of super-oxygenated waters. At the time, this product was sold by several manufacturers under brand names such as Aqua Rush, Athletic Super Water and AquOforce, and each claimed to contain up to 10 times more O₂ content than regular tap water. The theory was that the body would absorb the extra O₂, resulting in improved stamina and athletic performance, reduced recovery time, and better mental clarity.

The study, conducted by the Human Performance

Research Lab at the University of Wisconsin-La Crosse, revealed that drinking super-oxygenated water had no measurable effect on heart rate, blood pressure or blood lactate values during sub-maximal and maximal exercise tests. At the time, researchers concluded that any potential benefits of super-oxygenated water would undoubtedly be attributed to the placebo effect. "The bottom line," said lead researcher John Porcari, Ph.D., "is that this stuff is no more beneficial than regular tap water."

Testing the Placebo Effect

But what if you didn't know that super-oxygenated water had no special effect on performance? That was the question Jennifer Otto and Heidi Felker set out to answer in 2006. Thirty-two healthy volunteers between the ages of 18 and 55 were recruited from the community of La Crosse, Wis. The participants represented both competitive and recreational runners who ran a minimum of 16 km

Table 1. Descriptive Characteristics of Subjects

	<i>n</i>	Age (yrs)	Ht (cm)	Wt (kg)	$\dot{V}O_2$ max (ml/kg/min)	km per week
Males	23	28.4 ± 12.7	179.6 ± 4.9	73.3 ± 2.1	63.9 ± 6.9	31.6 ± 3.4
Females	9	29.7 ± 13.3	168.4 ± 3.8	59.4 ± 3.0	52.9 ± 5.5	29.8 ± 1.6
Overall	32	28.7 ± 12.7	176.8 ± 6.8	69.8 ± 6.6	60.8 ± 8.2	31.1 ± 3.1

(7.3 miles) per week (see Table 1 for more details about the subjects).

Study participants were told that they were involved in a study to measure the effects of super-oxygenated water (SOW) on exercise performance. Each volunteer watched a short video detailing the beneficial effects of SOW and how their performance might be enhanced by drinking SOW before a race.

After a preliminary $\dot{V}O_2$ max test to determine fitness level, each subject ran three separate non-paced 5-km time trials. Each run was completed at least three days apart on an indoor 200 m track. The first run was to allow participants to get familiar with pacing on the track. The second run involved half the subjects drinking 16 ounces of bottled water or 16 ounces of what they thought was SOW (but was, in fact, tap water) prior to running. For the third run, subjects completed the opposite condition.

During each trial, heart rate and rating of perceived exertion (RPE) were measured, while blood lactate concentration and running performance time were measured at the end.

The Results

Heart rate, RPE and blood lactate levels were virtually the same between the two conditions (Figure 1, Table 2.). There was, however, a significant difference in average lap time (Figure 2) and total time. During the placebo trial, subjects ran an average of 83 seconds faster, or 3.3 seconds per lap, when they thought they were drinking SOW. And a full 84 percent (27 of 32 subjects) ran faster during the placebo trial.

Interestingly, those who ran the control trial faster than 20 minutes improved by about 28 seconds during the placebo run. But the subjects who took longer than 20 minutes to complete the control trial took an average of two minutes, 22 seconds off their placebo run. In the words of one researcher: "That is huge."

The Bottom Line

Given that the subjects ran faster during the placebo trial, it would make sense that heart rate, RPE and blood lactate levels would reflect the added effort, but that was not the case. Previous studies on the placebo effect have shown that subjects who believe that they are receiving treatment tend to feel less pain with a placebo. For example, one study used ultrasound to reduce inflammation following the removal of impacted molars. The majority of the patients who received

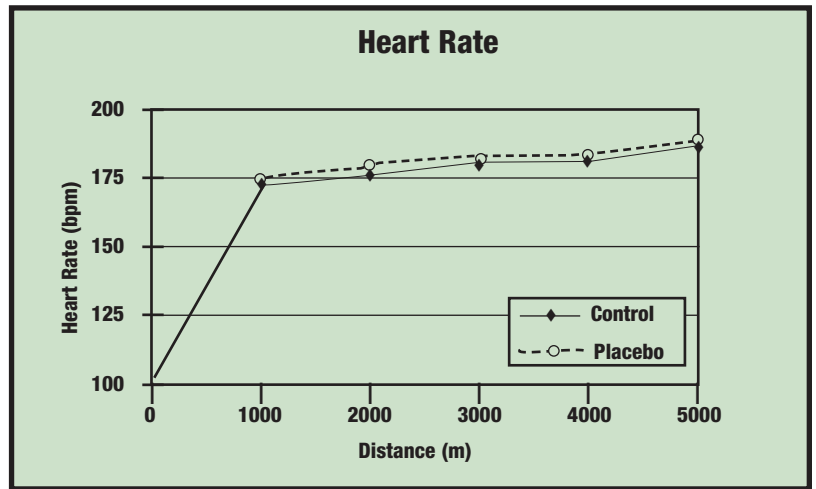


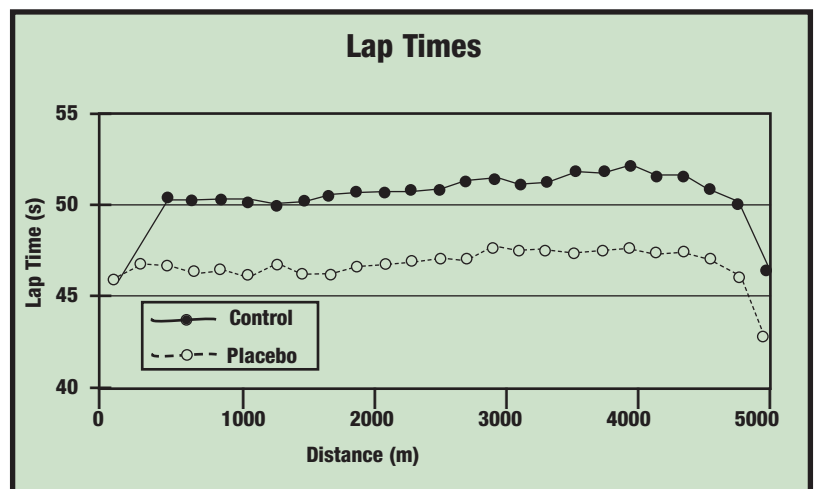
Figure 1. Mean heart-rate responses for 5-km runs

the placebo exhibited anti-inflammatory activity. Similarly, asthmatic patients treated with a placebo had less bronchial constriction and the occurrence of exercise-induced asthma decreased after exercise.

Lead researcher Otto also believes that the running ability of the subjects influenced the outcome: The placebo effect was more evident in the slower subjects. While several of the lower-fit subjects claimed that they "felt lighter on their feet" and wanted to know where they could buy the product, more experienced runners asserted that they didn't feel any different after the run and that they "didn't think that stuff works."

Future studies will have to examine if it is possible to have a chronic placebo effect. In other words, can you continue to make athletes believe that something is boosting their performance over time? It's virtually guaranteed that every coach and athlete will be waiting for the results of that study. 🏃

Figure 2. Average lap time for each 200 m of the 5-km runs for each trial



Lower-fit subjects claimed they "felt lighter on their feet." More experienced runners asserted they didn't feel any different.

Trial	Total Time (min)	RPE	Blood Lactate (mmol/L)
Control	21:04 ± 3:34	7.7 ± 1.4	9.8 ± 3.9
Placebo	19:41 ± 2:32*	7.7 ± 1.2	10.2 ± 3.7

* $p < 0.05$