Study of Firefighters Finds Whole Blood Viscosity Levels Improve Upon Proper Rehydration

Findings from pilot study underline the importance of staying hydrated during exercise, heat and stress.

BOTHELL, Wash. (Oct. 1, 2013) – A recent pilot study of firefighters, designed to examine the effect of heat stress, physical exertion and dehydration on Whole Blood Viscosity (WBV) levels, confirmed that dehydration has a profound negative effect on blood viscosity (“i.e. “thickening blood”). The study, published in the July/August 2013 issue of *Alternative Therapies*, further found rehydration with *Essentia® Water* to be an effective means of significantly improving WBV levels that were depressed during high stress activity, as well as very nearly restoring the body back to its pre-exercise state.

Heat stress, physical exertion and fluid losses can result in decreased cardiac output and risk of heart attack, evidenced by cardiovascular disease being the leading cause of death among on-duty firefighters. Blood viscosity, which is a measurement of the thickness and stickiness of an individual’s blood, is important because it is a critical parameter to determine the amount of friction against the blood vessels, how hard the heart has to pump and how much oxygen is delivered to the body’s organs and tissues. With this pilot study, Essentia sought to identify the best means to test for and minimize risk of dehydration among firefighters.

“We utilized firefighters for this study because there are few professions or situations aside from professional athletes where participants are subjected to such high levels of heat stress and fluid loss on an ongoing basis,” said Ralph E. Holsworth, Jr., DO, the study’s lead author, and director of clinical and scientific research for Essentia Water. “We want the takeaway from this study to be for athletes, firefighters, trainers and consumers alike to recognize the importance of staying regularly hydrated as part of an overall health regimen.”

He adds that as an emergency room doctor, all too often he sees patients with severe dehydration. He wants to remind firefighters that, “you wouldn’t show up to fight a fire without oil and gas in the engine and access to a fire hydrant, so please remember to prepare your own body in a similar way by staying hydrated.”

Firefighting duties often require an extreme physical workload, use of closed air breathing apparatus, and the associated heat stress and dehydration. But dehydration is also an important issue among the general population, with well-established data on the impact of soft drink consumption, warming climate, constipation and other factors contributing to dehydration.

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The study by Dr. Holsworth and colleagues monitored nine healthy, non-smoking firefighters from the Fire Training Division in Renton, Wash. Measurements were performed over a two-week period prior to the drill to establish normal WBV and complete blood count (CBC) measurements for each participant. On the day of the study, the eight male and one female participants were subjected to a stringent mock fire drill, wearing a self-contained breathing apparatus and carrying 70-lb. packs up and down stairs for two 30-minute sessions of mock firefighting in a building with a live fire.

Less than an hour after the exercise, upon rehydration with the 9.5 pH water, each of the firefighters’ blood tests showed they had very nearly been restored back to pre-test baseline hydration levels. A follow-up study is being planned to test Essentia’s absorption rate against other types of water.

“Essentia prides itself on providing scientific evidence for each health and wellness claim we make about our functional water, so we are pleased that this finding confirms the role of hydration on health,” said Ken Uptain, Essentia’s president and CEO. “It’s a natural next step for us to plan a much larger, clinical test to measure the absorption rate of Essentia versus other hydration products.” He adds that the follow-up study, which he anticipates will be conducted next year, aims to use a much larger sampling of participants who regularly put their bodies through extreme dehydration stresses, such as competitive cyclists or a larger group of firefighters.

The current study further found WBV measurements should be performed to monitor the cardiovascular health of at-risk firefighters, which Essentia hopes will help contribute to reduced morbidity and improved health among some of the more than one million firefighters who serve and protect us from coast to coast.

**Outcome Measures / Findings from the Pilot Study**

Blood viscosity rises and falls with each cardiac cycle, much like blood pressure. To get a meaningful test you need systolic (high-shear) and diastolic (low-shear) blood viscosity. Systolic blood viscosity is affected by hematocrit and plasma, and is known to be highly affected by hydration status. According to Dr. Holsworth, hematocrit, which measures if you have too few or too many red blood cells, is an important determinant of whole blood viscosity levels.

After the exercise, two separate blood draws from each firefighter were completed with the first post-exercise but prior to rehydration and the second post-exercise and 45 minutes after oral rehydration with Essentia water. The tests measured WBV, hemoglobin (Hb) and hematocrit (Hct) levels. As expected, the changes in percentages for Hb and Hct from pre-drill to post-drill were 4.1 percent and 5.5 percent, respectively, indicating significant hemoconcentration due to the heat stress/dehydration. After rehydration with Essentia, the changes in Hb and Hct were -5.8 percent and 4.6 percent, respectively.

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Compared to the changes in the Hb and Hct, the changes in the WBV from pre-drill to post-drill were much greater (9.5 percent and 17.2 percent respectively). Before the test began, the participants had a mean baseline WBV of 39.0 (low-shear) and 105.5 (high-shear). In the first blood draw after the test WBV numbers jumped to 42.7 and 123.6 respectively. After rehydration, average WBV levels dropped back to near normal at 38.8 (low-shear) and 109.8 (high-shear), indicating rehydration with Essentia water significantly improved WBV. This further supports the importance of staying hydrated throughout exercise, whether you’re a firefighter, cyclist, avid cross-fit participant or active adult.

About Essentia
Essentia Water, Inc. launched its Super Hydrating Water™ in 1998. The innovator of the first functional bottled water, today it is the No. 1 selling bottled water brand in the natural channel and the fastest growing top 10 premium bottled water brand in the grocery channel. Headquartered in Bothell, Wash., Essentia’s proprietary process results in an electrolyte-enhanced water with optimum alkalinity and an ideal pH of 9.5. Essentia Water hydrates the body, promoting optimal health. Available at natural foods markets and grocers throughout the United States, Essentia is also available online at Amazon.com.

To learn more about Essentia, please visit www.essentiawater.com. Or connect with Essentia on Facebook.

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(Media note: Interviews with study’s lead doctor, Essentia executives and fire chief who helped organize the study are available upon request).

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