



## **Research at Appalachian State indicates natural plant substance helps reduce illness in physically stressed athletes finding may have military application.**

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BOONE—Researchers at Appalachian State University have proven that a natural antioxidant derived from plants is able to reduce illness and maintain mental performance in physically stressed test subjects.

Quercetin, a naturally occurring, powerful anti-oxidant found in red grapes, red wine, red apples, green tea and broccoli, is the first plant compound proven in a controlled clinical trial to reduce susceptibility to viral illnesses.

“These are ground-breaking results, because this is the first clinical, double-blind, randomized, placebo-controlled study that has found a natural plant compound to prevent viral illness,” said Dr. David Nieman, a professor in Appalachian’s Department of Health, Leisure and Exercise Science.

Nieman is leading the team of biologists, exercise scientists, psychologists and nutritionists who are studying the substance’s beneficial properties.

Research on quercetin at Appalachian State was funded by a \$1.1 million contract awarded to the university in 2005 by DARPA, the U.S. Department of Defense’s high risk research and development organization. DARPA is seeking ways to maintain the immune systems of troops who are undergoing the physical and cognitive stresses of combat. The high-purity quercetin, QU995, was generously supplied by Quercegen Pharma in Newton, Mass.

Nieman will present results from the research study Feb. 9 at the southeastern regional meeting of the American College of Sports Medicine, which will be held Feb. 8-10 in Charlotte, N.C.

The average U.S. citizen eating a normal, healthy diet consumes about 25-50 milligrams of quercetin a day.

Participants in the study ingested pure quercetin, combined with vitamin C and niacin to help the body absorb the substance.

In the study, 20 cyclists ingested 1,000 milligrams of quercetin a day for five weeks. A placebo was given to 20 other cyclists. Three weeks into the study, the athletes rode a bicycle three hours a day for three days to the point of exhaustion. “We set it up to really stress the athletes,” Nieman said.



Researchers then studied blood and tissue samples to track any physiological changes occurring in the test subjects.

Nieman's previous research has documented that extreme exercise, such as running a marathon, weakens a person's immune system and increases infection rates.

While 45 percent of the cyclists who took a placebo reported illness following the extreme exercise, only 5 percent of the quercetin group reported any days of sickness. There was no evidence of any adverse side effects.

"That's a highly significant difference," Nieman said. "When you have a double-blind, placebo-controlled study and you have those kinds of differences, it can't be due to chance," he said.

Another finding was that the immune boosting properties of quercetin didn't appear to take effect until after the three-day intense exercise period.

"It appears that it takes significant stress to bring out quercetin's infection-fighting properties," Nieman said. "This all happened when athletes were under high oxidative stress, when stress hormones were high, and they were also undergoing muscle damage."

Researchers in Appalachian's Department of Psychology also found that following the three days of exercise, quercetin helped maintain mental alertness and reaction time of the athletics in a fashion similar to that of caffeine.

"The athletes taking the quercetin supplement maintained their ability to react to an alertness test when exhausted, whereas those who took the placebo became measurably slower," Nieman said. "The infection data and vigilance data are our two biggest findings in this study."

Next, Nieman and his research team will look at quercetin's benefits for the general public who experience everyday psychological stressors, and whether lower doses during a shorter period of time have beneficial effects.

"The question that needs to be answered now is will quercetin help members of the general community who are just going through mental stress," Nieman said. "I really want to see if this substance will help the common person. That's what we're gearing up for with our next research project."

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