BioPerine® and Resveratrol Enhance Skeletal Muscle Mitochondrial Performance

THEORY:

RESVERATROL—a naturally occurring polyphenol antioxidant found in grapes, berries and several other plants—has been shown in animal trials to possess a range of health-promoting properties, including increasing mitochondrial capacity in exercise, although results in human studies have been inconsistent. Natural bioavailability enhancers like piperine (a bioactive component from black pepper) can impact the uptake of a broad range of nutritional ingredients, influencing the effectiveness of their pharmacokinetic and pharmacodynamic profiles. Could resveratrol combined with piperine be helpful in enhancing skeletal muscle mitochondrial performance during low-intensity exercise training in humans?

PARAMETERS:

A DOUBLE-BLIND, placebo-controlled, four-week clinical trial evaluated the effects of resveratrol (500 mg) and BioPerine® (10 mg, a standardized extract of black pepper from Sabinsa) supplementation in combination with exercise training on skeletal muscle mitochondrial performance in 16 healthy young adults. Half the subjects took identical-looking placebo pills. Participants performed 30 minutes of supervised forearm wrist flexor exercises of the nondominant arm three times per week over a four-week period. The dominant arm was used as the untrained control for each subject. Mitochondrial capacity measurements using near infrared spectroscopy (NIRS) were taken at weeks zero, two, three and four.

OUTCOME:

The increase in mitochondrial performance from baseline to post-testing was

40% in resveratrol and BioPerine combination group

10% in placebo group

In the resveratrol and piperine group, supplementation and training increased mitochondrial rate constants in **7 of 8** participants.

In the placebo group, only **3 of 8** individuals exhibited training-induced increases in mitochondrial rate constants.

THE STUDY AUTHORS concluded supplementation with a resveratrol and piperine combination might be helpful in enhancing skeletal muscle mitochondrial performance during low-intensity exercise training.

IMPACT:

Physical inactivity reduces mitochondrial capacity. Resveratrol has shown potential in helping expand mitochondrial capacity—an effect also triggered by exercise training. However, resveratrol has shown low bioavailability in human studies.[1] Piperine has been found to increase bioavailability of some ingredients from 30 to 200 percent. Enhancing a low-intensity training program with a combination of resveratrol and piperine may help elicit muscle mitochondrial adaptations.

1. Amri A et al. "Administration of resveratrol: What formulation solutions to bioavailability limitations?" *J Control Release*. 2012 Mar 10;158(2):182-93. DOI: 10.1016/j.jconrel.2011.09.083.

2. Kesarwani K, Gupta R. "Bioavailability enhancers of herbal origin: An overview." *Asian Pac J Trop Biomed.* 2013 Apr; 3(4):253-266. DOI: 10.1016/S2221-1691(13)60060-X.

Source: Polley KR et al. "Influence of exercise training with resveratrol supplementation on skeletal muscle mitochondrial capacity." *Appl. Physiol. Nutr. Metab*. 2016;41(1):26-32. DOI: 10.1139/apnm-2015-0370.