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FILE: ■ Spirulina (*Arthrospira platensis* syn. *Spirulina platensis*)
■ Muscle Damage Prevention
■ Exercise-induced Stress

HC 030685-360

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RE: Spirulina Provides Antioxidant Protection and May Enhance Exercise Duration

Lu HK, Hsieh CC, Hsu JJ, Yang YK, Chou HN. Preventive effects of *Spirulina platensis* on skeletal muscle damage under exercise-induced oxidative stress. *Eur J Appl Physiol*. Sep 2006;98(2):220-226.

Athletes from the Chinese and Cuban Olympic teams consume spirulina (*Arthrospira platensis*, *A. maxima*, syn: *Spirulina platensis*, *S. maxima*) during training and before competitions. Spirulina is a blue-green algae used as a protein-rich dietary supplement. The common name spirulina reflects the older taxonomic classification of these species in the genus *Spirulina*, but they are currently members of the genus *Arthrospira*. Research has indicated that spirulina has biological activities including prevention of fatty liver disease, reduction of serum lipid levels, prevention of cardiovascular disease, elevation of hemoglobin, and antioxidant properties. Animal studies have indicated that spirulina may reduce muscle fatigue and damage. The purpose of this clinical trial was to examine the efficacy of supplementation with spirulina in the prevention of skeletal muscle damage and the delay of fatigue onset in non-athlete human subjects.

Healthy subjects (n=16) were recruited for this double-blind clinical trial, conducted at the National Taiwan College of Physical Education (Taichung, Taiwan). The 2 groups (3 men, 5 women each) received either a spirulina dietary supplement (Fareast Microalgae Industry, FEMICO, Taipei, Taiwan) or soy (*Glycine max*) protein in 0.5 g capsules. The subjects from the 2 groups were instructed to take 5 capsules 3 times daily for a total daily dose of 15 capsules (7.5 g) over 3 weeks, less than the 10 g daily normally recommended. The subjects performed an all-out treadmill exercise following the Bruce incremental protocol for 30 minutes, and blood samples were drawn 30 minutes after the exhaustive workout.

After 3 weeks of supplementation, the spirulina group showed a significant increase in the time that it took for them to become exhausted on the treadmill test (P=0.014), while the soy group showed no significant difference. But, there was no significant difference between the

2 groups. The spirulina group also showed significantly decreased levels of malondialdehyde ($P=0.033$), a measure of oxidative damage, and increased levels of lactate, a product of anaerobic metabolism during intense exercise ($P=0.001$), while the soy group did not show improvements. Again, there was no significant difference between the 2 groups. Both groups showed significant increases in levels of superoxide dismutase, an antioxidation enzyme, after 3 weeks, with no significant difference between the groups (spirulina: $P=0.008$, soy: $P=0.018$). There was a statistically significant difference between the 2 groups with the spirulina group having greater increased levels of glutathione peroxidase ($P=0.018$), an antioxidation enzyme, and decreased levels of lactate dehydrogenase, an enzyme that removes lactate from muscle cells and a marker for skeletal muscle damage ($P<0.001$). There were large deviations in levels of creatine kinase, another indicator of muscle breakdown, in both groups, and a tendency toward lower levels with spirulina and higher levels with soy, but no significant differences were observed.

The authors write that soy protein, which was used as a placebo in this study, demonstrated antioxidant effects and "could be looked at as another supplementation other than placebo." They conclude that the results show that spirulina reduces lipid peroxidation, thus preventing skeletal muscle damage and probably delaying time to exhaustion during intense exercise. More research, preferably including athletes, is needed to confirm these results.

—*Marissa N. Oppel, MS*

The American Botanical Council has chosen not to reprint the original article.

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