Antioxidants can reduce the effect of endurance training

If you are taking high daily doses of the antioxidants vitamins C and E you risk getting less out of your workout.

Both vitamin C and E supplements are widely popular and are used together by many who would improve their health and improve their performance.

But a new Norwegian study indicates that the use of these antioxidants can counter the effect of exercise – at least if you are in training for events that require plenty of stamina, such as a marathon or a punishingly long ski race such as Sweden’s 90-km long Vasaloppet.

“Our results show that vitamin C and E supplements weaken the power packs of the muscle cells, the mitochondria. The normal effect of endurance training is an increase in the number and size of the mitochondria,” says Gøran Paulsen, a researcher at the Norwegian School of Sport Sciences (NIH).

“But we don’t see this effect in our study of those who took the supplements when they trained,” says Paulsen, who is the first author of the new study and a member of Norway’s organisation of Olympic sports trainers, Olympiatoppen.

He emphasises that increasing the quantity and size of mitochondria in muscle tissue is fully necessary for building endurance.

Spanner in the works

Mitochondria are found in all our cells. They act as small power stations that convert nutrients into the energy that cells need to function.

Paulsen thinks it is likely that high doses of the two vitamins, which are both antioxidants, remove some of the stress that muscles are subjected to before, during and after training.

Such oxidative stress, or oxidation, is a chemical reaction that occurs when we exercise and exposes muscle cells to more oxygen through the bloodstream.

The two antioxidants appear to throw a spanner in the works in terms of the muscle stress that is a critical part of increasing endurance.

Truls Raastad, a professor in NIH’s Department of Physical Performance, points out that our bodies need vitamins C and E, but few people in a well-fed country like Norway are deficient in either.

Raastad is one of the 19 authors of the study.
“We also see signs that the muscles’ natural ability to burn fat during endurance training is reduced,” he says.

**Be careful with high doses**

In a previous study, led by Paulsen, researchers looked at the same antioxidants’ affect on strength training. The results were the same – these antioxidants can have a direct effect on the muscles’ power generation potential.

It has been documented that regular workouts and exercising increase mitochondria numbers in the muscle cells. People who increase the endurance of their muscles can perform at higher levels before their muscles stiffen and build up a surplus of lactic acid.

The researchers have taken muscle tissue samples from two groups of individuals who were training. The first group took vitamin C and E supplements while the others were given a placebo – bogus vitamins.

“It is fascinating that we find differences in something as basic and essential as the power stations of the muscles. I think we are seeing reason to be concerned about using higher doses of vitamins C and E, especially for people who are engaged in endurance training,” says Paulsen.

**Saw a tendency in wind sprints**

Even though the researchers found a negative influence on the cellular level, the picture was less clear when they investigated what happened when the participants were asked to sprint back and forth 20 metres, at an increasing pace, for a few minutes.

“We saw a tendency among those who took the supplements to accomplish more than the others. But perhaps we need to try more exercises that are limited to fewer muscles to see the effect more clearly. In any case, our findings show an effect on the benefits of training,” says Paulsen.

Raastad also thinks the vitamin supplements reduce an individual's performance.

“We had some tests of 60 and 80 percent intensity in the study which clearly showed an effect of training on heart rates and the burning of fats and carbohydrates in the placebo group, but not in the group that took the supplements,” says Raastad.

He thinks the short-term test does not pose as much of a challenge to muscular endurance as a marathon race, for example.

**Three or four sessions per week**

The researchers carried out tests for 11 weeks with 54 healthy men and women. The group that wasn’t given a placebo received daily doses of 1000 mg vitamin C and 235 mg vitamin E.

This was a double blind study. In other words, neither the researchers nor the participants knew which participants were getting real vitamins and which were getting the placebo.

The men and women carried out the training programme with three or four sessions a week, mainly running, for periods of 30 minutes to an hour.

The researchers took blood samples and tissue samples from the participants’ muscles before and after the training sessions.
Fifty-four healthy women and men participated in the study. (Photo: Colourbox)

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