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## Vitamin E anti-cancer mechanism mooted by researchers



By Nathan Gray+  
15-Mar-2013

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**The supposed anti-cancer effects of vitamin E have been long suggested. Now researchers believe they may have identified a key mechanism behind these properties.**

The anti-cancer effects of vitamin E have long been suggested, however pinpointing a viable mechanism behind such supposed effects has until now proved a step too far, said researchers revealing their new data.

The study, published in *Science Signaling*, showed that the gamma-tocopherol form of vitamin E blocks the activation of an enzyme – known as Akt – that is essential for cancer cell survival.

"This is the first demonstration of a unique mechanism of how vitamin E can have some benefit in terms of cancer prevention and treatment," said lead author Professor Ching-Shih Chen of Ohio State University. "This is a new finding. We have been taking vitamin E for years but nobody really knew about this particular anti-cancer mechanism."

However, Chen cautioned that use of a normal vitamin E supplement won't offer such a benefit for at least two reasons:

- many affordable supplements are synthetic and based predominantly on a form of the vitamin that did not fight cancer as effectively in this study (alpha-tocopherol)
- humans cannot absorb the high doses that appear to be required to achieve the anti-cancer effect.

"Our goal is to develop a safe pill at the right dose that people could take every day for cancer prevention," he said. "It takes time to optimise the formulation and the dose."

Chen has also filed an invention disclosure with the university, and Ohio State has filed a patent application for a modified version of the gamma-tocopherol compound.

### Vitamin E

Vitamin E occurs in a number of forms based on chemical structure, with the most common being tocopherols.

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In this study, Chen and his team showed that of the tocopherols tested, the gamma form was the most potent anti-cancer agent.

Both alpha- and gamma- tocopherol were found to inhibit the Akt enzyme in very targeted ways, but the gamma structure emerged as the more powerful form of the vitamin, said Chen.

After this, the team manipulated the structure of gamma-tocopherol and found that the effectiveness of the new agent they created was 20-fold higher than the vitamin itself in cells.

In experiments in mice, the new modified vitamin E compound reduced the size of prostate cancer tumours, they said.

### A matter of shape

Chen and his team said the gamma- form was most effective because its chemical shape allowed it to attach to Akt in the most precise way to shut off the enzyme.

Because of the way that the various forms of vitamin E interact with the on the cell membrane, Chen and his team predicted that shortening a string of chemical groups dangling from the main body – or head group – of the gamma-tocopherol molecule would make anti-cancer effect even stronger.

The team modified the vitamin by cutting off around 60% of this side chain and tested the effects of the new agent in the prostate cancer cells.

*"By reducing two-thirds of the chain, the molecule had a 20 times more potent anti-tumor effect, while retaining the integrity of vitamin E's head group,"* Chen said.

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