# Wine With a Double Shot of Vitamin C?

**Genetically designed grapes with elevated levels of vitamin C may be more than wishful thinking, according to researchers at the University of California, Davis, and the University of Adelaide, Australia, who recently identified an enzyme in grapes that helps convert vitamin C into tartaric acid, a key acid in winemaking.**

This discovery about the biochemical pathway by which grapes synthesize tartaric acid will appear the week of March 20 in the online version of the *Proceedings of the National Academy of Sciences*.

"While we're a long way from producing wine that will replace your morning glass of orange juice or vitamin C tablet, we now have a much better idea of one way in which the healthfulness of grapes and wine might be enhanced," said UC Davis plant pathology professor Doug Cook.

"It's been said that 'acid is the nerve of great wine,'" Cook added, quoting Richard Geoffroy of Dom Perignon. "Given the importance of tartaric acid in wine, it is possible that understanding how this pathway is regulated in grape berries may have practical implications for how we grow grapes and make wine."

Tartaric acid is the most abundant acid found in grapes. It plays an important role in the taste of the grape as well as in the flavor, color and texture of wine, and can sometimes be seen as crystals in the wine or on the wine bottle's cork. It is relatively rare in other fruits and, unlike other fruit acids, is synthesized from vitamin C instead of sugars. Scientists had previously identified the chemical intermediaries in the production of tartaric acid, but none of the enzymes responsible for this synthesis had been identified.

UC Davis' Cook, along with graduate student Seth DeBolt and Chris Ford of the University of Adelaide, set out to identify several potential candidate enzymes and the genes that code for them by examining the changing levels of gene expression and the compounds produced in the cultivated wine grape, Vitis vinifera.

They compared the acid content of 28 related grape species and found one, Ampelopsis aconitifolia, which had no tartaric acid. This particular grape species also lacked one of the candidate genes, which the researchers had shown controls production of the enzyme for one key step in the formation of tartaric acid.

Interestingly, the grapes on the A. aconitifolia vine accumulate about three times as much vitamin C as do other grape species.

Together, these findings suggest that it might be possible to manipulate this newly identified gene and the enzyme it codes for in cultivated grapes in order to produce grapes rich in vitamin C.

"This project grew from the fact that our colleagues in Adelaide had biochemical intermediates, but no

genes; whereas here at UC Davis we had databases and freezers full of grape genes resulting from our genomics work, waiting for a clear hypothesis to test," Cook said. "In the end, we have a nice piece of novel biochemistry and a candidate gene for this key metabolic step."

Further research is needed to identify two more important steps in the biosynthesis of tartaric acid, and to better understand the impact of light on that process, he noted.

Source: UC Davis