

Why does even a small amount of red wine give some people headaches?

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A red wine may pair nicely with the upcoming Thanksgiving meal. But for some people, drinking red wine even in small amounts causes a headache. Typically, a "red wine headache" can occur within 30 minutes to three hours after drinking as little as a small glass of wine.

In a new study, scientists at the University of California, Davis, examined why this happens—even to people who don't get headaches when drinking small amounts of other alcoholic beverages. Researchers think that a flavanol found naturally in red wines can interfere with the proper metabolism of alcohol and can lead to a [headache](#). The study was published in the journal *Scientific Reports*.

The headache culprit: Quercetin, a flavanol

This flavanol is called [quercetin](#) and it is naturally present in all kinds of fruits and vegetables, including grapes. It's considered a healthy antioxidant and is even available in supplement form. But when metabolized with alcohol, it can be problematic.

"When it gets in your bloodstream, your body converts it to a different form called quercetin glucuronide," said wine chemist and corresponding author Andrew Waterhouse, professor emeritus with the UC Davis Department of Viticulture and Enology. "In that form, it blocks the metabolism of alcohol."

Acetaldehyde toxin buildup leads to flushing,

headache, nausea

As a result, people can end up accumulating the toxin acetaldehyde, explains lead author Apramita Devi, postdoctoral researcher with the UC Davis Department of Viticulture and Enology.

"Acetaldehyde is a well-known toxin, irritant and inflammatory substance," said Devi. "Researchers know that high levels of acetaldehyde can cause facial flushing, headache and nausea."

The medication disulfiram prescribed to alcoholics to prevent them from drinking causes these same symptoms. Waterhouse said that's because the drug also causes the toxin to build up in the body when normally an enzyme in the body would break it down. About 40% of the East Asian population also has an enzyme that doesn't work very well, allowing acetaldehyde to build up in their system.

"We postulate that when susceptible people consume wine with even modest amounts of quercetin, they develop headaches, particularly if they have a preexisting migraine or another primary headache condition," said co-author Morris Levin, professor of neurology and director of the Headache Center at the University of California, San Francisco.

"We think we are finally on the right track toward explaining this millennia-old mystery. The next step is to test it scientifically on people who develop these headaches, so stay tuned."

Sunlight increases headache-causing flavanol in grapes

Waterhouse said levels of this flavanol can vary dramatically in [red wine](#).

"Quercetin is produced by the grapes in response to sunlight," Waterhouse said. "If you grow grapes with the clusters exposed, such as they do in the Napa Valley for their cabernets, you get much higher levels of quercetin. In some cases, it can be four to five times higher."

Levels of quercetin can also differ depending on how the wine is made, including [skin contact](#) during fermentation, fining processes and aging.

Clinical trial on wine headaches

Scientists will next compare red wines that contain a lot of quercetin with those that have very little to test their theory about red wine headaches on people. This small human clinical trial will be led by UCSF.

Researchers said there are still many unknowns about the causes of red wine headaches. It's unclear why some people seem more susceptible to them than others. Researchers don't know if the enzymes of people who suffer from red [wine](#) headaches are more easily inhibited by quercetin or if this population is just more easily affected by the buildup of the toxin acetaldehyde.

"If our hypothesis pans out, then we will have the tools to start addressing these important questions," Waterhouse said.

More information: Inhibition of ALDH2 by Quercetin Glucuronide Suggests a New Hypothesis to Explain Red Wine Headaches, *Scientific Reports* (2023). doi.org/10.1038/s41598-023-46203-y

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