New Scientist

SPECIAL ISSUE

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Health

Why 'alcohol flush' gene variant raises heart disease risk

Michael Le Page

AROUND 8 per cent of the world's population has a gene variant that impairs the body's ability to metabolise alcohol and causes unpleasant symptoms, such as flushing, soon after drinking. Now, researchers have shown why this *ALDH2*2* mutation also raises the risk of heart disease.

The *ALDH2* gene encodes one version of alcohol dehydrogenase, an enzyme that breaks down the toxic acetaldehydes produced when alcohol is metabolised and mops up other harmful substances called free radicals. The *ALDH2*2* mutation stops the enzyme working.

Joseph Wu at Stanford University in California and his colleagues first analysed biobank data from Japan and the UK. They found that the risk of heart disease is four times higher in regular drinkers with *ALDH2*2* than in those without the variant.

In volunteers, they then measured the ability of blood vessels to dilate. In people with the standard *ALDH2* gene, this measure increases after drinking, but in those with *ALDH2*2*, it falls. This may seem odd given that people with *ALDH2*2* flush when they drink, but the flushing is caused by the release of histamines, says Wu.

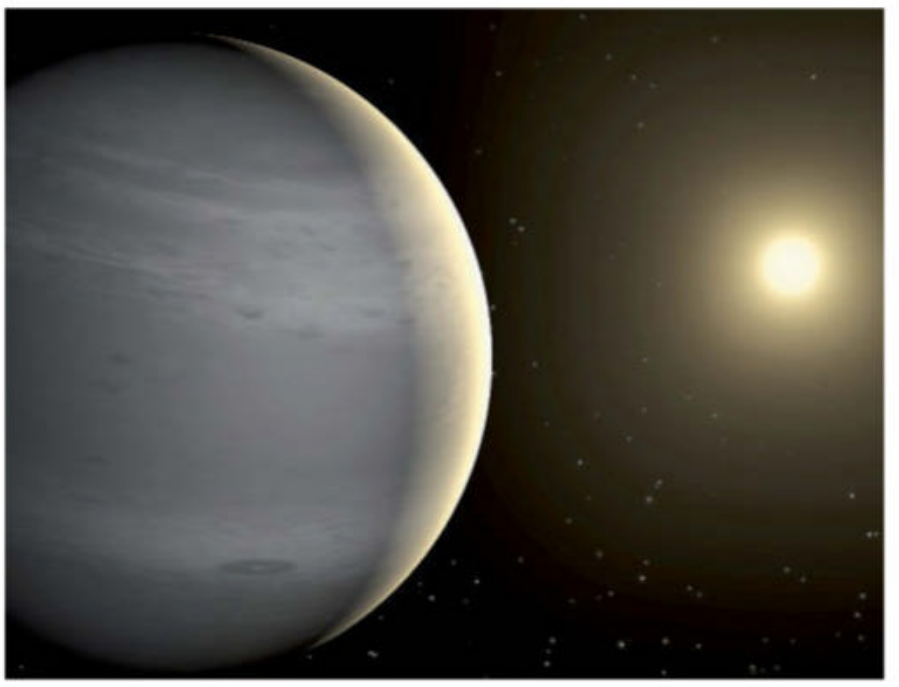
Next, they tested endothelial cells – which line blood vessels – derived from human stem cells. They found that cells with *ALDH2*2* had higher levels of free radicals and inflammation than endothelial cells without the variant, and were less able to generate nitric oxide, which helps relax blood vessels. All these effects were exacerbated by exposing cells to alcohol (*Science Translational Medicine*, doi.org/grpszv).

For Wu, the take-home message is clear. "If you're missing this enzyme, try not to drink. If you drink consistently, you are at much higher risk of heart disease, hypertension, diabetes and cancer." ▮

Astronomy

Forbidden planet somehow escaped being eaten by star

Jonathan O'Callaghan



NASA/JPL-CALTECH

Illustration of 8 Ursae Minoris b orbiting its host star

A PLANET has been found sitting in an orbit where it should have been consumed when its host star expanded into a red giant, the same fate that may one day befall Earth.

Called 8 Ursae Minoris b, the planet is more than 500 light years from Earth and is a gas giant slightly larger than Jupiter. It orbits its star at about half the distance between Earth and the sun, completing this journey every 93 days.

Although the star has returned to a smaller size, it appears to have previously expanded into a red giant as it ran out of fuel – which should have destroyed the planet.

"Once low to intermediate-mass stars exhaust their hydrogen, they become red giants," Marc Hon at the University of Hawaii told the 241st meeting of the American Astronomical Society in early January. "The star grows really big, and if you have a close-in planet, it's doomed. The star will engulf the planet."

While 8 Ursae Minoris b was discovered in 2015, follow-up work by Hon and his colleagues shows that the host star had already been a red giant and is now shrinking, a phase in which it is called a red clump star.

It would have expanded to reach about 70 per cent of the distance between Earth and the sun, which should have consumed 8 Ursae Minoris b in the process. "This planet is in a forbidden place," he says.

93

The number of days 8 Ursae Minoris b takes to orbit its star

How the planet ended up there is a puzzle. One possibility is that it was originally further out in the system before being pulled in by the red giant as it expanded, but it is unclear why the planet would have stopped at its current location rather than continuing towards the star. "We disfavour such a process," says Hon.

Another possibility is that the current star is the result of a merger between a pair of closely orbiting stars.

This could have prevented the red giant from expanding to the orbit of the planet, or might have created a debris disc that formed the planet following the red giant phase, making 8 Ursae Minoris b a rare example of a second-generation planet.

"We are very caught up with the idea of this being a binary system," says Hon.

The merger would perhaps have been between a red giant and a white dwarf, which is the remnant core left behind after a star has expanded to become a red giant.

Survival questions

The finding is an "exciting result" that "raises questions about how the planet survived", says Joleen Carlberg at the Space Telescope Science Institute in Baltimore, Maryland.

While planets have been found orbiting red giants before, they have been seen during the first stage, when the star is still growing in size. "If the planet gets too deep into the star, you expect it to be pulled apart," says Carlberg.

The existence of 8 Ursae Minoris b could have implications for Earth, says Shreyas Vissapragada at the Harvard-Smithsonian Center for Astrophysics in Massachusetts.

While our planet could "fall into the sun" as our star expands, he says, it is also possible that it could survive, perhaps being pushed outwards as the solar wind removes mass from the expanding sun.

"We may have a shot," says Vissapragada. "We all want to know how the story ends for our solar system." ▮