New Scientist

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Ageing

How mental health conditions seem to make you age faster

Grace Wade

PEOPLE with a mental health condition have more RNA damage than those without one. Since RNA damage accelerates ageing, these findings could explain why mental illness is linked to an increased risk of dying from age-related diseases such as cancer or type 2 diabetes.

Anders Jørgensen at Frederiksberg Hospital in Denmark and his colleagues measured markers of damaged RNA and DNA in more than 7700 people aged 25 and up, almost 3100 of whom had a history of mental health conditions. They focused on markers of oxidative stress, which occurs when reactive compounds containing oxygen damage cells. Oxidative stress contributes to age-related conditions like heart disease, dementia and cancer. Sources of the compounds that cause oxidative stress include digestion, smoking and pollution.

Urine samples collected between 2007 and 2013 from people with a mental health condition had levels of a particular marker of RNA damage that were 9 per cent higher, on average, than those of samples from people without a mental health condition, after taking into account the age of the participants.

By tracking participant deaths from the time each joined the study until the end of May 2023, the team found participants with high levels of the marker and a mental health condition were almost twice as likely to die as those with low levels and no mental health condition (*JAMA Psychiatry*, doi.org/mmz6).

The findings suggest that RNA damage from oxidative stress may explain the association between mental illness and premature death. Why people with psychiatric conditions have more oxidative stress is unclear, says Jørgensen. It may be because smoking or obesity is seen more often in people with mental health conditions, he says. ▮

Planetary science

Blow dealt to hopes that Europa's ocean hosts life

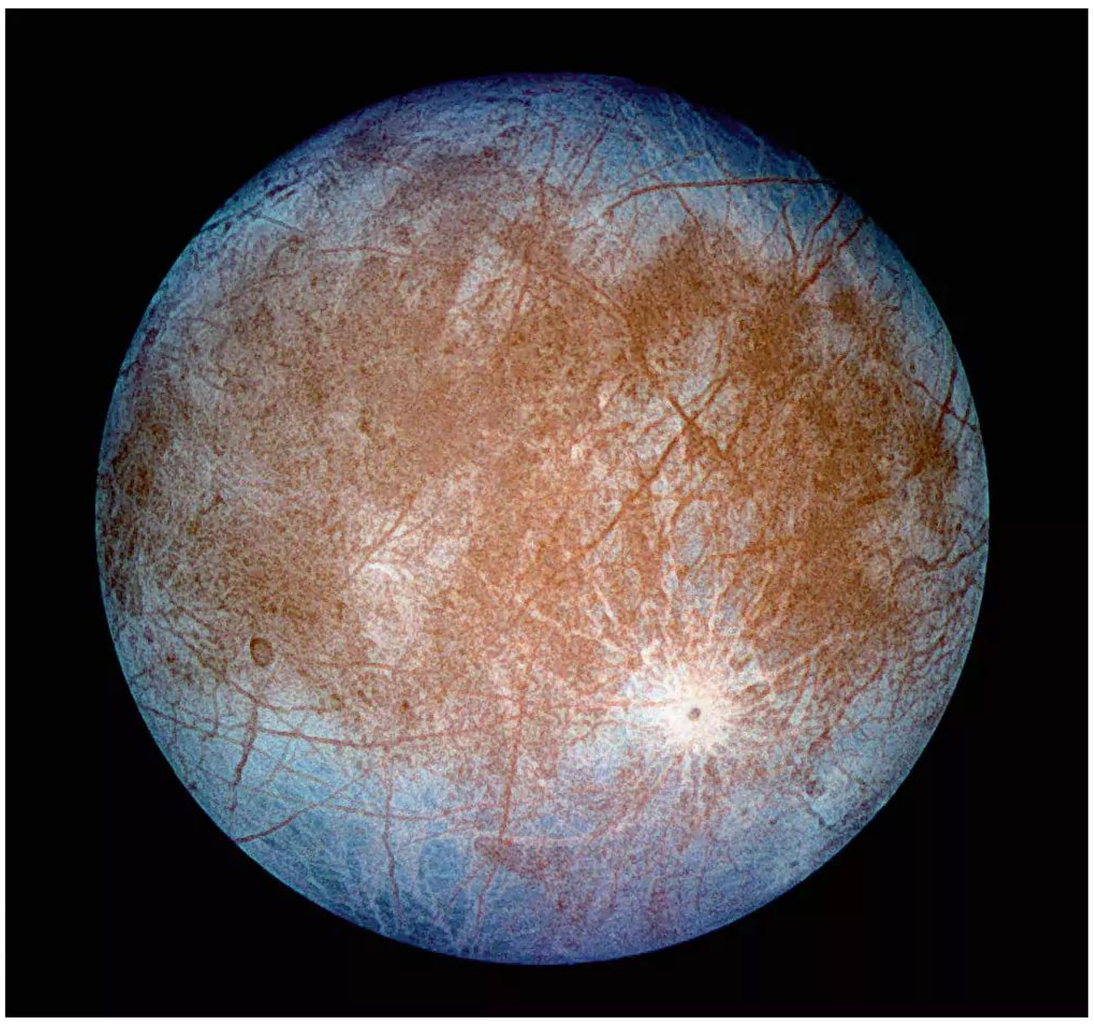
Leah Crane

JUPITER'S icy moon Europa may not be as ripe for life as we thought. Its underground ocean has long made it one of the most promising candidates in our solar system to host life, but theoretical studies of its seafloor are putting a damper on its promise.

On Earth, much of the life in the deep ocean is supported by hydrothermal activity at the seafloor, where water interacts with rock. This provides nutrients and energy for living organisms, and researchers think that similar processes could aid life on Europa.

However, these interactions require a regular supply of fresh rock. That can come from faults in the rock or via volcanic activity that lets magma rise from deep underground. Research discussed at the Lunar and Planetary Science Conference in Texas on 11 and 12 March suggests both things may be unlikely on Europa.

Europa, a moon of Jupiter, has an underground ocean



NASA/JPL/DLR

"There's been a lot of work done on the outer shell because we can see it… but we don't have much information on the seafloor, not surprisingly, because it's extremely hard to get to," said Paul Byrne at Washington University in St. Louis, Missouri. Studies of Europa's seafloor have had to rely on theoretical calculations, simulations and comparisons to what we see on Earth.

The most dramatic way Europa's core could contribute to the habitability of its ocean is via volcanism – magma from deep underground seeping into the ocean through cracks called dikes. Austin Green at NASA's Jet Propulsion Laboratory in California and his colleagues simulated this process, but the dikes weren't able to transport magma all the way from the molten areas deep in the core to its edge.

"They did really, really, really, really bad," said Green. "Our most successful one was an 11.5-kilometre dike." That one would have had to penetrate 227 kilometres of rock to spill magma onto the seafloor. "If this volcanism is necessary for habitability, Europa's ocean is uninhabitable," said Green.

"If this volcanism is necessary for habitability, Europa's ocean is uninhabitable"

The faults in the seafloor don't necessarily have to have magma in them to be useful, though. Even empty faults could fuel important water-rock interactions – but Byrne and his team found that it is unlikely that any new faults are forming under Europa's sea. "I don't think there's anything happening at the ocean floor," said Byrne.

Another research group found that even simple erosion by sand is unlikely because the moon's low gravity means that the sediment should sit lightly on the seafloor, not providing enough weight to wear it down. "Unfortunately, I'm kind of adding to the depressing news that maybe the seafloor isn't as active as we maybe thought it could be," said team member Perianne Johnson at the University of Texas at Austin.

This doesn't mean Europa is uninhabitable, though. "I think that what's being shown here is that volcanism and habitability models that rely on the interior are starting to be less likely, but I still think that stuff coming through the ice shell from the top down is still a pretty promising avenue of research," said Green. ▮