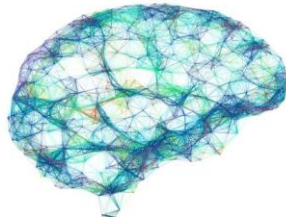


<https://bbc.in/3dVx9bs>

Machine translates brainwaves into sentences

Scientists have taken a step forward in their ability to decode what a person is saying just by looking at their brainwaves when they speak.

By Paul Rincon Science editor, BBC News
They trained algorithms to transfer the brain patterns into sentences in real-time and with word error rates as low as 3%.



Brain activity was fed into a computer system, which recognised recurring features in the data SPL

Previously, these so-called "brain-machine interfaces" have had limited success in decoding neural activity. The study is [published in the journal Nature Neuroscience](#).

The earlier efforts in this area were only able to decode fragments of spoken words or a small percentage of the words contained in particular phrases.

Machine learning specialist Dr Joseph Makin from the University of California, San Francisco (UCSF), US, and colleagues tried to improve the accuracy. Four volunteers read sentences aloud while electrodes recorded their brain activity. The brain activity was fed into a computing system, which created a representation of regularly occurring features in that data.

Limited language

These patterns are likely to be related to repeated features of speech such as vowels, consonants or commands to parts of the mouth.

Another part of the system decoded this representation word-by-word to form sentences.

However, the authors freely admit the study's caveats. For example, the speech to be decoded was limited to 30-50 sentences.

"Although we should like the decoder to learn and exploit the regularities of the language, it remains to show how many data

would be required to expand from our tiny languages to a more general form of English," the researchers wrote in their Nature Neuroscience paper.

But they add that the decoder is not simply classifying sentences based on their structure. They know this because its performance was improved by adding sentences to the training set that were not used in the tests themselves.

The scientists say this proves that the machine interface is identifying single words, not just sentences. In principle, this means it could be possible to decode sentences never encountered in a training set.

When the computer system was trained on brain activity and speech from one person before training on another volunteer, decoding results improved, suggesting that the technique may be transferable across people.

<https://bit.ly/3bNXSVz>

Mars Could Have at Least Two Ancient Reservoirs of Water Deep Underground

A least two distinct reservoirs of ancient water could be preserved under the Martian surface

Michelle Starr

Mars. Water. You'd never find two more unlikely companions, even in a buddy cop movie. But once upon a time, the dry, red dustbowl of Mars was lush and soggy.

We're still unravelling the history of that water, and planetary scientists have just discovered at least two distinct reservoirs of ancient water could be preserved under the Martian surface, with different chemical signatures.

This finding indicates that, unlike Earth, Mars probably didn't have one big global ocean of underground magma encircling the entire planet.

"A lot of people have been trying to figure out Mars' water history," [explained planetary scientist Jessica Barnes of the University of Arizona](#).

"Where did water come from? How long was it in the crust (surface) of Mars? Where did Mars' interior water come from? What can water tell us about how Mars formed and evolved?"

The evidence was found in Mars rocks. We can't exactly nip over to Mars and fetch them; indeed, to date we haven't even conducted a robotic Mars sample return mission. But occasionally, Mars comes to us anyway.

Meteorites broken off from the Martian crust will, from time to time, make their way to Earth. Here in Earth labs, using state-of-the-art techniques, researchers carefully studied two such meteorites - [Allan Hills 84001](#), discovered in Antarctica 1984, and [Northwest Africa 7034](#), discovered in the Sahara Desert in 2011.

The team looked at the isotopes of hydrogen locked inside the Mars rocks. Isotopes are variants of an element with different numbers of neutrons; deuterium - also known as heavy hydrogen - has one proton and one neutron. Protium, or light hydrogen, has one proton and no neutrons.

Because hydrogen is one of the components of water, the ratio of these two isotopes locked in rocks can help us to understand the history of the water they were in - it's like a fossil of water, an imprint of its presence that can be analysed to learn the chemical processes it was subject to, and its origins.

Barnes and her team are not the first to study hydrogen isotopes in Martian meteorites in order to try to learn about the planet's water. But previous results have been scattered and inconsistent.

Here on Earth, [protium is the dominant hydrogen isotope](#). That's true for the atmosphere (although there's not much hydrogen there), the water hydrogen in rocks, and the water in the ocean.

On Mars, deuterium is the dominant hydrogen isotope in the atmosphere, likely because solar radiation is stripping the protium - but isotope ratios in the rocks tested by scientists have run from Earth-like to Mars-like.

So, Barnes and her team decided to take a closer look at meteorites they knew for a certainty originated in the Martian crust.

Allan Hills 84001, according to previously conducted [radioactive decay dating techniques](#), interacted with fluid in the Martian crust around 3.9 billion years ago. [Similar analysis](#) determined that Northwest Africa 7034 interacted with fluid 1.5 billion years ago.

When Barnes and her team conducted their isotope analysis, they found that both samples had similar isotope ratios, sitting comfortably in between the ratio found in Earth's water and the ratio found in the Martian atmosphere. Even more peculiarly, this ratio was similar to younger rocks analysed by the Curiosity rover right there on Mars.

This indicates that the chemical composition of that water has been consistent for around 3.9 billion years - a completely unexpected result, given the previous research

"Martian meteorites basically plot all over the place, and so trying to figure out what these samples are actually telling us about water in the mantle of Mars has historically been a challenge," [Barnes said](#).

"The fact that our data for the crust was so different prompted us to go back through the scientific literature and scrutinise the data."

But when the team compared their results with previous research on hydrogen isotopes in meteorites from the Martian mantle - below the crust - they found something really surprising. Mantle meteorites fit into two distinct groups of igneous rock called shergottite.

Enriched shergottite has more deuterium; depleted shergottite has less deuterium. Average out their two ratios, and you get the crustal ratio seen in Allan Hills 84001 and Northwest Africa 7034.

Those two distinct chemical signatures indicate two different, unmixed reservoirs of water in the Martian mantle. Which may mean that, unlike Earth, a global ocean of liquid magma below the mantle did not homogenise the layer above.

"These two different sources of water in Mars' interior might be telling us something about the kinds of objects that were available to coalesce into the inner, rocky planets," [Barnes said](#).

"This context is also important for understanding the past habitability and astrobiology of Mars."

The research has been published in [Nature Geoscience](#).

<https://bit.ly/2UOKARE>

Researchers discover potential boost to immunotherapy *Pathway that regulates special immune system cells in lung cancer tumors*

Mount Sinai researchers have discovered a pathway that regulates special immune system cells in lung cancer tumors, suppressing them and allowing tumors to grow. The scientists also figured out how to interrupt this pathway and ramp up the immune system to prevent tumor formation or growth, offering a potential boost to immunotherapy, according to a study published in *Nature* in March. Researchers analyzed human and mouse lung cancer lesions, specifically studying the highly specialized immune cells called dendritic cells, which are considered the generals of the immune system. Dendritic cells give other immune system cells, called T-cells, identifying information from tumors so the T-cells can recognize and fight the cancer. Certain genetic material in the tumors, however, tamps down the dendritic cells' function via this newly discovered immune regulatory pathway.

Scientists performed high-tech, single-cell sequencing and high-definition imaging on mouse and human tumors to study the dendritic cells' activity in lung cancer and adjacent noncancerous lung tissues. They identified a molecular pathway that dampens dendritic cells' ability to program T-cells to kill. This study also showed that reversing this pathway significantly improves tumor responses in animals.

Based on the findings, scientists are designing a clinical trial that they expect will enhance patients' response to an immunotherapy called checkpoint blockade, by adding a second therapy that blocks the immune regulatory pathway that decreases dendritic cells' function in tumors. Right now only about 20 percent of patients respond to checkpoint blockade therapies. The trial will be done in collaboration with Regeneron Inc.

"This study highlights the power of single-cell technologies to identify new therapeutic targets in cancer," said senior author Miriam Merad, MD, PhD, Director of the Precision Immunology Institute and Mount Sinai Professor in Cancer Immunology at the Icahn School of Medicine at Mount Sinai, Co-leader of the Cancer Immunology Program at The Tisch Cancer Institute at Mount Sinai, and Director of the Mount Sinai Human Immune Monitoring Center.

<https://bbc.in/2US4nzO>

Blood test 'can check for more than 50 types of cancer' *A simple blood test can check for more than 50 types of cancer, often before any signs or symptoms, scientists say.*

By Michelle Roberts Health editor, BBC News online

It could help diagnose tumours sooner, when they are easier to treat and, ideally, cure, experts hope. More than 99% of positive results are accurate, the team says, but it will be crucial to check it does not miss cases and provide false assurance.

Doctors are using it in trials with patients but [more studies](#) are needed, they say in [Annals of Oncology](#). Trial data suggests it is better at detecting more advanced disease rather than the beginnings of cancer, which may limit how useful it becomes.

How does it work?

The test looks for telltale chemical changes to bits of genetic code - cell-free DNA - that leak from tumours into the bloodstream.

The researchers, from the Dana-Farber Cancer Institute and Harvard Medical School, working with UK colleagues from The Francis Crick Institute and University College London, tested more than 4,000 samples from patients - some with and some without cancer. More than 50 types of cancer, such as bowel, lung and ovarian, were included. And in 96% of the samples, the test accurately detected the type of cancer.

What do experts say?

The study is funded by Grail, the maker of the blood test.

One of the lead researchers, Prof Geoff Oxnard, said: "This blood test seems to have all the features needed to be used on a population scale, as a multi-cancer screening test.

"Everyone asks when will a test like this will be ready for use.

"Based upon this successful clinical validation in thousands of patients, the test has actually now been launched for limited use on clinical trials. "But before this blood test is used routinely, we will probably need to see results from clinical studies like this to more fully understand the test performance. "Certainly the field is moving quickly and it makes us hopeful that blood-based cancer detection will be a reality."

Cancer Research UK early detection head Dr David Crosby said: "Detecting cancers at their earliest stages, when they are less aggressive and more treatable, has a huge potential to save lives and we sorely need tech innovations that can turn this potential into reality.

"Although this test is still at an early stage of development, the initial results are encouraging. "And if the test can be fine-tuned to be more efficient at catching cancers in their earliest stages, it could become a tool for early detection. "But more research is needed to improve the test's ability to catch early cancers and we still need to explore how it might work in a real cancer-screening scenario."

<https://bit.ly/3dMFs9l>

Broken bone location can have significant impact on long-term health

In older individuals, the location of a broken bone can have significant impacts on long-term health outcomes

Washington--In older individuals, the location of a broken bone can have significant impacts on long-term health outcomes, according to research accepted for presentation at ENDO 2020, the Endocrine Society's annual meeting, and publication in a special supplemental section of the *Journal of the Endocrine Society*.

The study found older people with broken bones closer to the center of the body, known as proximal fractures (such as upper arm, upper leg, pelvis and ribs) face a greater risk of being admitted to the hospital for major medical conditions and of dying prematurely following their fracture than similarly aged people without fractures.

"It is well-known that a hip fracture can have devastating health implications for older individuals, but less is known about the effects of other fractures in the body," said lead study author Jacqueline R. Center, Ph.D., of the Garvan Institute of Medical Research in Sydney, Australia. "Not only should people be treated for their bone health, but we now have information allowing us to understand why people do badly after a fracture and how we may intervene to improve outcomes."

The researchers used the Danish National Database to study 300,000 patients 50 years or older with a low-trauma fracture (due to falls from a standing height). They examined differences in the

reasons for subsequent hospital admission and death patterns between patients with proximal fractures compared with those fractures further away from the center of the body, known as distal bones (such as the wrist, ankle, hand or foot), where there is no increased risk of death. They matched people with fractures to people without fractures who had a similar age and other medical diagnoses.

They found that people with broken bones at proximal sites had a 1.5- to 4-fold greater risk of death over the next two years than their non-fracture counterparts, whether they were admitted to the hospital after their fracture or not. They were also more likely to have an admission to the hospital for cardiovascular disease, cancer, stroke, diabetes, pneumonia and lung disease. By contrast, those people who had a distal fracture had similar or lower risk of death, as well as similar hospital admission patterns as their counterparts with no fractures.

"This research provides important insights as to why people who have a proximal fracture die prematurely," Center said. She said further studies are needed to find specific ways of preventing these premature deaths.

<https://bit.ly/2ykvCv0>

Heavy drinking into older age adds 4 cm to waistline
More than half of drinkers aged 59 and over have been heavy drinkers and this is linked to a significantly larger waistline and increased stroke risk, according to a new UCL study.

The study, [published in the journal *Addiction*](#), examined the association between heavy drinking over a lifetime and a range of health indicators including cardiovascular disease.

The researchers used data from the Whitehall II cohort, which collected information from UK civil servants, aged 34-56 years at study outset, since 1985-88. The final sample for this study was

made up of 4,820 older adults, aged between 59 and 83 years. The mean (average) age was 69, and 75% were male.

It found that heavy alcohol consumption over a lifetime is associated with higher blood pressure, poorer liver function, increased stroke risk, larger waist circumferences and body mass index (BMI) in later life, even if you stop drinking heavily before age 50. However, stopping heavy drinking at any point in life is likely to be beneficial for overall health.

Dr Linda Ng Fat (UCL Institute of Epidemiology & Health Care), first author on the study, said: "Alcohol misuse, despite the common perception of young people binge drinking, is common among older adults, with alcohol related hospital admissions in England being the highest among adults aged over 50.

"Previous studies have focused on single snapshots of consumption, which has the potential to mask the cumulative effects of drinking. This study raises awareness of the effect of alcohol consumption over the life-course."

A heavy drinker was identified using the Alcohol Use Disorders Identification Test for Consumption (AUDIT-C), a standard screening tool for GPs. The screening tool consists of just three questions, and assesses how often you drink, how much you drink, and how often you binge (have six or more drinks). To provide an example a person who has three or four drinks, four or more times a week, would score positive as a hazardous drinker on the AUDIT-C. Participants were asked on a single occasion to complete the AUDIT-C retrospectively for each decade of their life, from 16-19 to 80 and over. This information was used to categorise their lifetime drinking pattern: never hazardous drinker, former early hazardous drinker (stopped before age 50), former later hazardous drinker (stopped at age 50 or after), current hazardous drinker, and consistent hazardous drinker (during every decade of their life).

More than half of drinkers (56%) had been hazardous drinkers at some point in their life, with 21% being current hazardous drinkers and 5% being consistent hazardous drinkers.

Current and consistent heavy drinkers were mainly male (80% and 82%, respectively), predominately white, and likely to be in senior level jobs (61% compared with 52% in the total sample).

Former later, current and consistent hazardous drinkers had significantly higher systolic blood pressure and poorer liver function, than never hazardous drinkers, after adjusting for lifestyle factors. Among current hazardous drinkers, systolic blood pressure was 2.44 mmHG higher and gamma-glutamyl transferase (GGT), a marker of liver disease, was elevated by 22.64 IU/l, compared with never hazardous drinkers.

Current hazardous drinkers had three times greater risk of stroke and former later hazardous drinkers had approximately two times higher risk of non-cardiovascular disease mortality compared with never hazardous drinkers.

Lifetime hazardous drinkers had significantly larger waist circumferences and BMI than never hazardous drinkers, with the magnitude increasing with more current and consistent hazardous drinking.

Former early hazardous drinkers on average had a 1.17 cm larger waist than never hazardous drinkers, whereas former later hazardous drinkers, current hazardous drinkers and consistent hazardous drinkers had a waist circumference that was 1.88 cm, 2.44 cm and 3.85cm larger respectively.

Dr Ng Fat added: "This suggests that the longer adults engage in heavy drinking the larger their waistline in older age. That is why it is beneficial, along with other health benefits, that adults reduce heavy drinking earlier rather than later."

Professor Annie Britton (UCL Institute of Epidemiology & Health Care), senior author on the study, said: "Despite high prevalence of

stroke and liver disease steadily increasing in the United Kingdom, heavy drinking remains common among older adults.

"Early intervention and screening for alcohol consumption, as part of regular check-ups, could help reduce hazardous drinking among this demographic."

The research was carried out with University of Cambridge. It was funded by the UK Medical Research Council/Alcohol Research UK and European Research Council.

Notes to Editors

'A lifetime of hazardous drinking and harm to health among older adults' will be [published in Addiction on Wednesday 1 April 2020, 00.01](#) UK time and is under a strict embargo until this time. DOI : 10.1111/add.15013

<https://bit.ly/2R2PQQE>

Some Patients Still Have SARS-CoV-2 Coronavirus after Symptoms Disappear, Scientists Say

Researchers at the Treatment Center of PLA General Hospital in Beijing, China, have found that half of the patients they treated for mild COVID-19 disease still had coronavirus for up to 8 days after symptoms disappeared.

"The most significant finding from our study is that half of the patients kept shedding the virus even after resolution of their symptoms," said Yale University's Dr. Lokesh Sharma, co-lead author of the study.

"More severe infections may have even longer shedding times."

The study included 16 patients (median age of 35.5 years) with COVID-19 who were treated and released from the Treatment Center of PLA General Hospital between January 28 and February 9, 2020.

The scientists collected samples from throat swabs taken from all patients on alternate days and analyzed. Patients were discharged after their recovery and confirmation of negative viral status by at least two consecutive PCR tests.

The primary symptoms in these patients included fever, cough, pain in the pharynx (pharyngalgia) and difficult or labored breathing

(dyspnea). Patients were treated with a range of medications. The time from infection to onset of symptoms (incubation period) was 5 days among all but one patient. The average duration of symptoms was 8 days, while the length of time patients remained contagious after the end of their symptoms ranged from one to 8 days.

Two patients had diabetes and one had tuberculosis, neither of which affected the timing of the course of COVID-19 infection.

“If you had mild respiratory symptoms from COVID-19 and were staying at home so as not to infect people, extend your quarantine for another two weeks after recovery to ensure that you don’t infect other people,” said PLA General Hospital’s Professor Lixin Xie, co-author of the study.

The researchers had a special message for the medical community:

“COVID-19 patients can be infectious even after their symptomatic recovery, so treat the asymptomatic/recently recovered patients as carefully as symptomatic patients.”

They emphasized that all of these patients had milder infections and recovered from the disease, and that the study looked at a small number of patients.

They noted that it is unclear whether similar results would hold true for more vulnerable patients such as the elderly, those with suppressed immune systems and patients on immunosuppressive therapies.

“Further studies are needed to investigate if the real-time PCR-detected virus is capable of transmission in the later stages of COVID-19 infection,” Professor Xie said.

The [study](#) was published in the *American Journal of Respiratory and Critical Care Medicine*.

De Chang et al. Time Kinetics of Viral Clearance and Resolution of Symptoms in Novel Coronavirus Infection. American Journal of Respiratory and Critical Care Medicine, published online March 23, 2020; doi: 10.1164/rccm.202003-0524LE

<https://bit.ly/3aG5zqc>

The leptin activator: New study reveals brain receptor key to burning brown fat

Some call it baby fat. But recent research has shown that adults have it too--which is a good thing.

Brown fat, the so-called good fat that can protect against obesity and associated health risks, like cardiovascular disease and diabetes, is located in small pockets throughout the body. Most mammals use brown fat (and its closely related cousin beige fat) to stay warm.

“In mice and humans, if you have more brown or beige fat, you are more protected from metabolic disease,” says Liangyou Rui, Louis G. D’Alecy Collegiate Professor of Physiology at U-M Medical School, whose lab studies the molecular and physiological mechanisms of obesity, diabetes and fatty liver disease.

In a new study [published in *Nature Communications*](#), Rui, first author Lin Jiang, Ph.D. and their colleagues reveal a pathway by which the hormone leptin contributes to weight loss.

Leptin regulates body weight by controlling appetite and energy expenditure, but exactly how has been a mystery. What is known, says Rui, is that leptin activates brown and beige fat. The new study elucidates a molecular accelerator of leptin action in the brain called Sh2b1.

His team has found that Sh2b1 in the hypothalamus, an important brain region controlling body temperature and hunger among other functions, promotes the stimulation of the sympathetic nervous system. The sympathetic nervous system sends signals to brown and beige fat to activate it, thus maintaining body weight and metabolism.

The team demonstrated this proof-of-principle by creating two mouse models. Mice that lacked the Sh2b1 gene in the leptin receptor neurons “had an incredibly reduced sympathetic drive to

the brown/beige fat and reduced capability to promote energy expenditure," says Rui.

This reduced the ability of brown fat to be metabolized into heat, lowering the mice's core body temperature. What's more, the mice also developed obesity, insulin resistance and a fatty liver. In contrast, mice with extra expression of Sh2b1 in their brains were protected from obesity.

"No one knew that Sh2b1 in the brain controls the sympathetic nervous system or was required for leptin to activate brown fat to increase energy expenditure," notes Rui. As for how this finding could be applied to humans, he says the hope is to eventually find a way to increase expression of Sh2b1 or its ability to enhance leptin signaling and fat burning.

Other U-M authors contributing to this paper include: Haoran Su, Xiaoyin Wu, Hong Shen, Min-Hyun Kim, Yuan Li, Martin G. Myers Jr, and Chung Owyang.

"Leptin receptor-expressing neuron Sh2b1 supports sympathetic nervous system and protects against obesity and metabolic disease, Nature Communications, DOI: 10.1038/s41467-020-15328-3

<https://bit.ly/2R0dj4Q>

New AI System Translates Human Brain Signals Into Text With Up to 97% Accuracy

AI systems can translate our brain activity into fully formed text, without hearing a single word uttered.

Peter Dockrill

The world is only just getting used to the power and sophistication of virtual assistants made by companies like Amazon and Google, which can decode our spoken speech [with eerie precision](#) compared to what the technology was capable of only a few short years ago.

In truth, however, a far more impressive and mind-boggling milestone may be just around the corner, making speech recognition seem almost like child's play: [artificial intelligence](#) (AI) systems that can translate our [brain activity](#) into fully formed text, without hearing a single word uttered.

It's not entirely science fiction. [Brain-machine interfaces](#) have evolved in leaps and bounds over recent decades, proceeding from animal models to human participants, and are, in fact, already attempting this very kind of thing.

Just not with much accuracy yet, researchers from the University of California San Francisco explain in a [new study](#).

To see if they could improve upon that, a team led by neurosurgeon Edward Chang of UCSF's [Chang Lab](#) used a new method to decode the [electrocorticogram](#): the record of electrical impulses that occur during cortical activity, picked up by electrodes implanted in the brain.

In the study, in which four patients with epilepsy wore the implants to monitor seizures caused by their medical condition, the UCSF team ran a side experiment: having the participants read and repeat a number of set sentences aloud, while the electrodes recorded their brain activity during the exercise.

This data was then fed into a neural network that analysed patterns in the brain activity corresponding to certain speech signatures, such as vowels, consonants, or mouth movements, based on audio recordings of the experiment.

After this, another neural network decoded these representations – gleaned from repetitions of 30–50 spoken sentences – and used it to try to predict what was being said, purely based on the cortical signatures of the words.

At its best, the system produced a [word error rate](#) (WER) with one participant of just 3 percent in translating the brain signals into text – which may be about as close to reading somebody's mind as AI has ever gotten, at least in these strictly defined experimental conditions.

In their paper, the team details numerous examples of the reference sentences the participants said, along with the 'predictions' the network generated, sometimes erroneous, but not always. When the

mistakes were apparent, though, they seem very different to the results of speech being misheard by human ears (which could be a side effect of the limited dataset introduced to the AI).

Examples of mistakes include: 'the museum hires musicians every evening', which was predicted as 'the museum hires musicians every expensive morning'; 'part of the cake was eaten by the dog' was predicted to be 'part of the cake was the cookie'; and 'tina turner is a pop singer', which became 'did turner is a pop singer'.

In the least accurate cases, the errors bear virtually no relation, semantically or phonetically, to what was being said: 'she wore warm fleecy woollen overalls' was interpreted to be 'the oasis was a mirage'.

Nonetheless, despite the weirdness of the obvious errors, overall the system may constitute a new benchmark for AI-based decoding of brain activity, and one that, at its best, is on par with professional human speech transcription, which has a WER of 5 percent, the team says.

Of course, professional transcribers dealing with ordinary human speakers have to contend with vocabularies that extend into the tens of thousands of words. By contrast, this system only had to learn the cortical signatures of about 250 unique words used in a limited set of short sentences, so it's not really a fair comparison.

While there are numerous hurdles to overcome, the team suggests the system might one day act as the basis of a speech prosthesis for patients who have lost the power to talk. If such a thing is possible, it could be a big deal – providing some people with a way to communicate with the world - and in ways that may go far beyond what the experiments show so far.

"In a chronically implanted participant, the amount of available training data will be orders of magnitude greater than the half hour or so of speech used in this study," [the authors explain](#), "which

suggests that the vocabulary and flexibility of the language might be greatly expandable."

The findings are reported in [Nature Neuroscience](#).

<https://bit.ly/2wTppWw>

Flu Shot Ignites Immune Attack Against Cancer in Mice

Injecting the seasonal flu vaccine directly into clumps of malignant cells recruits immune cells to confront the cancer.

[Ashley Yeager](#)

Nearly 5,000 years ago, Egyptian physician Imhotep observed a grotesque but revealing detail about tumors: some grew so large that they burst open—and eventually disappeared. Seeing this happen, ancient texts suggest, he developed a radical cancer treatment: pierce patients' tumors and then wait to see if they got smaller, cancer researcher [Andrew Zloza](#) of Rush University Medical Center in Chicago tells *The Scientist*. Sometimes they did. With no knowledge of the human immune system, Imhotep had hit on an essential connection between tumors and infections that wouldn't appear again in the scientific literature until the turn of the 20th century, when bone surgeon and cancer researcher William Coley began [injecting live bacteria and later bacterial toxins](#) into individuals with sarcoma.

Although Coley's technique showed some success in treating patients' cancer, it was quickly abandoned in favor of emerging chemo-therapy and radiation therapy, Zloza says.

Imhotep developed a radical cancer treatment: pierce patients' tumors and then wait to see if they got smaller.

Now, as immunotherapy captures cancer researchers' attention, Zloza and others have begun to recognize that Imhotep and Coley might have been onto a major breakthrough in immunotherapy: they were [using infections](#) to kick-start cancer patients' own immune systems to target and kill their tumors. Zloza and his

colleagues recently added to the evidence for this approach with a study of tumor-bearing mice treated with the seasonal flu vaccine: injecting the vaccine, which consists of inactivated flu viruses, directly into mice's skin tumors dramatically slowed the growth of tumors and in some cases reduced their size, the researchers reported in January in [PNAS](#).

“Having this fairly bland vaccine have such a profound effect on tumor immunity is super surprising,” says [Thomas Kupper](#), a dermatologist who studies skin tumor treatments at Dana-Farber Cancer Institute in Boston and was not involved in the study. If the results hold up in human clinical trials, he says, it could offer an innovative way to target certain types of tumors that have been exceedingly tricky to treat, as well as cancer cells that are on the move to other parts of the body.

Zloza and his team were focusing on just those sorts of difficult-to-treat tumors, known as cold tumors because they don't have many immune cells infiltrating them. Compared to other tumors, in cold tumors there are fewer chances for the immune system to identify the presence of cancer cells that differ from normal cells in the body, and any immune cells that are present tend to suppress rather than activate the immune system.

The researchers suspect that the injection of flu-associated proteins into the mouse skin tumors signaled to the mice's innate immune system that foreign material had entered the body. The resulting immune response, the scientists hypothesized, converts cold tumors to hot ones.

Consistent with this idea, the team found that the treatment only worked when flu proteins were injected directly into the skin tumors. Injecting the live influenza virus into the tumors did not affect the cancerous cells, probably because the virus is unable to replicate and produce viral proteins in these cells, the researchers suggested in their paper.

Injecting heat-inactivated virus or viral proteins outside of the tumor—into the mice's muscles, for example—didn't affect the tumors, either.

When the team injected the flu vaccine into the tumors, dendritic cells, the foot soldiers of the innate immune system, swarmed the cancerous cells. Those dendritic cells began to pick up bits of the flu virus called pathogen-associated molecular patterns (PAMPs), which help trigger an immune response, and to engulf bits of the tumors. When the dendritic cells present viral and tumor antigens on their surfaces to attract T cells, they may trigger attacks on both the flu and the cancer cells.

“We haven't proved this yet, but we think what happens . . . is that you turn the tumor microenvironment into an immune hotbed, and so the antitumor response is aided in that way,” Zloza says.

The team detected an increase in killer T cells carrying receptors for a specific tumor antigen, suggesting that those cells had indeed been primed to target tumor cells. The researchers also showed that when a mouse had two tumors, both the treated and untreated tumors, grew more slowly after the flu shot injection compared with tumors in untreated mice.

“That would mean you elicited an adaptive immune response that's specific to the tumor itself,” and that the anti-cancer T cells circulate through the body primed to kill, says immunologist [David Masopust](#) of the University of Minnesota who was not involved in the study. “That would be important in the setting where the tumor has metastasized, which is often the case.”

To see if something similar would happen with human tumors, Zloza's team implanted human breast cancer cells into mice's mammary fat pads. As happens in this form of human cancer, the fatty tissue tumors metastasized to the mice's lungs.

Just as the team had found when working with mouse tumors, a flu shot into the primary tumor in the fat pad led to reduced growth of

both that tumor and any metastatic lung tumors that had started to form.

However, there's an important difference between mice and humans that intrigues both Zloza and Masopust. Lab mice have never been exposed to the flu, but humans have, and many get vaccinated every year against it. That means that there could be lingering T cells that are primed to respond to the inactivated virus if it's injected into humans' tumors.

Masopust and his colleagues have been studying whether they can use this idea to tap the adaptive immune system, harnessing these virus-primed T cells to quickly target the viral proteins once the vaccine is injected into tumors and then spur the immune system to target the tumors too.

Sure enough, in tumor-bearing mice that had T cells primed to remember infection with a particular RNA virus, injecting a peptide from that virus into the tumor did jump-start the mice's immune system to target the tumor, Masopust and his colleagues [reported](#) last year.

The result suggests that in humans, memory of a flu virus may actually add to the immune response incited by a viral injection into a tumor.

Kupper notes that the research also shows that clinicians could use viral immunotherapy to boost the effectiveness of another form of cancer treatment, checkpoint inhibitors, which are known to be less effective in cold tumors.

“Checkpoint inhibitor therapy, when it works, tends to work in patients with hot tumors, tumors that are already infiltrated with T cells,” Kupper says. There's a lot of interest in turning cold tumors into hot tumors, and this work on using the flu vaccine is “a good first step towards that.”

<https://bit.ly/3dP3lqo>

Antarctica was warm enough for rainforest near south pole 90m years ago

Experts say new evidence from Cretaceous period ‘shows us what carbon dioxide can do’

[Nicola Davis](#)

Think of [Antarctica](#) and it is probably sweeping expanses of ice and the odd penguin, that come to mind. But at the time of the dinosaurs the continent was covered in swampy rainforest.



An artist's impression of Antarctica as a swampy rainforest between 92m and 83m years ago. Photograph: James McKay/under Creative Commons licence CC-BY 4.0

Now experts say they have found the most southerly evidence yet of this environment in plant material extracted from beneath the seafloor in west Antarctica. The Cretaceous, 145m to 66m years ago, was a warm period during which Earth had a greenhouse climate and vegetation grew in Antarctica.

Scientists say the new discovery not only reveals that swampy rainforests were thriving near the south pole about 90m years ago but that temperatures were higher than expected. Such conditions, they add, could only have been produced if carbon dioxide levels were far higher than previously thought and there were no glaciers in the region.

“We didn't know that this Cretaceous greenhouse climate was that extreme,” said Dr Johann Klages of the Alfred Wegener Institute in Germany and a co-author of the research. “It shows us what carbon dioxide is able to do.”

[Writing in the journal Nature](#), the team explained how, in 2017, they drilled a narrow hole down into the seafloor near the Pine

Island glacier in west Antarctica. This location is about 2,000km (1,200 miles) from today's south pole, but about 90m years ago it was about 900km from the pole.

The hole was drilled and material extracted using a remotely operated rig. "It is like a spaceship sitting on the seafloor," said Klages. The first few metres of material were glacial sediment, dating to about 25,000 years ago, while the next 25m were sandstone, dating to about 45m years ago – something Klages said was of little interest to the team.

As they worked, a huge field of sea ice was approaching. "It was getting a little dangerous," said Klages. "We said: 'OK, three more metres and then we can evacuate the coring site here.' And in this three metres we had this exciting new material."

This three-metre section was composed of mudstone, topped by a coal-like material, and packed with soil from the ancient forest, complete with roots, spores and pollen – with the latter identified as coming from plants including conifer trees and ferns. "It is like if you would go to a forest near your house somewhere and drill a hole into the forest soil," said Klages. "It is really pristine ... it was amazing."

The team found evidence of more than 65 different kinds of plants within the material, revealing that the landscape near the south pole would have been covered in a swampy conifer rainforest similar to that found today in the north-western part of the South Island of New Zealand. The material was dated to between 92m and 83m years ago. It would have had average annual temperatures of 12-13C (53-55F), "which is warmer than in Germany today", Klages said, adding that analysis of chemicals left by photosynthetic organisms called cyanobacteria revealed that surface waters, for example of lakes, would have been a pleasant 20C.

Crucially, said Klages, computer modelling shows that such an environment so close to the south pole – where in the winter there

is darkness for four months – would only have been possible if greenhouse gas concentrations were far higher than previously thought and the land surface were covered in vegetation.

In other words there were no ice sheets present – something Klages noted had been a matter of debate.

Dr James Bendle, an expert in organic geochemistry from the University of Birmingham, said that studying the Antarctic ecosystem was hugely important in understanding past and future climate change, adding that unabated use of fossil fuels use could push concentrations of carbon dioxide to levels similar to those 90m years ago by the start of the next century.

"Ultimately, if we have an atmosphere of more than 1,000 parts per million of carbon dioxide, we are committing ourselves to a future planet that has little to no ice, and ultimately an Antarctic continent that would be vegetated and wouldn't have an ice cover," he said.

<https://bit.ly/39AIPgp>

Consumption of 3-6 eggs/week lowers the risk of cardiovascular disease and death

U-shaped relationships between egg consumption and the risks of incident CVD and total death among general Chinese

Eggs have been acknowledged as a good source of high-quality proteins and contain bioactive components beneficial for health, while they are also loaded with abundant cholesterol in the yolks, making the public hesitant about consuming whole eggs. Up to now, most studies exploring the association of egg consumption with incident CVD or total death were conducted in high-income countries and findings were inconsistent across populations and CVD subtypes. Accordingly, no consensus has been reached on the recommendation of egg consumption around the world.

The current study conducted by Xia and her colleagues from Fuwai Hospital, Chinese Academy of Medical Sciences suggested that there were U-shaped relationships between egg consumption and

the risks of incident CVD and total death among general Chinese, and those consumed 3-6 eggs/week was at the lowest risk. More specifically, consumption of <1 egg/week was associated with 22% higher risk for incident CVD and 29% higher risk for total death; on the other hand, consumption of ≥ 10 eggs/week was associated with 39% and 13% higher risk for incident CVD and total death, respectively.

In addition, researchers pointed out that the influence of egg consumption seemed to be different across CVD subtypes. Individuals had higher consumption of eggs was more likely to have increased risk of coronary heart disease (CHD) and ischemic stroke, while the elevated risk of hemorrhagic stroke was only found among those with lower consumption.

Multivariable-adjusted Hazard Ratio (95% Confidence Intervals) *

	<1 egg/week	1-<3 egg/week	3-<6 egg/week	6-<10 egg/week	≥ 10 egg/week
Total death	1.29 (1.18 to 1.41)	1.07 (0.99 to 1.16)	Ref	1.13 (1.04 to 1.24)	1.13 (1.04 to 1.24)
CVD	1.22 (1.11 to 1.35)	1.09 (1.00 to 1.19)	Ref	1.25 (1.14 to 1.38)	1.39 (1.28 to 1.52)
CHD	1.07 (0.88 to 1.32)	1.01 (0.85 to 1.21)	Ref	1.34 (1.12 to 1.61)	1.86 (1.57 to 2.22)
Stroke	1.27 (1.12 to 1.44)	1.13 (1.01 to 1.26)	Ref	1.21 (1.07 to 1.36)	1.18 (1.05 to 1.33)
Ischemic Stroke	1.20 (1.02 to 1.42)	1.09 (0.95 to 1.26)	Ref	1.28 (1.10 to 1.49)	1.33 (1.15 to 1.54)
Hemorrhagic Stroke	1.34 (1.07 to 1.68)	1.23 (1.01 to 1.50)	Ref	1.13 (0.90 to 1.41)	1.03 (0.83 to 1.28)

* Cox proportional hazard model, stratified by cohort, adjusted for age, gender, urban or rural resident, per-capita household income, education attainment, tobacco smoking, alcohol consumption, family history of CVD, physical activity, BMI and dietary factors (red meat intake, fresh fruit and vegetable intake). Abbreviations: CVD, cardiovascular disease; CHD, coronary heart disease; HR, hazard ratio; CI, confidence interval.

Associations of egg consumption with risk of CVD endpoints and all-cause mortality ©Science China Press

The current study was conducted based on the project of Prediction for Atherosclerotic Cardiovascular Disease Risk in China (China-PAR), which was established to estimate the epidemic of CVD and identify the related risk factors in general Chinese population. A total of 102136 participants from 15 provinces across China were included, who were all free of CVD, cancer or end-stage renal diseases at baseline. During up to 17 years of follow-up, 4848 cases

of incident CVD (including 1273 CHD and 2919 stroke), and 5511 total death were identified, with over 90% follow-up rate.

A previous Chinese evidence from the China Kadoorie Biobank (CKB) study indicated that low to moderate intake of eggs (about 5 eggs/week) was significantly associated with lower risk of CVD in comparison with never or rare consumption (about 2 eggs/week). However, lacking participants with consumption of ≥ 1 egg/d limited them to further assess the influence of higher egg consumption. In the China-PAR project, about 25% participants consuming 3-6 eggs/week, and the percentage of participants consuming < 1 egg/week and ≥ 10 eggs/week was 12% and 24%, respectively. Benefiting from the wide range of egg consumption, the present study firstly demonstrated the potential adverse effects of too much egg intake among Chinese population.

The removal of limits on dietary cholesterol in the most recent US and Chinese dietary guidelines have provoked considerable reaction. Both the American Heart Association and the Chinese Preventive Medicine Association subsequently released scientific reports and emphasized that "dietary cholesterol should not be given a free pass to be consumed in unlimited quantities". Considering the rapid increase of both cholesterol intake and hypercholesteremia prevalence in China, measures should be taken to encourage the public to limit dietary cholesterol intake. Meanwhile, those with rare egg consumption could be recommended to eat a bit more in the future. This novel evidence should be considered in the update of guidelines on dietary cholesterol and CVD prevention for the general Chinese and probably for other populations in the low-and middle- income countries.

See the article: Xia, X., Liu, F., Yang, X., Li, J., Chen, J., Liu, X., Cao, J., Shen, C., Yu, L., Zhao, Y., et al. (2020). Associations of egg consumption with incident cardiovascular disease and all-cause mortality. *Sci China Life Sci* 63, <https://doi.org/10.1007/s11427-020-1656-8>

<https://mayocl.in/2JBt8Lq>

Mayo Clinic research finds spina bifida surgery before birth restores brain structure

In utero surgery to repair defects from spina bifida triggers the body's ability to restore normal brain structure

By Susan Buckles

Rochester, Minn. — Surgery performed on a fetus in the womb to repair defects from [spina bifida](#) triggers the body's ability to restore normal brain structure, [Mayo Clinic](#) research discovered.

Research by [Rodrigo Ruano, M.D., Ph.D.](#), chair of Mayo Clinic's [Division of Maternal and Fetal Medicine](#), finds that [fetal surgery](#) to correct congenital spinal cord defects is more effective at healing neurological structure than surgery after birth. This research was published in [Mayo Clinic Proceedings](#).

"We discovered the main benefit of this procedure is not only to close the spine, but the most important thing is to improve the brain structure and the brain anatomy," says Dr. Ruano. "Our study shows we can regenerate the brain structure so that it comes back to better development."

Dr. Ruano's research focused on three last consecutive patients with [myelomeningocele](#) who underwent fetal surgery, the most common and serious form of spina bifida. Myelomeningocele is a condition in which the backbone and spinal canal do not close properly. Membranes and spinal nerves push through this opening, forming a sac and exposing tissues and nerves. This makes the baby prone to life-threatening infections.

In each case, a related neurological disorder, known as [Chiari malformation](#), or hindbrain herniation, pushed the brain down through the base of the skull. That may lead to a buildup of fluid on the brain, causing a condition known as hydrocephalus. Oftentimes, infants with hydrocephalus require a shunt after birth to drain the fluid from the brain.

"Our hypothesis is if we closed the spinal defect in utero, we could prevent inflammation and trauma to the nerves, and most importantly stop the leakage of brain fluid through the base of the skull. And the posterior part of the brain can be restored or improved," says Dr. Ruano. "The study showed that after in utero intervention, the brain healed itself and prevented a more severe buildup of fluid on the brain."

Dr. Ruano and his team performed surgery on each of the babies to close the spinal cord opening between 23 and 26 weeks of gestation. MRI scans performed six weeks later while the babies were still in the womb showed the brain structure had been restored in each baby before birth.

The babies were delivered at 37 weeks via cesarean section with no complications. None of the babies needed a shunt to drain fluid from the brain after birth, and each baby was discharged from the hospital within three days.

Approximately 1 in every 4,000 babies, or 1,645 infants every year, are born in the United States with myelomeningocele, according to the Centers for Disease Control and Prevention. Left untreated, this type of spina bifida and Chiari malformation can lead to serious disabilities. Each case is different, but disabilities can range from bowel and bladder disorders to mobility problems and paralysis.

Future studies will be needed to investigate the benefits of open, in utero surgery, which requires a larger incision in the uterus versus fetoscopic surgery that is performed through two small incisions.

<https://bit.ly/34cRMv9>

A Genome Study Has Caught Humans And Neanderthals Having Lots of Sex All Over Eurasia
The more we learn about our evolutionary history, the more it seems like early humans and Neanderthals just couldn't keep their hands off one another.

Carly Cassella

A new study has once again found evidence that a long, long time ago, our ancestors made a habit of intermingling with Neanderthals - not once, not twice, but time and time again, in several different locations. As our ancestors made their way out of Africa and through Europe and Asia, it seems they unknowingly weaved traces of other human species into our modern genome.

Analysing the DNA of hundreds of people with Eurasian ancestry, researchers have found genetic material linked to Neanderthals in the Altai mountains of modern Siberia - an entirely different lineage from the Croatian population of Neanderthals identified in past genomic research. "It's not a single introgression of genetic material from Neanderthals," [says](#) biologist Omer Gokcumen from the University at Buffalo.

"It's just this spider web of interactions that happen over and over again, where different ancient hominins are interacting with each other, and our paper is adding to this picture."

It's only recently that we've come to realise just how much of our evolutionary history is [filled with interspecies sex](#).

Fresh archaeological discoveries and modern genomic research has [found](#) that rather than simply replacing other competitor species, like Neanderthals and Denisovans, *Homo sapiens* actually [interbred with them](#). And that's not necessarily a bad thing, either. In fact, there's evidence to suggest that our Neanderthal DNA [helps to protect us from viral epidemics](#), which seems oddly comforting given the times.

Today, most modern humans still have a little bit of Neanderthal hiding in their genes, even those who come from the epicentre of humanity. Just this year, a new method for analysing our genomes [revealed](#) modern African populations, who were once thought to be Neanderthal-free, also contain a mixed heritage in their genome.

For years, it was assumed that this tiny dose of DNA - [usually around 2 percent](#) - was linked to a brief encounter thousands of

years ago between our species and another. Growing evidence, however, makes that scenario far less likely. Instead, it appears this was a frequent love affair. "It seems like the story of human evolution is not so much like a tree with branches that just grow in different directions. It turns out that the branches have all these connections between them," Gokcumen [says](#).

The sheets have been crinkled and it's going to take us a while to iron out all the details. Gokcumen says that every ancient genome we sequence will bring with it a new perspective and he's more than excited about that prospect.

In this case, his team's research has not only isolated variants at a single shared nucleotide level between us and Neanderthals, it also reveals a large deletion of genetic information shared with both Neanderthal lineages - a variant that hasn't been found before.

In the end, the authors [conclude](#) that the Altai Neanderthal lineage "represents the ancestral lineage of Neanderthals and was sampled only in Asia and late Neanderthals", while the other lineage "replaced the ancestral Neanderthal lineage in Europe ~50,000 years ago."

Together, these results suggest that in the far distant past, ancestors of East Asians and Western Europeans intermixed with different Neanderthal lineages on multiple occasions as they spread out of Africa. "The picture in my mind now is we have all these archaic hominin populations in Europe, in Asia, in Siberia, in Africa," Gokcumen [explains](#).

"For one reason or another, the ancestors of modern humans in Africa start expanding in population, and as they expand their range, they meet with these other hominins and absorb their DNA, if you will. "We probably met different Neanderthal populations at different times in our expansion into other parts of the globe."

The study was published in [Genetics](#).

<https://bit.ly/2x1QzdQ>

Study offers new insight into the impact of ancient migrations on the European landscape

New study suggests it was not until the Bronze Age that human activity led to significant changes to Europe's landscape

Neolithic populations have long been credited with bringing about a revolution in farming practices across Europe. However, a new study suggests it was not until the Bronze Age several millennia later that human activity led to significant changes to the continent's landscape.

Scientists from the University of Copenhagen and the University of Plymouth led research tracing how the two major human migrations recorded in Holocene Europe - the northwestward movement of Anatolian farmer populations during the Neolithic and the westward movement of Yamnaya steppe peoples during the Bronze Age - unfolded.

In particular, they analysed how they were associated with changes in vegetation - which led to Europe's forests being replaced with the agricultural landscape still much in evidence today.

Their results, published in [PNAS](#), show the two migrations differ markedly in both their spread and environmental implications, with the Yamnaya expansion moving quicker and resulting in greater vegetation changes than the earlier Neolithic farmer expansion.

The study - also involving the University of Gothenburg and the University of Cambridge - used techniques commonly applied in environmental science to model climate and pollution, and applied them to instead analyse human population movements in the last 10 millennia of European history.

It showed that a decline in broad-leaf forest and an increase in pasture and natural grassland vegetation was concurrent with a decline in hunter-gatherer ancestry, and may have been associated with the fast movement of steppe peoples during the Bronze Age.

It also demonstrated that natural variations in climate patterns during this period are associated with these land cover changes.

The research is the first to model the spread of ancestry in ancient genomes through time and space, and provides the first framework for comparing human migrations and land cover changes, while also accounting for changes in climate.

Dr Fernando Racimo, Assistant Professor at the University of Copenhagen and the study's lead author, said: "The movement of steppe peoples that occurred in the Bronze Age had a particularly strong impact on European vegetation. As these peoples were moving westward, we see increases in the amount of pasture lands and decreases in broad leaf forests throughout the continent. We can now also compare movements of genes to the spread of cultural packages. In the case of the Neolithic farming revolution, for example, the two track each other particularly well, in both space and time."

The research made use of land cover maps showing vegetation change over the past 11,000 years, which were produced through the University of Plymouth's Deforesting Europe project.

Scientists working on that project have previously shown more than half of Europe's forests have disappeared over the past 6,000 years due to increasing demand for agricultural land and the use of wood as a source of fuel.

Dr Jessie Woodbridge, Research Fellow at the University of Plymouth and co-author on the study, added: "European landscapes have been transformed drastically over thousands of years. Knowledge of how people interacted with their environment in the past has implications for understanding the way in which people use and impact upon the world today. Collaboration with palaeogeneticists has allowed the migration of human populations in the past to be tracked using ancient DNA, and for the first time allowed us to assess the impact of different farming populations on land-

cover change, which provides new insights into past human-environment interactions."

<https://bit.ly/3aEjbbX>

Up to 25% of people with COVID-19 may not show symptoms

The data is prompting the CDC to reconsider who should wear face masks.

By [Rachael Rettner - Senior Writer](#)

A significant portion of COVID-19 patients may never show [coronavirus symptoms](#) at all — a key factor aiding the spread of the virus, according to a top U.S. health official.

As many as 25% of people infected with the [new coronavirus](#) remain asymptomatic, Dr. Robert Redfield, director of the Centers for Disease Control and Prevention, [told NPR](#) this week. "That's important, because now you have individuals that may not have any symptoms that can contribute to transmission," Redfield said.

What's more, even if people do get sick, they may shed the virus up to 48 hours before they show symptoms, Redfield added. "This helps explain how rapidly this virus continues to spread across the country, because we have asymptomatic transmitters and we have individuals who are transmitting 48 hours before they become symptomatic," Redfield said.

Recent studies from other countries also show that [asymptomatic transmission](#) of COVID-19 is likely occurring. For example, a study published today (April 1) in the CDC journal [Morbidity and Mortality Weekly Report](#) found that, of the more than 150 non-travel-related COVID-19 cases in Singapore, 6.4% appeared to involve asymptomatic transmission. In another study, published March 19 in the journal [Emerging Infectious Diseases](#), scientists reviewed data on COVID-19 in China outside of Hubei province, and found that 12.6% of cases appeared to involve asymptomatic transmission.

In light of this data on asymptomatic spread, the CDC is "aggressively" reviewing its recommendations on the [use of face masks](#) and whether people should wear them if they don't have symptoms, Redfield said. Currently, the agency recommends face masks only for health care providers and people who are sick with COVID-19.

Still, there is a concern that such a recommendation could reduce the supply of face masks for health care workers who desperately need them.

"The thing that has inhibited [a broader recommendation] a bit is to make sure we don't take away the supply of masks from the health care workers who need them," Dr. Anthony Fauci, director of the National Institute of Allergy and Infectious Diseases, [told CNN](#).

"But when we get in a situation where we have enough masks, I believe there will be some very serious consideration about ... broadening this recommendation of using masks. We're not there yet, but I think we're close to coming to some determination."

<https://bit.ly/2V0uHaH>

US Selects Two COVID-19 Vaccine Candidates for Huge Investments

The government is assisting Johnson & Johnson and Moderna with expediting clinical testing while at the same time prepping for large-scale manufacturing.

[Amy Schleunes](#)

The US government has announced collaborations with Johnson & Johnson and Moderna to simultaneously support clinical testing and the development of production infrastructure for COVID-19 vaccines, according to a [statement](#) from the US Department of Health and Human Services.

"Delivering a safe and effective vaccine for a rapidly spreading disease like COVID-19 requires accelerated action with parallel development streams," says Rick Bright, director of the Biomedical

Advanced Research and Development Authority (BARDA), in the statement. “The rapid progress we are making with industry partners clearly demonstrates a commitment to protecting people at home and abroad.”

Johnson & Johnson [announced](#) on Monday (March 30) a joint investment with the US government of \$1 billion intended to create the capacity to manufacture more than 1 billion doses of a vaccine, reports [Reuters](#), and the efforts will be funded in part by roughly \$420 million from BARDA. The funding will support non-clinical studies, according to the statement, as well as a Phase 1 clinical trial of Ad26 SARS-CoV-2, an investigational vaccine for COVID-19 developed by Janssen, a pharmaceutical subsidiary of Johnson & Johnson. Ad26 SARS-CoV-2 uses the same technology as Janssen’s investigational Ebola vaccine, according to [Science](#), which was [made available](#) in the Democratic Republic of Congo in November 2019. The clinical trial for Ad26 SARS-CoV-2 is set to begin no later than this coming fall, and could produce a vaccine available for emergency use in the US in early 2021.

The agency will also support Moderna to get Phase 2 and 3 clinical trials of its COVID-19 vaccine, SARS-CoV-2 mRNA-1273, ready to go as soon as the Phase 1 trial is complete, according to the statement. The Phase 1 study for the vaccine, developed in partnership with the National Institute of Allergy and Infectious Diseases, got underway earlier this month.

Bright tells Reuters that BARDA intends to support five to six vaccine candidates, out of which two or three may be ultimately be successful, and that the goal is to work “as quickly as possible and manufacture enough of [a vaccine] for us and the rest of the world in a very short timeframe.”

Choosing which experimental vaccines to invest in is a bit of a gamble, according to Seth Berkley, chief executive of the Global Alliance for Vaccines and Immunization (GAVI), who tells Reuters,

“What you need to do is take an assessment of what the most likely candidates are and invest at risk in those.”

Berkley adds that deciding earlier on which vaccines to support helps to organize manufacturing processes, but that doing so also decreases confidence in whether they will work.

Johnson & Johnson’s chief scientific officer Paul Stoffels confirms in an interview with [Science](#) that his company and BARDA are both investing in the research and development phase of the experimental vaccine as well as in manufacturing to create additional capacity. “Of course, it’s step by step—it has to work—but there’s no hesitation now to do everything in parallel,” he says. “When we have clinical data, we will have the capacity to scale up to very large quantities.”

<https://bit.ly/2UVDcUM>

Woman with COVID-19 developed a rare brain condition. Doctors suspect a link.

The rare condition has been associated with other viral infections, including influenza and herpes.

By [Nicoletta Lanese - Staff Writer](#)

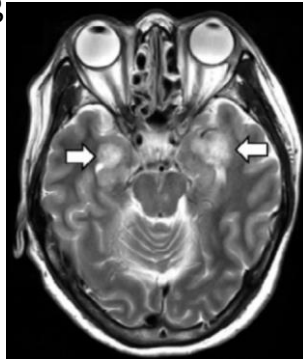
A woman who tested positive for COVID-19 developed a rare brain disease known as acute necrotizing encephalopathy, a condition that can be triggered by viral infections like [influenza](#) and herpes.

At this point, the brain damage "has yet to be demonstrated as a result of COVID-19 infection," according to a case report published March 31 in the journal [Radiology](#). However, as the novel coronavirus continues to spread, "clinicians and radiologists should be watching for this presentation among patients presenting with COVID-19 and altered mental status," the authors wrote.

"We need to be thinking of how we’re going to incorporate patients with severe neurological disease into our treatment paradigm," Dr. Elissa Fory, a Henry Ford neurologist who was part of the team of medical experts involved in making the diagnosis, [said in a](#)

[statement](#). "This complication is as devastating as severe lung disease."

The woman, a 58-year-old airline worker, checked into the Henry Ford Health System in Detroit, after having a fever, cough (known [coronavirus symptoms](#)) and "altered mental status" for three days, the report noted. At the hospital, the woman appeared confused, lethargic and disoriented, the statement noted.



An MRI scan from a woman who tested positive for COVID-19 revealed evidence of tissue damage. (Image: © Radiological Society of North America)

She tested negative for influenza, herpes, *Varicella zoster virus* (which causes [chickenpox](#)) and [West Nile virus](#); and her cerebrospinal fluid, which saturates the brain and spinal cord, contained no trace of bacterial infection.

Noting her symptoms, the doctors also [tested the patient for COVID-19](#) using a diagnostic test provided by the U.S. Centers for Disease Control and Prevention (CDC), and found that she tested positive for the disease.

CT scans of the woman's brain revealed symmetrical tissue damage in a region of the brain called the thalamus. (Image credit: Radiological Society of North America)

CT scans of the woman's brain revealed symmetrical tissue damage in the thalamus — a structure buried in the center of the brain that helps relay sensory information from the body to the rest of the organ, [according to BrainFacts.org](#). These damaged areas appeared darker on the woman's CT scan than they did in a scan of a healthy brain, meaning they were less dense than usual, [according to an explanation of radiological terms from St. Vincent's University Hospital](#). Brain regions can become less dense when due to edema, when excess fluid floods the tissue after injury, or necrosis, when

cells making up the tissue die off in large quantities, the case study authors noted.

The doctors gathered additional scans of the woman's brain using MRIs (magnetic resonance imaging) and examined them to find evidence that the patient had suffered a hemorrhage, or bleeding from a ruptured blood vessel. They again found damage in the thalamus, as well as in portions of the wrinkled cerebral cortex and in brain regions that lie just below its folds. The doctors diagnosed the woman with acute necrotizing encephalopathy, which, if left untreated, can progress to cause "coma, liver problems and neurological deficits," according to [The National Institutes of Health's Genetic and Rare Disease Information Center](#) (GARD).

"The team had suspected encephalitis at the outset, but then back-to-back CT and MRI scans made the diagnosis," Fory said.

The rare condition develops most commonly after a viral infection, such as those caused by influenza A, influenza B and the human herpes virus 6, according to GARD. These infections can trigger a so-called cytokine storm in the brain, when inflammatory substances that normally help the body fight off disease instead go haywire and damage the infected tissue, the case report authors noted. Cytokine storms break down the tissue that surrounds blood vessels in the brain, known as the blood-brain barrier, and can thus lead to hemorrhage, they wrote.

Although the doctors could not directly demonstrate that COVID-19 triggered the woman's unusual brain disease, a recent report in the journal [the Lancet](#) suggests that a subset of infected patients appear vulnerable to brain-bound cytokine storms. In addition, a case report published in the [Cureus Journal of Medical Science](#) described a 74-year-old patient with both COVID-19 and signs of encephalopathy.

It should be noted that "elderly patients with chronic conditions are at an increased risk of altered mental status in the setting of acute

infections," the authors of the Cureus paper wrote. At this point, the potential neurological symptoms of COVID-19 are not well understood, but they should be further investigated in infected patients, they added. Altered mental status might even serve as an early symptom of COVID-19 in some people, they said.

"If patients with neurological conditions are not considered to have COVID-19, this may present a nationwide issue to health care team members treating patients and in turn the general public if they are discharged and further exposed to other people," the Cureus authors noted.

<https://wb.md/2R4Nwss>

FDA Calls for Market Removal of Ranitidine

A problem with probable human carcinogen NDMA contamination in Zantac has led to a call to remove the product

Gregory Twachtman

A problem with probable human carcinogen N-nitrosodimethylamine (NDMA) contamination in [ranitidine](#), commonly known by the brand name Zantac, has led the Food and Drug Administration to call for manufacturers of the drug to remove all product, both over-the-counter and prescription forms, from the market. The NDMA contamination does not stem from a manufacturing concern, but rather the levels have been found to increase over time depending on how the ranitidine is stored.

In particular, the FDA found through product testing that the NDMA impurity developed over time when the ranitidine was stored above room temperature.

"The testing also showed that the older a ranitidine product is, or the longer the length of time since it was manufactured, the greater the level of NDMA," FDA said in a statement announcing the call for product withdrawal.

In addition to product being removed from the market, FDA is asking consumers to discard any ranitidine products they may have.

"There are still questions about how the impurity is formed in ranitidine over time during storage," Janet Woodcock, MD, director of the FDA Center for Drug Evaluation and Research, said during an April 1 conference call with reporters announcing the withdrawal request. "For example, what impact does the drug packaging have on the development or the specific formulation have on the development of NDMA."

She said the issue may be fixable over time, and the agency is open to reformulations that demonstrate that ranitidine is stable over time and under various storage conditions.

Dr. Woodcock stressed that the products at the point of manufacture do not have unacceptable levels of NDMA.

"This is a market withdrawal, this is not a recall because technically the products are okay. They met all their specs," she said. "It is only when they are subjected generally to heat stress do they manifest higher levels" of NDMA. "Clearly, we can't have products on the market that if they are stored under conditions consumers might store them under that they would become unacceptable."

Dr. Woodcock said FDA is not withdrawing approvals for the products, but manufacturers would need to show the product remains stable under normal storage conditions.

This article originally appeared on MDedge.com.

<https://bit.ly/2wfrImx>

Checklist for emergency department team's COVID-19 surge

Translating disaster medicine theory into practice

The COVID-19 pandemic has presented challenges to many health care systems across the globe. With limited science to guide staff and structure surge response, authors Matteo Paganini, Andrea Conti, Eric Weinstein, Francesco della Corte and Luca Ragazzoni from the Research Center in Emergency and Disaster Medicine (CRIMEDIM), Università del Piemonte Orientale in Novara, Italy

reviewed the available surge literature and using a translational science approach posed the question "How does the concept of sudden onset mass casualty incident (MCI) surge capability apply to the process to expand COVID-19 response?"

After reviewing the on-line ahead of print and print COVID-19 scientific publications, as well as grey literature, a [checklist was created to guide](#) the Emergency Department team's COVID-19 surge structural response in the Novara hospital.

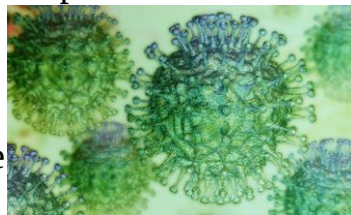


Image of Coronavirus European Centers for Disease Control

According to Dr Paganini "Preparedness is crucial for the resilience of healthcare systems. This pandemic has found us unprepared. We have to translate disaster medicine theory into practice, reconfiguring our Emergency Departments to meet the surge of patients. These guidelines can help the hospital team meet this demand."

<https://bit.ly/3bVV9cK>

Direct human ancestor *Homo erectus* is older than we thought

An unusual skullcap and thousands of clues have created a southern twist to the story of human ancestors, in research published in Science on 3 April.

The rolling hills northwest of Johannesburg are famous for fossils of human-like creatures called hominins. Because of this, the area is known as the Cradle of Humankind.

"During our field school excavations at Drimolen, a student began uncovering a cluster of fragments. We could see that they were parts of a skull. But they weren't immediately identifiable," says Ms Stephanie Baker.

Baker is a researcher and Ph.D. candidate at the Palaeo-Research Institute at the University of Johannesburg. She manages research

at the Drimolen fossil site in the Cradle of Humankind where the fragments of DNH 134 were found.

The international team was led by researchers from La Trobe University in Australia and Washington University in St. Louis in the United States.

Fossil forensics

Fossils that are millions of years old often come out of the soil in fragments. The fragments need to be rebuilt before researchers can confidently identify what kind of animal they came from.

"Over the course of the field season, more and more fragments were uncovered. We began piecing them together. No one could decide what this skullcap was from, until one night it all came together—and we realized we were looking at a hominin," she says. They named the skullcap DNH 134.

The next question was—what kind of hominin? The Cradle of Humankind has several different species of human ancestors and the Drimolen site had at least two kinds.

"This find really challenged us. We compared the assembled skullcap to all of the other examples of hominins in the Cradle area. Eventually, its teardrop shape and relatively big brain cavity meant we were looking at *Homo erectus*," says Baker.

Homo erectus is one of our direct human ancestors and is best known for migrating out of Africa into the rest of the world.

These hominins walked upright and were a more human-like species than the other hominins found in the Cradle. They had shorter arms and longer legs. They could walk and run for longer distances over the African grasslands than the others.

How old?

Once the question of 'which species?' was answered, two other huge questions presented themselves. How long ago was this individual alive? And how old were they when they died?

The researchers knew that no other Homo erectus fossils had ever been found in South Africa before. Even more surprising was the [time period](#) suggested by the soil layers the skull fragments were found in. "Before we found DNH 134, we knew that the oldest Homo erectus in the world was from Dmanisi in Georgia dating to 1.8 million years ago," says Baker.

Building a 3-D puzzle over time

Trying to figure out how old fossils are from the caves west of Johannesburg is quite tricky. There were no volcanoes during the time of the hominins, so there are no ash layers to give the researchers quick age estimates, like they use for eastern African sites.

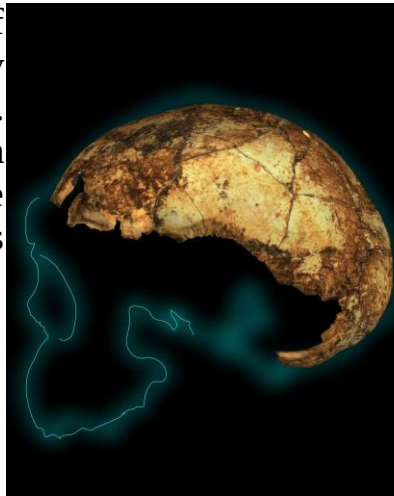
But while they were uncovering the fragments at Drimolen, they kept and recorded every clue they could find. This included fragments of small animals like bats and lizards, but also things like soil samples.

They can also tell exactly where in 3-D-space in the Drimolen quarry each little fossil fragment was found.

Then the research team used every possible dating technique available to get the most accurate possible date for the deposit. This included Palaeomagnetic dating, Electron spin resonance, Uranium lead dating, and faunal dating.

Possible shifted, earlier origin

"We collated all of the dates from each of these techniques and together they showed that we had a very precise age. We now know that the Drimolen Main Quarry and all of the fossils in it, are dated from 2.04 to 1.95 million years ago," says Baker.



That means that DNH 134 is much older than the next oldest Homo erectus in Africa; and from Georgia.

"The age of the DNH 134 fossil shows that Homo erectus existed 150,000 to 200,000 years earlier than previously thought," says Professor Andy Herries. Herries is the project co-director with Ms Baker and lead researcher. He is Head of the Department of Archaeology and History, at La Trobe University in Australia and an associate in the Palaeo-Research Institute at UJ.

Because Homo erectus is one of our direct ancestors, the discovery has implications for the origins of modern humans.

DNH 134 cranium with stylised projection of the outline of the rest of the skull. Credit: Andy Herries, Jesse Martin and Renaud Joannes-Boyau

"Until this find, we always assumed Homo erectus originated from eastern Africa. But DNH 134 shows that Homo erectus, one of our direct ancestors, possibly comes from southern Africa instead. That would mean that they later moved northwards into East Africa. From there they went through North Africa to populate the rest of the world," says Baker.

The skull is also unusual because it is the skull of a young Homo erectus. "The Homo erectus skull we found, was likely aged between two and three years old when it died," says Herries.

Sharing a landscape

The age of the DNH 134 skullcap shows something else—that three species of early human ancestor lived in southern Africa at the same time at the Drimolen fossil site.

"We can now say Homo erectus shared the landscape with two other types of humans in South Africa, Paranthropus and Australopithecus," says Herries.

This might mean they needed to use different parts of the landscape to avoid competing with one another. For a start, they looked different.

Paranthropus robustus hominins were shorter than Homo erectus and Australopithecus, says Baker.

"Paranthropus robustus ate things like roots and tubers, which is why their teeth are really big. They used their enormous teeth for grinding down what we call fall-back foods—tough hard plants."

Changing weather

In comparison to the other two species, Homo erectus hominins were tall and slender. They ate things which are easier to digest, like fruits and berries.

"We also know that they were eating meat, but we aren't exactly sure how they were getting it yet. We can say that at least these early Homo erectus weren't hunting with any weaponry yet," says Baker.

"We also know that they were able to cover long distances. Which turned out lucky for them, because during their time, the climate changed in southern Africa.

Paranthropus and Australopithecus evolved in warm and humid climates and were used to that. But then the weather began to shift from warm and humid, to cool and dry," she says.

Gradually the tree-cover diminished, and grasses took their place. Eventually the forests were replaced with the African savannah grasslands of today. The cooler weather suited the more mobile and social Homo erectus better. But it meant that Paranthropus had to rely on less desirable foods.

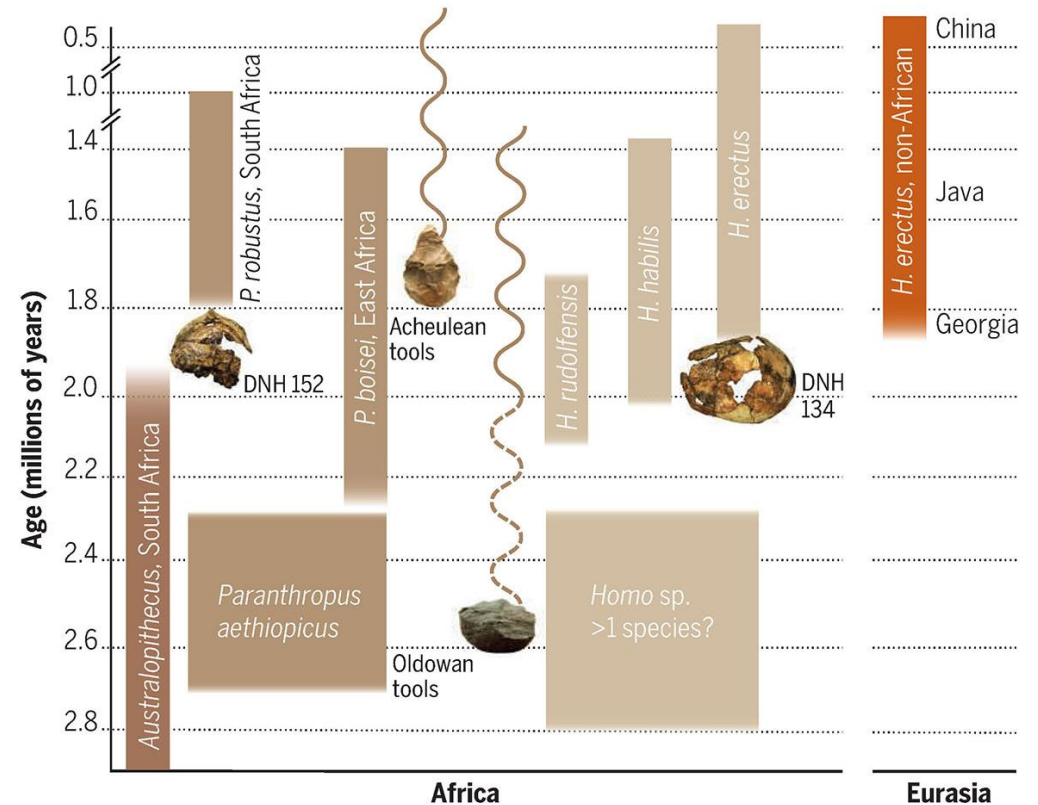
More information: A.I.R. Herries et al., "Contemporaneity of Australopithecus, Paranthropus, and early Homo erectus in S. Africa," *Science* (2020).

[science.sciencemag.org/cgi/doi ... 1126/science.aaw7293](https://science.sciencemag.org/cgi/doi/10.1126/science.aaw7293)

"All Who Wander Are Not Lost," *Science* (2020). [science.sciencemag.org/cgi/doi ... 1126/science.abb4590](https://science.sciencemag.org/cgi/doi/10.1126/science.abb4590)

Temporal existence of archaic human species

Shown are the ages of fossils DNH 134 and DNH 152. Stone-tool time ranges are shown with wavy lines. The dashed part of the wavy line indicates lesser frequency of find sites.



Graphic: N. Cary/*Science*; (Photos) Antón *Et Al.* (13) And Herries *Et Al.* (2)

<https://bit.ly/2JFz1qj>

Cats, Ferrets Susceptible to SARS-CoV-2: Study
 Researchers report that dogs, pigs, chickens, and ducks did not easily become infected.

[Shawna Williams](#)

Cats and ferrets can both be infected with SARS-CoV-2, the virus that causes COVID-19, and can pass the infection on to other members of the same species, researchers reported in a study

[preprint](#) on March 31. The study indicates that ferrets may be a suitable laboratory model for studying the disease (indeed, researchers are [already using](#) ferrets in their SARS-CoV-2 studies), but experts say it doesn't reveal whether pets could transmit the infection to people.

In the study, which has not undergone peer review, researchers put viral particles into the noses of a small number of cats. They euthanized a few of the animals four days later and tested their organs for SARS-CoV-2 genetic material. They found viral RNA in the cats' noses, soft palates, and tonsils, but not in their lungs.

Other exposed animals were housed in cages near unexposed animals. The researchers later detected viral RNA in one of the three cats that had been housed near an infected cat.

The team, led by Zhigao Bu of the Harbin Veterinary Research Institute, also ran tests on ferrets, dogs, pigs, chickens, and ducks, and found viral RNA in the ferrets after their exposure.

Two of the five exposed dogs had viral RNA in a rectal swab, but not an oronasal swab, two days after infection, while none of the pigs or fowl tested positive for viral RNA at any of the time periods tested.

Jonathan Ball, a virologist at the University of Nottingham in the UK, tells [The Guardian](#) that cats had similarly been found to be susceptible to infection with the virus that caused the SARS outbreak of 2003, which is related to SARS-CoV-2. "However, it should be remembered that cats are not playing much, if any, role in the spread of this virus," he says. "Human to human transmission is clearly the main driver, so there is no need to panic about cats as an important source of virus."

Obviously, if you think you have Covid-19 and share a house with a cat, then it would be sensible to limit close interactions with your furry friend until you are better."

Virologist Linda Saif of the Ohio State University notes in an interview with [Nature](#) that none of the infected cats showed symptoms of illness, and that only one out of the three felines housed near infected cats caught the virus. "This suggests the virus may not be highly transmissible in cats," she says.

<https://bit.ly/2R9SijV>

This lizard lays eggs and gives live birth. We think it's undergoing a major evolutionary transition

Things aren't as simple as they first appear

Charles Foster * Camilla Whittington **

Our earliest vertebrate (animals with backbones) ancestors laid eggs, but over millions of years of evolution, some species began to give birth to live young.

There is a traditional dichotomy in vertebrate reproduction: species either lay eggs or have live births. However, as is often the case in biology, things aren't as simple as they first appear, and there are a handful of vertebrate animals that do both.

One of these is the three-toed skink (*Saiphos equalis*). [Our recent research](#) suggests the egg-laying *S. equalis* may currently be in the process of transitioning from egg-laying to giving live birth. Studying them gives us a unique opportunity to watch evolution in action.



Saiphos equalis has a distinctive yellow belly, and a long, slender body, ideal for its underground lifestyle. Charles Foster

From eggs to babies, and back again?

There are two main reproductive strategies in vertebrates.

Animals that lay eggs are called "oviparous". For instance, many fish species spawn eggs that are fertilised externally. In other oviparous species, including birds and some lizards and snakes,

eggs are fertilised inside the mother, an eggshell is added, and then eggs are laid.

Depending on the species, much or all of the nutrition needed to grow a healthy baby is supplied in the egg yolk.

In contrast, “viviparous” animals carry embryos internally until they are fully developed. The embryos can rely entirely on yolk for nutrition, or the parents can provide supplementary nutrition, sometimes via a placenta (as in humans).

There is strong evidence that [egg-laying is ancestral to live birth](#), meaning it came first. Many physiological changes were necessary for live birth to have evolved from egg-laying. With this transition, some structures were lost, including the hard outer eggshell. Other mechanisms were gained to ensure embryonic survival within the parent, including the supply of adequate oxygen and water during development.

The evolution of live birth has occurred frequently, [including at least 121 times in independent groups of reptiles](#).

Evolutionary “reversals” to egg-laying are much rarer, probably because [regaining the physiological machinery for producing eggshells](#) would be exceptionally difficult.

¿Por que no los dos?

Despite the vast differences between egg-laying and live birth, some species can do both. This phenomenon called “bimodal reproduction” is exceptionally rare. There are [more than 6500 species of lizards worldwide](#), but only three exhibit bimodal reproduction.

We’re lucky enough to have two of these in Australia. [Our research group](#) at the University of Sydney studies the bimodally reproductive three-toed skink, in the hope of understanding how live birth evolved.

In northern NSW, the three-toed skink [gives birth to live young, but near Sydney, they lay eggs](#). Even though they reproduce differently, [previous research](#) has shown these lizards are a single species.

Even the egg-laying members of the species are odd, as the eggs are retained within the mother for a relatively long time. After being laid, ordinary skink eggs are [incubated for at least 35 days](#) before they hatch, but some three-toed skink eggs [hatch in as few as five days](#) after being laid. One female even [laid eggs and gave birth to a live baby in the same litter](#).

The genetics behind different reproductive modes

Most aspects of an animal’s development are controlled by its genes, but not every gene is always active. Genes can be expressed (switched on) to different degrees, and gene expression can stop when not needed.

An egg-laying skink uterus undergoes [only a couple of genetic changes](#) between being empty and holding an egg.

A live-bearing skink uterus is different. It undergoes [thousands of genetic changes](#) to help support the developing baby, including genes that probably help provide oxygen and water, and regulate the mother’s immune system to keep the baby safe from [immunological attack](#).

Unexpected similarities between the egg-laying and the live-bearing

[Our research](#) measured changes in gene expression between egg-laying and live-birth in the three-toed skink. We investigated how the expression of all genes in the uterus differed between when the uterus was empty and when it held an egg or embryo.



Embryos of egg-laying Saiphos equalis are nearly completely developed at the time of laying. Stephanie Liang

As expected, live-bearing *S. equalis*, undergo thousands of genetic changes during pregnancy to produce a healthy baby.

But surprisingly, when we looked at the uterus of the egg-laying *S. equalis*, we found these also undergo thousands of genetic changes, many of which are similar to those in their live-bearing counterparts. Some of the most important genetic changes in gene expression in egg-laying *S. equalis* allow embryos to develop within the mother for a long time.

These genes also seem to allow the uterus to remodel to accommodate a growing embryo, and drive the same kinds of functions required for the embryonic development in live-birthing three-toed skinks.

Are 'reversals' to egg-laying easier than previously thought?

Our findings are important because they demonstrate that egg-laying three-toed skinks are an evolutionary intermediate between "true" egg-laying and live birth.

We now know that uterine gene expression in egg-laying *S. equalis* mirrors live-bearing skinks much more closely than true egg-laying skinks. These results may explain why it's possible for a female three-toed skink to [lay eggs and give birth to a live baby in a single pregnancy](#).

The similarities in gene expression between egg-laying and live-bearing three-toed skink uteri might also mean "reversals" from live birth back to egg-laying could be easier than previously thought. However, this may be restricted to species in which live-birth has evolved recently, such as the three-toed skink.

*Postdoctoral Research Associate, University of Sydney

**Senior lecturer, University of Sydney

Disclosure statement

Charles Foster receives funding from The University of Sydney.

Camilla Whittington receives funding from The University of Sydney and the Australian Research Council.

Partners [University of Sydney](#) provides funding as a member of The Conversation AU.

[View all partners](#)

<https://bit.ly/3bSfpvv>

Gabon bans eating of pangolin and bats amid pandemic

Pangolins are critically endangered and have long been protected, but they are sold in the markets of the capital Libreville and their meat is popular

Gabon on Friday banned the sale and eating of bats and pangolins, which are suspected of sparking the novel coronavirus in China where they are highly prized in traditional medicine.



President Ali Bongo Ondimba also announced the government was planning to lock down the capital Libreville and unveiled an emergency package for those hard hit by the pandemic.

The novel coronavirus is believed to have come from bats, but researchers think it might have spread to humans via another mammal. Pangolins are critically endangered and have long been protected, but they are sold in the markets of the capital Libreville, as are bats, and their meat is popular.

The central African nation is 88 percent covered in forest and hunting and bush meat have long been a way of life.

The water and forest ministry said the novel coronavirus was a "combination of two different viruses, one close to bats and the other closer to pangolins", and claimed to be quoting a scientific study published in Nature.

Gabon has declared 21 COVID-19 infections, but none from animals, the ministry said. "A similar decision was taken by the authorities when our country was affected by the Ebola virus—a ban on eating primates," Forestry Minister Lee White said.

The national parks agency ANPN announced in mid-March that tourists would no longer be allowed to interact with great apes to avoid any risk of contamination by the coronavirus.

The pangolin, the world's most heavily trafficked mammal, also called the scaly anteater, is believed to have possibly been a vector in the leap of the novel coronavirus from animal to human at a market in China's Wuhan city last year. Its body parts fetch a high price on the black market as they are commonly used in traditional Chinese medicine, although scientists say they have no therapeutic value.

Gabon has also put in place a raft of measures such as grounding international flights, closing schools and ordering a night curfew to stop the spread of the coronavirus.

On Friday, Bongo said Libreville would be put under lockdown "in the coming days" but gave no precise date.

All but one of Gabon's reported 21 cases are in the city, where a large proportion of the country's two million residents live.

Bongo also announced an aid package of 250 billion CFA francs (380 million euros) to help both individuals and businesses whose livelihoods have suffered because of the crisis.

<https://wb.md/3bV46D6>

Hard Truths From Infectious Disease Specialists

We should expect more deaths from COVID-19 than previously predicted, leaders of the Infectious Diseases Society of America (IDSA) said at a press briefing Friday.

Ken Terry

The models on which the current national estimate of US mortality from COVID-19 are based assume that optimal social distancing will be practiced across the country, said Rochelle Walensky, MD, vice chair of IDSA's [HIV](#) Medicine Association and chief of the infectious diseases division at Massachusetts General Hospital in Boston. Under that scenario, the [White House has said](#), the range of mortality would be 100,000 to 240,000 deaths.

However, Walensky noted, "We're not properly social distancing. We're not doing enough. And in that case, the models were wrong.

Our prevention activities were not as robust as the models suggested, so the number of deaths will be higher."

When the number of COVID-19 cases declines, Walensky cautioned, some degree of social distancing will still be needed. "We can't think about not social distancing anymore until we can understand what it means to go from mitigation back to containment [of the coronavirus].

"When we go from mitigation to containment, that means that anyone who is symptomatic has access to a test, and we have to make sure that a person who tests positive is able to self-isolate and that we can 'contact trace' all of those people. We're talking about blanketing tests so they're universally available to anyone at any time."

Thomas File Jr, MD, president of the IDSA and chair of the infectious disease division at Summa Health in Akron, Ohio, added, "As we go back from mitigation to containment, everyone is anxious to get back to business as usual. But I'm not sure we'll ever get back to business as usual. The whole concept of promoting good health practices is going to have to continue even after we're in the downslope. By that, I mean staying home if you're sick, washing your hands, avoiding touching your face. We'll have to continue those practices, even if there's a downslope of this virus epidemic in our country and in the world pandemic."

Test Accuracy

Walensky noted that the COVID-19 test now being used in hospitals is only 70% sensitive for negative results. "Therefore, we're doing results review for every patient we take off precautions from the hospital to make sure they're not a false negative."

She clarified, "We believe the test is pretty good if it gives you a positive result. We think we can trust that to say the person really has the disease. But if it gives a negative result, the reported sensitivity of that is only about 70%."

One reason for this, she said, is that there can be a sampling problem if the clinician doesn't stick the test swab far enough into someone's nose. "Second, as patients get sicker, the virus migrates from the nasopharynx to the oropharynx and into the respiratory tract. We don't know, when it migrates down, whether it has left the nasopharynx."

Patients aren't being retested near the end of their clinical course, although that would be ideal to ensure they were free of infection, File said. "After people are afebrile for a certain period of time, usually after 14 days, we've considered that they've resolved their illness to the point where we can reduce the quarantine aspect of their care," he said.

Infected healthcare workers, on the other hand, are not only quarantined for 2 weeks but also must have two negative tests, 24 hours apart, before they're allowed to return to work at Massachusetts General, Walensky said.

Social Distancing Works

With most of the country on some form of lockdown, Walensky stressed there is abundant evidence that social distancing can slow the spread of COVID-19. "There have been empirical data going back to the 1918 [flu](#) epidemic that demonstrate that social distancing measures delayed the peaks in mortality, had lower mortality, and took longer for that mortality to happen," she said. "We also have new data from China showing the infectivity of the SARS COVID virus. We know from those data that social distancing almost halved the infectivity and the reproductive number of SARS."

The Trump Administration [has signaled](#) that everyone in the most infected areas will soon be urged, but not required, to wear masks in public. Walensky emphasized that people should continue to adhere to social distancing even if they wear masks. Also, she noted, "You're not protecting yourself if you wear a mask, you're

protecting someone else from something you might transmit to them asymptotically and unknowingly."

Walensky acknowledged that "vulnerable communities," including the poor, have less ability to socially distance than other people do. "They may not have the space, and they may have more need to go to work and get paychecks. And, where less social distancing is occurring, we're seeing a higher incidence of the epidemic."

Walensky said she hasn't seen any triaging of patients by their ability to pay for care. But some vulnerable groups have less access to healthcare than more affluent people do, File noted.

A reporter asked Walensky whether doctors are collecting observational data on the effects of hydroxychloroquine, which was recently approved by the Food and Drug Administration (FDA) for [emergency use](#) against COVID-19, and whether the data would be useful if they did. She said that 35 clinical trials of the drug are now being conducted, and a lot of physicians are already prescribing it. However, she added, "We need a big observational cohort, because not every hospital has the capacity to look through these charts and see what people got."

Editor's note: Find the latest COVID-19 news and guidance in Medscape's [Coronavirus Resource Center](#).

<https://bit.ly/3bXx6tY>

An Ingredient in Some Medicinal Mouthwashes Could Put Teeth at Great Risk of Cavities

Mouthwash may not be the simple defence against cavities you might think it is.

Carly Cassella

Mouthwash is sold as a way to rid your mouth of nasty bacteria, but a particular ingredient used in some brands mean it may not be the simple defence against cavities you might think it is.

A new study suggests oral rinses that rely on a particular chemical called [chlorhexidine](#) - sold in the US under [various brands](#) - may actually leave your teeth more open to damage.

Although this chemical is said to be 'antibacterial', that's only true in some cases. Recent findings suggest the solution can disturb the microbiome in your mouth, leading to an abundance of lactate-producing bacteria, which makes your saliva more acidic.

That's not exactly good for your teeth. Saliva plays an important role in keeping the pH of your mouth relatively neutral, but if that changes, it might cause issues in your gums and gnashers.

"There is a surprising lack of knowledge and literature behind the use of these products," [says](#) dietetics researcher Raul Bescos from the University of Plymouth in the UK.

"Chlorhexidine mouthwash is widely used but research has been limited to its effect on a small number of bacteria linked to particular oral diseases, and most has been carried out in vitro."

In the new study, 36 healthy participants were given a placebo mouthwash to use for one minute, twice a day, for seven days. Then, the next week, that fake mouthwash was swapped out with another real one that uses chlorhexidine.

At the end of each trial, the authors analysed the abundance and diversity of bacteria in each participants' mouth, measuring pH, saliva, neutralising acids, lactate, glucose, nitrate, and nitrite concentrations.

Using chlorhexidine mouthwash not only decreased microbial diversity and increased acidity, it also lowered the saliva's ability to buffer pH.

Saliva lactate and glucose concentrations were elevated after using this mouthwash, and it also disrupted the conversion of nitrate into nitrite, which may support our circulation.

This is important, because the authors found increased systolic blood pressure when the real mouthwash was used.

This weird effect has [popped up in previous studies](#), and the authors think the use of CHX mouthwash may be more accentuated in people with high blood pressure levels.

"We have significantly underestimated the complexity of the oral microbiome and the importance of oral bacteria in the past," [says](#) biomedical scientist Louise Belfield at the University of Plymouth.

"Traditionally, the view has been that bacteria are bad and cause diseases. But we now know that the majority of bacteria - whether in the mouth or the gut - are essential for sustaining human health."

In short, this sort of mouthwash appears to be killing the good bacteria as well as the bad plaque. And while it's not clear if this is leading to oral disease, the authors say we need more information on mouthwashes before we can prescribe them correctly.

Today, that could be a very timely consideration.

"In the face of the recent COVID-19 outbreak, many dentists are now using chlorhexidine as a pre-rinse before doing dental procedures," [says](#) Brookes, who says this study is a first of its kind.

"We urgently need more information on how it works on viruses."

The study was published in [Scientific Reports](#).

<https://wb.md/39K6haX>

Neurologic Symptoms and COVID-19:

What's Known, What Isn't

US neurologists are now reporting that COVID-19 symptoms may also could include encephalopathy, ataxia, and other neurologic signs.

Damian McNamara

Since the Centers for Disease Control and Prevention (CDC) confirmed the first US case of novel coronavirus infection on January 20, much of the clinical focus has naturally centered on the virus' prodromal symptoms and severe respiratory effects.

However, US neurologists are now reporting that COVID-19 symptoms may also could include encephalopathy, ataxia, and other neurologic signs.

"I am hearing about strokes, ataxia, myelitis, etc," Stephan Mayer, MD, a neurointensivist in Troy, Michigan, posted on Twitter on March 26. <https://twitter.com/stephanamayer/status/1243168223660593154>

Other possible signs and symptoms include subtle neurologic deficits, severe fatigue, [trigeminal neuralgia](#), complete/severe anosmia, and myalgia as reported by clinicians who responded to the tweet.

Last week, as [reported by](#) by *Medscape Medical News*, the first presumptive case of encephalitis linked to COVID-19 was documented in a 58-year-old woman treated at Henry Ford Health System in Detroit.

Physicians who reported the acute necrotizing hemorrhagic encephalopathy case in the journal *Radiology* counseled neurologists to suspect the virus in patients presenting with altered levels of consciousness.

Researchers in China also [reported the first presumptive case](#) of Guillain-Barre syndrome associated with COVID-19. A 61-year-old woman initially presented with signs of the autoimmune neuropathy GBS, including leg weakness, and severe fatigue after returning from Wuhan, China.

She did not initially present with the common COVID-19 symptoms of fever, cough, or chest pain.

Her muscle weakness and distal areflexia progressed over time. On day 8, the patient developed more characteristic COVID-19 signs, including 'ground glass' lung opacities, dry cough, and fever. She was treated with antivirals, immunoglobulins, and supportive care, recovering slowly until discharge on day 30.

"Our single-case report only suggests a possible association between GBS and SARS-CoV-2 infection. It may or

may not have causal relationship. More cases with epidemiological data are necessary," senior author Sheng Chen, MD, PhD, told *Medscape Medical News*.

However, "we still suggest physicians who encounter acute GBS patients from pandemic areas protect themselves carefully and test for the virus on admission. If the results are positive, the patient needs to be isolated," added Chen, a neurologist at Shanghai Ruijin Hospital and Shanghai Jiao Tong University School of Medicine in China.

Neurologic presentations of COVID-19 "are not common, but could happen," Chen added. [Headache](#), muscle weakness and myalgias have been documented in other patients in China, he said.

Early Days

Despite this growing number of anecdotal reports and observational data documenting neurologic effects, the majority of patients with COVID-19 do not present with such symptoms.

"Most COVID-19 patients we have seen have a normal neurological presentation. Abnormal neurological findings we have seen include loss of smell and taste sensation, and states of altered mental status including confusion, lethargy, and coma," Robert Stevens, MD, who focuses on neuroscience critical care at the Johns Hopkins School of Medicine in Baltimore, Maryland, told *Medscape Medical News*.

Other groups are reporting seizures, spinal cord disease, and brain stem disease. It has been suggested that brain stem dysfunction may account for the loss of hypoxic respiratory drive seen in a subset of patients with severe COVID-19 disease, he added.

However, Stevens, who plans to track neurologic outcomes in COVID-19 patients, also cautioned that it's still early and these case reports are preliminary.

"An important caveat is that our knowledge of the different neurological presentations reported in association with COVID-19

is purely descriptive. We know almost nothing about the potential interactions between COVID-19 and the nervous system," he noted. He added it's likely that some of the neurologic phenomena in COVID-19 are not causally related to the virus.

"This is why we have decided to establish a multisite neuro-COVID-19 data registry, so that we can gain epidemiological and mechanistic insight on these phenomena," he said.

Nevertheless, in an [online report](#) February 27 in the *Journal of Medical Virology*, Yan-Chao Li, MD, and colleagues write that "increasing evidence shows that coronaviruses are not always confined to the respiratory tract and that they may also invade the central nervous system, inducing neurological diseases."

Li is affiliated with the Department of Histology and Embryology, College of Basic Medical Sciences, Norman Bethune College of Medicine, Jilin University, Changchun, China.

A Global View

Scientists observed SARS-CoV in the brains of infected people and animals, particularly the brainstem, they note. Given the similarity of SARS-CoV to SARS-CoV2, also known as COVID-19, the researchers suggest a similar invasive mechanism could be occurring in some patients.

Although it hasn't been proven, Li and colleagues suggest COVID-19 could act beyond receptors in the lungs, traveling via "a synapse-connected route to the medullary cardiorespiratory center" in the brain. This action, in turn, could add to the acute respiratory failure observed in many people with COVID-19.

Other neurologists tracking and monitoring case reports of neurologic symptoms potentially related to COVID-19 include Mayer and Amelia Boehme, PhD, MSPH, an epidemiologist at Columbia University specializing in stroke and cardiovascular disease.

Boehme suggested on Twitter that the neurology community conduct a multicenter study to examine the relationship between the virus and neurologic symptoms/sequelae.

Medscape Medical News [interviewed](#) Michel Dib, MD, a neurologist at the Pitié Salpêtrière hospital in Paris, who said primary neurologic presentations of COVID-19 occur rarely — and primarily in older adults.

As other clinicians note, these include confusion and disorientation. He also reports cases of encephalitis and one patient who initially presented with [epilepsy](#).

Initial reports also came from neurologists in countries where COVID-19 struck first.

For example, stroke, [delirium](#), epileptic seizures and more are being treated by neurologists at the University of Brescia in Italy in a dedicated unit designed to treat both COVID-19 and neurologic syndromes, Alessandro Pezzini, MD, [reported](#) in *Neurology Today*, a publication of the American Academy of Neurology.

Pezzini notes that the mechanisms behind the observed increase in vascular complications warrant further investigation. He and colleagues are planning a multicenter study in Italy to dive deeper into the central nervous system effects of COVID-19 infection.

Clinicians in China also report neurologic symptoms in some patients. A [study of 221 consecutive COVID-19 patients](#) in Wuhan revealed 11 patients developed acute [ischemic stroke](#), one experienced [cerebral venous sinus thrombosis](#), and another experienced [cerebral hemorrhage](#).

Older age and more severe disease were associated with a greater likelihood for cerebrovascular disease, the authors report.

Chen and Li have disclosed no relevant financial relationships.

Editor's note: Find the latest COVID-19 news and guidance in Medscape's [Coronavirus Resource Center](#).

<https://bit.ly/3dZRpIH>

Coronavirus After Contact With Worker

Six other big cats have also developed symptoms, the zoo said in a statement.

By [Josephine Harvey](#)

In what's thought to be the first known case of animal coronavirus infection in the U.S., a tiger at New York's Bronx Zoo has tested positive for the coronavirus, officials said Sunday.

A 4-year-old Malayan tiger named Nadia tested positive for COVID-19, the disease caused by the coronavirus, after she, her sister, two Amur tigers, and three African lions developed dry coughs, the [zoo said in a statement](#). The animals are all expected to recover. The tiger was tested "out of an abundance of caution," the zoo said, after a person who was asymptotically infected with the virus cared for them.

"This is the first time we know of, or from any of the people we've been in contact with, that an animal has gotten sick with COVID," Dr. Paul Calle, chief veterinarian at the Bronx Zoo, [told the New York Daily News](#).

After the onset of Nadia's respiratory symptoms, a number of other tests were run before it occurred to zoo officials to test her for COVID-19, the outlet reported.

"Because of New York City being an epicenter for COVID right now in the pandemic, we of course wanted to make sure we also did that testing," Calle said.

Nadia was the only cat tested because the process requires anesthetizing a big cat, Calle told [The Associated Press](#). She was also temperature checked and received a normal result.

Measures have been put in place to protect zoo staff who care for the animals, as well as other cats at three other zoos operated by the Wildlife Conservation Society (WCS), which is in charge of the Bronx Zoo.

HuffPost has reached out to the WCS for additional information.

According to the [World Health Organization](#), while there has been one instance of a dog testing positive for coronavirus in Hong Kong, there is no evidence that animals can transmit the virus.

The [Centers for Disease Control and Prevention](#) says it is aware of a [small number](#) of cases of animals testing positive outside the U.S., but there is nothing to suggest they can pass it on to humans. Still, they suggest practicing general hygiene around animals, like hand-washing after handling and restricting contact with pets when sick.

The United States Department of Agriculture is not recommending routine coronavirus testing for animals, veterinarian and department official Dr. Jane Rooney told the AP. The small number of animals that have been tested in the U.S. have returned negative results, excluding Nadia's, Rooney said.

The positive COVID-19 test for the tiger was confirmed by the USDA's National Veterinary Services Laboratory, based in Ames, Iowa. The Bronx Zoo and other WCS affiliate zoos and aquariums have been shuttered temporarily since March 16.