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Verbal insults trigger a 'mini slap to the face', finds new research

Hearing insults is like receiving a "mini slap in the face", regardless of the precise context the insult is made in.

That is the conclusion of a new paper published in *Frontiers in Communication*. The researchers used electroencephalography (EEG) and skin conductance recordings to compare the short-term impact of repeated verbal insults to that of repeated positive or neutral evaluations. The results provide us with a unique opportunity to research the intersection between emotion and language.

Humans are a highly social species. We rely on ever-changing cooperation dynamics and interpersonal relations to survive and thrive. Words have a big role to play in these relations, as they are tools used to understand interpersonal behavior. As such, [words](#) can hurt, but we know little about how the impact of words comes about as someone processes an [insult](#).

"The exact way in which words can deliver their offensive, emotionally negative payload at the moment these words are being read or heard is not yet well-understood," said corresponding author Dr. Marijn Struiksma, of Utrecht University.

Because insults pose a threat against our reputation and against our 'self', they provide a unique opportunity to research the interface between language and emotion. Struiksma continued:

"Understanding what an insulting expression does to people as it unfolds, and why, is of considerable importance to psycholinguists interested in how language moves people, but also to others who wish to understand the details of social behavior."

EEG and skin conductance

Struiksma and her colleagues wanted to examine whether processing verbal insults is less sensitive to repetition than

compliments, and if so, which cognitive stages are implicated in the adaptation, and which aren't.

"We assume that verbal insults trigger a cascade of rapidly consecutive or overlapping processing effects, and that different parts of that cascade might be differently affected by repetition, with some of them rapidly wearing off, and others remaining strongly responsive for a long time," explained Struiksma.

EEG and skin conductance electrodes were applied to 79 [female participants](#). They then read a series of repeated statements that realized three different speech acts: insults (for example, "Linda is horrible"), compliments (for example, "Linda is impressive"), and neutral, factually correct descriptive statements (for example, "Linda is Dutch").

To examine whether the impact of the words depended on who the statement was about, half of the three sets of statements used the participant's own name, and the other half used somebody else's. The experiment involved no real interaction between the participants and another human. The participants were told that the statements were being said by three different men.

Mini slaps to the face

The researchers found that even under unnatural conditions—a lab-setting, no real human interactions, and statements coming from fictitious people—verbal insults can still "get at you", no matter who the insult is about, and continue to do so even after repetition.

Specifically, the EEG showed an early insult effect in P2 amplitude that was very robust over repetition and did not depend on who the insult was about. P2 is a waveform component of the event-related potential (ERP) measured at the human scalp.

In the setting of the experiment, the insults were perceived as mini slaps to the face, explained Struiksma: "Our study shows that in a psycholinguistic laboratory experiment without real interaction between speakers, insults deliver lexical 'mini slaps in the face',

such that the strongly negative evaluative words involved that a participant reads, automatically grab attention during lexical retrieval, regardless of how often that retrieval occurs."

Yet the study only shows the effects of insults in an artificial setting. The participants will have recognized the insults as such, but as decontextualized statements the actual emotional effects of insults lose power. Studying insults in a real setting remains ethically challenging.

Even so, the results show an increased sensitivity of our brains to negative words compared to positive words. An insult immediately captures our brain's attention, as the emotional meaning of insults is retrieved from long-term memory. The compliments elicited a less strong P2 effect, showing a negativity bias in the amount of attention that is automatically allocated to negative versus positive interpersonal situations.

More information: Do People Get Used to Insulting Language? Frontiers in Communication (2022). DOI: 10.3389/fcomm.2022.910023

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

Do Shingles Viral Infections Increase a Person's Risk of Dementia?

Scientists have speculated that shingles could increase the risk of dementia. However, new research has found that shingles is not associated with an increased risk of dementia.

Shingles is a viral infection caused by the reactivation of the chickenpox virus that results in a painful blistering rash along one side of the body or face from nerve inflammation. Because of such inflammation, there has been scientific speculation that shingles may increase a person's risk of dementia. However, shingles is not associated with an increased risk of dementia according to the results of new research. The study was recently published in *Neurology*, the medical journal of the American Academy of Neurology.

"As a person's age increases, so does their risk of dementia, and it's important to determine which factors may contribute to this risk," said study author Sigrun Alba Johannesdottir Schmidt, MD, PhD, of Aarhus University Hospital in Denmark. "Shingles most often affects people over age 50. The good news is that our study found it does not seem to increase a person's risk for dementia."

Scientists reviewed Danish medical registries for the research. They identified 247,305 people who had visited a hospital for shingles or were prescribed antiviral medication for shingles, and 1,235,890 people matched for age and sex who did not have the disease over a 20 year period. The average age was 64.

Researchers then examined which participants developed dementia up to 21 years after their shingles diagnosis. 9.7% of the people who had shingles eventually developed dementia. 10.3% of people who did not have shingles developed dementia.

After adjusting for other health conditions such as diabetes, cancer, and traumatic head injury, the scientists discovered that people with shingles had a 7% lower risk of dementia than people who did not have shingles.

"We were surprised by these results," said Schmidt. "The reasons for this decreased risk are unclear, but it could be explained by missed diagnoses of shingles in people with undiagnosed dementia. Shingles vaccination is encouraged for older people because it can prevent complications from the disease, but our study suggests it is unlikely to reduce dementia risk."

Researchers did find that people who had shingles that had spread to the central nervous system had nearly twice the risk of developing dementia. However, Schmidt said such complications are rare, affecting below 0.1% of those with shingles.

A limitation of the study was that participants were identified based on antiviral prescriptions or hospital visits for the disease so results may not be the same for people with milder cases and those who

are not treated for the disease.

Reference: "Incident Herpes Zoster and Risk of Dementia: A Population-Based Danish Cohort Study" by Sigrun Alba Johannesdottir Schmidt, Katalin Veres, Henrik Toft Sørensen, Niels Obel and Victor W. Henderson, 8 June 2022, Neurology.

[DOI: 10.1212/WNL.000000000000200709](https://doi.org/10.1212/WNL.000000000000200709)

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

Scientists discover world's longest underwater avalanche after rescue of lost data

Prompt action by scientists recovered sensors drifting across the Atlantic Ocean that held data on a seabed sediment avalanche that traveled for 1,100 km to ocean depths of 4,500 km.

A study published today in *Nature Communications* shows that the data was recovered after anchors mooring these [sensors](#) to the seabed had been broken by these huge underwater flows.

The recovered data will help predict hazards to seabed telecommunications cables, improving reliability and reducing future breakages, while also providing insight into how future climate or land-use changes may impact the deep-sea. Scientists worked with the Natural Environment Research Council (NERC) and National Oceanography Center (NOC) to recover the data. Funding for the research was provided by NERC.

A race against time

Each sensor was fitted with a beacon that transmitted its position, but as the beacon's battery only lasted for about three months, the rescue timescale was very tight. Any normal rescue procedure was ruled out due to COVID-19 pandemic travel restrictions in spring 2020. However, a private vessel traveling off the West African coast found one buoy and the captain agreed to help collect others.

The project team, and staff from NERC and the National Marine Facilities division at NOC acted quickly to assess the vessel's suitability and arrange this emergency charter. In about 48 hours, NERC had assessed and approved the rescue attempt.

Over the next few weeks, researchers successfully chartered a variety of additional boats including a cable-laying vessel, a cargo ship and a ship servicing oil and gas rigs.

Fiber optic telecommunication cables operator Angola Cables also proved instrumental in securing necessary permits for the vessels to operate in Angolan waters through the project. In total, nine of the 11 sensors and their data were recovered.

Natalie Powney, NERC's Head of Marine Planning, says that "making this project possible required a huge team effort from everyone, including staff from NERC and the National Marine Facilities team at the National Oceanography Center. Within just 48 hours, NERC had assessed and approved the rescue attempt. Funding was provided through our Discovery Science Portfolio, which encourages curiosity-driven, adventurous science. The research is hugely significant and identified a link between major river floods, spring tides and powerful turbidity currents."

New understanding of turbidity currents

Prior to this study, directly measuring powerful deep-sea avalanches was considered impractical. But the rescued data provided direct monitoring of sediment flow in the Congo Canyon, enabling scientists to assess for the first time how major river floods connect to the deep-sea.

The study reveals:

- The turbidity current of 14 January 2020 traveled more than 1,100 km from the Congo River estuary to deep-sea, making it the longest avalanche of sediment ever measured on Earth. In two days, the flow reached an ocean depth of more than 4,500 m.
- The seafloor turbidity current resulted from two factors: severe flooding along the Congo River in late December 2019 followed by unusually large spring tides. In combination these factors triggered an avalanche of sand and

mud equivalent in volume to one third of the sediment produced annually from all rivers worldwide.

- The avalanche of sediment accelerated, increasing in speed from 5.2 meters per second in the upper reaches of the Congo Canyon to 8 meters per second as it reached the end of the channel, some 1,100 km from the coastline.

Preventing seabed cable breakages

The Congo Canyon turbidity current broke not only the sensor moorings but also two seabed telecommunications cables, cutting internet data speeds across west, central and south Africa.

National Oceanography Center (NOC) researcher Dr. Mike Clare, who is a co-investigator on the project, says that "these remarkable data provide the first direct measurements of such a large and powerful flow. We now have a new understanding of how these events are triggered, and also the hazards they pose to seafloor infrastructure networks, such as the cables that underpin global communications."

Seafloor fiber-optic cable networks carry around 99% of global data traffic, but can be damaged or broken by underwater avalanches. Breakages cause massive disruption to the global economy and day-to-day lives.

The study shows that the pattern of seabed erosion from this 2020 turbidity current was surprisingly localized and patchy, especially given how big the flow was. Scientists believe this may explain why it broke some submarine telecommunication cables, but others survived. This information could help cable companies in future to position cables so that they have the best chance of surviving these events.

The research identified for the first time a link between major river floods, spring tides and powerful turbidity currents. Increased river flooding in future due to changes in climate or land-use could result in more frequent underwater avalanches and an increase in the

volumes of sediment entering the deep-sea. Scientists further believe that floods and tides may trigger turbidity currents in an even wider range of settings than previously thought.

More information: Peter J. Talling et al, Longest sediment flows yet measured show how major rivers connect efficiently to deep sea, Nature Communications (2022). [DOI: 10.1038/s41467-022-31689-3](https://doi.org/10.1038/s41467-022-31689-3)

<https://nyti.ms/3OrkrSL>

How Penguins Beat the Heat and Went South Scientists reconstructed some of the evolutionary steps that led penguins to quit tropical climates for the Antarctic life over millions of years.

By Jack Tamisiea

Few animals have evolved to survive the unforgiving Antarctic like penguins. Species like the emperor penguin have overlapping layers of insulating plumage, tightly packed veins to recycle body heat and just enough paunch to weather wind chills that approach minus 80 degrees Fahrenheit.



Scientists say more than three-quarters of all penguin species that have ever lived are extinct now. Credit...Alexandre Meneghini/Reuters

With all these cold-weather adaptations, it's difficult to envision penguins living anywhere else. But fossils of ancient penguins have popped up along the Equator, and many of these prehistoric seabirds predate the formation of Antarctica's ice sheets. "They lived through some of the hottest times in Earth's history, when it was five degrees warmer at the Equator," said Daniel Ksepka, a paleontologist at the Bruce Museum in Greenwich, Conn. "They basically evolved in an ice-free context."

To determine how penguins transitioned from balmy, tropical waters to polar seas, Dr. Ksepka and his colleagues recently analyzed the genomes of all living penguins, including pipsqueaks

like the foot-tall [blue penguin](#), rarities like the [endangered yellow-eyed penguin](#) and showstoppers like the yellow-tufted [rockhopper penguin](#). However, the genetics of modern penguins could tell the researchers only so much. Most modern lineages date back only a couple million years, obscuring most of the 60-million-year odyssey of penguin evolution.

Dr. Ksepka said that more than three-quarters of all penguin species “are extinct now.” He added, “You have to look at the fossil record, or you’re only getting a fragment of the story.”

To complement the modern data, the researchers examined fossils from a motley crew of ancient seafarers. Some [prehistoric penguins](#) plied tropical waters off Peru, using [spearlike bills](#) to harpoon fish. Others [sported long legs](#), and the largest may have pushed seven feet tall. Some even had patches of rusty [red feathers](#).

Comparing the genomes of modern penguins with fossil penguins allowed the team to reconstruct penguin evolution. In their findings, published Tuesday in [Nature Communications](#), the researchers pinpointed genes that helped penguins transition from wading through warm waters to perfecting the polar plunge. Some of these genes aided penguins’ ability to pack on blubber, while others molded their shriveled wings into streamlined flippers. Some even bolstered penguins’ immune systems or helped them tolerate low oxygen during deep dives.

The researchers also identified genes that helped fine-tune penguin eyes to peer through icy depths. Whereas most birds have four color cones in their eyes, one of these is inactive in penguins, hampering their ability to see green and red. Instead, their eyes have adapted to adjust to the ambient blue of the ocean.

Some missing genes were perplexing to the researchers. While modern penguins gobble krill, the team found evidence that their ancestors lacked genes that would have helped break down crustacean shells. This may be evidence that ancient penguins were

spearfishing larger prey, like fish and squid. Penguins retain a restricted palate. Their taste receptors can pick up only salty and sour tastes, which is “pretty good if you’re eating fish,” Dr. Ksepka said. “That’s probably why they’re pretty happy with sardines.”

When these changes occurred in ancient penguins, they stuck. The genetic analyses revealed that penguins generally have the lowest evolutionary rate of any group of birds. Because they look so bizarre, this glacial rate of change seems surprising. But it reveals how successful the penguin’s plump yet streamlined body plan is — over millions of years, it has changed only in slow increments. But emperor penguins, which breed during the bitter Antarctic winter, have the highest evolutionary rate of any penguin, leading the researchers to deduce that colder temperatures somehow speed penguin evolution.

Juliana Vianna, an ecologist at the Pontifical Catholic University of Chile, says this idea is consistent with the southward march of penguins occurring during bouts of global cooling. “Their evolutionary history is pretty much associated with historical climate change and glaciation,” said Dr. Vianna, who recently led [similar research but was not involved in the new study](#).

Understanding how penguins changed in the past may offer clues to how these cold-weather specialists could fare in a hotter future. “Warming temperatures will impact the biogeographic ranges of penguins, the species they rely on as food and the species that, in turn, hunt them,” said Daniel Thomas, a paleontologist from Massey University in New Zealand and an author of the new study. While the research is a comprehensive look at the penguin family, Dr. Ksepka said, there’s still one seabird missing — the last flying penguin. The small, [puffinlike](#) bird probably lived in ancient New Zealand, but its fossils have proved elusive. “That would be the No. 1 thing I’d ask for if I had a genie,” he said.

<https://bit.ly/3Otw4sr>

Generosity Could Be an Early Sign of Alzheimer's *Seniors' willingness to give money is associated with the early-stage cognitive indicators of Alzheimer's disease*

Researchers are attempting to identify those who are most vulnerable to financial exploitation in order to help protect older adults. Recent research from the [Keck School of Medicine at USC](#) suggests a connection between financial generosity and the early stages of Alzheimer's disease. These results were recently published in the *Journal of Alzheimer's Disease*.

A laboratory exercise required 67 senior citizens without dementia or cognitive impairment to choose between giving money to an unidentified recipient and keeping it for themselves. Additionally, they participated in various cognitive tests, including word and story recall. On the cognitive tests known to be sensitive to Alzheimer's disease, those who gave more money did worse.

"Our goal is to understand why some older adults might be more susceptible than others to scam, fraud, or financial exploitation," said the study's senior author, Duke Han, Ph.D., director of neuropsychology in the Department of Family Medicine and a professor of family medicine, neurology, psychology and gerontology at the Keck School of Medicine. "Trouble handling money is thought to be one of the early signs of Alzheimer's disease, and this finding supports that notion."

Earlier studies that looked at the relationship between altruism and cognition focused on self-report measures, such as asking older adults whether they would be willing to give money in particular scenarios. In the current study, the relationship was investigated using actual money.

"To our knowledge, this is the first study to explore the relationship using a behavioral economics paradigm, meaning a scenario where participants had to make decisions about giving or keeping actual

money," said Gali H. Weissberger, Ph.D., a senior lecturer in the Interdisciplinary Department of Social Sciences at Bar-Ilan University in Israel and first author of the study.

Giving and cognition

The average age of the 67 adults the researchers enrolled in the trial was 69. In the final analysis, they adjusted for the impacts of age, sex, and education level after gathering information on participant demographics. If a participant had dementia or any kind of cognitive impairment, they were excluded from the research.

Each participant was informed in the lab that they had been matched with an online research participant who would remain anonymous. They were then given \$10 and told to split it between themselves and the anonymous individual in \$1 increments as they saw fit.

The older participants in the research also underwent a series of neuropsychological exams, including several that are often used to help diagnose Alzheimer's disease in its early stages. The tests included story and word recall tasks where participants are asked to remember information after a short delay; a category fluency test that involves listing words on a specific topic; and several other cognitive assessments.

Participants who gave more away scored significantly lower on the neuropsychological tests known to be sensitive to early Alzheimer's disease. There were no significant performance differences on other neuropsychological tests.

Clarifying the link

More research is needed to confirm the nature of the relationship between financial altruism and cognitive health in older adults, including with larger and more representative samples. Future studies could also collect both behavioral and self-report data on financial altruism to better understand participants' motivations for giving.

Han, Weissberger, and their colleagues are now collecting data for a longitudinal study using the same giving task. This could help determine whether some older adults are becoming more altruistic over time.

“If a person is experiencing some kind of change in their altruistic behavior, that might indicate that changes are also happening in the brain,” Weissberger said.

Clarifying these details about the link between altruism and cognition could ultimately improve screening for Alzheimer’s disease and help people protect their loved ones from financial exploitation. It can also help researchers distinguish between what represents healthy giving behavior versus something that could signify underlying problems.

“The last thing we would want is for people to think that financial altruism among older adults is a bad thing,” Han said. “It can certainly be a deliberate and positive use of a person’s money.”

The study was funded by the [National Institutes of Health](#) [RF1AG068166, T32AG000037] and the Elder Justice Foundation.

Reference: “Increased Financial Altruism is Associated with Alzheimer’s Disease Neurocognitive Profile in Older Adults” by Gali H. Weissberger, Anya Samek, Laura Mosqueda, Annie L. Nguyen, Aaron C. Lim, Laura Fenton and S. Duke Han, 13 June 2022, [Journal of Alzheimer’s Disease](#). DOI: 10.3233/JAD-220187

<https://bit.ly/3zo7Nzw>

Enceladus’s oceans may be the right saltiness to sustain life

The geometry of the icy shell around Saturn’s moon Enceladus suggests that the ocean beneath is a little less salty than Earth’s oceans and could potentially sustain life

By [Karmela Padavic-Callaghan](#)

The way ice covers the surface of Saturn’s moon Enceladus suggests that the oceans trapped beneath it may be only a little less salty than Earth’s oceans. The finding adds to the possibility that this moon might be able to sustain life.

The surface of Enceladus is encased in clean, bright ice. [Wanying Kang](#) at Massachusetts Institute of Technology and her colleagues wanted to determine what the characteristics of this ice shell indicate about the ocean beneath it.

Samples taken by the [Cassini spacecraft](#) of geyser-like jets of water from Enceladus’s surface previously showed that there is some organic matter that could sustain [potential life](#) on the icy moon. Considering the waters under Enceladus’s ice was the logical next step for inferring its habitability, says Kang.

The team devised a theoretical model detailing how ocean salinity, ocean currents and ice geometry affect each other on a planet or a moon, then tweaked it to best reproduce the properties of Enceladus’s ice.

The researchers found that saltier subsurface oceans correspond to thicker ice on a planet’s poles than over its equator and vice versa for less salty water. On Enceladus, the ice over the poles is thinner than the ice over the equator. The specific variation in thickness suggests that the ocean’s salinity could be as high as 30 grams of salt in a kilogram of water. For comparison, Earth’s oceans have a salinity of 35 grams of salt per kilogram of water.

The researchers also determined details of water circulation under the moon’s ice. These currents are related to temperature differences in the water so understanding them is also important for determining habitability, says Kang.

The team found that some heat emanates from the bottom of Enceladus’s ocean, possibly indicating the existence of heat vents in the ocean floor. Kang says that some astrobiologists have previously suggested that, like on Earth, [such hydrothermal vents](#) could be where life is found in the future.

[David Stevens](#) at the University of East Anglia, UK, says that the behaviour of ice and water on other planets is directly related to their habitability. At the same time, salinity is only one factor, he

says.

Kang and her team are currently working on applying the new model to Jupiter's moon Europa, whose oceans are thought to have a higher salinity than those on Earth and Enceladus. Ultimately, they want to pin down the details of the oceans of all icy moons and planets observed by space missions as a step towards better determining how habitable they all are.

Journal reference: *Science Advances*, DOI: [10.1126/sciadv.abm4665](https://doi.org/10.1126/sciadv.abm4665)

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

Long COVID Risk Associated With Certain Symptoms: Study

*People who reported sore throats, headaches, and hair loss soon after testing positive for COVID-19 may be more likely to have lingering symptoms months later, according to a [recent study](#) published in *Scientific Reports*.*

Carolyn Crist

Researchers have been trying to determine who faces a higher risk for developing long COVID, with symptoms that can last for weeks, months, or years after the initial infection. So far, the condition has been reported in both children and adults, healthy people, those with preexisting conditions, and a range of patients with mild to severe COVID-19.

"These people are not able to do necessarily all the activities they would want to do, not able to fully work and take care of their families," Eileen Crimmins, PhD, the senior study author and a demographer at the University of Southern California's Leonard Davis School of Gerontology, told the [Los Angeles Times](#).

"That's an aspect of this disease that needs to be recognized because it's not really as benign as some people think," she said. "Even people who have relatively few symptoms to start with can end up with long COVID."

Crimmins and colleagues analyzed data from the Understanding

Coronavirus in America survey, which followed nearly 8000 people bi-weekly from March 2020 to March 2021. They focused on 308 nonhospitalized COVID-19 patients who were interviewed 1 month before their infection, around the time of infection, and 12 weeks after infection.

Among those, about 23% of the survey participants were still experiencing symptoms that lasted for more than 12 weeks, which the researchers considered as having long COVID. The most common persistent symptoms were [headache](#) (22%), runny or stuffy nose (19%), abdominal discomfort (18%), fatigue (17%), and [diarrhea](#) (13%).

Long COVID was nearly seven times more likely among COVID-19 patients who experienced hair loss and about three times more likely among those who reported headaches and sore throats.

"Our assumption is that hair loss reflects extreme stress, potentially a reaction to a higher fever or medications," Crimmins told the newspaper. "So it's probably some indication of how severe the illness was."

Long-term symptoms were also more than five times as common among people with [obesity](#). However, the researchers said there was a lack of evidence that long COVID risk was related to age, gender, race and ethnicity, smoking status, or other chronic conditions such as diabetes or [asthma](#). Previous studies have indicated that these factors could play a role in long COVID risks.

Since the study covered the first year of the pandemic, the data doesn't include information about vaccines or major coronavirus variants such as Delta and Omicron. The symptom list also didn't include the most debilitating ones that long COVID patients have described to doctors, such as brain fog, cognitive issues, and memory loss.

"We need a universal case definition before we can really understand the prevalence of long COVID. Right now, the

definition varies wildly across studies, leading to a big range in prevalence estimates," Jana Hirschtick, PhD, MPH, an epidemiologist at the University of Michigan's School of Public Health, told the newspaper. "After all this time, we still don't have a clear picture of who is at greatest risk," she said.

<https://bit.ly/3PuE9hQ>

Traditional Chinese Medicine Shows Promise in Treating Lung Cancer

The natural compound berberine, which is present in plants like goldenseal and barberry, has promise for the treatment of lung diseases.

According to a recent study, the natural compound berberine, which is present in plants like goldenseal and barberry, inhibits the growth of lung cancer cells in the lab. It also lessens inflammation of the airways and reduces the damage to healthy lung cells exposed to the toxins from cigarette smoke.



The chemical berberine, which is found in the root of barberries (shown above), is believed to have health-promoting properties.

Around 1.8 million deaths from lung cancer are reported each year, making it the leading cause of cancer-related deaths worldwide. Chronic inflammation increases the risk of lung cancer and other disorders including chronic obstructive pulmonary disease (COPD) and asthma.

"Berberine has shown therapeutic benefits for diabetes and cardiovascular disease. We were keen to explore its potential in suppressing lung cancer and reducing inflammation," says lead researcher Dr. Kamal Dua, a senior lecturer in Pharmacy at the [University of Technology Sydney \(UTS\)](https://www.uts.edu.au/).

In a study recently published in the journal *Pharmaceutics*, berberine's impact on non-small cell lung cancer has been

evaluated. It demonstrates that berberine has significant anticancer activity, suppressing the growth of cancer cells in vitro.

By assessing the mRNA levels of tumor-associated genes and protein expression levels, the potential mechanism of action for anti-cancer efficacy was identified. It demonstrated that berberine regulates proteins involved in cancer cell migration and proliferation while upregulating genes known to decrease tumor growth.

The study is a follow-up to research led by Dr. Dua that was recently published in the journal *Antioxidants* and demonstrated that berberine may inhibit oxidative stress, reduce inflammation, and slow down cellular senescence caused by cigarette smoke extract in lab-grown human healthy lung cells.

Professors Phil Hansbro, Brian Oliver, Bikash Manandhar, and Keshav Raj Paudel were also members of the research team. International colleagues from Qassim University in Saudi Arabia and the International Medical University in Malaysia also contributed.

Dr. Dua's focus is on exploring the curative potential of traditional medicinal plants and how their active compounds work at the cellular level. He has a multi-faceted research background with experience in drug delivery technology, biomedical sciences, immunology, and microbiology.

Berberine has long been used in traditional Chinese and Ayurvedic medicine, however, its therapeutic benefits have been limited by its lack of water solubility and absorption in the gut, as well as toxicity at higher doses.

To overcome these challenges Dr. Dua has developed the use of liquid crystalline nanoparticles, an advanced drug delivery system that encapsulates berberine in tiny soluble and biodegradable polymer balls to enhance safety and effectiveness.

Decades of research have shown that cigarette smoke is toxic to

lung cells, causing inflammation of the airways and hastening diseases such as cancer, chronic obstructive pulmonary disease (COPD), and asthma.

The researchers found that berberine suppressed the generation of inflammatory chemicals, called reactive oxygen species, which cause damaging effects to cells. It also modulated genes involved in inflammation, oxidative stress, and reduced premature cell senescence.

Dr. Dua is now in discussion and working closely with Sydney-based companies to take this research to the next level and identify the best formulation and delivery system for these nanoparticles so that they can be translated to the bedside.

References: "Evaluation of the Cytotoxic Activity and Anti-Migratory Effect of Berberine-Phytantriol Liquid Crystalline Nanoparticle Formulation on Non-Small-Cell Lung Cancer In Vitro" by Abdullah M. Alnuqaydan, Abdulmajeed G. Almutary, Mohd Azam, Bikash Manandhar, Geena Hew Suet Yin, Lee Li Yen, Thiagarajan Madheswaran, Keshav Raj Paudel, Philip M. Hansbro, Dinesh Kumar Chellappan and Kamal Dua, 24 May 2022, Pharmaceutics. DOI: [10.3390/pharmaceutics14061119](https://doi.org/10.3390/pharmaceutics14061119)

"Attenuation of Cigarette-Smoke-Induced Oxidative Stress, Senescence, and Inflammation by Berberine-Loaded Liquid Crystalline Nanoparticles: In Vitro Study in 16HBE and RAW264.7 Cells" by Keshav Raj Paudel, Nisha Panth, Bikash Manandhar, Sachin Kumar Singh, Gaurav Gupta, Peter R. Wich, Srinivas Nammi, Ronan MacLoughlin, Jon Adams, Majid Ebrahimi Warkiani, Dinesh Kumar Chellappan, Brian G. Oliver, Philip M. Hansbro and Kamal Dua, 28 April 2022, Antioxidants.

[DOI: 10.3390/antiox11050873](https://doi.org/10.3390/antiox11050873)

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

Scientists pinpoint the exact moment in evolutionary time when mammals became warm-blooded

And it happened much more quickly than scientists expected.

Scientists have pinpointed the moment in time our earliest ancestors evolved to be warm-blooded, and it happened much later and far more quickly than the researchers expected.

The discovery, made by studying the minuscule tubes of the inner ear, places the evolution of mammalian warm-bloodedness at around 233 million years ago — 19 million years later than

scientists previously thought.

These semicircular canals are filled with a viscous fluid, called endolymph, that tickles tiny hairs lining the canals as the fluid sloshes around. These hairs transmit messages to the [brain](#), giving it instructions for how to keep the body balanced. Like some fluids, the honey-like endolymph gets runnier the hotter it is, requiring the semicircular canals to change their shape so the fluid can still do its job. In ectothermic, or cold-blooded, animals, this ear fluid is colder and thus behaves more like molasses and needs wider spaces in which to flow. But for endothermic, or warm-blooded, animals, the fluid is more watery and small spaces suffice.

This temperature-based property makes tiny, semicircular canals a perfect place to spot the moment when ancient mammals' cold blood turned hot, researchers wrote in a paper published July 20 in the journal [Nature \(opens in new tab\)](#).



An artist's illustration of a mammal ancestor breathing out hot air on a cold night, a hint that it is warm-blooded. (Image credit: Luzia Soares)

"Until now, semicircular canals were generally used to predict locomotion of fossil organisms," study co-lead author Romain David, an evolutionary anthropologist at the Natural History Museum in London, [said in a statement \(opens in new tab\)](#).

"However, by carefully looking at their biomechanics, we figured that we could also use them to infer body temperatures.

"This is because, like honey, the fluid contained inside semicircular canals gets less viscous [syrupy] when temperature increases, impacting function," David explained. "Hence, during the transition to endothermy, morphological adaptations were required to keep optimal performances, and we could track them in mammal ancestors."

To discover the time of this evolutionary change, researchers measured three inner ear canal samples from 341 animals — 243 living species and 64 extinct species — spanning the animal kingdom. The analysis revealed that the 54 extinct mammals included in the study developed the narrow inner ear canal structures suitable for warm-blooded animals 233 million years ago.

Before this study, scientists thought mammals inherited warm-bloodedness from the cynodonts — a group of scaly, rat-like lizards that gave rise to all living mammals — that were thought to have evolved warm-bloodedness around the time of their first appearance 252 million years ago. However, the new findings suggest that mammals diverged from their early ancestors more markedly than expected.

And this drastic change happened surprisingly fast. Heat-friendly ear canals didn't just appear later in the fossil record than the scientists expected. It happened far more rapidly, too — popping up around the same time the earliest mammals began evolving whiskers, fur and specialized backbones.

"Contrary to current scientific thinking, our paper surprisingly demonstrates that the acquisition of endothermy seem[s] to have occurred very quickly in geological terms, in less than a million years," study co-lead author Ricardo Araújo, a geologist at the University of Lisbon in Portugal, said in the statement. "It was not a gradual, slow process over tens of millions of years as previously thought, but maybe was attained quickly when triggered by novel mammal-like metabolic pathways and origin of fur."

Follow-up studies will need to confirm the findings via other means, but the researchers said they are excited that their work will help to answer one of the longest-standing questions about the [evolution](#) of mammals.

"The origin of mammalian endothermy is one of the great unsolved

mysteries of paleontology," study senior author Kenneth Angielczyk, the Field Museum's MacArthur curator of paleomammalogy, said in the statement. "Many different approaches have been used to try to predict when it first evolved, but they have often given vague or conflicting results. We think our method shows real promise because it has been validated using a very large number of modern species, and it suggests that endothermy evolved at a time when many other features of the mammalian body plan were also falling into place."

<https://bit.ly/3RVJy2U>

New York resident infected with polio, marking 1st US case in a decade

The last U.S. case was in 2013.

By [Nicoletta Lanese](#)

After nearly a decade with no reported polio cases in the U.S., a resident of Rockland County, New York has tested positive for the viral disease, state and county health officials [announced](#) (opens in new tab) Thursday (July 21).

The infected individual caught a strain of poliovirus known as "revertant polio Sabin type 2 virus," tests performed by the New York State Department of Health (NYSDOH) revealed. Unlike wild polioviruses, this type of virus derives from the live oral [polio vaccine](#), which has not been administered in the U.S. since 2000.

The U.S. and many other countries discontinued use of the oral vaccine because the shot contains live, but weakened, polioviruses that can be shed in the stool of vaccinated people, according to the [Global Polio Eradication Initiative](#) (opens in new tab) (GPEI). In rare instances, these weakened viruses have evolved to behave more like wild, naturally-occurring polioviruses that can cause illness in people who aren't fully vaccinated. Due to this risk, the U.S. now only administers "inactivated" polio vaccines, and for polio to be fully eradicated, all countries will eventually need to

halt their use of the oral vaccines.

Because the New York resident tested positive for a vaccine-derived poliovirus, this suggests that "the virus may have originated in a location outside of the U.S. where [oral polio vaccine] is administered, since revertant strains cannot emerge from inactivated vaccines," the health department statement notes. The last polio case reported in the U.S. occurred in 2013 and was also caused by a vaccine-derived strain.

"Based on what we know about this case, and polio in general, the Department of Health strongly recommends that unvaccinated individuals get vaccinated or boosted with the FDA-approved IPV polio vaccine as soon as possible," State Health Commissioner Dr. Mary T. Bassett said in the statement.

"The polio vaccine is safe and effective, protecting against this potentially debilitating disease, and it has been part of the backbone of required, routine childhood immunizations recommended by health officials and public health agencies nationwide," Bassett said. The polio vaccine is part of the required school immunization schedule for all U.S. children, so many people are protected from a young age. However, completely unvaccinated individuals and those who have not completed their polio vaccine series should seek vaccination, NYSDOH recommends. In addition, people who are already vaccinated but are at risk of exposure should seek a booster shot.

On Friday (July 22) morning, Rockland County will host a polio vaccination clinic at the Pomona Health Complex (Building A) at 50 Sanatorium Road in Pomona, New York. A second clinic at the same location will be held in the afternoon on Monday (July 25).

New Yorkers can pre-register for a free appointment [here](#) (opens in new tab) or call 845-238-1956 to schedule. Walk-ins will also be accepted. Vaccines are also available through local healthcare providers, including Federally Qualified Health Centers.