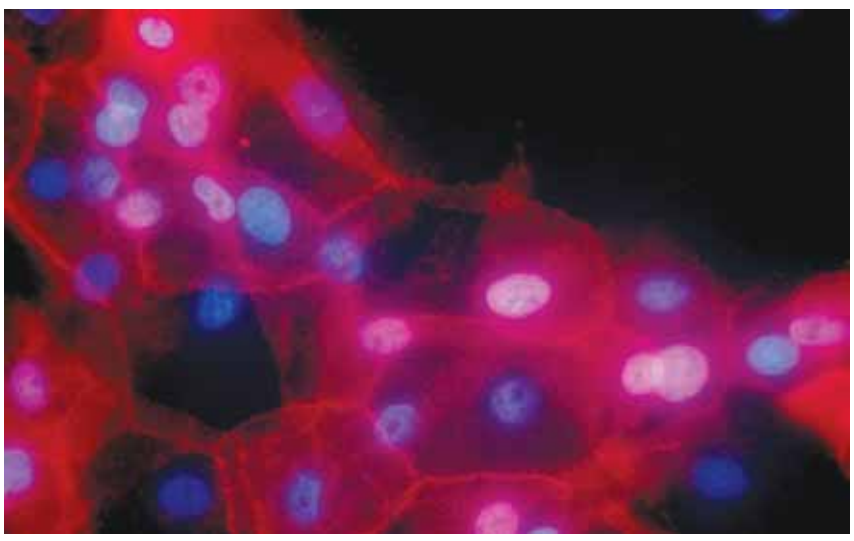
Unavoidable typos in DNA help fuel cancer

Gene mutations cause cancer but what causes mutations?

WASHINGTON: Cancer patients often wonder "why me?" Does their tumor run in the family? Did they try hard enough to avoid risks like smoking, too much sun or a bad diet? Lifestyle and heredity get the most blame but new research suggests random chance plays a bigger role than people realize: Healthy cells naturally make mistakes when they multiply, unavoidable typos in DNA that can leave new cells carrying cancer-prone genetic mutations.

How big? About two-thirds of the mutations that occur in various forms of cancer are due to those random copying errors, researchers at Johns Hopkins University reported Thursday in the journal Science. Whoa: That doesn't mean most cases of cancer are due solely to "bad luck." It takes multiple mutations to turn cells into tumors - and a lot of cancer is preventable, the Hopkins team stressed, if people take proven protective steps.

Thursday's report is an estimate, based on a math model, that is sure to be hotly debated by scientists who say those unavoidable mistakes of nature play a much smaller role. But whatever the ultimate number, the research offers a peek at how cancer may begin. And it should help with the "why me" question from people who have "done everything we know can be done to prevent cancer but they still get it," said Hopkins' Dr Bert Vogelstein, a pioneer in cancer genetics who co-authored the study. "They need to understand that these cancers would have occurred no matter what they did."



This undated fluorescence-colored microscope image made available by the National Institutes of Health in September 2016 shows a culture of human breast cancer cells. Environmental risks and heredity get the most blame for cancer, but new research released suggests random chance may play a bigger role than people realize. — AP

What causes mutations?

You might inherit some mutations, like flaws in BRCA genes that are infamous for causing aggressive breast and ovarian cancers in certain families. More commonly, damage is caused by what scientists call environmental factors - the assault on DNA from the world around us and how we live our lives. There's a long list of risks: Cigarette smoke, UV light from the sun, other forms of radiation, certain hormones or viruses, an unhealthy diet, obesity and lack of exercise. Then there are those random copy errors in cells - what Vogelstein calls our baseline rate of genetic mutations that will occur no matter how healthy we live. One way to think of it: If we all have some mutations lurking in our cells anyway, that's yet another reason to avoid known risks that could push us over the edge.

How cells make typos

New cells are formed when an existing cell divides and copies its DNA, one cell turning into two. Every time DNA is copied, about three random mutations occur, Vogelstein said. We all harbor these kinds of mutations and most don't hurt us because they're in genes that have nothing to do with cancer or the body's defense mechanisms spot and fix the damage, said Dr. Otis Brawley of the American Cancer Society, who wasn't involved in the new research. But sometimes the errors hit the wrong spot and damage genes that can spur cancerous growth or genes that help the cell spot and fix problems. Then the damaged cells can survive to copy themselves, allowing important mutations to gradually build up over time. That's one reason the risk of cancer increases with age. —AP

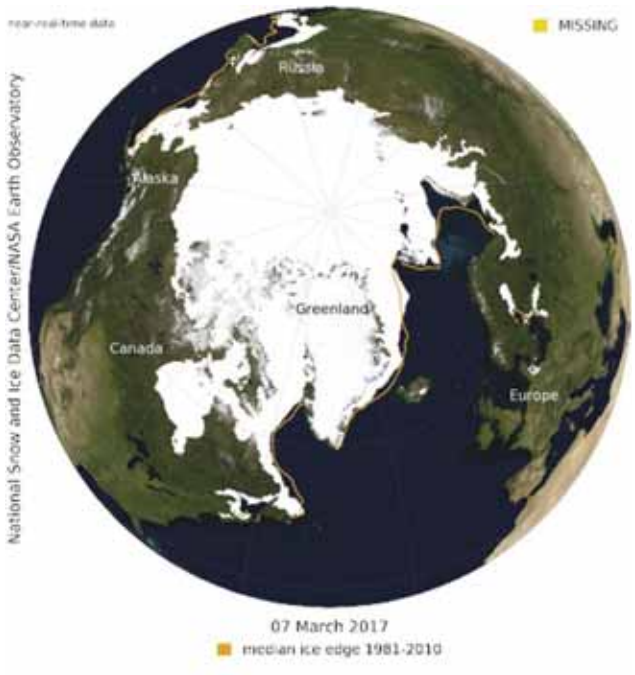


Photo shows how low sea ice levels were in the Arctic this winter, alarming climate scientists. During the winter, Arctic sea ice grew to 5.57 million square miles at its peak, but that's the smallest amount of winter sea ice in 38 years of record keeping, beating the record set in 2015 and tied last year. — AP

Arctic sea ice dips to a record low

WASHINGTON: The frigid top of the Earth just set yet another record for low levels of sea ice in what scientists say is a signal of an overheating world. The extent of floating ice in the Arctic hit a new low for winter: 5.57 million square miles (14.42 million square kilometers). That's about 35,000 square miles (97,000 square kilometers) - an area about the size of Maine - below 2015's record. Last year had a shade more than 2015, but nearly a tied record.

This puts the Arctic in a "deep hole" as the crucial spring and summer melt season starts and more regions will likely be ice-free, said Mark Serreze , director of the National Snow and Ice Data Center in Colorado, which released the findings Wednesday. "It's a key part of the Earth's climate system and we're losing it," he said. "We're losing the ice in all seasons now."

At the other end of the world, Antarctica, where sea ice reaches its lowest point of the year in March, also hit a record low mark. Antarctic sea ice varies widely unlike Arctic sea ice, which has steadily decreased. The ice data center measures how wide sea ice extends based on satellite imagery. It's harder to measure the thickness and overall volume, but data from the University of Washington show that as of late last month ice volume levels were down 42 percent from 1979, said polar science center chief Axel Schweiger .

Several scientists called the sea ice loss disturbing. "It's evidence that the climate at the top of the world continues to change faster than anywhere else on Earth with impacts to us that are still frankly unknown," Pennsylvania State University meteorology professor and retired admiral David W Titley , said in an email. Scientists blame a combination of natural random weather and man-made global warming from the burning of coal, oil and gas. The winter of 2016-2017 was unusually toasty and the Arctic saw three "extreme heat waves," Serreze said.

A new study earlier this month in the journal Nature Climate Change found that natural causes can explain between 30 and 50 percent of plunging September sea ice lows, while Serezze and others give climate change an even bigger role in sea ice loss. A relatively new idea - that still divides meteorologists - links the shriveling ice cap at the North Pole to a weaker polar vortex and weak and ambling jet stream, which can mean more extreme weather for a good part of the rest of the world. "Recent cold spells and big snowstorms that we have experienced over the past few winters have occurred when the polar vortex is weak," top winter weather forecaster Judah Cohen , of the private Atmospheric Environmental Research in Lexington, Massachusetts, said in an email. It's not just the weather. As more regions become free of ice, shipping lanes will open in the Arctic, there will be more drilling for oil and gas and more overall economic activity. And that may mean rising tensions between countries over newly available resources, Serreze said. — AP

Another reason to flip the off switch: Light pollution

PARIS: For the 11th year running, cities worldwide will turn their lights off Saturday to mark Earth Hour in a global call to action on climate change. But the moment of darkness should also serve as a reminder, activists say, of another problem that gets far less attention: light pollution. More than 80 percent of humanity lives under skies saturated with artificial light, scientists recently calculated. In the United States and western Europe, that figure goes up to 99 percent of the population, most of whom cannot discern the Milky Way in the night sky.

Artificial lighting has been shown to disturb the reproductive cycles of some animals and the migration of birds that navigate using the stars, and to disorient night-flying insects. For humans, circadian rhythms that regulate hormones and other bodily functions can also be thrown out of whack by too much light at night. Even the most ardent critics of light pollution are not saying cities should go dark, or that lighting is not an essential element of urban life. But society needs to address a growing list of concerns, they suggest.

"In general, it's getting worse," Diana Umpierre, president of the International Dark-Sky Association, said of light pollution in her home state of Florida. And things are moving in the wrong direction, she said. "We are predicted to have 15 million more residents in the next 50 years" with all the extra lighting that entails. By contrast, in Chad, the Central African Republic and Madagascar-not coincidentally among the poorest countries in the world-three quarters of people have a clear view of the heavens. Arguably, no-one suffers more from light pollution than astronomers whose telescopes are blinded by the glare of urban glow. In 1958 Flagstaff, Arizona-more than 2,100 metres (nearly 8,000 feet) above sea level-became the first sizeable city to curb night lighting, mainly to shield a major observatory.

Not taken lightly

One of the biggest challenges in fighting light pollution is convincing people that "brightness" is not synonymous with "safety", said Umpierre. "Sometimes it's just the opposite," she argued, citing studies showing that people drive more carefully-and more slowly-on roads with less or no lighting at night. Over the last 15 years, biologists, doctors, non-governmental organizations and even UNESCO have joined the fight against light pollution by detailing negative impacts to health and well being-for humans and other animals. In 2012, the American Medical Association (AMA) concluded that exposure to "excessive" night light "can disrupt sleep and exacerbate sleep disorders". And it called for more research into possible links to cancer, obesity, diabetes and depression. —AFP