SPACE SCIENCE
NASA astronauts on ISS (opposite), including Christina Koch (above), intentionally damaged the DNA of yeast cells, then allowed those cells to repair themselves, revealing whether the repair restored the DNA to its original order or made errors.

PHOTOS: NASA

Genes in Space
Astronaut safety may fight cancer on Earth

Boeing-sponsored student experiment edits DNA aboard International Space Station

BY STEVEN SICELOFF, BOEING WRITER

The search for a cancer cure has made it all the way to space.

Genetic editing to discover and develop treatments for the effects of deep-space missions on astronauts is closer to reality, following a student experiment conducted on the International Space Station (ISS).

In 2021, ISS marked 21 years of constant human habitation. In that time frame, access to orbital science broadened to include high school students through the Boeing-sponsored Genes in Space program.

REPLICATION STATION
Astronauts made copies of the repaired section of the cell using a process called polymerase chain reaction with a DNA replicator such as the one NASA astronaut Nick Hague is pictured using aboard ISS.

PHOTO: NASA

TEAM TALK
(From left) Students Aarthi Vijayakumar, David Li, Michelle Sung and Rebecca Li speak during a NASA science briefing on April 19, 2019, before their Genes in Space experiment was launched to the International Space Station.

PHOTO: GENES IN SPACE

The technique, known as clustered regularly interspaced short palindromic repeats, or CRISPR, was used on yeast cells aboard ISS to create precise breaks in DNA strands to see how they repaired themselves. The research was published in the scientific journal PLOS ONE by microbiologists and student researchers working with the Boeing-sponsored Genes in Space program.

Being able to do the CRISPR work in space means astronauts on long-duration missions may be able to detect DNA damage and potentially even treat it — just as scientists will do for patients on Earth.

The experiment was part of the Genes in Space-6 payload designed by students David Li, Rebecca Li, Michelle Sung and Aarthi Vijayakumar when they were in high school in Minnesota. The project was led by NASA spaceflight microbiologist Sarah Stahl-Rommel and colleagues, including Boeing senior manager Scott Copeland, the founder of Genes in Space.

DNA ON ISS
NASA astronaut Nick Hague runs an analysis during the experiment exploring how space radiation damages DNA and how cells repair that damage in microgravity.

PHOTO: NASA

“This is the kind of research that opens up many scientific gene-editing opportunities in the future,” said Copeland, who manages all the scientific payloads launched for use on the U.S.-operated part of the orbiting laboratory. “It offers researchers a pathway to additional experiments to drive our discovery that much further.”

Breaks in DNA — the coded protein chain of molecules that detail every aspect of a cell’s function and operation — can lead to mutations and in some cases even cancer. By carefully breaking a DNA molecule, scientists can observe how the repair happens.

Insight from these Genes in Space experiments may fuel future discoveries to prevent mutation and protect people from radiation, which is important for those on Earth but critical for astronauts who travel far beyond the protection of the planet’s magnetic field. **IQ**

Mirror image

With the mountains on the plane matching those in the distance, the Boeing 2021 ecoDemonstrator, an Alaska Airlines 737-9, soars above Washington state’s San Juan Islands. This is the eighth airplane to serve as a flying test bed since the program began in 2012. **IQ**

PHOTO: PAUL WEATHERMAN/BOEING

SURPRISE SASQUATCH SIGHTING
Under the last “a” in Alaska on the Boeing 2021 ecoDemonstrator, sharp eyes can spot a stealthy nod to the Pacific Northwest.

KIM KWOCK/BOEING

SCAN CAM HERE, BOOST YOUR IQ!
Video: Tour the ecoD.

IQR