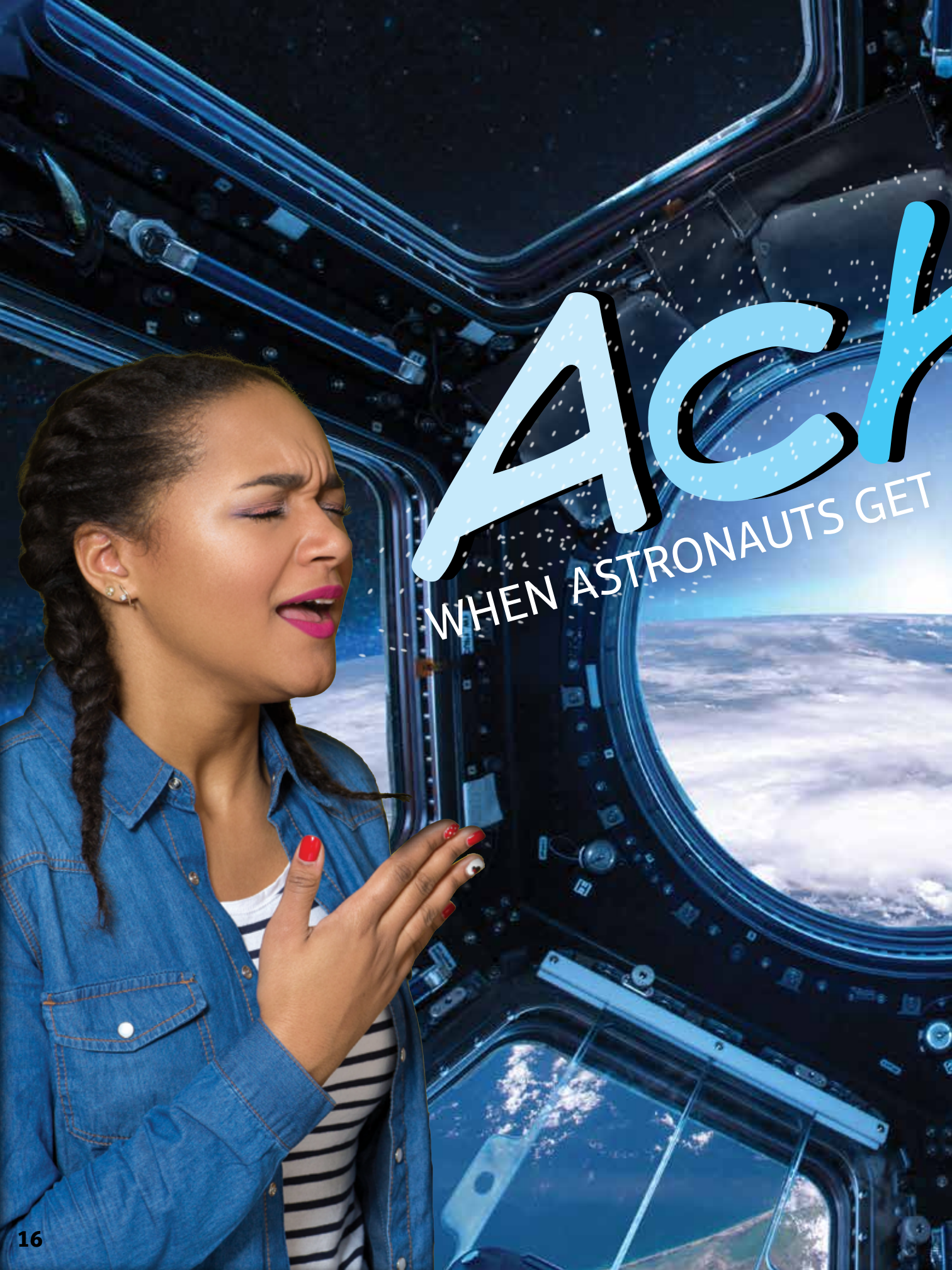
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WHEN ASTRONAUTS GET

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SICK IN SPACE

by Lee Gjertsen Malone

In 1968, all three men in the crew of the Apollo 7 came down with head colds during an 11-day mission into Earth's orbit. The craft's crew became cranky and irritable. They even broke a rule about wearing their helmets on re-entry because they needed to blow their noses.

Ever since the early days of space travel, scientists have been trying to determine the best way to treat illnesses in space. That's especially true as humans consider longer missions as well as the possibility of regular citizens traveling beyond Earth—or even living on other planets.

Pass the Tissues

The common cold is only one piece of the problem. Many regular medical treatments (such as a blood test or treatment for a heart attack) face unique challenges outside Earth's gravity. And some diseases can have much more dramatic symptoms in space. That's because conditions in space change the way bacteria behave and how the human immune system functions.

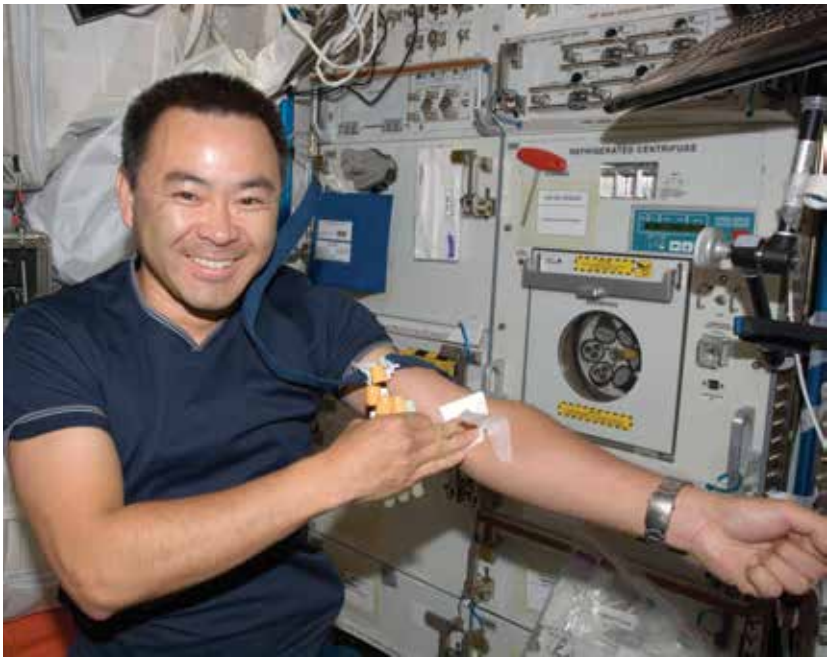
And most importantly, everything the astronauts need—from the smallest bandage to a breathing-assistance device—has to be brought along on the ship.

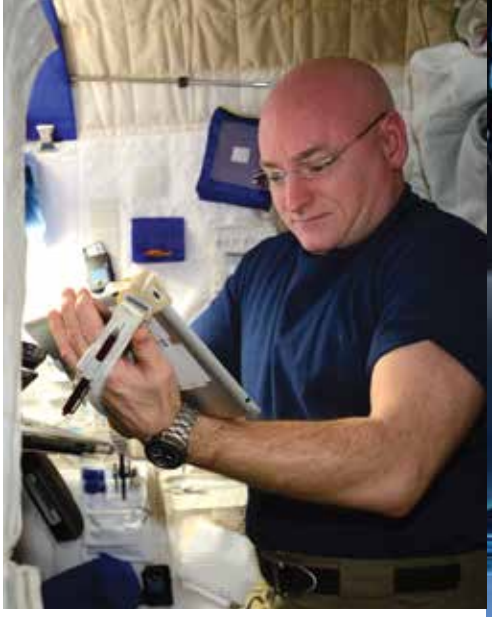
If someone gets sick on a Mars mission, they can't turn around and come home," explains Leonard A. Mermel, a professor of medicine at Brown University. "So the ramifications for getting sick are vastly different." Mermel's research is focused on how astronauts can prevent and control diseases caused by infections in space.

How Spaceflight Is Like Summer Camp

Mermel highlights a couple of big issues facing space travelers who need to stay healthy. First the stress of space travel itself is hard on the body and can make people more likely to get sick. Astronauts also usually live and work in close quarters with each other. This type of situation always tends to spread germs, whether the people are in a summer camp cabin or on an international space station.

At right: the crew of Apollo 7 suffered through bad colds during their 1968 mission.





Aki Hoshide (left) and Scott Kelly (above) have participated in research that helps keep fellow astronauts healthy in space.

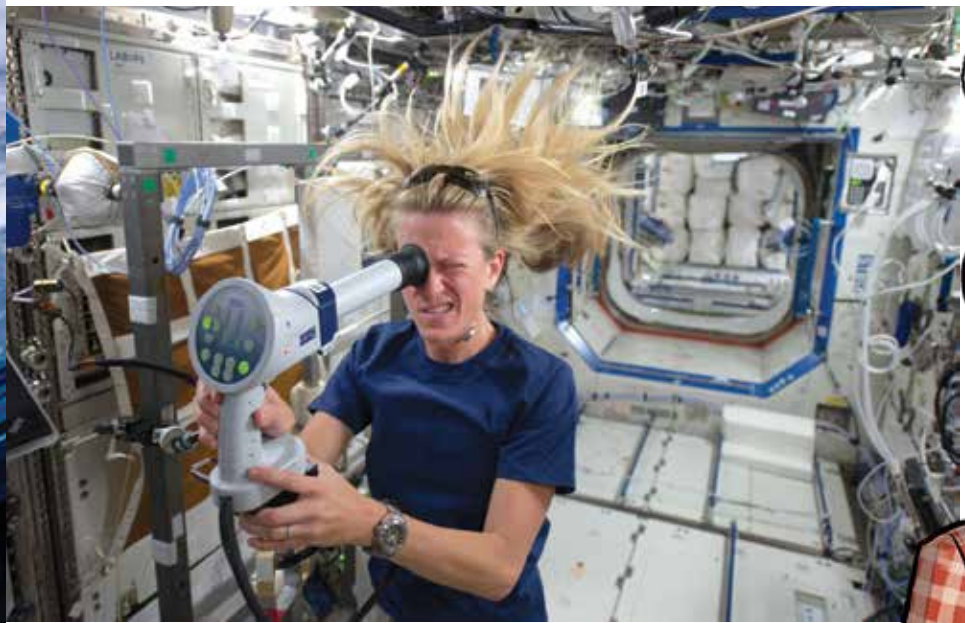
Another issue is that because of the physical changes of microgravity, humans can become more vulnerable to different illnesses. "We've evolved on Earth—we've evolved with gravity," Mermel says, and that includes our immune systems. Scientists aren't 100 percent sure why, but they do know that people's immune systems don't seem to work correctly during space travel.

For example, researchers have discovered that during space missions, dormant viruses often reactivate. A dormant virus is one that just sits there in a person's body, not causing any illness. For example, after a child has chicken pox, the virus remains, but usually never again makes that person sick. In rare cases, though, the chicken pox virus wakes up, causing the disease shingles. This is much more likely to happen when the immune system is weakened.

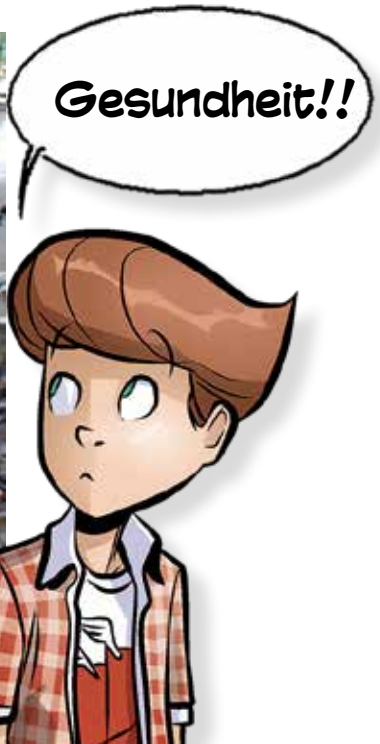
Mermel explains that astronauts may be carrying viruses, bacteria, or fungi that have not made them ill on Earth. But in space, the same microorganisms could cause an active infection that could be spread to fellow voyagers.

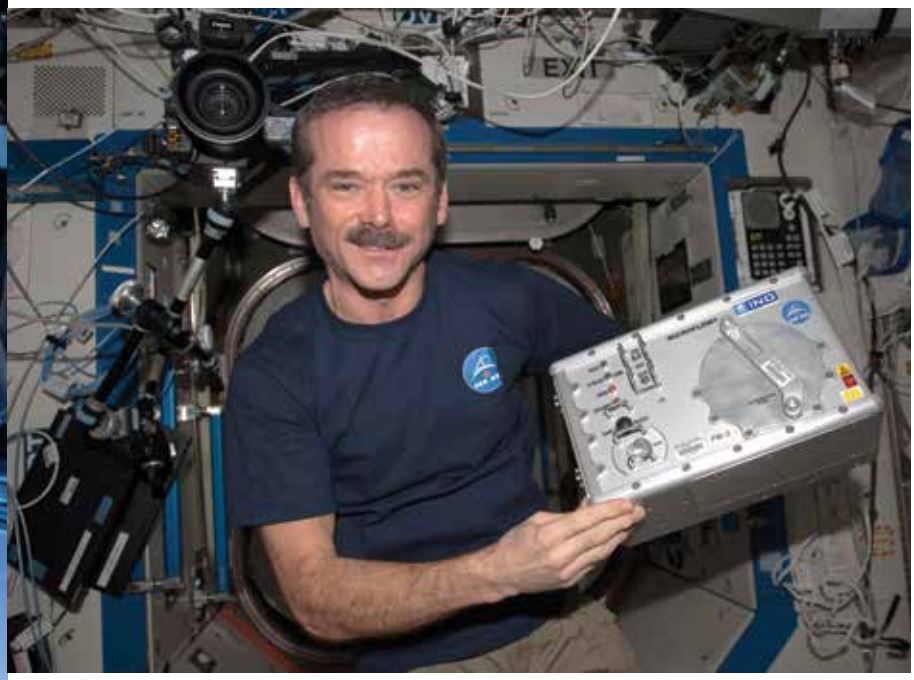
An Ounce of Prevention

So what is NASA trying to do to keep astronauts healthy? First of all, they're working to understand how the human body reacts to the unique challenges of space travel. In 2015, American astronaut Scott Kelly and Russian cosmonaut Mikhail Korniyenko spent a year on the International Space Station to study the health effects of living in space for a long time. Their mission was part of a study where NASA researchers compared the health of Scott, in space, with his identical twin brother Mark Kelly, back on Earth. Preliminary results from the study



In an ISS lab, Expedition 37 flight engineer Karen Nyberg uses a device to measure eye health.





Above: Canadian astronaut Chris Hadfield holds Microflow, a portable medical device.

Left: Is there a doctor in the spacecraft? Physician Jonny Kim is a member of NASA's astronaut training program.

found Scott experienced a range of body changes during his time in space, including temporary changes in his genetic material and a shift in the varieties of bacteria living in his gastrointestinal tract. Researchers also noticed possible differences in the way some of parts of his body, like his immune system, behaved. NASA scientists have continued to monitor Scott and Mark Kelly to learn as much as possible about the long-term effects of space travel.

Another key component of health is disease prevention. "You need to do as much as you can pre-flight," Mermel says, including testing astronauts for diseases in advance and making sure they are vaccinated. Space travelers also need to use common sense when it comes to simple disease-prevention strategies, like washing their hands or covering their mouth when they sneeze. "If you sneeze on Earth, most of the particles that you sneeze quickly end up on the ground," he says. "In microgravity, the particles may remain suspended for a more prolonged period of time." Hopefully, an air filter will capture the particles . . . but they could just as easily head toward a fellow astronaut.

Air filters and disinfectants help remove germs. Treating food with radiation to kill any bacteria in it also helps, since food-borne illnesses are a major source of infections. However, humans are used to eating food with some amount of bacteria, and we all have friendly bacteria living in our digestive system. Spending years on a long-haul flight eating bacteria-free food may not be good for astronauts, Mermel says.

The Doctor Is In . . . Outer Space

So even with every precaution, some space travelers will get sick—and that means they will need treatment. But again, the unique environment of space makes even simple treatments a whole lot harder.

For example, some antibiotics and other medications degrade faster in space, perhaps due to higher levels of radiation. This means they may stop working long before they are needed. And even some basic tools, like alcohol swabs, can't be used in a space ship because they are flammable. Every space flight also needs to worry about conserving energy, which means that large diagnostic equipment that use a lot of power, like traditional MRI machines, can't come along.

One option is the development of more portable medical technology. Canadian scientists invented the Microflow, a device about the size of a toaster oven that can analyze the cells and hormones in blood and other human samples. The Microflow was tested on board the International Space Station in 2013. This kind of technology could replace testing systems on Earth that are too large and heavy to bring on a spaceship.

Sometimes, finding a way to conduct an important life-saving medical procedure in space requires thinking outside the box. Jochen Hinkelbein, a physician and professor at the University Hospital Cologne in Germany, led a study on the best way to do CPR (cardiopulmonary resuscitation, a series of chest compressions given to someone suspected of having a heart attack) in low gravity.

The best method his team found? Doing a handstand on the patient's chest.

Lee Gjertsen Malone is the author of middle grade novels *The Last Boy at St. Edith's* and *Camp Shady Crook* (May 2019). She got the idea for this story when she had a really bad sinus infection on a long airplane trip.