

* Read & annotate each paragraph.

* Answer the question on the last page.

7th grade science

Meet a Scientist Who Grows New Cells

When parts of the body get old or injured, they sometimes stop working the way they should—and cause pain, sickness, or worse. In many cases, doctors can help patients by replacing a part or a whole organ with a machine or a mechanical version, like an artificial heart or a knee joint made from plastic and metal. But what if scientists could grow brand-new organs and use them instead of the mechanical versions? Dr. Grace O'Connell, a researcher at the University of California, Berkeley, is trying to do just that.

O'Connell and the students in her lab study the soft tissues in the spine—specifically the squishy discs of tissue between the vertebrae, or bones, of the spine. Because these discs are between the vertebrae, they're called intervertebral discs. The discs act like cushions between the vertebrae, allowing the spine to bend and keeping the vertebrae from touching. The discs in the spine sometimes begin to wear out with age, or squeeze out from between the vertebrae, so they don't offer as much cushioning. That's a sore spot: vertebrae rubbing together or discs putting pressure on the spinal nerves can cause back pain. In most cases, doctors don't replace discs when they wear out; instead, they remove the worn-out or injured disc and glue the vertebrae above and below it together, forming one longer bone. The glued bone doesn't cause as much pain, but it's also less flexible than two vertebrae with a healthy disc between them.



Dr. Grace O'Connell is working to grow new tissue for spinal discs, which could help people with back problems.



The discs between vertebrae (shown here in white) allow the spine to bend and keep the vertebrae from touching or rubbing against nerves in the spine.

O'Connell hopes to change the way doctors treat damaged or worn-out discs. Instead of gluing the vertebrae together, she hopes to grow brand-new disc tissue to replace old or injured discs! Her lab has two main goals: to study healthy intervertebral discs and to grow new intervertebral disc tissue that behaves just like healthy discs.

Because tissues are made of cells, O'Connell is really working with cells. She begins with a small sample of disc cells and encourages them to reproduce and form new disc tissue. To make the tissue perform exactly like healthy disc tissue, O'Connell and her students look at the cells and how they behave. "The cells create the tissue, which gives the joint its function," she says. "So we look at the way the whole disc works, but we also keep in mind that the cells are really responsible, and we look at how the cells are changing things." Some of the cells O'Connell and her students study come from human medical patients: "Patients sign a release that says they're willing to donate their cells to science, and we get to grow their cells," she says. But sometimes O'Connell and her students study cells that aren't human—and they come from the butcher down the street!

"We get the oxtails," she says. "If they're fresh, the cells are still living, and we can use them."

Growing up near Philadelphia, O'Connell wanted to fly and design airplanes. She even took flying lessons in high school! In college, she studied aeronautical engineering—the study of engineering for flight—but decided to use her engineering knowledge to help people with health problems instead, and studied the way engineering relates to the body. Along the way, she says, "I studied math. Lots of math." She still hopes to earn her pilot's license someday.

Today, she enjoys the challenges of trying to grow new disc tissue from just a few cells—even when her work doesn't go as planned. "One of the biggest challenges of this kind of research is that the cells don't always do what you want them to," she says. "But sometimes that leads to new questions and new learning." In fact, she says one of the hardest parts of the job is finding out that there are some things nobody knows. "You're told 'this is how things are,' when this really isn't how things are in reality. There's a lot that nobody knows, and you have to find out. It's challenging, but it's very exciting when you do learn something that nobody else knew before."



The scientists at Dr. O'Connell's lab grow new cells in dishes of cell culture medium, which helps support cellular growth.

Name: _____

Date: _____

Homework: Reading “Meet a Scientist Who Grows New Cells”

Did you know scientists can grow new cells? To learn more about a scientist who is studying how to solve medical problems by growing new cells, read and annotate the “Meet a Scientist Who Grows New Cells” article. Then, answer the question below.

What is one interesting thing you learned from this article?
