

**IN THE LAB:** Dasia Taylor works on her infection-detecting sutures.

**SURGICAL SUTURES:**  
Doctors use specialized thread to close up wounds and incisions.



# Smart Stitches

## A 17-year-old invents color-changing stitches that can detect infections and save lives

## Explore More Online



**Skill Builders**



Levelled  
Text

**AS YOU READ, THINK ABOUT** the importance of making medical advances more widely accessible to people around the world.

**In 2019, Dasia Taylor was in chemistry class at her Iowa City high school when her teacher asked if anyone was interested in entering a local science fair.** “I’m more of a writing and humanities person,” says Dasia. But she raised her hand anyway. She had no idea that this small gesture would lead to an award-winning scientific invention!

For her project, Dasia developed stitches that change color when a wound is infected, alerting doctors to the problem. The idea is both simple and inexpensive, and it has the potential to help people around the world with their recovery after surgery. Dasia's work eventually earned her a finalist spot in the Regeneron Science Talent Search—one of the top science and math competitions in the U.S. "It's been a wild ride!" she says.

## A PROBLEM TO SOLVE

When Dasia first decided to enter her local science fair, she wasn't sure what her investigation should focus on. So she started reading science news online. One article described new "smart" *sutures*—threads used to stitch together the edges of a wound—that use tiny sensors and electronics to monitor injuries as they heal. "But these sutures were super expensive and complicated," Dasia says. She knew the technology would never be affordable for most people around the world.

About 9 out of 10 people in low- and middle-income countries lack access to basic surgical care, according to the World Health

**AWARD  
WINNER:**  
Dasia wearing  
medals she  
has won for  
her invention

**COLOR CHANGE**  
Sutures dyed with beet juice change color at different pH levels. To show this, Dasia applied two solutions with different pHs to sample stitches.

early warning that something is wrong, says Dasia. This would allow doctors to start delivering potentially life-saving treatments before an infection becomes more dangerous.

## BEET-ING THE COMPETITION

Dasia entered her sutures in several science fairs, where she won awards and got rave reviews from judges. She used their feedback to refine her idea further. Now she's *patented* her invention. That gives her the exclusive rights to her idea so she can turn her creation into a real product. "Most 17-year-olds do not file for patents," Dasia jokes. "Once again, I found myself doing a lot of Googling."

When asked what advice she has for other kids who want to become inventors, Dasia had this to say: "Be curious. I am so glad I was curious enough to raise my hand in chemistry class that day. It literally changed my life!" ✨

—Stephanie Warren Drimmer

**DEFINING PROBLEMS:** Think of a problem you would like to solve. What steps could you take create a simple and affordable solution?

## FAKE SKIN TEST

pH 5

Untreated

pH 9

Organization. In particular, Dasia thought about pregnant women in Africa who undergo a surgical procedure called a C-section when delivering their babies. More than 20 percent of them will develop an infection in the incision site on their abdomen. These infections can be dangerous or even deadly. Dasia knew that if she could create sutures that were “smart” but also inexpensive, she could help save lives.

## THE BASIC IDEA

Dasia did more research and learned that healthy human skin is slightly *acidic*. It has a *pH* of about 5 (see *The pH Scale*, below). When an infection sets in, the skin's

pH becomes *basic*, rising to 8 or higher. Taylor scoured the internet to find something inexpensive that changes color at different pH levels. She came across beet juice, a natural *pH indicator*.

It took Dasia months of experimenting—plus the juice of about three dozen beets—but she managed to mix up a concoction that dyed sutures a bright red color. When their pH changed from acidic to basic, the sutures turned dark purple, which would indicate infection had set in. The color change could act as an

## The pH Scale

The pH scale measures how acidic or basic something is. Acids tend to be sour and corrosive. Bases tend to be bitter and slippery. Which item on the scale has the closest pH to healthy skin?

