



WRITING / EDITING / COACHING

## WRITING SAMPLE

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### UT-San Antonio lab hopes to 3-D print human organs one day

By Mary Ann Roser

Research in San Antonio using three-dimensional printing demonstrates the progress and high hurdles facing the field's next frontier: printing human organs for transplant.

No one yet has printed a whole organ, such as a kidney, lung or heart, that could be placed into a sick or injured person, although California researchers used 3-D printing to make artificial liver tissue for drug testing. And scientists at Wake Forest Baptist Medical Center said in an article published last month in Nature Biotechnology that they printed ear, bone and muscle parts that were implanted in animals and matured into working tissue. They think the same technique could work in humans, using a person's own cells to print tissue or organs.

That's also the hope of Teja Guda, assistant professor of biomedical engineering at the University of Texas at San Antonio.

Guda said his lab recently acquired a \$200,000 3-D printer that's capable of printing living tissue without killing the cells because it can operate without heat or high pressure. His lab is testing the device with silicone and soon plans to print grafts for bones, skeletal muscle, pancreas tissue and salivary glands using tissue from rats, he said.

To do that, members of Guda's team would use a gel, such as collagen, filled with living cells. They would load the material into little syringes that would be inserted into the machine, which would print the implant layer by layer.

Once those grafts are available, they would be implanted in rats. Bone structures are less complex than organs because they have fewer types of cells, making them good candidates for the first implants, Guda said.

But printing human organs to implant is much farther down the road.

“We’re probably looking at a decade,” Guda said.

Some experts think it could be longer than that.

“Printing an entire organ for a human is still a big challenge, but we’re often led to believe that it’s something that is happening now or will happen very soon,” said Terry Wohlers, president of Wohlers Associates Inc., a Fort Collins, Colo.-based consulting firm specializing in 3-D printing and other new technologies.

Among the challenges are growing large numbers of human cells outside of the body, keeping them alive and printing very fine blood vessels that can handle blood flow, Wohlers said. Overcoming those challenges could take at least a decade, he said.

At Wake Forest, the researchers developed their own 3-D printer with funding from the Armed Forces Institute of Regenerative Medicine, which is interested in addressing combat injuries. That team wants to implant muscle, cartilage and bone in patients once it perfects the process.

Its Integrated Tissue and Organ Printing system uses living cells placed into hydrogels and biodegradable polymer materials. A computerized image of the injured organ is used to achieve the correct shape of the implant, the researchers said in the article they published last month.

Guda said the strong military presence in San Antonio is a key driver for his work to develop 3-D printed implants.

“Our targeted focus was on the military,” he said, but 3-D printing “could help people in automobile and rodeo accidents.”

He added that someday printed organs might solve the severe shortage of organs available for transplant. Twenty-two Americans die each day, on average, waiting for a transplant, according to the federal government’s Organ Procurement and Transplantation Network.

In addition, some of those who receive transplants might die or need a new organ because their body rejects the transplant. Printing an organ from one’s own cells would alleviate that concern, Guda said.

Some day.