

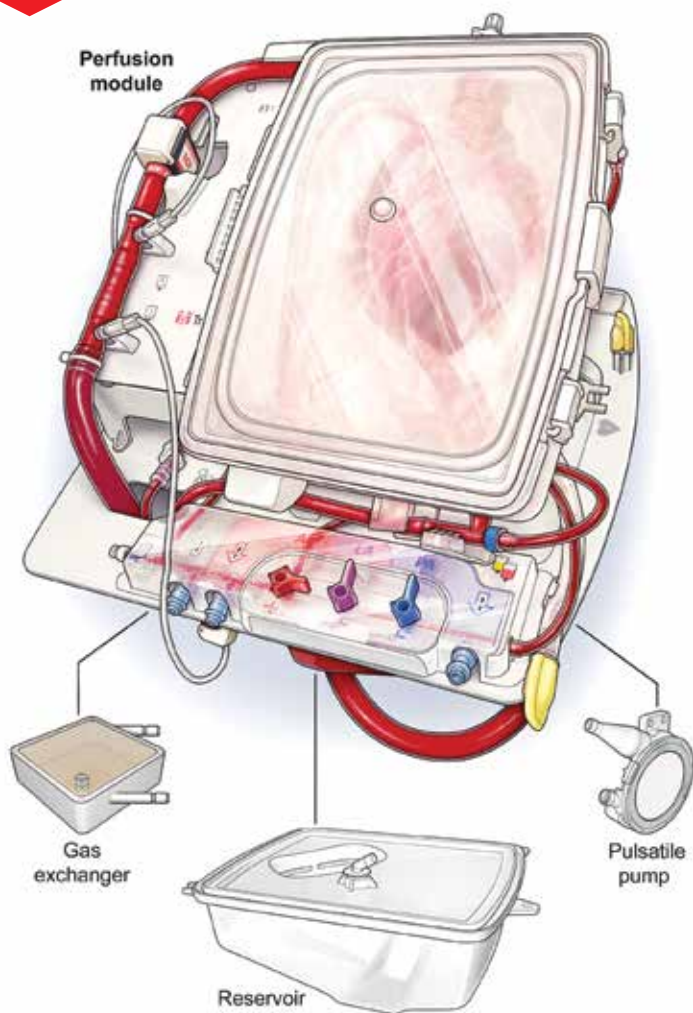
by Jeanne Miller

What's Mine Is Yours

SWAPPING GOOD
BODY PARTS FOR
BAD ONES

PICTURE THIS: At the entrance to a hospital a drone descends. It deposits a large box on wheels. Hospital personnel rush out. They wheel the box into the building and down the hall to an operating room. There, doctors, gowned and scrubbed for surgery, open the box. Inside is a beating human heart with blood flowing in and out through transparent tubes.





to pump as it makes its way, by land or air, to the needy patient. The machine is not in widespread use in the United States yet, but government-approved trials are taking place.

To be honest, the delivery by drone is fictional—for now. However, a company specializing in donor organ transport has announced it's taking steps toward using unmanned aerial vehicles (drones) in the future. And that's just the beginning of the strange-but-true advances in medical technology.

»» About Face

Imagine being able to touch the face of a loved one who passed away months—or years—before. Marinda Righter can do just that. Her deceased mother's face lives on in Carmen Tarleton of Thetford, Vermont. Tarleton sustained serious injuries when an attacker used lye, a caustic chemical, as a weapon in 2007. Chemical burns affected more than 80 percent of her body. Blind, without eyelids or lips, and with a face that was a patchwork of scar tissue and skin taken from other parts of her body, Tarleton worked hard to heal emotionally from the injuries. She somehow found the strength to reclaim her life, sharing her story with others in a book and in public speeches, but life was still a struggle.

Then, in 2013, Righter's mother, Cheryl, suffered a stroke that left her brain-dead. She was already registered as an organ donor. But doctors came to Marinda Righter with another request. Would she give permission for them to remove her mother's face so that it, too, could benefit someone? That someone was Tarleton. It took Righter only a moment to agree.

The face transplant has been a life changer for Tarleton. She says, "I have feeling in my face now. I have eyelids—I can blink. I have lips—I can drink from a cup now." And she can kiss, which is important since she and her piano teacher fell in love while she was waiting for the transplant.

Tarleton and Righter have become close friends. Tarleton doesn't look like Righter's mother because transplanted faces follow the bone structure of the recipient. But Righter loves seeing her mother's freckles and kissing her cheeks. It's a relationship that brings both Tarleton and Righter comfort.

»» A Different Kind of Transplant

In 2012 Melissa Cabral, a healthy Massachusetts woman, took an antibiotic after having a root canal on a tooth. Soon she developed severe stomach symptoms. Medication helped temporarily, then the symptoms came back. For months she suffered from diarrhea and vomiting. More than once she was hospitalized. Often she barely had the energy to walk from the bedroom to the bathroom. Finally she went to see Dr. Colleen Kelly, a gastroenterologist in Providence, Rhode Island. Kelly soon diagnosed the problem as *Clostridium difficile* (known as C. diff), a dangerous kind of bacteria in her gut. The antibiotic had

»» Traveling Tell-Tale Heart

Sounds like fiction, doesn't it? But the real heart pumping real blood is fact. A machine called the Organ Care System makes this possible. It sends warm blood through a heart while it travels from a newly dead donor to an ailing recipient.

Organ transplant isn't new. During the first successful one, in 1954, doctors took a kidney from a living 23-year-old and gave it to his identical twin brother, who was dying of kidney disease. The successful transfer ushered in an era of replacing failing organs with healthy ones.

But actually getting an organ from a donor to the patient who needs it can be a problem. When an organ donor dies and surgeons remove the heart from the body, they put it in a plastic bag and into a cooler on ice. Then there's a mad rush to get it to the recipient. It must be in the new body within about five hours because the heart begins to deteriorate once it's no longer connected to a living system.

The Organ Care System avoids that problem. When the doctor puts the heart in this box, the heart continues



This snapshot shows Carmen Tarleton before she was injured. Following face transplant surgery, Tarleton (below right) received a kiss on the cheek from Marinda Righter, the daughter of the donor.





One day, pills may deliver healing bacteria to the intestines. The current delivery method usually cures *C. diff* infections. But it's kind of gross.

wiped out the “friendly” bacteria in her large intestine, leaving the *C. diff* to grow unchecked.

Kelly says, “We need some germs in our bodies to maintain health. And when they get disrupted by antibiotics there can be situations where you get an overgrowth of bad germs and get really sick.” Kelly knew the most effective treatment: a fecal transplant. She takes stool (poop) from a healthy donor, blends it with a saltwater solution, and strains it. It looks a bit like chocolate milk when she introduces it into the large intestine of the patient. There, the good bacteria grow and take over the area, leaving no room for *C. diff* to flourish.

Kelly has been one of the pioneers in using fecal transplants with remarkable success to treat patients with

persistent *C. diff* infections. The treatment has worked more than 90 percent of the time. Within a day of getting the stool transplant, Cabral’s symptoms were gone for good.

Currently researchers are working on isolating the stool bacteria that are the most effective ones. They plan to put these into a capsule that someone can swallow. If this proves successful, Dr. Kelly says, “Then you don’t have to do a whole stool fecal transplant. You can just have the patient take a pill and that would do the same thing.”

»» Is This Next?

Dr. Sergio Canavero, a neurosurgeon in Italy, expects that two years from now he’ll be able to perform a human head transplant. In other words, he believes that he’ll be able to remove the living head from someone suffering from, for example, a muscle wasting disease that has left his body nonfunctional. He’ll attach this head to the body of someone who is brain-dead and on life support but whose body has remained undamaged.

Today surgeons can connect blood vessels and nerves and stitch bones to each other, but nobody has tried to fuse two spinal cords together. Canavero thinks it can be done. He predicts that when the recipient wakes up, that person will be able to move and speak and feel his or her face. Canavero expects it will take several months of physical therapy to learn to walk.

Some neurosurgeons think it will be many more years before such a procedure can be successful. Some believe it will never be possible.

On the other hand, perhaps one day a drone will deliver to a hospital a box that contains the headless body of a donor being kept alive by a machine. Picture that!

Dr. Sergio Canavero is anticipating the first transplant of a human head onto a new body.



Jeanne Miller writes about science for kids. She hopes that if Amazon starts delivering packages by drone, they won’t deliver a beating heart to her by mistake.