

Easy Knee Repair, Scar-Free Surgery...

...and five other medical miracles that could change your life

By Beth Howard

It's not every day, or even every decade, that research leads to a real medical breakthrough—the kind that revolutionizes the treatment of a disease or condition. But these cutting-edge therapies promise to do just that. And for the four women profiled here—who have been part of these exciting studies—the revolution has already happened.

KNEE SELF-REPAIR

Three years ago, Pixie Greenemeier, then 45, was doing a squat in her exercise class when she tore her right meniscus, the cartilage that cushions the bones of the knee. The injury was severe—Greenemeier, a mother of four and a pediatric nurse at Children's Hospital in Denver, was in constant pain, which sometimes interfered with her responsibilities at work: "If I had to bend down to look at, say, an oxygen tank, it was a real ordeal to get back up."

Greenemeier thought arthroscopic surgery would help restore her active lifestyle—she also took rigorous self-defense classes—but there was so much damage ("In one area, it was basically bone on bone," she says), there was no way to repair it. Her only option, it seemed, was knee-replacement surgery.

Then Greenemeier learned about a new procedure that uses a patient's own stem cells to regenerate damaged tissues. Physicians extract bone marrow from your hip, grow special cells from it in the lab, and then inject them into the injured area of the ailing knee. Over the next several weeks, the cells differentiate into the type needed—in this case, cartilage. Plus, they

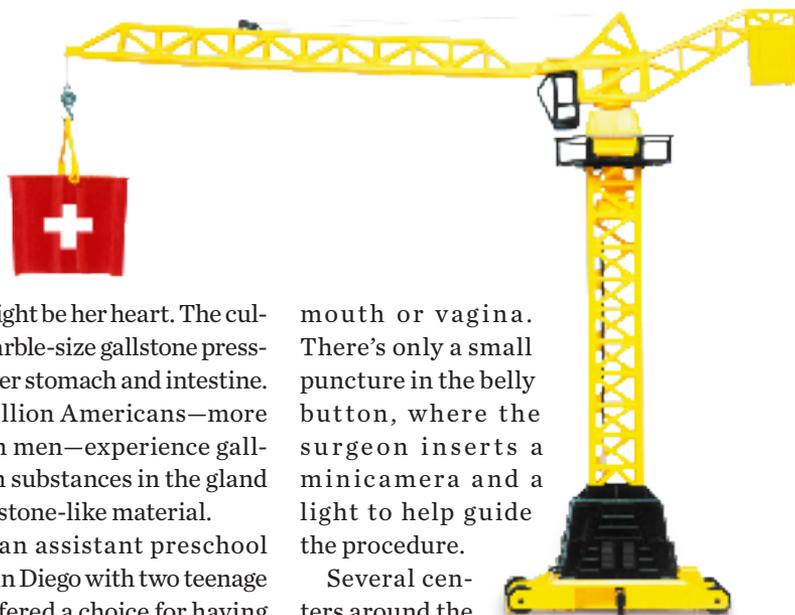
"act like general contractors," says researcher Christopher Centeno, M.D., head of the Centeno-Schultz Pain Management Clinic in Broomfield, CO, who conducted trials on the procedure. "They can bring in other cells to help with repair or inflammation." This versatility makes stem cells potentially useful for fixing many problems; indeed, hundreds of studies are under way, testing the cells for everything from wound healing to heart repair.

For Greenemeier, the procedure has been life-changing. Although the injection of cells into her inflamed knee was somewhat painful, after three weeks, the discomfort and swelling eased. Strikingly, an MRI taken six months later, before a second injection, showed that the cartilage had grown by 40 percent. And the cartilage has kept on →



80,696

Number of
medical studies
listed on
clinicaltrials
.gov on one
day in 2009



growing—now, two years later, it's increased about 70 percent.

Although not every patient is so lucky, among a group of 50 people slated for knee replacement in Dr. Centeno's pilot study, almost 90 percent had at least a 50 percent improvement in function and pain. And for half of these volunteers, the improvement was 75 percent. Next up: a randomized, controlled study.

Today, Greenemeier can work—and work out—without pain. She's enjoying all her favorite fitness activities, including deep squats at her conditioning classes. "I can go all the way down again," she reports. And her 12-hour shifts at the hospital are not a problem. "The other day, I finished and my knee was a little sore," she says. "Then I realized it was my *left* knee—not the injured one."

SCAR-FREE SURGERY

Linda Qua's first gallbladder attack, two years ago, was so painful, she

thought it might be her heart. The culprit was a marble-size gallstone pressing against her stomach and intestine. Some 20 million Americans—more women than men—experience gallstones, when substances in the gland harden into stone-like material.

Qua, 48, an assistant preschool teacher in San Diego with two teenage boys, was offered a choice for having her troublemaking gallbladder removed. The first option: laparoscopic surgery, in which doctors would make four small incisions in her abdomen to view the abdominal cavity, pass instruments back and forth, and remove the diseased organ. Option two, though strange, was more intriguing: Doctors would remove the gallbladder through a natural opening in Qua's body.

Called natural orifice transluminal endoscopic surgery (NOTES), such operations include removing gallbladders and appendixes and repairing hernias through the patient's

mouth or vagina. There's only a small puncture in the belly button, where the surgeon inserts a minicamera and a light to help guide the procedure.

Several centers around the country, including the UC San Diego Medical Center, New York–Presbyterian Hospital in New York City, and Northwestern Memorial Hospital in Chicago, are performing the surgeries now, and more are expected to start as companies develop the specialized instruments the procedures require.

Unlike standard abdominal operations, NOTES avoids cutting through abdominal muscles. External incisions not only are painful, but also can take weeks to fully heal and can cause complications like hernias. The small internal cuts that NOTES →

MORE MIRACLES Other medical advances that could change your life

- Putting Fertility on Ice** One of the cruelties of cancer treatment for a young woman is that while it may save her life, it also may leave her infertile. But now a patient about to undergo chemo or radiation can have an ovary removed, then frozen in strips, ready to be reimplanted after treatment—making it possible for her to become pregnant. The procedure, called ovarian tissue cryopreservation, has resulted in 14 births so far, with most of the mothers conceiving naturally. Cryopreservation is available at 30 facilities around the country; for info, go to myoncofertility.org.
- Stickless Blood Sugar Testing** People with diabetes need to prick their fingertips several times a day to check their blood glucose level. But a new noninvasive method could mean less painful testing. The device, under development at Texas A&M University, uses microscopic beads implanted just under the skin. When a laser light is shone on the beads, the color of the light changes in response to the level of glucose around them. The technology, say the researchers, will be packaged in a wristwatch-like device and could be available within five years.
- A Positive for Triple Negative** About 15 percent of breast cancer cases are called triple negative—the tumor lacks receptors for estrogen, progesterone, and HER2. These receptors serve as targets for effective medications, so these women can't benefit from the drugs; also, women who lack the receptors are more likely to have a recurrence. Now researchers are testing a new class of medications, called PARP inhibitors, which take aim at an enzyme that makes chemotherapy less effective in triple-negative patients. In a study of 120 patients at Baylor Charles A. Sammons Cancer Center at Dallas, women who received a PARP inhibitor along with chemo lived over 50 percent longer than those who got just chemo. Results from a similar British study were published in the *New England Journal of Medicine*, which rarely accepts results of phase 1 drug trials—the first step on the way to FDA approval.

surgeons make, generally in less sensitive internal organs like the stomach or vagina, heal quickly and are not exposed to germs. “An open wound can cause an infection,” says Qua’s surgeon, Santiago Horgan, M.D., chief of minimally invasive surgery at UC San Diego Medical Center. “With the tiny puncture hidden deep in the belly button, we minimize that risk while

though sometimes she experienced mania—periods of wildly elevated emotion and extreme energy. “I’d stay up half the night washing and ironing sheets,” she says. She took the drug lithium to regulate her moods, but eventually the swing tilted in the opposite direction and stayed there.

Schaefer was so depressed she was barely able to leave the house. The

my three daughters,” she laments. She even considered taking her own life.

Then, two years ago, Schaefer’s doctor helped enroll her in a study of a pioneering treatment called deep brain stimulation at Boston’s Massachusetts General Hospital. Already approved for treating patients with Parkinson’s and other neurological disorders, DBS is a kind of pacemaker for the brain. The battery-powered unit is placed in the chest, where it sends electric signals to receivers that have been implanted in specific brain regions, correcting abnormal activity associated with depression.

In studies of DBS, half the patients have experienced at least a 50 percent improvement in mood, and a third have had complete remission—unusual success for treatment-resistant depression. “You just don’t get these kinds of results in these patients,” says study coauthor Emad N. Eskander, M.D., associate professor of surgery at Harvard Medical School. The procedure is still experimental, though →

Participating in a clinical trial is one way to be first to benefit from a new treatment

achieving a scarless cosmetic result.”

At first, Qua wasn’t thrilled at the idea of having her gallbladder removed through her vagina. But having had major scoliosis surgery in her teens, she knew what being cut open and having stitches meant. “I wanted to avoid that pain and long recovery,” she explains.

Her decision was the right one. “My sister had her appendix removed through traditional abdominal surgery and was wiped out and in bed for two weeks,” Qua says. “I needed a painkiller for just two or three days. A week later, I was back to my regular activities, even chasing the kids at school, with only a little tenderness around my belly button.”

MOOD-LIFTING IMPLANTS

Some 18 million Americans suffer from major depression. Of them, about one in five never gets better, no matter what therapy is tried.

Leslie Schaefer, 55, fell into that so-called treatment-resistant group. Her problems began when she was about 20, newly married, and starting a family in Rockport, MA. She worked at a bank and enjoyed teaching Sunday school.

At first, her mood was just off-kilter,

simplest tasks became overwhelming. “I had so little concentration, I’d get lost going to the grocery store,” she says. Once she wandered away from her home and ended up in a nearby park, where her frantic family found her—hours later—asleep on a bench.

Schaefer was hospitalized several times for her depression and, through the years, tried everything—counseling, drugs, even electroshock therapy. “All that did was destroy memories of

IF YOU WANT TO BE A GUINEA PIG

Participating in a medical study is one way to be first to benefit from a new treatment. And volunteers are often badly needed: Numerous trials, including many sponsored by the National Cancer Institute, can’t be completed because not enough patients have signed on. To find studies, check clinicaltrials.gov and centerwatch.com, as well as organizations for your specific condition. But before you sign up:

Clear the study with your doctor There could be something in your medical history that makes you a poor candidate. If it’s your physician who’s recruiting, get a second opinion.

Consider the risks Read the informed-consent form carefully, and pay special attention to potential adverse events. “Don’t participate if you don’t feel comfortable with the safety information provided by the sponsor,” advises Mary Beth Woodin, founder and president of Menopause Alliance, a nonprofit educational organization.

Ask about costs Most health insurance policies won’t cover anything research-related, says Arthur L. Caplan, Ph.D., director of the Center for Bioethics at the University of Pennsylvania. You need to find out what care will be provided free of cost if you’re injured or experience a negative side effect.

final trials for FDA approval are under way and it could be available within a few years.

Schaefer was among the lucky ones. “I used to cry every day,” she says. But after her pacemaker was turned on, her sadness gradually lifted. She no longer has trouble finding her way around town, and has returned to church, where she cochairs the trustee committee. She is filling in her missing memories by creating scrapbooks for her daughters and other family members.

Every six months or so, Schaefer has to have the batteries in the chest unit replaced—surgery done under general anesthesia. But, weighing where she was before and what her life offers her now, she says it’s not a big deal: “For 34 years I was fighting just to stay alive.” Even with the pain and inconvenience, she says, “this is the best thing that’s ever happened to me and my family.”

CODE COOL

When a person’s heart stops beating, no blood—and no oxygen—is going to the brain. Cooling the body a few degrees reduces the chance of damage, increasing the odds that the patient will return to a normal life. That’s why accident victims who live through a plunge into a freezing river can survive without neurological problems. But in a hospital, the processes that are used to cool bodies—blowing cold air on patients, or packing them in ice—can take hours, often too long to stop cell death and brain damage. It’s no wonder only a small fraction of cardiac arrest patients whose hearts are restarted regain all their abilities.

“If the stars hadn’t fallen in line on November 11, 2008,” as Cynthia Crawford, 57, puts it, she might not have been in that lucky group. A former psychiatric nurse in Baton Rouge, LA, and a mother of four, Crawford was at New

Orleans’s Ochsner Medical Center for tests to see if she was a candidate for a heart transplant. A former smoker who suffered from congestive heart failure, Crawford was using a pacemaker and an implanted defibrillator to keep her heart pumping. But it was growing weak. When a medical resident found her slumped in the hospital garage, he quickly rushed her to the ER.

You could call it being in the right place at the right time. Ochsner is one of only about 50 medical facilities that use a novel cooling therapy called the ThermoSuit. This inflatable cocoon-like device sprays the body with hundreds of icy-cold jets of water, reducing a patient’s temperature in about 20 to 40 minutes. “It’s faster than anything previously available,” says Paul McMullan Jr., M.D., an interventional cardiologist at Ochsner; that has translated into far lower rates of brain damage in patients at centers using the device.

Crawford doesn’t remember much about the day her heart stopped. But when she woke up in the intensive care unit, she says, “I knew I’d been to hell and back. I learned that they’d had to shock me five times to get my heart going again.”

After cooling her body, doctors implanted a heart pump to take over the work of her weakened heart, buying time while she waits for a new one from a donor. But she wouldn’t even be on the transplant list if she hadn’t been lucky enough to be placed in a ThermoSuit. “A nurse on the cardiac unit told me that somebody who comes in like I did usually ends up in a long-term-care facility,” says Crawford.

Instead, she has “more energy than ever.” And while the battery for the pump, carried in a vest, is a “little cumbersome,” says Crawford, it hasn’t slowed her down. “I go everywhere—especially if it involves shopping.” ■

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