Major Progress in Health Through Technology

From VOA Learning English, this is SCIENCE IN THE NEWS in Special English. I’m Bob Doughty.

And I’m Faith Lapidus. Today, we tell about a woman who can use signals from her brain to move a robotic arm. We tell about efforts to develop an experimental gene treatment for patients with heart disease. And we explain how American computers are helping medical workers in Zimbabwe study the condition of their patients.

A woman paralyzed from the neck down has learned to use her thoughts to control a specially-designed motorized arm. The arm is the product of years of research on mind-controlled artificial limbs.

Researchers in the American state of Pennsylvania say the motorized arm is the most advanced mind-controlled prosthetic, or replacement limb ever made. They created the device to help return some muscle control to Jan Scheuermann. She is suffering from a degenerative neuromuscular disease that paralyzed her from the neck down. She has no control of her arms and legs.

The motorized right arm has a five-fingered, fully-jointed hand. It enables Ms. Scheuermann to pick up and hold objects, and feed herself.

Neurobiologist Andrew Schwartz led the University of Pittsburgh research team that developed the prosthetic arm. He says researchers placed about 200 electrodes in the woman’s left cerebral cortex. The left cerebral cortex is the part of the brain that people use to move their right arm.

Dr. Schwartz says the electrodes recorded what the woman’s brain cells were doing when she thought about moving the arm.

“And that was enough information that we could then decode from those recordings, what the intention of the subject was, the way she wanted to move her arm and her wrist and close her hand. We could decode the information from those neurons to allow us to do that.”
Jan Scheuermann took part in a 13-week-long program to teach her brain to move the arm. But she did not need that much time. She was able to use her mind to move the robotic arm after just two weeks of training.

She reportedly told researchers that she planned to use the arm to feed herself some chocolate. When she was able to do that, it made the research team very happy.

Andrew Schwartz says his team plans to build another artificial arm, so people like Ms. Scheuermann can hold and move objects using two hands.

“And really the satisfying part is that we’re not just making a machine move, we’re actually recreating natural humanoid movements. So we’re capturing all the beauty and grace and skill of a real movement, and allowing these subjects to basically return to a certain amount of function that they used to have.”

The researchers would like to create a wireless system that helps the brain communicate with the robotic limbs. The brain’s signals would be changed into messages that computers can understand. People could then use the arms or legs in their homes without wires or help from scientists.

A report describing the prosthetic arm was published in the journal The Lancet.

A patient with an arrhythmia, or irregular heartbeat, might one day be able to have a normal heartbeat with the injection of a single gene. The experimental gene would help to create a natural heart pacemaker. This would end the need for placing an electronic device in a person’s chest to control the heartbeat.

Researchers in California created what they are calling “biological pacemaker cells” by adding a single gene to a virus. They then injected the engineered virus into the hearts of guinea pigs. The animals had been bred to suffer from arrhythmia.

The gene caused the creation of an exact copy of the sino-atrial node in the heart’s upper right chamber. Other studies have shown that this node helps to keep the heart beating normally. The gene changed heart muscle cells -- called cardiomyocytes -- into natural pacemaker cells.
Eduardo Marban is director of the Cedars-Sinai Health Institute in Los Angeles. He says the node, called S-A-N, makes up just 10,000 cells among the ten billion heart muscle cells. He says the tissue made by the inserted gene looks almost like the structure it replaces.

“If we were to give scientists who are specialized in this area the data to look at it then compare it to a genuine pacemaker cell -- which, as I said, are exceedingly rare -- to the ones we created by putting a gene into an ordinary heart cell, it’d be, they’d be hard-pressed to tell the difference.”

Dr. Marban estimates that five to six billion dollars is spent each year worldwide on electronic pacemakers for millions of patients. But these man-made pacemakers can cause life-threatening infections. And every five to seven years, the batteries that supply power must be changed. This requires another operation.

Dr. Marban says the devices are not right for all patients. And others are too sick to use them. He says researchers plan to put the experimental gene in very sick patients in about two years. They want to prove the gene is both safe and effective.

“Basically, what we are going to look for are patients who already have an electronic pacemaker, who develop a severe infection and need to have the electronic pacemaker taken away. And then, during the time the patients are free of an electronic pacemaker, they, their hearts need to be sustained by some means, and we hope that we would be able to create this biological pacemaker to keep the heart going between treatments.”

A report on the natural cardiac pacemaker was published in the journal Nature Biotechnology.

Finally, the United States has launched a program to help improve Zimbabwe’s health information management system. The program is meant to strengthen investigation and reporting of disease outbreaks and epidemics.

You are listening to a group of health workers. They include doctors and medical aides from Manicaland, an area in eastern Zimbabwe. They were happy because America’s Centers for Disease Control and Prevention had donated laptop computers and other equipment. The computers will be used to store information about patients they treat in the area.
The donation is part of a $2.1 million gift from PEPFAR -- the President’s Emergency Plan for AIDS Relief -- to strengthen Zimbabwe’s health management system.

Paula Morgan is the deputy director of the CDC in Zimbabwe.

“Health wise across the board, particularly around disease detection and surveillance, it’s important to us to capture all of them, but because we do work with the PEPFAR program, we do concentrate on the HIV and AIDS epidemic.”

One of the biggest problems facing Zimbabwe is the HIV/AIDS epidemic. The human immunodeficiency virus, also known as HIV, is the cause of the disease AIDS. The United Nations says new HIV infection rates have dropped by 50 percent in Zimbabwe. But there are still 1.2 million people infected with the virus.

The government in Zimbabwe has little money for health care programs. As a result, the country has failed to meet the targets of what health officials have called the “Abuja Declarations.” Under those goals, African governments are required to spend 15 percent of their budgets on health-related issues.

Ponesai Nyika is a director of the Zimbabwe Ministry of Health.

“This donation is really, really important. It came at a time when we really need it, because what has been happening is at the local clinic they’re using hard copies, which is a paper-based system. They record their patients in registers and tally sheets, where they just tally against the patient’s age, name and the diagnosis, the treatment that they have been given.”

Ponesai Nyika says all of that work is now done with the CDC’s donation of computers to Zimbabwe.

PEPFAR is paying a non-profit group, Research Triangle International, to give two weeks of training to health workers in Zimbabwe. Henry Chidawanyika works for the group. He says Zimbabwe needs the help.
“It is very weak in terms of the ability to deliver, mostly because we don’t have enough personnel on the ground, we don’t have enough equipment, issues of infrastructure, power, connectivity. Health information is a cornerstone of a delivery of a health system, because if you don’t know where you are, then you don’t know where to go.”

Health care workers in Zimbabwe must deal with many diseases and epidemics. A working, dependable health information system will enable them to gather information about groups like pregnant women living with HIV. Medical workers can use that information to help such women receive antiretroviral therapy and treatment for tuberculosis.