Eyes, hearts, bionic spines—partners in new health technologies

Across America lives have been improved by Australian inventions—the cervical cancer vaccine, the bionic eye, gum that repairs tooth decay. What’s next?

Extended wear contact lenses for healthier eyes

Some 30 million Americans use contact lenses. Today they can wear a single pair for up to 30 consecutive days and nights, safely and comfortably thanks to the work of CIBA Vision and CSIRO, Australia’s national science agency.

Contact lenses were once rigid and had to be taken out every night. In 1991, a team of researchers from CSIRO, the University of New South Wales, and the Vision Cooperative Research Centre joined forces with CIBA Vision in the US, and Novartis in Switzerland, to create a better contact lens.

To be successful, the new lens needed to allow the continuous flow of oxygen and ions through the contact lens to keep the eye healthy, be at least as comfortable as current contact lenses, to move over the eye sufficiently, and be biologically compatible with the eye itself.

The CSIRO leg of the team, led by Dr Gordon Meijs and Dr Hans Griesser, developed a new silicone hydrogel called Lotrafilcon A, which fit all these requirements.

In 2001, CIBA Vision’s Focus Night & Day™ extended wear contact lenses were approved by the US Food and Drug Administration (FDA) for safe continuous use for 30 days. It was the first of a series of products that brought CIBA Vision a 30 per cent share of the contact lens market, improving vision, comfort, and eye health across America.

A new heart

Soon, patients with heart failure in the US who don’t have a donor heart lined up could have the option of a new heart.

In 2015 a team at the Texas Medical Center gave a sheep a new heart. Within six hours of the operation it was on its feet and eating. The heart was the invention of a Brisbane researcher, Dr Daniel Timms.

The BiVACOR artificial heart weighs half a kilo, and is small enough for a child while also being powerful enough for an adult. It’s made up of a titanium outer shell with a small spinning disk inside that levitates within a magnetic field, propelling blood through the device and around the body like a fan—it doesn’t create a pulse like a normal heart does. And because the disk is levitating and not touching any other part of the device, it shouldn’t wear out.

More than 300,000 Australians and 5.7 million Americans are affected by heart failure, but there are only 4,000 donor hearts available each year, worldwide. And by 2030, numbers are predicted to increase a further 25 per cent.

“The BiVACOR device could act as an alternative to heart transplant,” says Daniel. “You could pull it off a shelf and implant it into a patient without having to wait.”

Daniel dreamed up the idea of an artificial heart as a 23-year-old, and went on to develop and create the technology at the Queensland University of Technology. He has since started up the US company BiVACOR to continue his work, headquartered at the Texas Medical Center.

Also...

Better ways to treat obstructive sleep apnoea are being developed through a Monash University/Harvard University collaboration.

Finding a cure for HIV—a pan-Pacific effort is being supported by the US National Institutes of Health, with the universities of Melbourne and Sydney, and four US partners.

Moving with the power of thought—a bionic spine is being developed by a University of Melbourne team with the support of US Defense Advanced Research Projects Agency (DARPA) and other US defence agencies and navy organisations.

Teaching computers to assess medical images—technology developed by American company Enlitic Deep Learning Services and Australian company Capitol Radiology.

Read about these, and other Australia-US partnerships in energy, food, mining, cyber security, advanced manufacturing, and more at www.usa.embassy.gov.au

Australian Government
Texas Medical Center is trialling BiVACOR, an artificial heart developed in Brisbane.