

BiVACOR bionic heart in development in Texas

March 14 2015, by Nancy Owano



(Medical Xpress)—A bionic heart is under development in Houston, Texas, which has been steadily generating interest over the past several years. According to Dylan Baddour in the *Houston Chronicle* on Thursday, researchers said this could be the first feasible commercial replacement for the [human](#) heart (short lifespan of past attempted bionic hearts have limited their usefulness, said Baddour—the constant grind of moving parts will wear down a manufactured heart). The invention's roots are attributed to Daniel Timms, who is the founder of BiVACOR. Timms, a biomedical engineer from [Australia](#), instigated the project in 2001 while studying at the Queensland University of Technology.

It was further developed with William Cohn, a surgeon at the Institute. They are both working on the BiVACOR bionic [heart](#) under

development at the Texas Heart Institute. Any discussion on sites describing this work highlights the absence of wear and tear as a key feature. According to the *Brisbane Times*, Timms said the BiVACOR device could last 10 years longer than previous artificial heart designs because of a lack of wear and tear on parts. That marks a shift from earlier pulse-style devices only lasting for several years.

This small and lightweight machine uses a magnetic field, spinning disc and centrifugal force to pump blood. In an interview last year in *TMC News*, Dr. Cohn touched on a history of artificial-heart efforts in medical science. "The [development](#) of a practical permanent [artificial heart](#) has remained an elusive goal despite six decades of effort and the expenditure of tremendous resources," he stated. He said previous efforts to date had leveraged a pair of volume displacement pumps using flexible diaphragms with paired inlet and outlet valves and some kind of internal actuation mechanism. "Generally artificial hearts of this design beat about 80 times each minute, which translates to 115,000 beats each day and 42 million beats each year. No man-made device has ever been able to demonstrate this type of endurance for more than a year or so."

He said the later iteration, developed by Timms and his team "in our lab as a continuation of the work conducted by Frazier and me over the last nine years," uses a single magnetically [suspended](#) double-sided rotor to provide flow to the body and lungs— no bearings or other areas of mechanical contact. Dr. Cohn said it was "capable of providing over three times the normal cardiac output, has only one moving part, is smaller than a normal heart and autonomously balances the systemic and pulmonary output over 20 times each second."

The BiVACOR site said the BiVACOR company's world headquarters is in Houston with an international office in Brisbane. Timms, the founder of BiVACOR, is the CEO. Dr. Cohn is the chief medical officer. The BiVACOR site described the system this way:

"The BiVACOR system comprises a magnetically levitated rotor located between opposing pump casings. The key feature that enables this device to support both the left and right sides of the heart is the left and right impeller blades, which are mounted on either side of the rotating hub. The hub is levitated and rotated via an electromagnetic motor and bearing arrangement on top of the pump casings. The dedicated hydraulic design of the impellers, combined with state-of-the-art magnetic levitation (MAGLEV) technology, permits control of the circulation to be fine-tuned by means of a differential fluid output. An external controller and batteries provide power to the internal device via a percutaneous driveline."

Sheep represent the chest [size](#) of women and children, said Dr. Cohn in a report from the Australian Broadcasting Corporation. The *Brisbane Times* reported that in January, a surgical team from Australia and the U.S. removed a sheep's heart and replaced it with the BiVACOR device. "Now it's a matter of making it robust and reliable so that it works in a patient," Timms said in the report. "Proving the concept was the first real hurdle. There are many to go from here but we're confident we have the collaborative team to take it to that next [level](#)."

More information: www.bivacor.com/

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