EPFL-TTO

EPFL Innovation Park J
CH-1015 Lausanne
Switzerland
+41 21 693 70 23
http://tto.epfl.ch/

Research Contact

Prof. Yves Perriard
+41 21 695 43 10
yves.perriard@epfl.ch

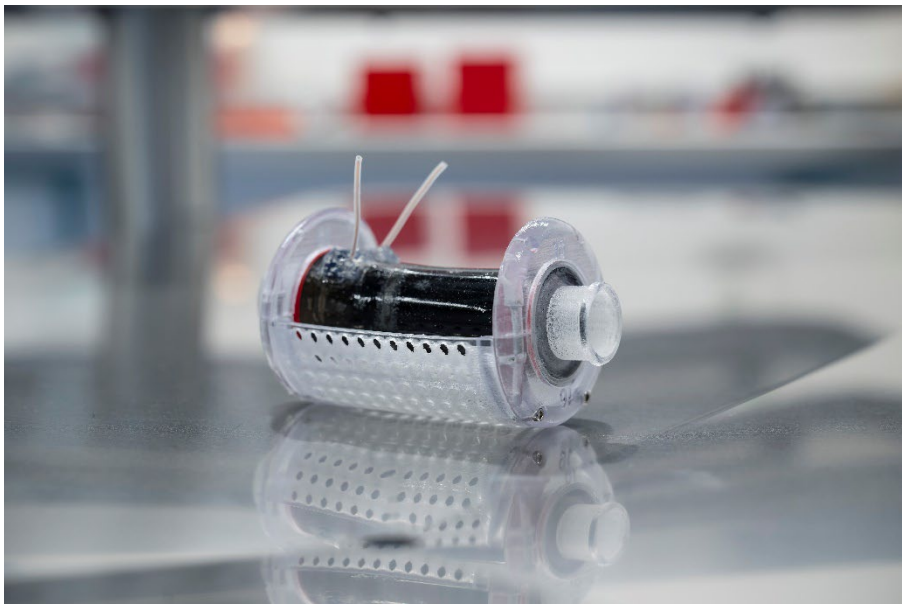
TTO Contact

Ghislain Singla
+41 21 693 54 77
ghislain.singla@epfl.ch

Licensing Opportunity

TTO – Technology Transfer Office

Soft Cardiac Assist Device



Manufactured DEA based augmented aorta implanted in pig.

Ref. Nr

6.2098

Keywords

Dielectric elastomer actuator, cardiac assist device

Intellectual Property

PCT/IB2021/052895

Publications

A novel soft cardiac assist device based on a dielectric elastomer augmented aorta: An in vivo study, Bioengineering & Translational Medicine, 2022-08-22. p. 1-15, e10396.
10.1002/btm2.10396

Date

04/01/2023

Description

Congestive heart failure (CHF) is a progressive and debilitating condition affecting a substantial proportion of the elderly population. While drugs are used to improve heart function and relieve symptoms, they usually fail to restore cardiac function in the long term. Heart transplantation is the gold standard for patients with severely impaired left ventricular dysfunction who cannot be treated otherwise. Due to the lack of donor organs, however, cardiac assist devices for permanent hemodynamic support remain an unmet clinical need. A safe and fully implantable system, capable of restoring cardiac function and thus eliminating the need for heart transplantation, should be used to achieve this objective.

Advantages

We propose the first dielectric-elastomer augmented aorta (DEAA). This DEAA consists of a tubular DEA with an electrically driven compliance. It is designed to assist the pulsatile nature of the heart by means of an innovative aortic counter-pulsation approach. The possibility of an electrically driven counterpulsation device paves the way for a fully implanted device (not possible for current pneumatically driven aortic counterpulsation devices) and for a high-level cardiac assistance.
We successfully implanted the DEA augmented aorta in an acute in vivo porcine model. When activated the DEA increases its internal diameter and thereby creates a decompression wave decreasing the aortic pressure. When deactivated, it returns to its passive state creating a compression wave increasing the aortic pressure.
Main problems encountered with other cardiac devices are removed by augmenting the natural role of the aorta deformation in order to support the heart.

Applications

- Heart failure
- Congenital heart malformation