

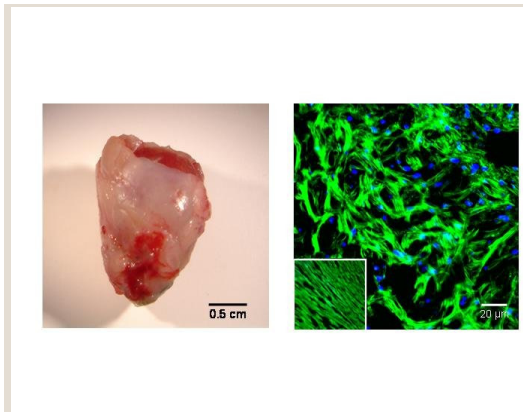
BioVAD - a Biological Ventricular Assist Device

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Challenge

Cardiac dilation is a common clinical phenomenon observed in several cardiac diseases, such as post-myocardial infarction and heart failure. In an early stage of cardiac dilation, the organ enlargement may be restricted to only a portion of the heart, such as the left ventricle. In an advanced stage, the complete heart may be



The morphology of the pouch-like tissue construct after implantation into Wistar rats: On the left panel, the pouch-like tissue construct is shown on a rat heart explanted after two weeks. On the right panel, the surviving of cardiac myocytes after two weeks is shown as controlled by confocal laser scanning analyses using DAPI/Actin.

enlarged. With each type of cardiac dilation, serious problems are associated which may include arrhythmias, leakage of the cardiac valves, and contractile failure. Cardiac dilation is a common reason for subjecting a patient to heart transplantation.

Drugs are employed for treating these problems, but rarely achieve a reversal of the disease process. Tissue engineering aims at generating functional three-dimensional tissues that can be tailored in size, shape and function according to the respective needs before implanting them into the body.

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Technology

The generation of engineered tissue is technically challenging, since the size of the constructs appears to be limited by the maximum diffusion distances for nutrients and oxygen. Therefore, it was not possible so far to construct larger three-dimensional tissue constructs which are suitable to be used for stabilizing a mammalian heart suffering from cardiac dilation. Here, we provide a new technology enabling the generation of pouch-like tissue constructs which can be used to on the one hand restrain a dilating heart and on the other hand offer contractile support.

Commercial Opportunity

The technology is offered for co-development or licensing.

Developmental Status

The BioVAD-technology has been developed in the rat and shall be further advanced to a human model. The latter requires the use of human pluripotent stem cell-derived myocytes. Proof-of-principle for the use of human embryonic stem cells is already available. We do not foresee major obstacles in commercializing our product.

Patent Situation

Trade mark "BioVAD", A priority establishing European patent application was filed in 2006, PCT was filed in 2007.

Further Reading

Yildirim Y, Naito H, Didié M, Karikkineth BC, Biermann D, Eschenhagen T, Zimmermann WH; Development of a biological ventricular assist device: preliminary data from a small animal model; (2007) *Circulation*;116(11 Suppl):I16-23.