JOTEC – artificial blood vessel specialist

JOTEC GmbH, a medical device company based in Hechingen, has a broad range of solutions on offer for the therapy of vascular diseases, including artificial blood vessels and stentgrafts and is an international leader in this field. The company not only produces traditional vascular grafts from high-quality plastics, but also absorbable bioartificial vascular grafts and cell-coated grafts made from biomaterials. Such an approach is currently unique in this sector of the industry.

JOTEC GmbH was founded by medical device pioneer Lars Sunnanväder in the year 2000. The company develops, produces and sells a broad range of innovative solutions for the treatment of vascular diseases, including aortic stents, small-lumen vascular grafts for the extremities and coronary vessels.

In the development of their ‘high-tech vessels’, the company has its own R&D department; it also cooperates with an effective competence network as well as research institutions and universities in the region. The partners optimise plastics for a broad range of applications and surgical techniques and investigate
future alternatives in the field of tissue engineering: a bioartificial vascular graft consisting of the patient's own cells and a specifically developed protein matrix.

Vascular grafts made from high-quality plastics

There are a number of products with which the company currently achieves high sales revenues: artificial vessels made from expanded polytetrafluoroethylene (ePTFE) or polyester; minimally invasive stents and the E-vita stentgraft product family that consists of a woven polyester part mounted on a flexible, cylinder-shaped Nitinol (nickel titanium alloy) scaffold. Vascular surgeons can use such small wire meshes to open up closed veins. The E-vita stentgraft product family includes E-vita thoracic stentgrafts for the minimally invasive treatment of thoracic aorta diseases, E-vita open plus for open heart surgery and E-vita abdominal for the treatment of abdominal aortic aneurysms. All three systems are equipped with the patented “Squeeze-to-Release®” mechanism, allowing a controlled release and precise positioning of the stentgraft by gradually moving a lever up and down.

Heparin coating imitates natural blood vessel environment
The ePTFE vascular grafts are mainly used for applications in the peripheral circulatory system and can be coated with heparin should this be required. Biologically active heparin is bound to the lumen surface of the prostheses, thereby imitating the coagulatory effect of heparan sulphate which is present in natural blood vessels. The use of heparin thus reduces the risk of a blood clot closing up the blood vessels. Experience has shown that problems tend to occur mainly in small-lumen vascular grafts used for the lower leg when the stents are not coated with antithrombotic heparan sulphate.

Plastic grafts don’t have all the answers
Plastic grafts still have their limitations despite intensive work put into their development. For this reason, JOTEC is developing absorbable biomaterials based on collagen: a bioartificial vascular graft in which the lumen of the vessels is coated with the patient’s own cells so that the implants replicate their natural models as closely as possible.

The future belongs to bioartificial vascular grafts
The innovative, bioartificial vascular graft produced by Jotec was originally developed in a regenerative medicine product funded by the German Federal Ministry of Education and Research (BMBF). The JOTEC scientists created a collagen matrix with pores the size of which can be controlled, enabling the patient’s own cells to enter the matrix and establish contact with the endothelial cells located in the inner wall of the vessel. After implantation, the collagen is, over time, absorbed by the organism and replaced by its own material. However, it will still take some time before patients are able to benefit from this type of treatment. “For us at JOTEC it is a project with a high potential for the future; but some questions still have to be answered,” said Dr. Kerstin Ragnitz, Head of Marketing at JOTEC GmbH. “The current state of development is a matrix that can be seeded with cells; we have also started the first animal experiments. Other questions that still remain to be solved are those related to logistics. Since the graft involves the patient’s own cells, the final product is not an off-the-shelf product and thus cannot just be shipped whenever it is required.” Nevertheless, the company believes that it will be able to put bioartificial vascular grafts on the market within the next few years.