

13th International Conference on

Tissue Engineering & Regenerative Medicine

July 12-13, 2018 Paris, France

Development of a vascularized scaffold from spinach leaves

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One of the major obstacles in growing replacement tissue is the inability to deliver oxygen, nutrients, and essential molecules required for cells to survive. To overcome this limitation, we have developed an unconventional approach that involves crossing the plant and animal biological kingdoms. The veins in spinach leaves are remarkably similar to the veins and arteries in human hearts. By removing the plant cells using a technique developed for mammalian organs and tissues, a cellulose structure with a branching network of vessels that can distribute fluid is left behind. The spinach veins remain patent after this process and allow the passage of microsphere approximately the same size as red blood cells. This scaffold supports human cell attachment, including contracting human heart muscle cells. The crossing of biological kingdoms may allow for new biomaterials with multiple applications in tissue engineering.

Biography

Glenn R Gaudette is the Professor of Biomedical Engineering at Worcester Polytechnic Institute. He received his PhD in Biomedical Engineering from SUNY Stony Brook University. He has over 75 publications, co-edited a book on Cardiovascular Regeneration, has four issued patents and founded a company based on the technology developed in his laboratory. His research, which is supported by the National Institutes of Health and the National Science Foundation, aims to develop a treatment for the millions of Americans suffering from myocardial infarction and other cardiovascular diseases. He has pioneered the use of plants as scaffold for heart regeneration. His work has been featured throughout the world including the BBC, The Washington Post and Fox National News. His work was named one of the top medical breakthroughs of the year by Boston Magazine and was the 7th most popular stories of 2017 in National Geographic. He also teaches biomedical engineering design and innovation, biomechanics and physiology. He promotes the development of the entrepreneurial mindset in his students through support provided by the Kern Family Foundation. He was named as the 2015 Faculty Member of the Year by the Kern Entrepreneurial Engineering Network. He also participates in multiple faculty governance committees at WPI and enjoys working with WPI students in the classroom, on projects and on research projects.

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