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A green pump

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Can you imagine spinach that you have in your regular salad, being used to develop cells for the heart? Hard to believe, but yes it can. All thanks to the researchers from Worcester Polytechnic Institute, Massachusetts who have converted a spinach leaf into a scaffold to grow tiny beating human heart cells which could, in future, be of medical importance to repair damaged organs. The researchers replaced the plant cells with the human heart cells, thus transforming the leaf veins into a network of active blood vessels. The remaining plant frame was then bathed in live human cells so that the human tissue grew on the scaffolding developed from spinach and grew surrounding the tiny veins. After the mini heart developed, fluids and microbeads were sent through the vasculature to show that blood cells can flow through it. The leaf could help deliver oxygen to the damaged tissue to ensure the regrown tissue does not die after implantation. Moreover, the biocompatible cellulose that remains after the plant cells are washed away can be used for regenerative medicine applications, such as cartilage tissue engineering and bone tissue engineering. Plants like these provide economical and environmental advantages to the biomedical field. This research has particularly provided evidence that something like spinach tissue can act as a scaffold for the construction of delicate body tissues like the heart tissue. Innovative methods such as 3-D printing have already enabled scientists to create large scale human tissues in the lab, however growing the most vital and delicate blood vessels, which are important for tissue health, has been the real challenge. Although the construct developed veins and blood vessels, making it a suitable replacement for the human heart is a challenge. Nevertheless, it shows promise in other medical uses, for example, the cylindrical hollow stem of the jewelweed plant could be used as a graft for an artery, and the vascular bundles of wood from trees could be used in bone engineering, due to their strength and structures. The present area of research of the team is the implantation of the heart tissue made of spinach into patients with damaged hearts, hence restoring the blood flow to the areas of the organ that have been ravaged by disease, trauma or infection. The artificial plant made tissue could be a patch surgically implanted onto a patient’s heart. Additionally, it is not only the spinach leaf that could help repair damaged organs, as any plant having a similar enough structure to a human organ could work as a framework to support a human tissue someday. So far this study has been very promising, hence a lot more further research is required for its successful implementation.

Keywords: Spinach leaves, Heart tissue, Plant scaffold, Tissue engineering

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