

Biomaterial pouch for long-term xenogeneic cell transplantation

Unmet Need

Cell therapy is an exciting therapeutic approach that is growing rapidly - there are more than 1,000 cell therapy clinical trials that are currently active in many different fields like oncology, neurology, hematology, and beyond. Currently, cell therapy approaches mostly focus on using either cells transplanted from a donor or a patient's own cells that have been modified outside the body and then reintroduced. However, with the rapidly growing demand in this space, there are concerns about supply of donor cells and an interest in cultivating cells from other species like pigs to transplant, a process called xenogeneic cell transplantation. Unfortunately, human bodies are particularly adept at rejecting foreign material and overactive immune responses are a major issue in the development of xenogeneic cell transplants. There is a need for ways to improve delivery of xenogeneic cell transplants that reduce rejection by the patient's body.

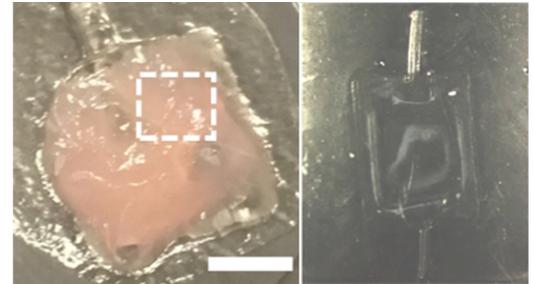
Technology

Duke inventors have developed a delivery method for xenogeneic cell transplantation that reduces rejection by the body. This is intended to be used in during the transplantation of therapeutic cells in the absence of immunosuppression. Specifically, this device is a biomaterial pouch comprised of a semipermeable chitosan membrane with a tunable reservoir and molecularly engineered interface. The chitosan pouch interface is decorated with 1,12-dodecanedioic acid (DDA), limiting the cell adhesion and vigorous foreign body response while maintaining the barrier properties amenable to cell encapsulation. This has been demonstrated by the fact that DDA modified pouch provides long-term protection to encapsulated human primary hepatocytes in the subcutaneous space of immunocompetent mice.

Advantages

- This study shows the longest survival of xenogeneic hepatocytes in an immune competent animal model
- The device supported the encapsulated cells for up to 6 months
- Demonstrated effectiveness with hepatocytes, paving the way for a first-in-class treatment of liver-based

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Duke File (IDF)

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Inventor(s)

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- Ryu, Ji Hyun

Links

- [From the lab of Dr. Shyni Varghese](#)
- [Cell-filled pouch creates temporary "chimeras" to treat disease \(EurekAlert, 2021\)](#)

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diseases

- DDA modification limits cell adhesion, cutting down on fibrosis
- Pouch can be implanted subcutaneously, allowing for minimally invasive surgery and retrieval

Publications

- [Molecularly Tailored Interface for Long-Term Xenogeneic Cell Transplantation \(Advanced Functional Materials, 2021\)](#)