UNIVERSITY OF MINNESOTA
Driven to Discover℠

Novel process to obtain large quantities of primary cells for transplantation

A method to isolate large quantities of high quality primary cells for therapeutic transplantation through freezing and thawing organs, including organs typically considered suboptimal for donation.

Technology No. 2020-057

IP Status: PCT Patent Application Filed; **Application #:** PCT/US2020/013956

Applications

- Isolation of cells for transplantation
- Creation of bioartificial organs
- Recovery of cells for basic research

Key Benefits & Differentiators

- **Isolate large quantities of cells suitable for transplantation:** Vitrification and thawing process minimizes damage to cells, facilitating the recovery of 1010 or more highly-functional cells.
- **Utilizes organs not viable for transplantation:** In animal models, the method has been shown able to recover high-quality cells from livers donated after cardiac death (DCD).
- **Provides time to identify best donor-recipient match:** Vitrified organs can be stored indefinitely, allowing the time to identify the best match, and ship organs over long distances when necessary.

The need for high quality primary cells for transplantation

Cell transplantation is a promising therapeutic technique for the treatment of end-stage liver disease, acute liver failure and some liver-based metabolic disorders. However, there remains a need for an on-demand supply of large numbers of high quality primary human hepatocytes. Current cryopreservation techniques damage cells and fall far short of being able to produce the required quantities of functioning hepatocytes for treatment. Work in John Bischof’s lab at

the University of Minnesota has developed a method to infuse organs with a cryopreservation solution containing magnetic nanoparticles prior to freezing that allows them to be rewarmed usingalternating magnetic fields. The solution and nanoparticles are subsequently washed out and this technique avoids the damage typically caused during the thawing processes and facilitates the recovery of large quantities of functional cells.

Isolate cells from typically wasted organs

Execution of the developed method may be used to recover and produce large numbers (1010 or greater) of functional cells. Of particular importance is that in animal models this technique has been shown capable of isolating high-quality cells even from livers donated after cardiac death (DCD), which are typically considered suboptimal and of little use for donation. Furthermore, since cell isolation happens *after* thawing the organ, the organ can be transported over long distances and extended periods of time, this facilitates identification of an ideal patient match and mitigates rejection risks. This approach can also be optimized for organs other than the liver, including kidney, heart, pancreas and lungs (among other). This method has the capacity to make use of thousands of donated organs that would typically be discarded, saving countless lives through facilitating cell transplants and the creation of bioartificial organs.

Phase of Development

Study in animal models has illustrated the ability to recover large quantities of high-quality hepatocytes from harvested livers, including those recovered after cardiac death that have undergone ischemic warming.

Researchers

John C. Bischof, PhD
Professor, Mechanical Engineering Director, Institute for Engineering in Medicine
External Link (cse.umn.edu)
Erik FInger, MD, PhD
Associate Professor, Dept. of Surgery
External Link (med.umn.edu)
Charles Lee, PhD
University of North Carolina, Charlotte
External Link (mees.uncc.edu)

Desired Partnerships

This technology is now available for:

- License
- Sponsored research
- Co-development

Please contact us to share your business’ needs and learn more.

https://license.umn.edu/product/novel-process-to-obtain-large-quantities-of-primary-cells-for-transplantation