IMPACT PROFILE

Tissue Engineered Small Intestine for Children with Intestinal Failure

Translational Science Benefits Model

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Helping children with intestinal failure live healthier, longer lives by creating a replacement intestine that reduces dependence on lifelong medical treatments and their serious complications.

The Challenge

Intestinal failure is a life-threatening condition in which a child's intestines cannot absorb enough nutrients to support normal growth and health. Many affected children require long-term intravenous nutrition, which can lead to serious complications such as infections, liver disease, and reduced quality of life. This research aims to develop a tissue-engineered small intestine that could help children regain normal intestinal function and reduce their dependence on these intensive treatments.

The Approach

This project aims to develop a tissue-engineered small intestine (TESI) that could one day provide a lasting treatment for children with intestinal failure.

- What makes this work innovative is its focus on restoring not only nutrient absorption but also the muscle structure needed for normal intestinal movement (peristalsis).
- Develop a tubular TESI scaffold designed to mimic the natural structure of the intestine.
- Create a durable intestinal lumen that can support future development of intestinal lining cells needed for nutrient absorption.

The Impact

This research addresses clinical benefits by developing a TESI with organized muscle tissue that may restore normal intestinal function and reduce complications associated with long-term intravenous nutrition. By improving the ability of children with intestinal failure to achieve greater independence from parenteral nutrition, this work has the potential to enhance life expectancy and quality of life while reducing the substantial healthcare costs and long-term societal burden associated with chronic treatment and hospitalization.

RESEARCH HIGHLIGHTS

- The highlight of this research is creating a lab-grown intestinal scaffold that helps muscle cells grow in the correct pattern needed for the intestine to move food normally.
- By solving this key challenge, the project moves scientists closer to developing a functional replacement intestine for children with severe intestinal failure.
- This finding could improve survival, quality of life, and reduce the need for long-term medical treatments and hospitalizations.

Key Benefits



Clinical

Demonstrated the benefit by developing a tissue-engineered intestinal scaffold that guides intestinal muscle cells into the organized structure needed for normal intestinal movement.



Community

Potential to improve life expectancy and quality of life by advancing a treatment that could help children with intestinal failure achieve more normal intestinal function, reducing dependence on long-term intravenous nutrition and lowering the risk of serious complications such as infections, liver disease, and repeated hospitalizations.



Economic

Potential to reduce the societal and financial costs of illness by advancing a treatment that may lessen the need for lifelong intravenous nutrition, frequent hospitalizations, and management of serious complications, ultimately decreasing the substantial healthcare costs associated with intestinal failure.

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