Instrumented Implant Device for Correcting Short Bowel Syndrome

Technology #4019

Background

Short bowel syndrome (SBS) represents a loss of sufficient length of intestine to allow for the absorption of nutrients and fluids to sustain life. The majority of people affected by SBS are infants and children, and mortality rates exceed 30%. Care for each SBS patient is in excess of $200,000 per year, and estimated costs in the United States have exceeded $1 billion annually. Numerous strategies have been used to treat SBS with limited success, including the use of growth hormones to stimulate intestinal function, surgical modification of the organs to increase intestinal length, and organ transplantation. These strategies are not universally effective and each poses unique, significant risks to the patient. Research suggests that placing mechanical tension on organs including bone, lung, and neural tissue is capable of stimulating the tissue to grow. This growth is due to the principle of mechanotransduction, or the translation of mechanical signals into biochemical signals inside cells within the tissue. This principle provides a promising approach to the development of new therapies for SBS.

Technology

Researchers at the University of Michigan have invented a device capable of lengthening the small intestine almost three-fold over a short timeframe. Specifically, they are developing a fully implantable device, optimized for use in children and infants suffering from SBS. The organ lengthening device works by applying measured, controlled distraction forces along the length of the small intestine. The intestinal lengthening produced by the device is actual growth of the organ, as characterized by increased epithelial cell proliferation and crypt depth. Importantly, lengthening of the intestine by the technology preserves the permeability and transport functions of the organ.

Applications and Advantages

Applications

- Treatment of Short Bowel Syndrome (SBS)
- Tissue expansion for other soft tissues (e.g. lung, neuronal tissue)

Advantages

- Device allows for control of rate of tissue growth
- Device can be optimized for multiple patient age groups
Inventors

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