Mechanical Extension Implants for Short Bowel Syndrome

Technology #3213

Background

Short-bowel syndrome (SBS) is a devastating disease associated with mortality rates exceeding 30%. It is a condition where the small intestinal length is far less than required for proper nutrient absorption. The syndrome prevents a self-sustaining absorption of nutrients from the intestine, and supplemental parental nutrition is required. However, several long-term effects due to parental nutrition have been found to be harmful, such as sepsis, liver disease, and bowel bacterial overgrowth. There are a number of treatment procedures proposed to alleviate SBS, such as using growth hormones, surgically modifying the organs to achieve an increase in intestinal length and small bowel transplantation. But many of these treatments have limited effectiveness as well as high failure rate. Therefore, there is a great need for an alternative procedure to treat short bowel syndrome.

Technology

Researchers at the University of Michigan have designed mechanical extension implants that promote linear extension of the gastrointestinal tract, including the esophagus, small intestine and large intestine. This design is based on the principle that mechanical forces can be powerful regulators of tissue growth and regeneration. Through the process of mechanotransduction—the translation of mechanical signals to biochemical ones which affect cell function—the response to the forces results in a cascade of actions including the activation of growth mechanisms. Therefore the implantable bowel extender can be a hydraulic and/or a shape memory alloy actuated device.

Applications and Advantages

Applications

• Treatment for SBS
• Correction of rib and chest wall deformities
• Applying slow traction to the vertebral-bodies so that patients suffering from-scoliosis could be treated in a gradual and-less traumatic fashion than currently performed.

Advantages

• Many current available treatments for SBS have limited effectiveness, unwanted side effects, and high risk of injury of intestinal and low survival rate. This new invention provides an alternative and effective way to treat SBS.
Inventors

Daniel H. Teitelbaum