

Minimally Invasive Iliac Crest Bone Graft Harvesting: A Design and Business Method Overview

Maxim Budyansky, Neil Shah, Haim Gottfried, Peter Truskey, and Shoval Dekel
Johns Hopkins University

A. Jay Khanna, Khaled Kebaish, and Lee Riley Johns
Johns Hopkins Medical Institute

Bone grafts are used commonly in spinal fusion procedures to induce the fusion of adjacent spinal vertebrae. Autologous bone graft (autograft) is taken from the patient's own bone. This bone

graft provides the best fusion rates; however, obtaining the bone graft requires a secondary incision that is time consuming to the surgeon and very painful to the patient. Alternative commercial bone graft solutions exist as well. However, these alternatives produce worse clinical outcomes and greatly increase the cost of health care. We propose a novel medical device for the minimally invasive extraction of autologous bone graft from the iliac crest of a patient. This device will allow physicians to achieve high fusion rates without burdening the hospital with the high costs of alternative products. Here, we overview our current design at a systems level and we demonstrate the market potential for the proposed device and outline a commercialization strategy for bringing this device to market.

Improving the Performance of Implantable Electrostimulation Devices Using Electrically Conducting Polymers

Jeff Hendricks, Sarah Richardson-Burns, and James Arps
Biotectix LLC

There is growing and continued interest in the development of new electrical stimulation and sensing devices for diverse biomedical applications such as cochlear prosthetics, deep brain stimulation, and cardiac rhythm management. Biotectix has developed BT DOT electrode coatings made from novel electrically conducting polymer formulations based on poly(3,4-

ethylenedioxythiophene) commonly known as PEDOT. These coatings enable intimate, long-term electrical and biological connections between implantable electrodes and the target tissue, offering the conductivity and stability of metals with the ease of processing and biological functionality of polymers. In this paper, we compare the in vitro electrical performance of three types of implantable electrostimulation devices: active fixation pacing leads, cochlear electrodes, and spinal cord stimulators with and without the BT DOT coatings. Significant decreases in impedance and polarization were observed along with significant increased charge storage capacity. The results suggest that such coatings may enable future medical device design improvements such as smaller device profiles and extended battery life.